



Planning,
Industry &
Environment



Clarence Valley Council

*NSW DPIE: Sustainable Councils
and Communities*

COMMUNITY ENERGY AND EMISSIONS REDUCTION STRATEGY

July 2021

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Abbreviations

Acronym	Definition
ABARES	Commonwealth Department of Agriculture, Water and the Environment
AC, DC	Alternating & direct current
ACCU	Australian Carbon Credit Unit
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AFOLU	Agriculture, Forestry and Other Land Use
APVI	Australian Photovoltaic Institute
ARENA	Australian Renewable Energy Agency
ATA	Alternative Technology Association
AWA	Australian Wind Alliance
B20, B50	Diesel blends with 20% and 50% biodiesel
BASIC	Basic reporting level under the GPC
BASIC+	Extended reporting level under the GPC
BASIX	Building Sustainability Index
BAU	Business-as-usual
BCA	Building Code of Australia
BEEC	Building Energy Efficiency Certificate
BESS	Battery Energy Storage System
BEV	Battery electric vehicle
BMS	Building Management System
BRC-A	Business Renewables Centre Australia
BZE	Beyond Zero Emissions
C4CE	Coalition for Community Energy
C40	Network of the world's megacities committed to addressing climate change
CASA	Civil Aviation Safety Authority
CCF	Climate Change Fund
CDM	Clean Development Mechanism
CEF	Community Enhancement Funds or Community Energy Fund
CER	Certified Emissions Reductions (offsets)
CFD	Contract for Difference
CFL	Compact fluorescent
CO ₂ -e	Carbon Dioxide Equivalent
COAG	Council of Australian Governments
COP	Coefficient of performance (e.g. refrigeration, heat pumps)
COP21	Conference of the Parties in Paris at which the Paris Agreement was reached
CORE	Community Owned Renewable Energy
CPP	Cities Power Partnership
CPRS	Australia's Carbon Pollution Reduction Scheme
CRC	Cooperative Research Centre
CSF	Climate Solutions Fund
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSP	Community Strategic Plan
DER	Distributed Energy Resources
DOL	Direct On Line
DPIE	NSW Department of Planning, Industry and Environment

E3	Equipment Energy Efficiency program
EER	Energy efficiency ratio
EPA	Environmental Protection Authority
EPC	Energy Performance Contracting
EPC(M)	Engineer, Procure, Construct (Maintain)
ERF	Emissions Reduction Fund
ERP	Estimated Resident Population
ESB	Energy Security Board
ESC	Energy Saving Certificates
ESS	NSW Energy Savings Scheme (to become the Energy Safeguard Scheme)
EUA	Environmental Upgrade Agreement
EV	Electric Vehicle
FIT	Feed-in-tariff
GFC	Global Financial Crisis
GHG	Greenhouse Gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
GPG	Gas Powered Generation
GREP	Government Resource Efficiency Policy (NSW)
H ₂	Hydrogen
HTS	Household Travel Survey
HVAC	Heating, ventilation, and air conditioning
ICE	Internal combustion engine
ICLEI	Local Governments for Sustainability
IP&R	Council’s Integrated Planning and Reporting
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Products and Product Use
ISP2020	AEMO’s Integrated System Plan 2020
K-12	School education from kindergarten to year 12
kWh, MWh, GWh	Units of energy – usually used for electricity
LAHC	Land and Housing Corporation
LED	Light Emitting Diode (lighting technology)
LGC	Large-scale Generation Certificate
LREV	Long-range battery electric vehicles
LGA	Local Government Areas
LPG	Liquefied Petroleum Gas
LSPS	Local Strategic Planning Statement
MJ, GJ	Units of energy – usually used for gas
MREP	Melbourne Renewable Energy Project
MSW	Municipal Solid Waste
NABERS	National Australian Built Environment Rating System
NCC	National Construction Code
NCCH	North Coast Community Housing
NCOS	National Carbon Offset Standard
NDC	Nationally Determined Contributions by countries to meet Paris commitments
NEM	National Electricity Market
NEW	North-East Waste
NFF	National Farmers Federation
NFP	Not For Profit

NGA	National Greenhouse Accounts
NGO	Non-Government Organisation
NRMA	National Roads and Motorists' Association
NSW	New South Wales
O&M	Operation and maintenance
P2P	Peer to Peer trading of renewable energy
PHEV	Plug-in hybrid electric vehicle
PPA (RE)	Power Purchase Agreement for Renewable Energy
PV	Solar photovoltaic technology
RCEF	Regional Community Energy Fund (NSW)
REF	Revolving Energy Fund
RET	Australia's Renewable Energy Target
REZ	Renewable Energy Zone
RMS	NSW Roads and Maritime Services
RMU	Removal Units (offsets)
ROI	Return on Investment
RWMS	NEW's Regional Waste Management Strategy
S1	Scope 1 emissions, from combustion of fuel at your facilities
S2	Scope 2 emissions, caused by consuming electricity
S3	Scope 3 emissions, indirect emissions up- and downstream of your business
SCADA	Supervisory Control and Data Acquisition systems that monitor and control devices
SDGs	Sustainable Development Goals
SRES	Small-scale Renewable Energy Scheme
SREV	Short-range battery electric vehicles
SPS	Sewer Pumping Station
SSROC	Southern Sydney Regional Organisation of Councils
STC	Small-Scale Technology Certificates
STP	Sewerage Treatment Plant
SWMS	Clarence Valley Council's Solid Waste Management Strategy
TAFE	Technical and Further Education
VCS	Verified Carbon Standard
VFD, VSD	Variable Frequency Drive / Speed Drive
VGA	Virtual Generation Agreement
VPPs	Virtual Power Plants
W, kW, MW	Units of power – usually used for electricity
WARR	NSW EPA's Waste Avoidance and Resource Recovery Strategy
WEF	World Economic Forum
WTP	Water Treatment Plant

1 Executive Summary

1.1 Emissions reduction targets and pathways for Clarence Valley

100% Renewables was engaged by the NSW Department of Planning, Industry & Environment: Sustainable Councils and Communities Program to develop a ***Community Energy and Emissions Reduction Strategy for Clarence Valley***.

1.1.1 Council's emissions reduction targets

This strategy development follows the adoption by Clarence Valley Council of ambitious renewable energy and greenhouse gas emissions reduction targets for its operations in 2018, including:

- reducing greenhouse gas emissions (excluding landfill) by 40 per cent by 2030 compared with 2016/17 levels, with the long term goal to reach zero net emissions by 2050, and
- supplying 50 per cent of Council's electricity demand from renewable energy by 2030, with the long term goal to source all electricity from renewable energy.

1.1.2 Recommended community emissions reduction targets

Engagement with the Clarence Valley community indicates that:

- Climate change is an important issue and impacts are being felt by the community now, and
- The community should aim to decarbonise in line with science, and ahead of NSW Government's plans

Given this, the following emissions reduction targets is recommended:

1. Net zero emissions by 2040, with 2030 emissions being reduced by at least 35% compared with 2019 emission levels

This target was modelled with an indicative pathway shown below, based on implementation of emissions reduction across key sources of emissions in the community.

Modelling of abatement scenarios highlights that the decarbonisation of the electricity grid is the most significant and largest change that will occur in the context of achieving net zero emissions by 2040, and that the impact of a transition to electric and potentially hydrogen vehicles will also be important.

However even if the grid decarbonises rapidly, there is still a significant role for households and businesses to act early to significantly reduce their own emissions to align with a science-based pathway towards net zero emissions.

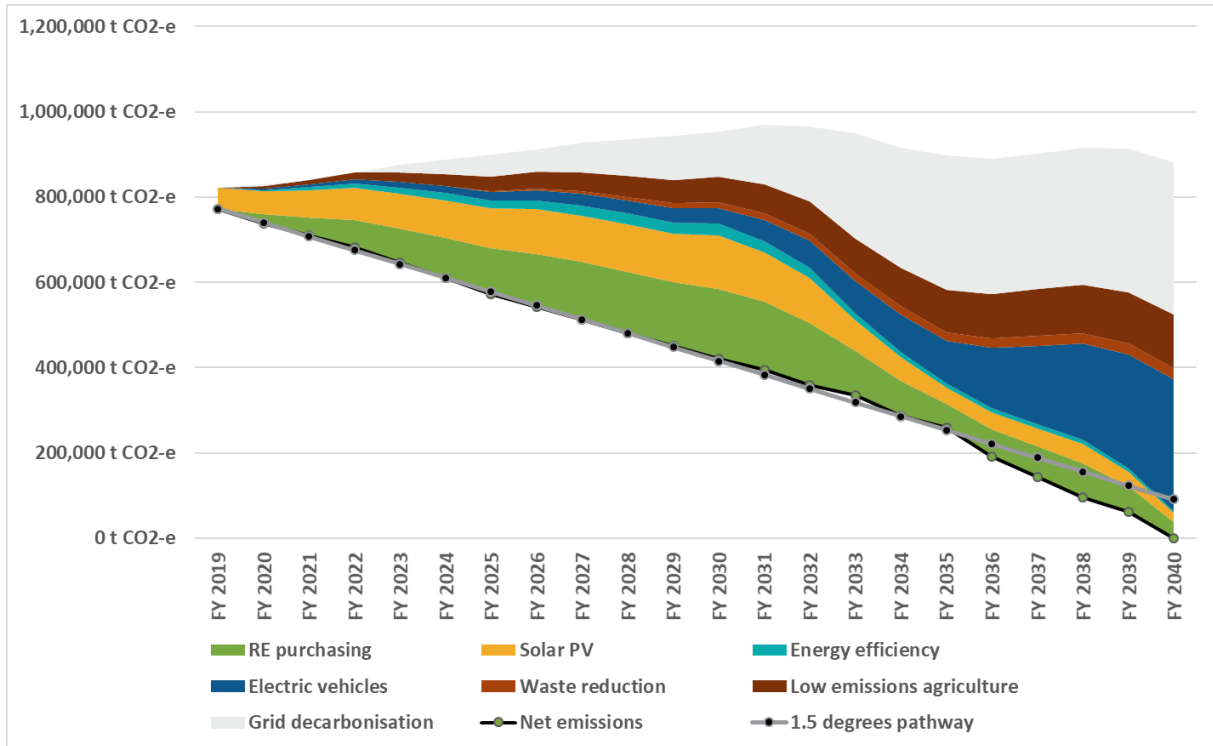


FIGURE 1: 2040 NET ZERO EMISSIONS ALIGNED WITH 1.5C – POSSIBLE PATHWAY FOR CLARENCE VALLEY

1.2 Context for action to reduce greenhouse gas emissions

Council’s leadership and target-setting, and this subsequent strategy to work with the community to help them reduce their emissions, is informed by the global consensus that we all need to act to reduce emissions rapidly to align with the goals of key international agreements and reports, including limiting warming to no more than 1.5°C and reaching net zero emissions by mid-century.

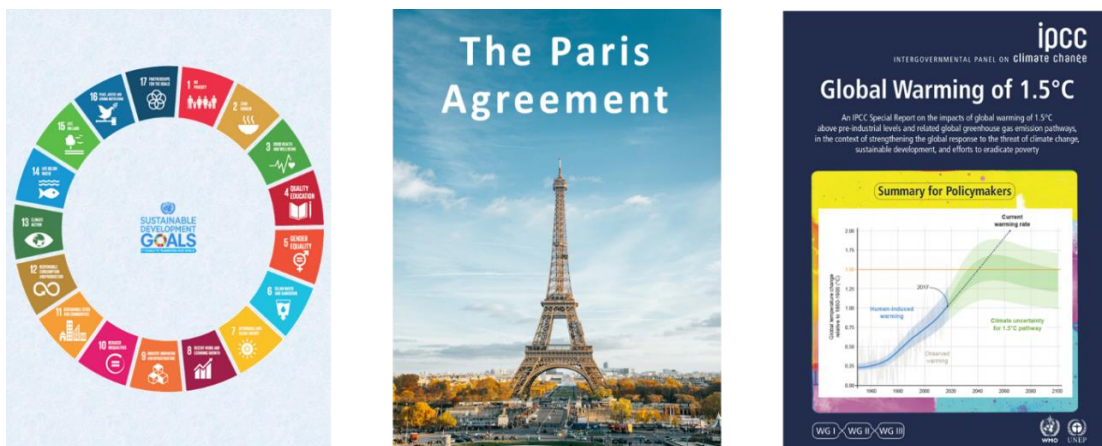


FIGURE 2: GLOBAL CONTEXT FOR ACTION ON CLIMATE

NSW, together with all other States and Territories in Australia, is committed to this goal of reaching net zero emissions by mid-century. In NSW there are two key measures that underpin this target, including:

1. **Net Zero Plan Stage 1: 2020–2030¹**. This is the first of three 10-year plans released that will set a pathway to net zero emissions by 2050.
2. **NSW Electricity Strategy²** which will help the State to deliver on its goal to attract renewable energy investment. On 27th November 2020 the NSW Government passed its *Electricity Infrastructure Investment Act 2020* which will help to drive the transition to renewables in the state in coming years by coordinating investment in new generation, storage and network infrastructure in New South Wales³.

Local communities, along with local councils, have also taken a leading stance in recent years to set and work towards achieving ambitious renewable energy and emissions reduction targets for their communities and operations, as illustrated below.

In addition, local communities have embraced technologies such as solar PV, with over 37% of dwellings in the Clarence Valley Local Government Area making this choice for their home or business. The 9,503 solar installations in the region position Clarence Valley at the upper end of LGAs in terms of the uptake of solar hot water and solar PV systems.



FIGURE 3: RENEWABLE ENERGY & CARBON TARGETS BY NSW COMMUNITIES, SEPTEMBER 2020

¹ © State of New South Wales 2020. Published March 2020

² <https://energy.nsw.gov.au/renewables/renewable-energy-zones>

³ <https://www.parliament.nsw.gov.au/bill/files/3818/XN%20Electricity%20Infrastructure%20Investment%20Bill.pdf>

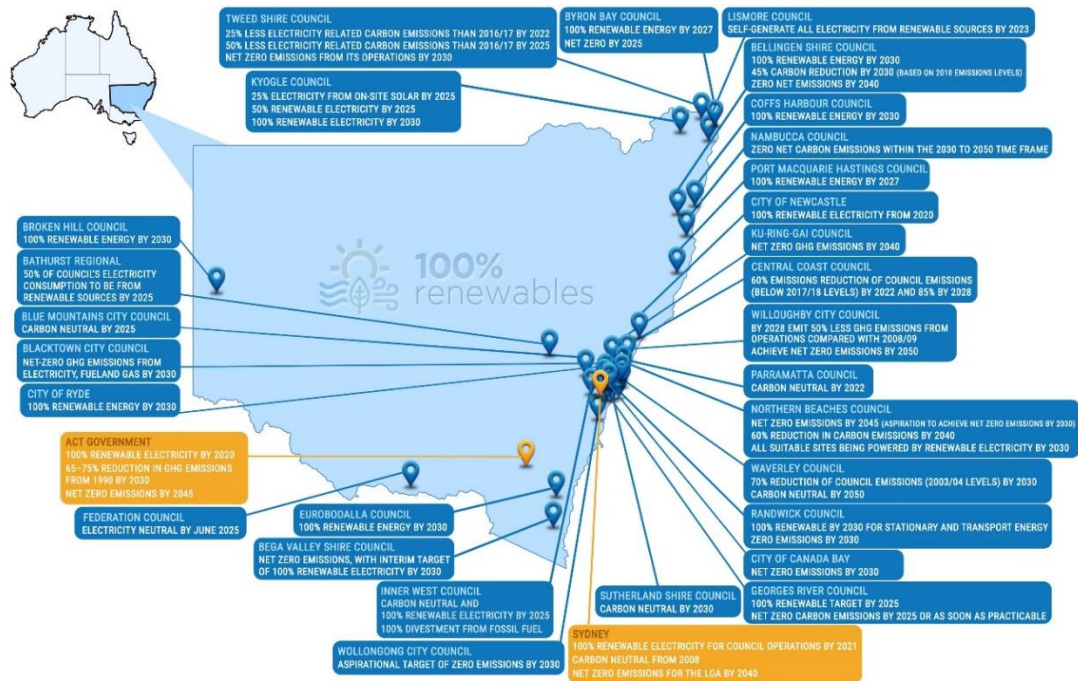


FIGURE 4: RENEWABLE ENERGY & CARBON TARGETS BY NSW COUNCILS & ACT, SEPTEMBER 2020

1.3 Planning and future use of this report

This community energy and emissions reduction strategy calls for action by the whole community in future years to reduce their carbon footprint, contributing its share to a wider emissions reduction task while saving money and creating jobs for the residents and businesses in Clarence Valley. To be effective the recommended action plan and targets for community emissions reduction should be considered and planned alongside other Council and regional strategies. For example:

- Clarence Valley Council Local Strategic Planning Statement (LSPS, April 2020)
- Council’s Integrated Planning and Reporting 2020-21 (IP&R), encompassing the Community Strategic Plan (The Clarence 2027), and informed by NSW State plans and the Far North Coast Regional Strategy
- The NSW Net Zero Plan Stage 1: 2020–2030, and
- The NSW Electricity Strategy which will help the State to attract renewable energy investment into its planned Renewable Energy Zones (REZ), and which is enabled by the Electricity Infrastructure Investment Act 2020

As well as these plans the NSW State Government will develop new plans and programs aligned with its net zero goals in coming years, and these will play an important role in helping Clarence Valley to set interim targets, prioritise and sequence actions over time, so that these targets can be achieved.



FIGURE 5: CLARENCE VALLEY AND NSW GOVERNMENT STRATEGIES INFORMING THE CEERS

1.4 Clarence Valley community profile and emissions







The population of Clarence Valley is forecast to grow at under 1% pa in the next 20 years, with a concurrent increase in the number of total dwellings. There are nearly 25,000 current dwellings in the LGA at present. Transport is largely road-based, with over 60,000 total vehicles, predominantly passenger and other light vehicles.

Industries that are prevalent in the region in terms of employment include Health Care and Social Assistance, followed by the Construction, Retail Trade and Education sectors. Together these sectors employed nearly 50% of all workers in the region. Health Care, Construction and Manufacturing account for around 50% of the region’s economic output. Total employment over the next 20 years is forecast to grow by 500-2,500 jobs.

Agriculture, fishing and forestry are also important industries for the Clarence Valley region. Beef and cattle farming, sugar cane growing and prawn fishing are all significant industries. Some 93% of the region’s 290,000 hectares of forested land is native forest, with 7% plantation forest, mostly hardwood.

A carbon footprint for the Clarence Valley LGA is taken from the Ironbark-BZE Snapshot Report⁴ (BZE), which estimates 2018-19 emissions for Clarence Valley, shown below. It is noted that this is one modelled estimate of emissions in the region, and this can be improved over time, which may help to shape and refine the community’s focus areas and climate response.

TABLE 1: CLARENCE VALLEY LGA CARBON FOOTPRINT 2018-19

	Emission Sources	Ironbark - BZE t CO ₂ -e	%
	Stationary Energy	349,500	45%
	Transport	287,800	37%
	Waste	24,800	3%
	Agriculture	115,500	15%
	Land Use	(4,700)	
	Total	777,600	100%

1.5 Measures available to reduce Clarence Valley’s footprint

Emissions reduction is the responsibility of all levels and sections of the community. Residents, businesses and all levels of government need to act themselves as well as work together if long-term successful outcomes are to be achieved.

Given the areas of emissions and the regional profile, this Community Energy and Emissions Reduction Strategy focuses on nine main areas of action that, implemented together in a sustained way, can significantly reduce emissions. These nine abatement areas are illustrated below.

⁴ Snapshot Report – Clarence Valley 2018/19 <https://snapshotclimate.com.au/locality/australia/new-south-wales/clarence-valley/2018/fy>

GRID DECARBONISATION
As more renewables feed into the grid, carbon emissions for electricity will decline

BUYING CLEAN ENERGY
Buy energy via GreenPower®, carbon neutral electricity or a renewable energy power purchase agreement (PPA)

COMMUNITY AND REGIONAL CLEAN ENERGY GENERATION
Develop and participate in local and regional renewable energy generation projects

BEHIND-THE-METER SOLAR
Onsite generation of electricity with solar panels, which may be used, stored for later use, or exported to the grid

ENERGY EFFICIENCY
Adopt energy efficient technologies and practices to reduce emissions



SUSTAINABLE TRANSPORT
Buy efficient, low and zero emissions vehicles and implement EV infrastructure

WASTE MANAGEMENT
Reduce emissions from waste through lower consumption, less waste and effective resource recovery and treatment

SEQUESTRATION
Sequester carbon by tree planting, protecting forests, and by protection and restoration of wetlands and seagrasses

AGRICULTURE
Increase carbon sequestration and reduce livestock methane emissions

FIGURE 6: NINE CATEGORIES OF EMISSIONS SAVING FOR CLARENCE VALLEY LGA

1.6 Community energy and emissions reduction action plans

Analysis of Clarence Valley community’s greenhouse gas emissions, stakeholder views and opportunities to reduce emissions has shown that there is a strong interest in, and feasible solutions that can see deep cuts to the region’s emissions, whether to achieve net zero emissions by 2050 in line with State Government targets, or by 2040 which is more closely aligned with community aspirations.

Action by all levels of government, business and individuals, as well as collaboration between these groups is important if such cuts to emissions are to be achieved. Different stakeholders will be able to respond in different ways, using the influences they can have. This approach is illustrated below.



FIGURE 7: TEN AREAS OF ACTION FOR KEY STAKEHOLDERS TO HELP THE COMMUNITY REDUCE EMISSIONS

An energy and emissions reduction action plan was developed for the Clarence Valley community, aligned with the potential influences the community stakeholders can have on emissions reduction across all activities and sources of greenhouse gases. An abbreviated summary of the action plan is provided below, with a more detailed plan included in the body of the report.

TABLE 2: CLARENCE VALLEY COMMUNITY ENERGY AND EMISSIONS REDUCTION ACTION PLAN

Action Number	Emissions Reduction Theme	Action Name	Action Description
AE1	All Energy & Emissions Reduction	Set a community emissions reduction target	Set a target for greenhouse gas emissions reduction by the Clarence Valley community, aligned with the aspiration of the community. Consider sub-targets such as goals for solar PV (e.g. 50% of generation potential reached by 2040), battery storage, electric vehicle uptake in the community, low-carbon (regenerative) agriculture, wetlands restoration, etc.
AE2	All Energy & Emissions Reduction	Appoint a community emissions reduction officer	Support and enable community action on climate change by providing tools and resources and recruiting a dedicated climate change community liaison officer in Council, who would look to work with key stakeholders to advance actions in this strategy over time (possible grant funds)
AE3	All Energy & Emissions Reduction	Measure and monitor community emissions	Establish a process to regularly re-assess the emissions of greenhouse gases by the community, and trends in both overall emissions and in bottom-up metrics such as solar and EV uptake (e.g. every three years for community emissions, annually for bottom-up metrics)
AE4	All Energy & Emissions Reduction	Reduce Council’s supply chain emissions through sustainable procurement	Clarence Valley Council can demonstrate how their procurement decisions can impact on the wider emissions reduction task. Sustainable purchasing considers environmental, social, economic as well as governance and their influence on buying decisions. In addition to factors such as value-for-money and buying locally, the carbon emissions associated with products and services Council buys can be impacted when this aspect is taken into account. This could lead to, for example, lower embodied emissions in cement, concrete and other building / road materials that Council buys, and lead to suppliers buying clean energy for their own businesses.
AE5	All Energy & Emissions Reduction	Recognise community leaders in sustainability	Continue awards that recognise excellence in sustainability in the Clarence Valley community, including climate change. For example this could expand on existing “Living Sustainably Awards”.
SE1	Grid de-carbonisation	Advocate for local opportunities in the transition to renewables	As Renewable Energy Zones (REZ) are developed, advocate for the development of feasible local renewable energy generation and storage opportunities and for jobs for Clarence Valley workers in these new generation projects.
SE2	Grid de-carbonisation	Advocate for local opportunities in the transition to renewables	Investigate and advocate for participation in opportunities to co-invest in future large-scale renewable energy generation projects in the region, and to participate in Community Energy Funds (CEFs) for any local projects.
SE3	Grid de-carbonisation	Inform the local community about the transition to renewables	The next 15 years will see an unprecedented change in the way electricity is generated, stored and dispatched in NSW, with Renewable Energy Zones (REZ) becoming the new power stations. Information and education of the community about these changes will help to increase energy literacy, address perceived risks and concerns, and encourage more sustainable actions by the community.
SE4	Buying clean energy	Council to purchase renewable energy for its operations	As part of its regular power purchasing Clarence Valley Council will look to increase renewable energy supply to its operations through a renewable energy Power Purchase Agreement (PPA).

Action Number	Emissions Reduction Theme	Action Name	Action Description
SE5	Buying clean energy	Business and individuals' to purchase renewable energy for their operations and homes	Businesses and residents can elect to purchase some or all of their electricity from renewables, with some large businesses and consortiums having successfully purchased renewables at a saving to regular power prices. Information hubs such as the Business Renewables Centre Australia (BRC-A), information resources such as the <i>DPIE Northern NSW Renewable Energy Blueprint for Local Governments</i> , the GreenPower for Businesses Guide, and the GreenPower website https://www.greenpower.gov.au/ are good resources to help businesses and residents decide to purchase renewable energy.
SE6	Buying clean energy	Establish a group / consortium to purchase renewable energy	Groups that have formed to purchase renewable energy include the Melbourne Renewable Energy Project (MREP) and the Southern Sydney Regional Organisation of Councils (SSROC). Businesses and Council in the Clarence Valley could work together to determine if there is an opportunity to develop a renewable energy PPA where a mutual benefit in terms of cost savings and long term price certainty can be achieved.
SE7	Buying clean energy	Inform the local community about purchasing of renewables	Resources that can help make businesses and residents more aware of their options and opportunities to purchase renewable energy in their electricity supply agreement could be collated and made available via ratepayer and member communication channels.
SE8	Community and regional clean energy generation	Host a community renewable energy project	Individual businesses can consider hosting a renewable energy project on their premises or land, which could be owned by the community for example, or could act as a 'solar garden' that those locked out from installing solar on their premises can purchase shares in to offset their electricity consumption. This could be initiated in collaboration with a community climate action or sustainability group, for example.
SE9	Community and regional clean energy generation	Facilitate and/or host a community renewable energy project	Clarence Valley Council can play a role in community energy projects, either as a host or through the provision of information, space, facilitation or similar services to help projects get established in the community.
SE10	Community and regional clean energy generation	Seek out grant funding opportunities for community renewable energy projects	There may be opportunities to develop community renewable energy projects (e.g. community solar and batteries) with grant funds from Commonwealth, State or other sources (such as the NSW Regional Clean Energy Fund RCEF). Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.
SE11	Behind-the-meter solar	Install solar PV and battery storage systems	Individuals and businesses in Clarence Valley can install solar panels on their facilities to reduce daytime energy use. They can look to carry out activities during the daytime when solar energy is free, and they can expand solar systems and install batteries to meet more of their energy needs, including for electric vehicle charging.
SE12	Behind-the-meter solar	Implement solar PV projects to achieve Council's renewable energy targets	Clarence Valley Council's adopted target for renewables is that these will supply 50% of Council's electricity demand by 2030, with the long term goal to source all electricity from renewable energy. In meeting this target Council will implement all cost-effective solar, battery and micro-hydro opportunities at its facilities.
SE13	Behind-the-meter solar	Implement solar and storage across the region's schools	Implementation of solar on schools (early education + K-12) has the dual benefit of cost & emissions savings for schools, and the education / learning benefit for students. A review of current solar on schools will be accompanied by engagement and collaboration to encourage all schools to implement solar (and storage where feasible).
SE14	Behind-the-meter solar	Develop and deliver information	A range of information resources exist that can help the community take informed decisions to install solar and batteries at their homes and

Action Number	Emissions Reduction Theme	Action Name	Action Description
		resources on solar and batteries	business premises. Resources include information for owners and renters, for buy-outright and solar leasing, for free-standing and multi-unit dwellings, as well as tools to help the community understand the size of their opportunity and the likely costs and benefits to them. As a key stakeholder, Clarence Valley Council can also provide education / training workshops, and could potentially coordinate events such as renewable energy expos that brings reputable suppliers to the community.
SE15	Behind-the-meter solar	Key stakeholder collaboration to inform the community about solar	Council, community and business groups can influence the community to take up their opportunities for solar and battery energy storage through the coordination of information resources and the use of their communication / media channels to ratepayers, members and colleagues.
SE16	Behind-the-meter solar	Review planning controls for residential and commercial buildings	Council's planning processes, documents and controls may be able to encourage and/or incentivise developers to provide for or install solar panels and battery energy storage in new or refurbishment projects (beyond what is required by BASIX as set by NSW Government and Section J of the Building Code of Australia as set by the Commonwealth). Council can advocate / lobby for changes to BASIX and the BCA that would mandate standards that would see higher implementation of solar and battery storage in new design.
SE17	Behind-the-meter solar	Develop solar energy and battery storage solutions for low income and social housing	Energy costs can be disproportionately high relative to income for some segments such as community housing. Collaboration with State Government, Community Housing Providers and other stakeholders can be pursued to ensure that all members of the community are able to participate in solar and battery storage initiatives that help them to lower their energy costs.
SE18	Behind-the-meter solar	Seek out grant funding opportunities for solar and battery storage	There may be opportunities for residents and businesses to access grant funding for solar and battery storage projects from Commonwealth, State or other sources – for e.g. programs to increase battery storage uptake, or to participate in a Virtual Power Plant (VPP) project. Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.
SE19	Energy efficiency	Implement energy efficiency improvements – including changes to practices, retrofits and new works	Individuals and businesses in Clarence Valley can implement energy efficiency in their homes and business operations through better awareness of energy waste, implementation of cost effective retrofits such as insulation, LED lights and VSD controls on motor systems, and investment in energy efficient appliances, air conditioners, heat pump and solar hot water systems, and process technologies for example.
SE20	Energy efficiency	Implement energy efficiency projects to achieve Council's emissions reduction targets	Clarence Valley Council's adopted target for emissions reduction is that these will be at least 40% lower than 2016/17 levels by 2030, not including emissions from landfill. In meeting this target Council will implement all cost-effective energy efficiency opportunities at its facilities.
SE21	Energy efficiency	Develop and deliver information resources on energy efficient technologies and practices	A range of information resources exist that can help the community take informed decisions to improve energy efficiency at their homes and business premises. Resources include information on a range of zero-energy actions and behaviours, energy technologies & appliances, for owners and renters, for base/common areas and tenancies in leased commercial buildings and multi-unit dwellings. As a key stakeholder, Clarence Valley Council can also provide education / training

Action Number	Emissions Reduction Theme	Action Name	Action Description
			workshops, and could potentially coordinate events such as energy expos that brings reputable suppliers to the community.
SE22	Energy efficiency	Key stakeholder collaboration to inform the community about energy efficiency	Council, community and business groups can influence the community to take up their opportunities for energy efficiency through the coordination of information resources and the use of their communication / media channels to ratepayers, members and colleagues.
SE23	Energy efficiency	Review planning controls for residential and commercial buildings	Council's planning processes, documents and controls may be able to encourage and/or incentivise designers and developers to include more passive and energy efficient design and technologies in new or refurbishment projects, beyond code requirements. Council can advocate / lobby for changes to BASIX and the BCA that would mandate standards that would see higher implementation of solar and battery storage in new design
SE24	Energy efficiency	Develop energy efficient solutions for low income and social housing	Energy costs can be disproportionately high relative to income for some segments such as community housing. Collaboration with State Government, Community Housing Providers and other stakeholders can be pursued to ensure that all members of the community are able to participate in energy efficiency initiatives that help them to lower their energy costs.
SE25	Energy efficiency	Seek out grant funding opportunities for energy efficiency	There may be opportunities for residents and businesses to access grant funding for energy efficiency projects from Commonwealth, State or other sources – for e.g. programs to install insulation, upgrade to energy efficient appliances, air conditioners or hot water systems. Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.
TR1	Sustainable transport	Choose hybrid or electric vehicles when purchasing a new car	Numerous hybrid vehicle models are available and cost effective for most road users. As electric vehicles and charging infrastructure become more widely available, accessible and cheaper it will be increasingly cost effective for road users to choose low emission vehicles, and to choose renewable energy supply to power EVs.
TR2	Sustainable transport	Clarence Valley Council to lead-by-doing in their transition to low and zero emissions vehicles	Clarence Valley Council can continue to buy or lease hybrid and electric vehicles in its fleet, and implement EV charging infrastructure at its facilities, through its fleet strategy. Council can update its strategy from time to time, and collaborate with State Government and regional partners and neighbouring councils to progress to a lower emissions fleet.
TR3	Sustainable transport	Engage with key stakeholders to ensure the region is well served by EV charging infrastructure and EV sales and servicing	A smooth transition over the coming decades to electric vehicles (and potentially hydrogen vehicles) needs to ensure that regional factors are fully taken into account, so that factors such as sales, servicing, charging and the like are catered for. Council and other key regional stakeholders will engage with State Government in their planning processes to ensure this outcome.
TR4	Sustainable transport	Develop the region's electric vehicle charging infrastructure	Clarence Valley Council will engage with key stakeholders in Clarence Valley, State Government, motoring associations, business groups, individual businesses (esp where EV charging is an important service to customers and the community) and others to help ensure a coordinated approach to the assessment, planning and implementation of EV infrastructure that adequately supports the uptake of electric vehicles in the region.
TR5	Sustainable transport	Update and implement	Clarence Valley Council developed active transport resources including a Pedestrian Access and Mobility Plan and a Bicycle Plan in 2015. These

Action Number	Emissions Reduction Theme	Action Name	Action Description
		Council's Active Transport Plan for the region	and other plans relevant to promoting active transport within the region will be reviewed and updated, and supporting infrastructure and services developed as part of Council's normal Operational Plan and Delivery Program works. In delivering an updated Plan, Council will seek out grant funding opportunities that can accelerate the improvement of pedestrian access and all modes of active transport.
TR6	Sustainable transport	Review and amend planning controls to facilitate EV charging infrastructure	Review Council's planning controls for residential, multi-residential and commercial building developments to determine what amendments can be made to ensure that charging infrastructure suitable for future electric vehicle charging, is incorporated in new and refurbishment works.
TR7	Sustainable transport	Develop and deliver information resources on hybrid and electric vehicles, and active transport	A range of information resources exist and are emerging that can help the community take informed decisions to purchase hybrid and electric vehicles, install EV charging at their homes and businesses, car pool, and engage in more active modes of transport. As a key stakeholder, Clarence Valley Council can also provide education / training workshops, and could potentially coordinate events that showcase future transport options to the community.
TR8	Sustainable transport	Seek out grant funding opportunities for electric vehicles and EV charging	There may be opportunities for residents and businesses to access grant funding for electric vehicles and EV charging projects from Commonwealth, State or other sources as this transition takes shape in coming years. Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.
WA1	Waste management	Reduce waste generation	Even though Clarence Valley Council has achieved more than 65% diversion of waste from landfill and has improved recycling rates, individual residents and businesses can help to further reduce emissions from waste through their own purchasing, use and disposal actions.
WA2	Waste management	Leading practice in waste collection and management	Clarence Valley Council manages the Grafton Regional Landfill and has successfully reduced greenhouse gas emissions through its bin collection strategy, composting, higher diversion and recycling rates, and through flaring of methane gas from the landfill for several years. Council will continue to lead and look to reduce emissions from waste through its collection and management systems, and will continue to collaborate with other councils, State Government and resource management companies to drive towards lower emissions and circular economy methods.
WA3	Waste management	Implement the Solid Waste Management Strategy 2020-27	The Solid Waste Management Strategy 2020-27 details the direction and actions for Clarence Valley Council to improve waste management outcomes, reduce landfill and increase resource recovery. The strategy notes the confidence that the industry can move towards a more circular and sustainable economy, has a strong focus on resource recovery, has communication and education as a key action area, and notes the 2019 declaration of a climate emergency by Council that can drive more urgent action to mitigate and adapt to a warming climate.
WA4	Waste management	Continue collaboration with North East Waste (NEW)	North East Waste (NEW) is a voluntary regional waste group including the Local Governments of Ballina, Byron, Clarence Valley, Kyogle, Lismore, Richmond Valley and Tweed. The NEW Regional Waste Management Strategy 2013 – 21 aims to achieve more sustainable waste management and better resource recovery in the NE Waste region through a proactive, collaborative approach between Councils, the NSW EPA and communities.

Action Number	Emissions Reduction Theme	Action Name	Action Description
WA5	Waste management	Implement communication and education initiatives from the SWMS and NEW RWMS	Both the Clarence Valley Council solid waste management strategy and the NEW strategy identify communication and education in the community – individuals, businesses, schools, etc – as key initiatives to be delivered in the scope and period of these strategies.
AL1	Agriculture & Forestry (including land use and wetlands)	Implement feasible opportunities for emissions reduction, sequestration and bioenergy	Owners of agri-businesses and land can contribute to both emissions reduction and carbon sequestration through their farming and land management practices (such as fertiliser management, clearing practices, manure management, grazing management, regenerative agriculture, etc), and may be able to develop or participate in trials and projects for managing enteric fermentation emissions and development of bioenergy resources. Farming businesses can also reduce their emissions through energy efficiency and renewables – e.g. as identified in the guide: Transforming Australian Agriculture with Clean Energy, developed by ARENA with NFF.
AL2	Agriculture & Forestry (including land use and wetlands)	Implement Council strategies relevant to carbon sequestration	Council strategies – including Urban Tree Management Strategy, Biodiversity Management Strategy, estuary and coastal management plans and Tree Management policies – recognise the impacts of climate change. Current strategies, and future updates to these strategies and plans, will recognise updated guidance on climate change impacts, include actions to continue to respond to climate risks, include actions that aim to increase the region’s sequestration in land, forests and wetlands, and demonstrate Council’s leadership to the community. Where applicable, any new requirements relating to trees and other vegetation will be reflected in planning controls.
AL3	Agriculture & Forestry (including land use and wetlands)	Work with Government, community and industry stakeholders to promote low carbon outcomes	Council will look to work closely with key stakeholders in relation to land clearing, forestry development and wetlands management & restoration so that NSW State goals for greenhouse gas emissions and sequestration are taken into account.
AL4	Agriculture & Forestry (including land use and wetlands)	Encourage sustainable farming and land management practices	Work with farmers and land owners to encourage sustainable practices which improve soil & water and reduce or sequester carbon. Work with farmers to identify opportunities for low or net zero emissions farming and land management.
AL5	Agriculture & Forestry (including land use and wetlands)	Apply to access financial support or incentives for emissions reduction and sequestration activities	Initiatives such as the Emissions Reduction Fund (ERF) have a range of eligible agriculture and vegetation management measures and can provide a source on income or incentive to reduce and sequester emissions from farming and land management. The NSW Government’s Net Zero Plan 2020-2030 includes a commitment to develop a Primary Industries Productivity and Abatement Program to supports primary producers and landowners to commercialise low emissions technologies and maximise revenue from carbon offset programs.



Background & context

**Factors underpinning
climate action at
global and regional
levels**



2 Global context for climate action and targets

2.1 The need to reach ‘net-zero’ greenhouse gas emissions

Due to all historical and current carbon emissions global temperatures have increased by ~1°C from pre-industrial levels. The main driver of long-term warming is the total cumulative emissions of greenhouse gases over time. As shown by the *Climate Action Tracker*⁵ below, without additional efforts, human-caused carbon dioxide (equivalent) emissions may increase to over 100 billion tonnes annually by 2100, which is double current global emissions. The resulting increase in global temperatures would be up to 4.8°C (as per the IPCC Climate Change 2014 Synthesis Report⁶).

With current policies around the world, global temperatures are projected to rise by up to 3.1°C. To prevent dangerous climate change by limiting global warming, close to 200 of the world’s governments signed the landmark Paris Agreement. This Agreement underpins science-based targets to limit global temperature increase to well below 2°C by 2050. With current pledges, and if all countries achieved their Paris Agreement targets, it would limit warming to 2.4°C. According to the Climate Action Tracker, to limit warming to 1.5°C, carbon emissions must decline sharply in the short-term and reach net-zero by mid-century (refer to the green line / band in the chart).

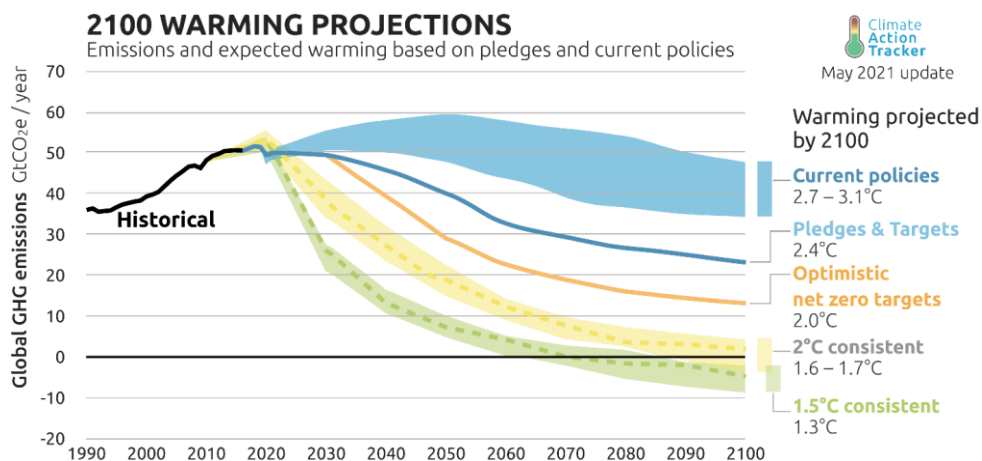


FIGURE 8: THE CLIMATE ACTION TRACKER’S WARMING PROJECTIONS FOR 2100, VARIOUS POLICY SCENARIOS

A net-zero target means that by the target date, there must be no greenhouse gas emissions on a net basis. For a local government area for example, this could require concerted action across all major emissions sources, including:

1. Electricity generation and consumption,
2. Stationary fuels such as natural gas and LPG,
3. Transport demand and reduction in or switching from fuels such as petrol and diesel,
4. Agriculture, including reduced emissions from livestock, and land use including forestry,
5. Industrial process (e.g. cement) and fugitive emissions (e.g. gas production) if applicable, and
6. Waste production, reduction and management, particularly diversion from landfill

⁵ <https://climateactiontracker.org/global/temperatures/>

⁶ [IPCC Climate Change 2014 Synthesis Report](#)

2.2 International drivers for climate action

Internationally, there are three primary drivers for urgent action on climate, additional to the second commitment period of the Kyoto Protocol from 2013 to 2020. These are:

1. Sustainable Development Goals (SDGs)

In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. Governments, businesses and civil society together with the United Nations are mobilising efforts to achieve the Sustainable Development Agenda by 2030⁷. The SDGs came into force on 1 January 2016 and call on action from all countries to end all poverty and promote prosperity while protecting the planet.

2. Paris Agreement

To address climate change, countries adopted the Paris Agreement at the COP21 in Paris on 12 December 2015, referred to above. The Agreement entered into force less than a year later. In the agreement, signatory countries agreed to work to limit global temperature rise to well below 2°C, and given the grave risks, to strive for 1.5°C Celsius⁸.

3. Special IPCC report on 1.5°C warming (SR15)

In October 2018 in Korea, governments approved the wording of a special report on limiting global warming to 1.5°C. The report indicates that achieving this would require rapid, far-reaching and unprecedented changes in all aspects of society. With clear benefits to people and natural ecosystems, limiting global warming to 1.5°C compared to 2°C could go hand in hand with ensuring a more sustainable and equitable society⁹.



FIGURE 9: GLOBAL CONTEXT FOR ACTION ON CLIMATE

⁷ Sourced from <https://www.un.org/sustainabledevelopment/development-agenda/>

⁸ Sourced from <https://www.un.org/sustainabledevelopment/climatechange/>

⁹ Sourced from https://www.ipcc.ch/news_and_events/pr_181008_P48_spm.shtml

In addition, the World Economic Forum’s Global Risks Report 2021¹⁰ highlights adverse climate change-related outcomes as among the most likely to occur with the highest impacts to the global economy. The chart below from the WEF’s report shows several key climate risks clustered in the top right corner; that is, these risks are assessed to be among the most likely to eventuate, with the greatest economic impact among all the global risks that were assessed.



FIGURE 10: GLOBAL RISKS REPORT 2021 – LIKELIHOOD AND IMPACT OF CLIMATE, OTHER RISKS TO GLOBAL ECONOMY

¹⁰ <https://www.weforum.org/reports/the-global-risks-report-2021>

3 National and State Government action

3.1 National targets

At a national level, Australia’s response to the Paris Agreement has been to set a goal for greenhouse gas (GHG) emissions of 5% below 2000 levels by 2020 and GHG emissions of 26% to 28% below 2005 levels by 2030. A major policy that currently underpins this is the Renewable Energy Target (RET). This commits Australia to source 20% of its electricity from renewable energy sources by 2020.



FIGURE 11: AUSTRALIA’S RENEWABLE ENERGY AND CARBON GOALS – NATIONAL LEVEL

According to the Clean Energy Regulator¹¹, the Renewable Energy target has been met and renewable energy generation will exceed the target by some 7,000 GWh in the short term.

The RET is the main successful policy underpinning Australia’s climate mitigation efforts. Other key initiatives include the Climate Solutions Fund, formerly the Emissions Reduction Fund, which sources abatement from eligible activities in the economy via periodic auction processes. Despite these initiatives, Australia’s GHG emissions remained relatively steady over the period 2015 to 2020, with a sharp dip in emissions observed throughout calendar year 2020 due to Covid-19.

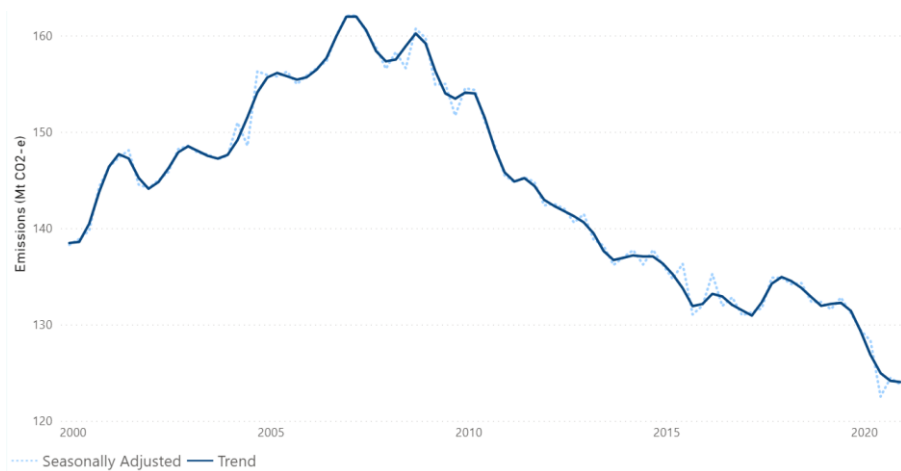


FIGURE 12: AUSTRALIA’S QUARTERLY GHG EMISSIONS FROM ALL SOURCES¹²

¹¹ March 2018, Australian Government – Clean Energy Regulator. 2018 Annual Statement to the Parliament on the progress towards the 2020 Large-scale Renewable Energy Target.

¹² <https://www.industry.gov.au/data-and-publications/national-greenhouse-gas-inventory-quarterly-update-december-2020#quarterly-emissions-data>

3.2 NSW State targets

At a sub-national level, most states and territories have established emissions targets as well as some legislated targets for renewable energy, as seen below.

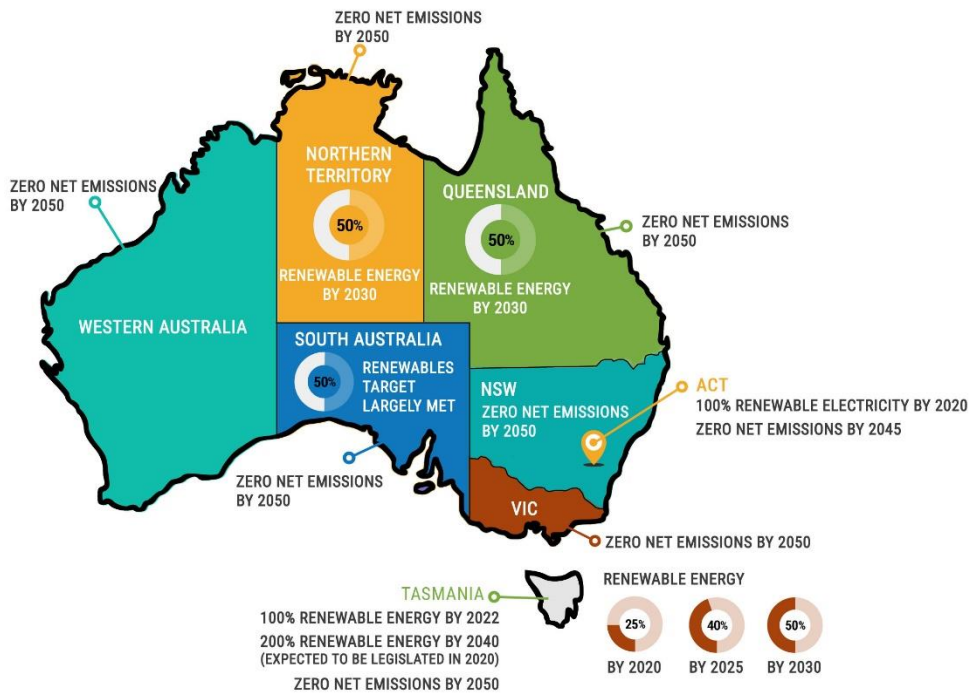


FIGURE 13: AUSTRALIA’S RENEWABLE ENERGY AND CARBON GOALS – STATE & TERRITORY LEVEL

Supporting the State’s commitment to reach net zero emissions by 2050, NSW Government recently released its **Net Zero Plan Stage 1: 2020–2030**¹³. This is a big milestone that sees the first of three 10-year plans released that will set a pathway to net zero emissions by 2050.

In addition the NSW Government has developed an **NSW Electricity Strategy**¹⁴ which will help the State to deliver on its goal to attract renewable energy investment. On 27th November 2020 the NSW Government passed its *Electricity Infrastructure Investment Act 2020* which will help to drive the transition to renewables in the state in coming years by coordinating investment in new generation, storage and network infrastructure in New South Wales¹⁵.

In the first instance a 3,000 MW renewable energy zone (REZ) in the Central West Orana will be developed, attracting significant private sector investment to developing new generation assets in this region. A larger 8,000 MW renewable energy zone is to be developed in the New England region, which is closer to Clarence Valley, with up to seven additional REZs’ to be developed in future.

The figures below show the approximate locations of the Central West Orana and New England REZs’.

¹³ © State of New South Wales 2020. Published March 2020

¹⁴ <https://energy.nsw.gov.au/renewables/renewable-energy-zones>

¹⁵ <https://www.parliament.nsw.gov.au/bill/files/3818/XN%20Electricity%20Infrastructure%20Investment%20Bill.pdf>

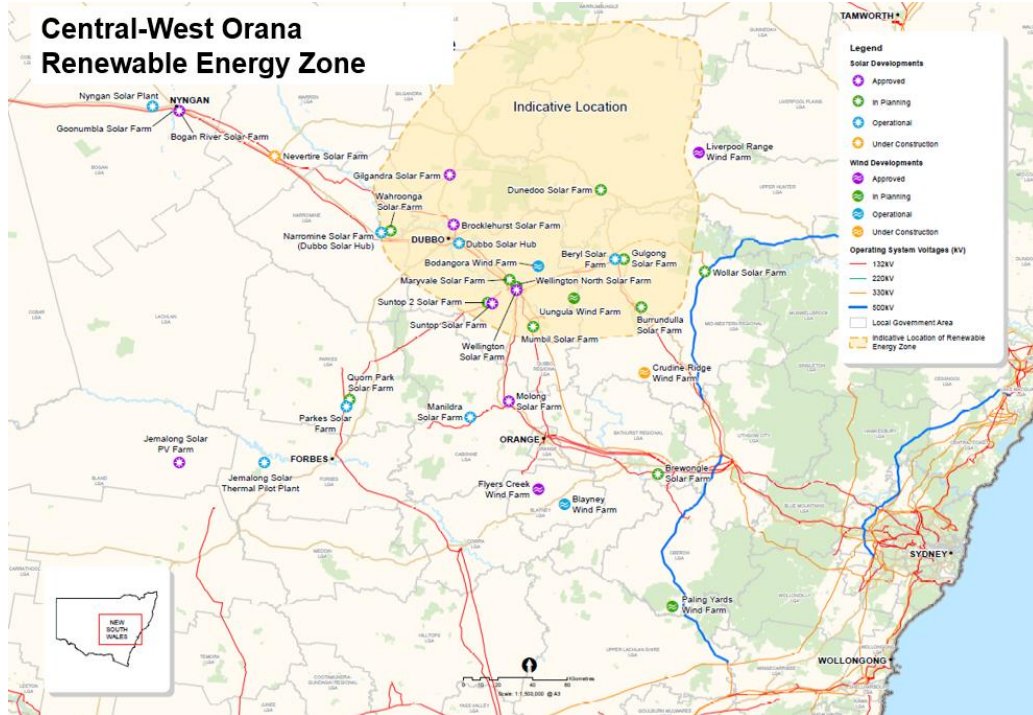


FIGURE 14: INDICATIVE CENTRAL-WEST ORANA NSW RENEWABLE ENERGY ZONE

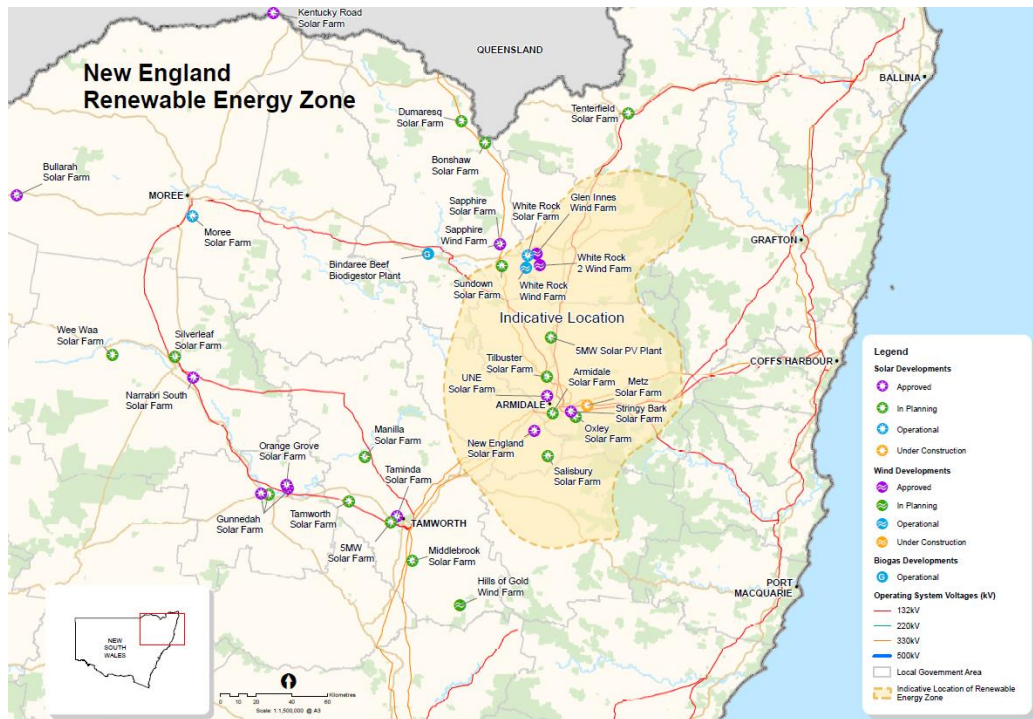


FIGURE 15: INDICATIVE NEW ENGLAND NSW RENEWABLE ENERGY ZONE

Some of the key highlights of the 2020-2030 Net Zero Plan include:

- A central focus of the Plan is about jobs that will be created and about the lowering of energy costs for consumers. Many renewable energy jobs will be created in regional NSW.
- The Plan commits to breaking down barriers that remain to people and business investing in commercially available technologies, such as energy efficient appliances and buildings, rooftop solar, firm grid-scale renewables, and electric vehicles.
- The Plan commits NSW to reducing State emissions by 35% by 2030 and to net zero by 2050 and articulates this is a shared responsibility among business, individuals and governments.
- There will be a broadening of the focus of abatement to encompass low-carbon products and services and providing consumers with more information to influence buying decisions.
- Clarity on some of the funding, targets and programs that will help drive this change, such as:
 - \$450 million Emissions Intensity Reduction Program
 - \$450 million commitment to New South Wales from the Climate Solutions Fund
 - \$1.07 billion in added funding via NSW and Commonwealth across several measures
 - Development of three Renewable Energy Zones in the Central-West, New England and South-West of NSW to drive up to \$23 billion in investment and create new jobs
 - Energy Security Safeguard to extend and expand the Energy Savings Scheme
 - Expanded Energy Efficiency Program
 - Expanded Electric and Hybrid Vehicle Plan with the Electric Vehicle Infrastructure and Model Availability Program to fast-track the EV market in NSW
 - Primary Industries Productivity and Abatement Program to support primary producers and landowners to commercialise low emissions technologies
 - Target of net-zero emissions from organic waste by 2030
 - Development of a Green Investment Strategy, with Sydney as a world-leading carbon services hub by 2030
 - Enhancement of the EnergySwitch service by allowing consumers to compare the emissions performance of energy retailers
 - Advocate to expand NABERS to more building types, and improve both the National Construction Code and BASIX
 - Establishment of a Clean Technology Program to develop and commercialise emissions-reducing technologies that have the potential to commercially out-compete existing emissions-intense goods, services and processes
 - Establishment of a Hydrogen Program that will help the scale-up of hydrogen as an energy source and feedstock, and target 10% hydrogen in the gas network by 2030
 - Aligning action by government under GREP with the broader state targets through clear targets for rooftop solar, EVs, electric buses, diesel-electric trains, NABERS for Government buildings, power purchasing and expansion of national parks

Several of these initiatives will be of interest and benefit to the Clarence Valley community to help it to access support to reduce emissions and costs for energy in future years.

3.3 Local communities' response to climate change

Much of the leadership on renewable energy and climate in Australia comes from local communities as well as local governments.

1. **Solar PV:** Australian houses and business have determined that solar is a good fit for their situation, and more than 23% of NSW dwellings have now installed solar on their premises, and more than 5,000 MW of solar is now installed in NSW. Of this almost 3,000 MW is installed on homes and on businesses across the state. The installed capacity of solar in each state is highlighted below¹⁶.

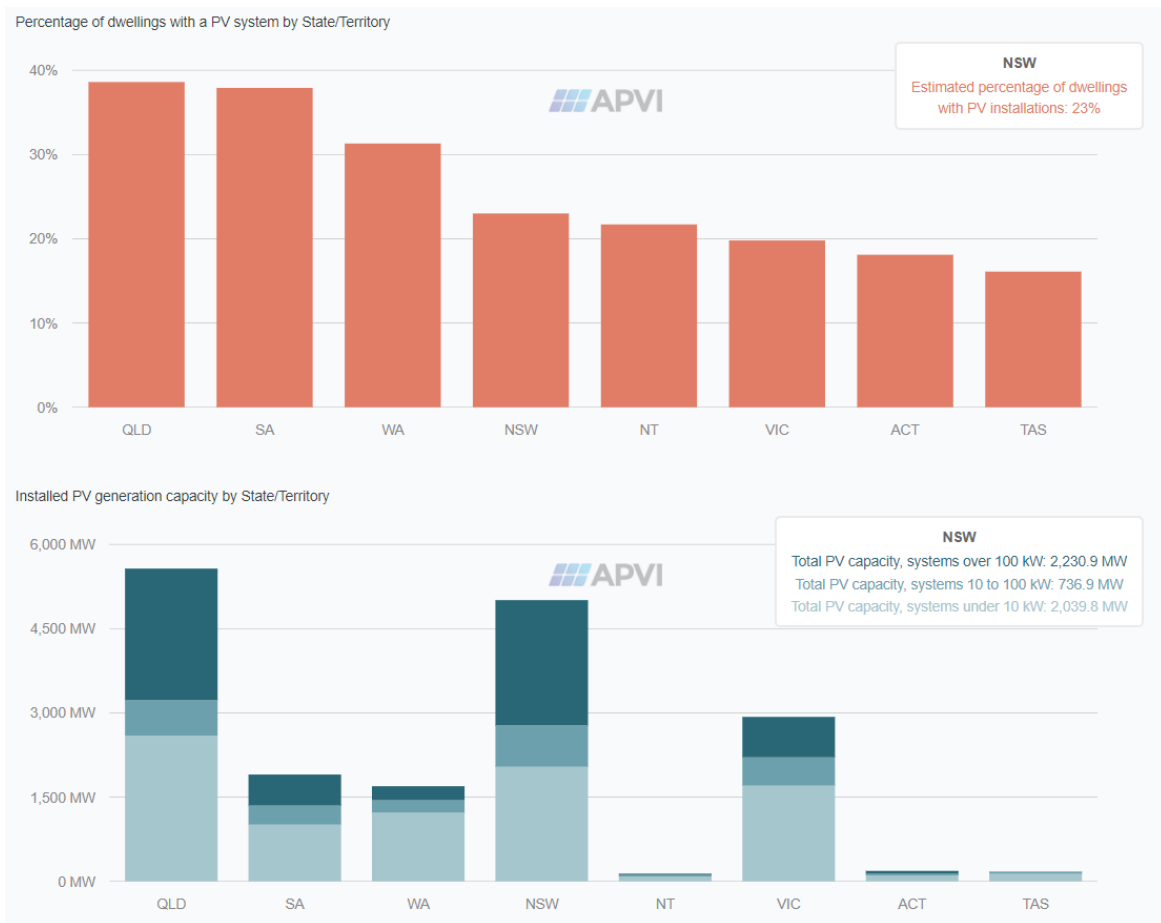


FIGURE 16: SOLAR UPTAKE IN NSW AS A % AND INSTALLED CAPACITY (MW), SEPTEMBER 2020

2. **Solar Hot Water:** according to the Clean Energy Council (CEC) there were 64,000 installations of solar hot water in Australia in 2019, bringing the total to over 1.22 million. This is an overall increase of around 25% over a 5-year period, and reflects a shift towards lower emissions water heating technologies. There is growth in the uptake of heat pumps for water heating as well, as older electric storage heating systems are phased out. The NSW Government

¹⁶ <https://pv-map.apvi.org.au/historical>

developed a hot water guide for households and business in 2018, which highlights solar hot water, water heating using excess solar PV generation and heat pump technologies¹⁷.

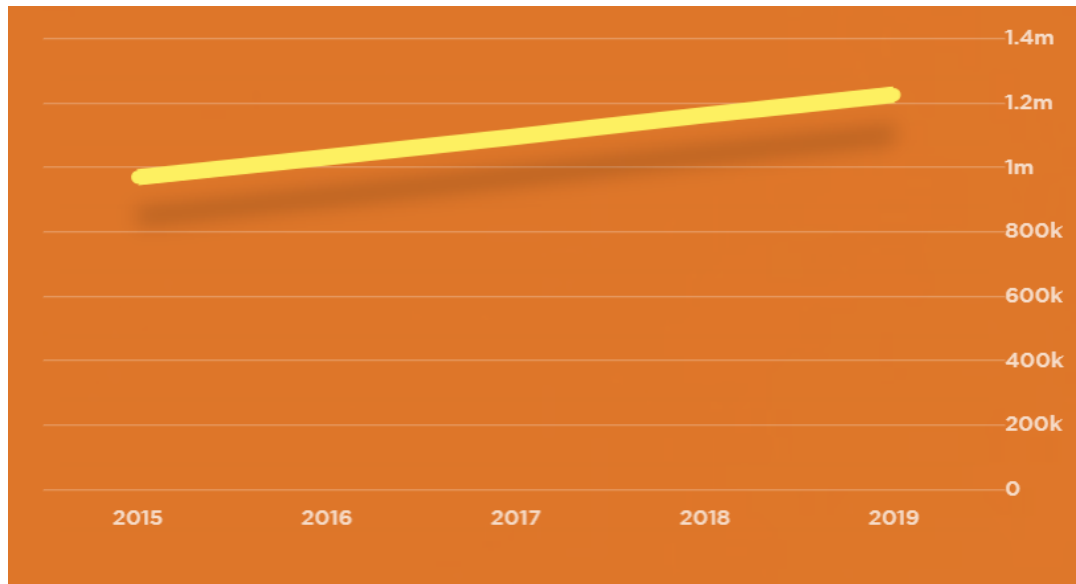


FIGURE 17: CUMULATIVE SOLAR WATER HEATER INSTALLATIONS IN AUSTRALIA¹⁸

3. **Community Energy:** communities across Australia have been coming together to increase renewable energy capacity and literacy by developing solar, wind, bioenergy and hydro projects that are owned locally and provide benefit to the communities they are located in. NSW Government has supported the Community Power Agency to develop a ‘how-to’ guide to developing community renewable energy projects, drawing on the range of approaches adopted by a wide range of renewable energy projects developed by communities¹⁹.

Examples such as the Hepburn wind farm have been widely reported. This co-operative-run 4.2 MW wind farm in Victoria is majority owned by residents and contributes AU\$30,000+ a year to a local Community Sustainability Fund.

The NSW Government’s commitment to community projects was further evidenced by the 2020-delivered Regional Community Energy Fund (RCEF) grant funding project²⁰. This will see grants provided to seven projects, worth approximately \$15.4 million. These projects will unlock nearly 17.2MW in electricity generation and up to 17.9MW/39.3MWh of energy storage, leveraging approximately \$36 million in private investment. Learnings will be shared to help other regional communities develop similar projects. The seven projects receiving funding under RCEF are tabulated below.

¹⁷ <https://energy.nsw.gov.au/media/1476/download>

¹⁸ <https://www.cleanenergycouncil.org.au/resources/technologies/solar-water-heating>

¹⁹ <https://www.environment.nsw.gov.au/resources/communities/cpa-community-energy-how-to.pdf>

²⁰ <https://energy.nsw.gov.au/renewables/clean-energy-initiatives/regional-community-energy>

TABLE 3: RCEF GRANT RECIPIENTS AND PROJECT DETAILS

Recipient	Project Title	Primary technology and capability	Location (closest town)
Byron Bay Solar Farm Holdings	Byron Bay Solar Farm + Battery Storage Facility	5 MW Solar PV 5 MW / 10MWh battery	Ewingsdale
Energise Gloucester	Gloucester Community Solar Farm	0.5 MW Solar PV	Gloucester
Community Energy for Goulburn	Goulburn Community Dispatchable Solar Farm	1.2 MW Solar PV 0.4 MW / 0.8MWh battery	Goulburn
Pingala - Community Renewables for Sydney	Haystacks Solar Garden	1 MW Solar PV	Grong Grong
Manilla Community Renewable Energy	Manilla Community Solar	4.5MW Solar PV 4.5 MW / 4.5MWh battery 2 MW / 17MWh hydrogen energy storage system	Manilla
ITP-NHT DevCo	Orange Community Renewable Energy Park	5 MW Solar PV Up to 5 MW / 5 MWh battery	Orange
Enova Community Energy Ltd	Shared Community Battery Scheme	1 MW / 2MWh battery	Regional NSW

4. **Ambitious targets for renewable energy and/or carbon emissions:** some towns / communities, as well as several local councils in consultation with their communities, have set ambitious targets to increase renewable energy and/or reduce greenhouse gas emissions within their communities. This both signals to the wider community that communities intend to act on climate change, and it can initiate projects and initiatives that are aimed at unlocking the potential within communities through engagement, education, project development, seeking grant funding and investment in renewables and low carbon technologies. The map below highlights the communities in NSW that have made ambitious commitments to date.

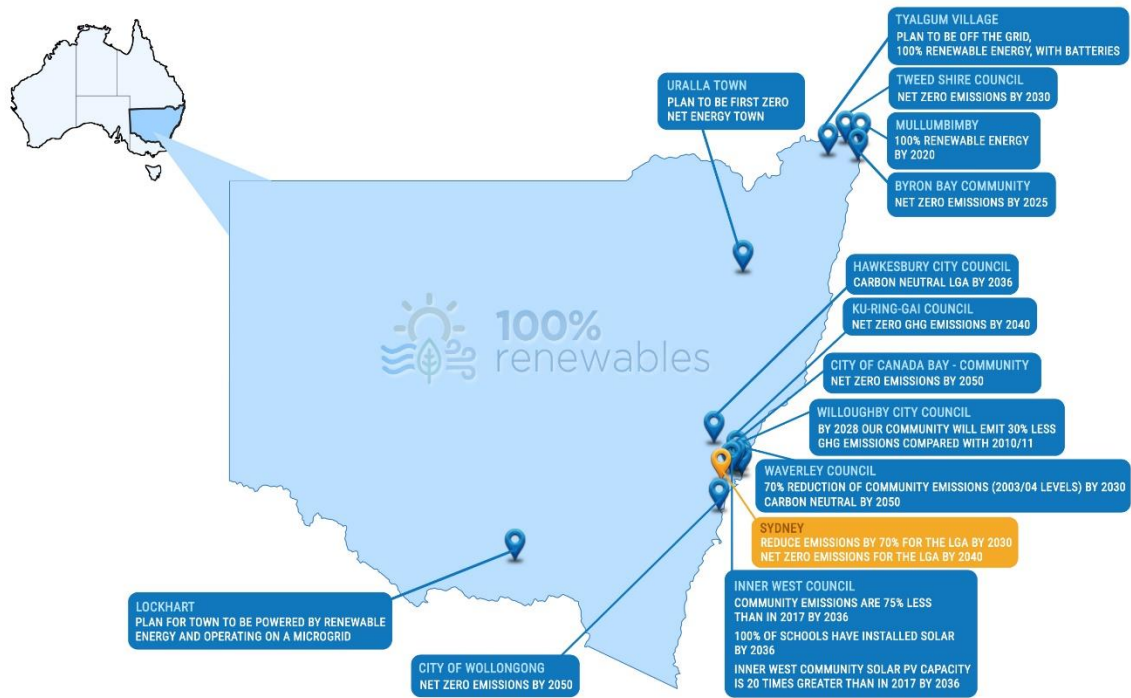


FIGURE 18: RENEWABLE ENERGY & CARBON TARGETS BY NSW COMMUNITIES, SEPTEMBER 2020

4 Solar PV uptake in Clarence Valley

Clarence Valley Local Government Area is in the upper end of LGAs in terms of the uptake of solar hot water and solar PV systems. According to data sourced from the Australian Photovoltaic Institute (APVI), Clarence Valley LGA has:

- 9,503 PV installations, a 37.2% penetration rate, at June 2021, with over 47.5 MW of installed capacity. Refer to the APVI map with Clarence Valley LGA details highlighted below.
- 4 installations of over 100 kW, 546 installations over 10 kW and less than 100 kW, and 8,953 installations of less than 10 kW.

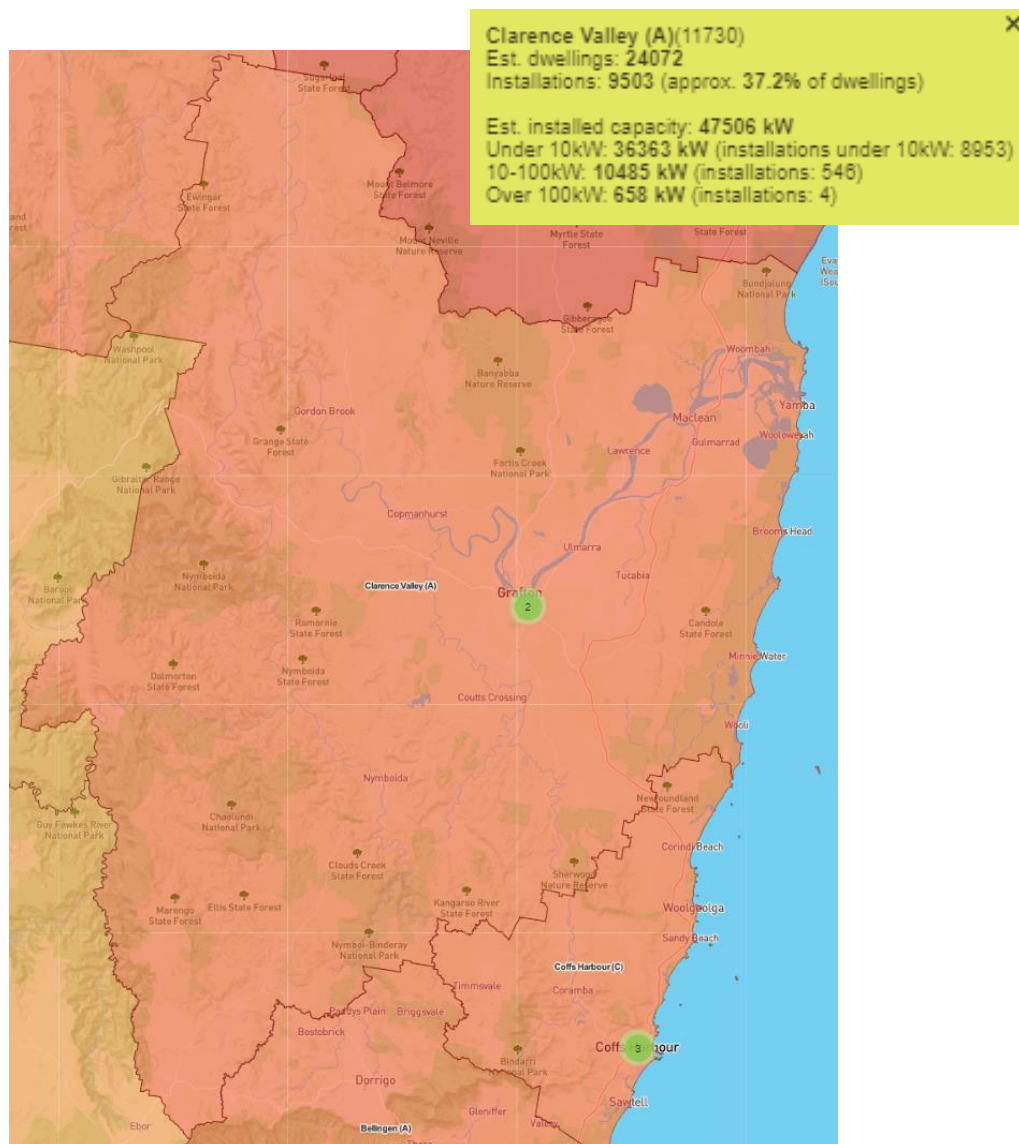


FIGURE 19: CLARENCE VALLEY LGA SOLAR PV INSTALLATIONS, JUNE 2021²¹

²¹ <https://pv-map.apvi.org.au/historical#10/-29.6636/152.6825>



Community baseline

Clarence Valley LGA
profile and 2018-19
carbon footprint



5 Clarence Valley community profile

5.1 Population

Latest profile.id figures for 2019 indicate that Clarence Valley has a population of 51,662²². Since 2006, there has been a slight increase in population and in 2019, population growth was 0.12% per annum.

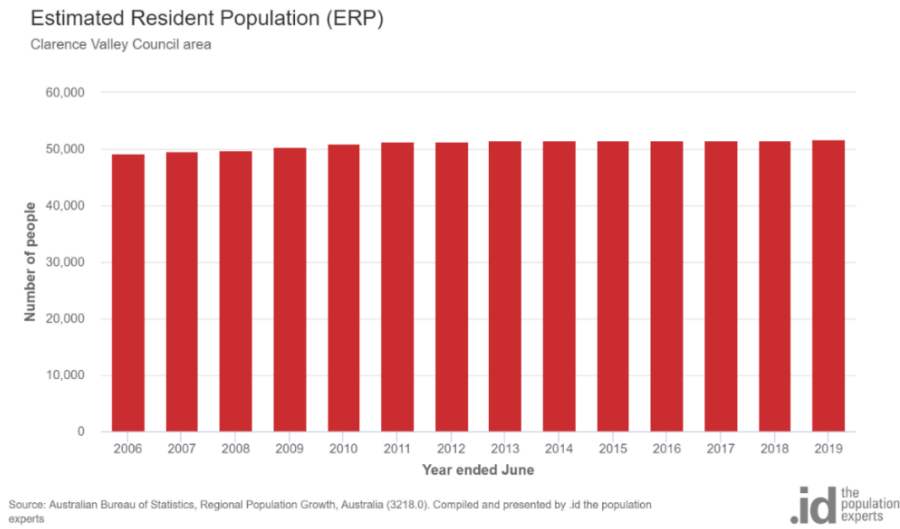


FIGURE 20: CLARENCE VALLEY POPULATION FROM 2006-2019

According to forecast.id, the population of Clarence Valley in 2041 will be a little over 60,000, an increase of 9,105 persons (17.64% growth), at an average annual change of 0.65%.

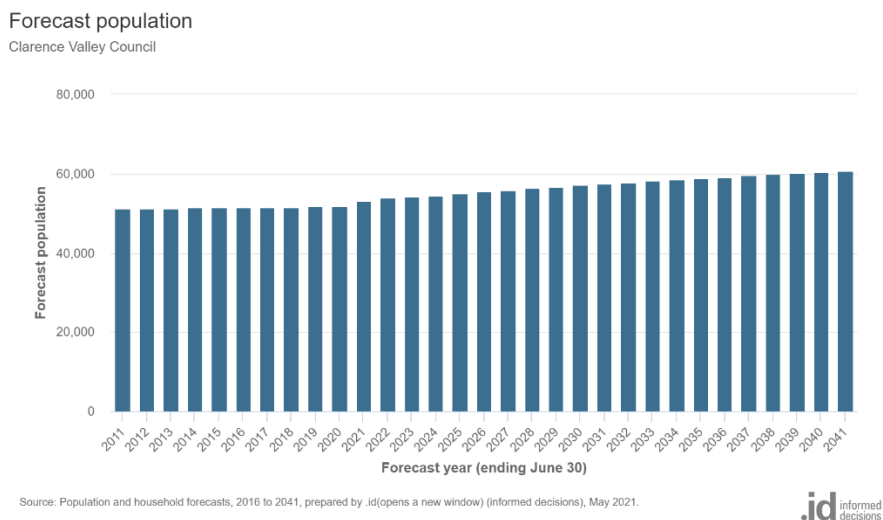


FIGURE 21: POPULATION PROJECTIONS TO 2041²³

²² <https://profile.id.com.au/clarence-valley/population>

²³ <https://www.planning.nsw.gov.au/-/media/Files/DPE/Factsheets-and-faqs/Research-and-demography/Population-projections/2019-Clarence-Valley.pdf>

5.2 Residential dwelling number and types

Most people in the Clarence Valley live in free-standing dwellings, at more than 81% of total dwellings in 2016. There has been an increase in dwelling numbers from 2011 to 2016, in total and across most housing types except for high density as shown in the table below.

TABLE 4: DWELLING TRENDS IN CLARENCE VALLEY FROM 2011 TO 2016²⁴

Clarence Valley Council area	2016		2011	
	Number	%	Number	%
Separate house	20,235	81.5	19,907	83.4
Medium density	2,766	11.1	2,582	10.8
Caravans, cabin, houseboat	1,112	4.5	919	3.8
Other	300	1.2	184	0.8
High density	231	0.9	248	1.0
Not stated	185	0.7	33	0.1
Total Private Dwellings	24,829	100.0	23,873	100.0

The forecast increase in population out to 2041 is also expected to lead to more housing in the region, though the average household size will fall slightly.

TABLE 5: FORECAST HOUSEHOLDS AND AVERAGE HOUSEHOLD SIZE TO 2041 IN CLARENCE VALLEY²⁵

Clarence Valley Council	Forecast year					
	2016	2021	2026	2031	2036	2041
Summary						
Total dwellings	24,986	25,792	26,812	27,782	28,742	29,582
Households	21,736	22,269	23,175	24,179	25,043	25,773
Average household size	2.32	2.28	2.26	2.24	2.24	2.23

5.3 Transportation

According to data collected by Roads and Maritime Services (RMS²⁶) at the end of 2018/19 there were a total of 60,673 vehicles registered in Clarence Valley, with a breakdown as estimated below.

TABLE 6: RMS DATA ON REGISTERED VEHICLES IN CLARENCE VALLEY AT END 2018/19

Category of Vehicle	Vehicle Type	Clarence Valley
Light Vehicles	Passenger Vehicles	17,542
	Off-road Vehicles	13,248
	People movers	326
	Small Buses	230
	Mobile Homes	195

²⁴ Sourced from Profile.id <https://profile.id.com.au/clarence-valley/dwellings>

²⁵ Sourced from Forecast.id <https://forecast.id.com.au/clarence-valley/population-households-dwellings>

²⁶ https://www.rms.nsw.gov.au/about/corporate-publications/statistics/registrationandlicensing/tables/table1111_2019q4.html

	Motorcycles	1,852
	Scooters	44
	Light Trucks	8,287
	Light Plants	18
	Light Trailers	16,733
	Other Vehicles	4
	All	58,480
Heavy Vehicles	Buses	141
	Heavy Trucks	1,236
	Prime Movers	245
	Heavy Plants	59
	Heavy Trailers	513
	All	2,194
All Vehicles	Grand Total	60,673

The majority of vehicles – approximately 75% - will be petrol-fuelled and most of the balance will be diesel fuelled. However average fuel use by diesel vehicles is much higher than for petrol, as it is used to power most heavy vehicles, light trucks and many off-road vehicles.

5.4 Industry

In 2018-19, Construction was the biggest industry sector in terms of economic output in Clarence Valley, followed by Health Care and Social Assistance, then Manufacturing. Together these three sectors accounted for a little over 50% of the region’s economic output. Construction was also the sector with the highest output in 2013-14, with real estate, agriculture, manufacturing and government administration being the next largest sectors making up 50% of local output.

TABLE 7: OUTPUT BY INDUSTRY SECTOR IN FY 2018-19²⁷

Clarence Valley local area Industry	2018/19		2013/14	
	\$m	%.	\$m	%.
Construction	1,422.8	35.9	583.9	16.9
Health Care and Social Assistance	301.3	7.6	226.2	6.5
Manufacturing	290.6	7.3	282.6	8.2
Agriculture, Forestry and Fishing	248.7	6.3	289.6	8.4
Public Administration and Safety	238.8	6.0	252.8	7.3
Retail Trade	203.7	5.1	210.9	6.1
Accommodation and Food Services	161.0	4.1	179.6	5.2
Education and Training	150.6	3.8	140.4	4.1
Transport, Postal and Warehousing	146.9	3.7	193.4	5.6

²⁷ Sourced from profile.id <https://economy.id.com.au/clarence-valley/output-by-industry>

Electricity, Gas, Water and Waste Services	139.6	3.5	235.4	6.8
Mining	131.4	3.3	23.7	0.7
Professional, Scientific and Technical Services	119.6	3.0	106.8	3.1
Administrative and Support Services	95.7	2.4	101.4	2.9
Other Services	87.3	2.2	78.2	2.3
Financial and Insurance Services	66.7	1.7	77.9	2.2
Wholesale Trade	61.1	1.5	61.6	1.8
Information Media and Telecommunications	53.5	1.4	60.4	1.7
Rental, Hiring and Real Estate Services	23.2	0.6	332.1	9.6
Arts and Recreation Services	20.6	0.5	28	0.8
Total industries	3,963.1	100.0	3,465.1	100.0

In terms of employment by industry in 2018-19, Health Care and Social Assistance employed 16% of all workers in the region, followed by the Construction, Retail Trade and Education sectors. Together these sectors employed nearly 50% of all workers in the region. The only change from 2013-14 was the steep rise in employment in the Construction sector, reflecting the variable nature of this sector.

TABLE 8: EMPLOYMENT BY INDUSTRY IN FY 2018-19²⁸

Clarence Valley Council area	2018/19		2013/14	
Industry	Number	%.	Number	%.
Health Care and Social Assistance	3,074	16	2,694	15
Construction	2,405	13	1,282	7
Retail Trade	2,121	11	2,309	13
Education and Training	1,730	9	1,680	9
Public Administration and Safety	1,682	9	1,553	8
Accommodation and Food Services	1,656	9	1,824	10
Manufacturing	1,085	6	1,275	7
Agriculture, Forestry and Fishing	1,063	6	1,187	6
Other Services	876	5	804	4
Transport, Postal and Warehousing	749	4	906	5
Professional, Scientific and Technical Services	607	3	602	3
Administrative and Support Services	525	3	543	3
Wholesale Trade	353	2	450	2
Electricity, Gas, Water and Waste Services	210	1	281	2
Financial and Insurance Services	204	1	252	1
Information Media and Telecommunications	183	1	224	1
Arts and Recreation Services	187	1	217	1
Mining	98	1	73	0
Rental, Hiring and Real Estate Services	47	0	311	2
Total industries	18,854	100	18,467	100

²⁸ Sourced from profile.id <https://economy.id.com.au/clarence-valley/employment-by-industry>

In terms of projected employment growth in the Grafton-Coffs Harbour region to May 2024, the expected total growth across all industries is 6.4%²⁹, with highest growth expected in Health Care, Administration, Construction and Telecommunications sectors. However, due to covid-19, these estimations may be affected.

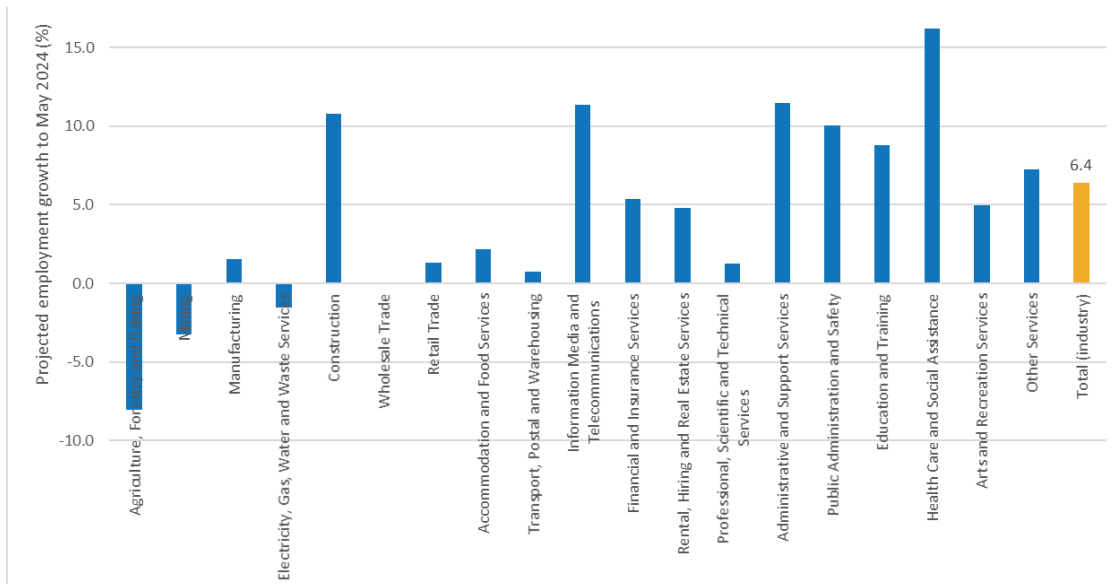


FIGURE 22: PROJECTED EMPLOYMENT GROWTH TO MAY 2024 IN COFFS HARBOUR - GRAFTON³⁰

According to the NSW Government’s ‘A 20-Year Economic Vision for Regional NSW³¹’, there will be 1,500-2,500 additional jobs from 2018-2038 in the Clarence Valley region.

5.5 Agriculture, Fisheries and Forestry

5.5.1 Agriculture

Data for these economic activities are sourced from the Commonwealth Government’s Department of Agriculture, Water and the Environment (ABARES)³², which has more up-to-date information from 2018-19 and up to May 2020. Data from profile.id are also presented, though these apply to 2015-16. The main limitation in the ABARES data available for Clarence Valley is that the data applies to the Coffs Harbour-Grafton region, thus encompassing three LGAs, similar to above projected employment growth forecasts.

²⁹ Sourced from Labour Market Information Portal
<https://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

³⁰ ibid

³¹ <https://www.nsw.gov.au/a-20-year-economic-vision-for-regional-nsw>

³² <https://www.agriculture.gov.au/abares/research-topics/aboutmyregion/nsw-grafton#agricultural-sector>

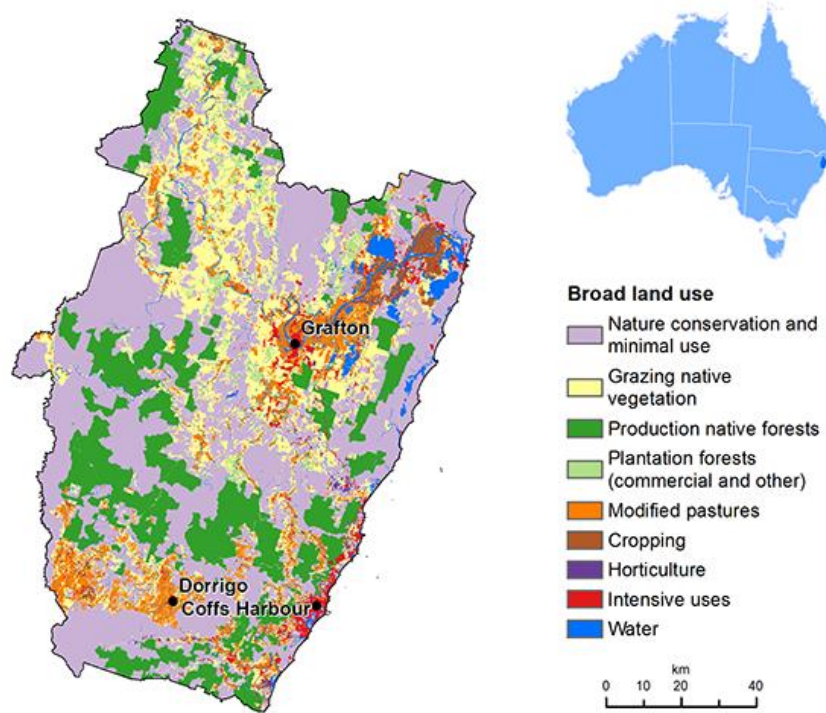


FIGURE 23: ABARES: LAND USE IN THE COFFS HARBOUR - GRAFTON REGION, 2018

According to ABARES there were 744 total farms in the Coffs Harbour-Grafton region in 2018, with nearly 50% of farms associated with cattle farming, and the remainder split between cropping and fruit & vegetable growing. This is tabulated below. Nearly two thirds of estimated farm value is created by around 20% of farms.

TABLE 9: FARMING BY TYPE IN THE COFFS HARBOUR-GRAFTON REGION 2017-18

Industry classification	Coffs Harbour - Grafton region	
	Number of farms	% of Region
Beef Cattle Farming (Specialised)	335	45.0
Sugar Cane Growing	118	15.9
Berry Fruit Growing	101	13.6
Other Fruit and Tree Nut Growing	43	5.8
Dairy Cattle Farming	35	4.7
Vegetable Growing (Outdoors)	23	3.1
Nursery Production (Outdoors)	21	2.8
Horse Farming	19	2.6
Nursery Production (Under Cover)	10	1.4
Floriculture Production (Outdoors)	10	1.4
Other	27	3.6
Total agriculture	744	100

A similar picture is presented when looking at the estimated value of agricultural commodities as provided by profile.id for the Clarence Valley region. As noted, the figures below refer to 2015-16 and may not be wholly representative of the present situation (e.g. the value of dairy output is likely to be significantly lower with the closure of a major dairy).

TABLE 10: VALUE OF CLARENCE VALLEY AGRICULTURAL PRODUCTION 2015-16³³

Commodity	\$ Value 2015-16	% of total
Livestock slaughtering	52,518,593	43.8
Other broadacre crops (mostly sugar cane)	39,749,567	33.2
Milk	11,914,965	9.9
Other fruit	5,590,434	4.7
Nurseries & cut flowers	3,712,118	3.1
Cereal crops	3,074,200	2.6
Crops for Hay	1,489,749	1.2
Vegetables	1,416,748	1.2
Nuts	267,763	0.2
Eggs	32,690	0
Wool	22,741	0
Citrus fruit	5,697	0
Agriculture - Total Value	119,795,265	100

5.5.2 Fisheries³⁴

The Coffs Harbour–Grafton region is a key commercial fishing region, including the Clarence Valley ports of Yamba and Iluka. In 2018–19 over 2,000 tonnes of Commonwealth catch was landed in the Coffs Harbour – Grafton region. New South Wales state fisheries also operate in the area, principally targeting prawns.

Within this region the Clarence River is the largest estuarine fishery in NSW.

5.5.3 Forestry

According to ABARES, in 2014–15, the total plantation area in the Coffs Harbour - Grafton region was 30,100 hectares, including 27,740 hectares of hardwood plantations and 2,400 hectares of softwood plantations. In 2016 there were about 961,400 hectares of native forests in the Coffs Harbour - Grafton region, of which 413,600 hectares were privately managed, while 278,600 hectares were in conservation reserves and 250,800 hectares were in multiple use public forest available for timber production. The majority of forested areas in the Coffs Harbour - Grafton region are eucalypt species with some rainforest.

³³ Sourced from profile.id <https://economy.id.com.au/clarence-valley/value-of-agriculture?BMID=30>

³⁴ <https://www.agriculture.gov.au/abares/research-topics/aboutmyregion/nsw-grafton#fisheries-sector>

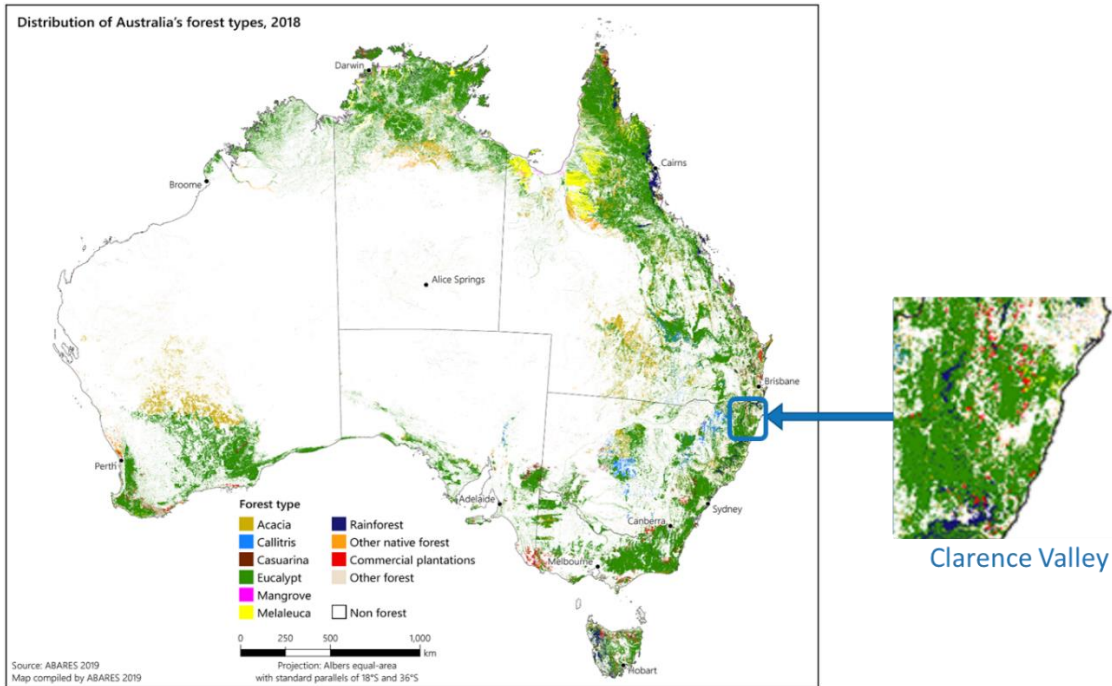


FIGURE 24: DISTRIBUTION OF AUSTRALIA’S FOREST TYPES IN 2018³⁵

Based on a 2007 publication by Clarence Valley Council³⁶, there was around 20,000 hectares of plantation, around two-thirds of the ABARES estimate above for the Coffs Harbour-Grafton region. Clarence Valley also had an estimated 270,000 hectares of native forests, 28% of the Coffs Harbour-Grafton region.

TABLE 11: NATIVE FOREST AND HARDWOOD PLANTATION AREAS IN CVC

	Plantations and Native Forest Managed by Forests NSW (ha)			Privately Owned and Managed Plantations and Native Forest (ha)	
	Hardwood Plantation	Softwood Plantation	Native Forest	Hardwood Plantation	Native Forest
Clarence Valley	8,074	1,063	102,852	11,158	167,000

³⁵ Sourced from Department of Agriculture, Water and the Environment <https://www.agriculture.gov.au/abares/forestsaustralia/profiles/australias-forests-2019>

³⁶ 2007, Clarence Valley Council: Investing in the Timber Heartland

5.6 Clarence Estuary wetlands

The Clarence River is the largest NSW coastal river in both catchment area and river discharge. Some 50% of catchment area of 22,400 km² is protected, through National Parks and State Forests.

Among the many benefits of coastal wetlands are their importance in the context of climate change, through their ability to sequester and store carbon, termed 'Blue Carbon', in mangrove forests, saltmarshes and seagrass beds, which store carbon dioxide in both plants and sediment³⁷.

As an example the Lower Clarence Estuary features:

- the 2nd largest area of seagrass (0.826 square km);
- the 4th largest area of mangroves (7.653 square kilometres); and
- the 8th largest area of saltmarsh (2.91 square kilometres).
- Saltwater wetlands (in the estuary) and freshwater wetlands (above the estuary), including
 - Wooloweyah Lagoon – covers an area of 2,390 ha and supports large areas of seagrass, mangroves and saltmarsh.
 - The Broadwater – a large tidal waterbody of the Clarence estuary fringed by mangroves and supporting seagrass and saltmarsh communities.
 - Everlasting Swamp – a freshwater wetland with vegetation including Swamp Oak, Spike-rush, Water Couch, Common Reed and Spiny Mudgrass.

Agricultural, industrial and urban development activities have degraded much of these habitats over the last several decades³⁸.







³⁷ <http://www.clarencevalleywatchyamba.com/blue-carbon.html>

³⁸ Sourced from: <https://www.oceanwatch.org.au/wp-content/uploads/2016/05/Case-Study-1-The-Clarence-River-Catchment-4.pdf>

6 Clarence Valley LGA’s 2018-19 carbon footprint

A carbon footprint for the Clarence Valley LGA, associated with the above profile of the region, is taken from the Ironbark-BZE Snapshot Report³⁹ (BZE), which estimates 2018-19 emissions for Clarence Valley. The emission sources reported consists of stationary energy, transport, waste, agriculture and land use. Stationary energy contributed 45% of the total emissions. Transport accounts for 37% of emissions, followed by agriculture with 15%. Snapshot data, methodology, and calculations have been independently verified and endorsed by ICLEI Oceania, Sustainability Victoria and Renew⁴⁰.

TABLE 12: CLARENCE VALLEY LGA CARBON FOOTPRINT 2018-19

	Emission Sources	Ironbark - BZE t CO ₂ -e	%
	Stationary Energy	349,500	45%
	Transport	287,800	37%
	Waste	24,800	3%
	Agriculture	115,500	15%
	Land Use	(4,700)	
	Total	777,600	100%

The above inventory is repeated below graphically, to highlight the dominance of stationary energy and transport in the community’s carbon footprint.

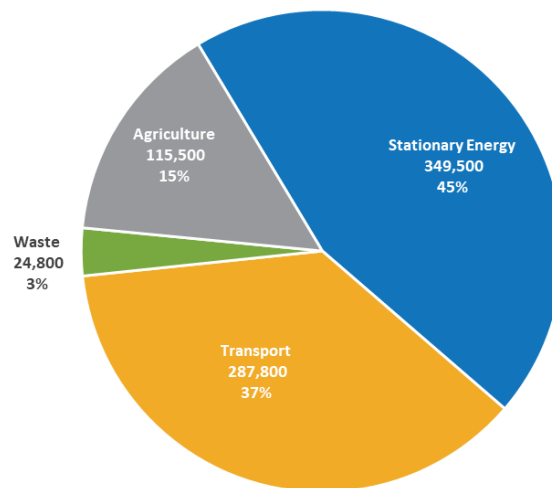








FIGURE 25: CLARENCE VALLEY LGA CARBON FOOTPRINT (EXCL LAND USE)

³⁹ Snapshot Report – Clarence Valley 2018/19 <https://snapshotclimate.com.au/locality/australia/new-south-wales/clarence-valley/2018/fy>

⁴⁰ <https://snapshotclimate.com.au/faq/has-the-data-been-verified/>

A detailed breakdown of each emission sources is shown in the table and figure below.

TABLE 13: DETAILED BREAKDOWN OF CLARENCE VALLEY LGA CARBON FOOTPRINT

	Emission Sources	Ironbark - BZE footprint t CO ₂ -e
	Electricity	349,500
	Residential	146,800
	Commercial	85,700
	Industrial	117,000
	Transport	287,800
	On road	283,800
	Domestic air travel	4,000
	Waste	24,800
	Landfill	18,000
	Water	6,800
	Agriculture	115,500
	Land Use	(4,700)
	Total	777,600

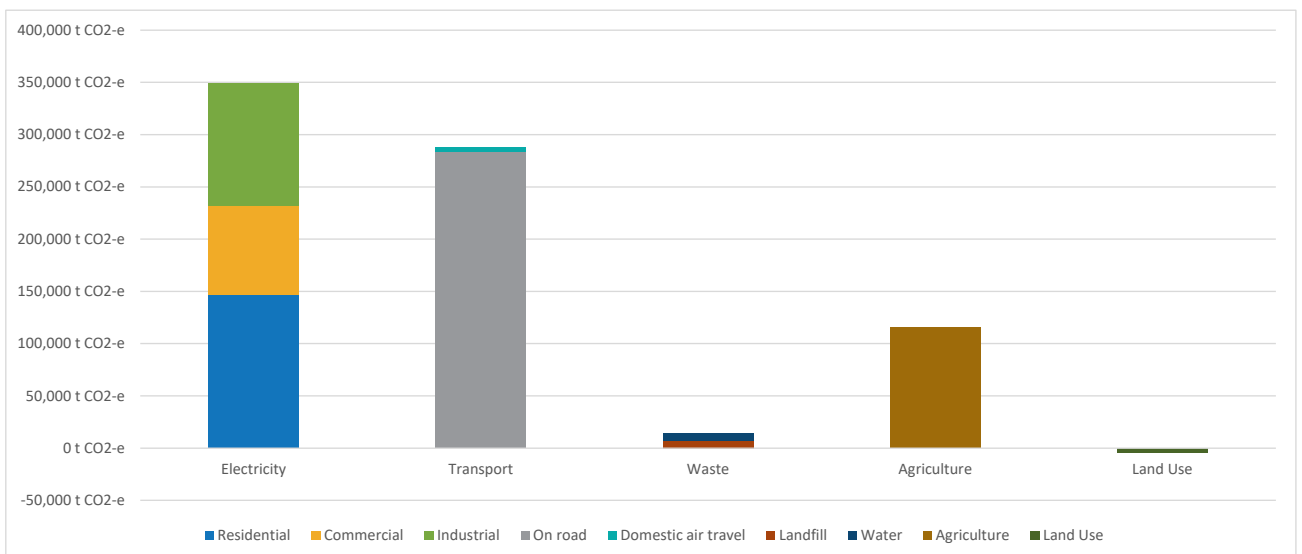


FIGURE 26: DETAILED BREAKDOWN OF CLARENCE VALLEY LGA CARBON FOOTPRINT


6.1 Other data sources for GHG emissions

The above carbon footprint for Clarence Valley was developed to be consistent with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC)⁴¹, and it is recommended that this be used as a baseline for the community’s greenhouse gas emissions. The snapshot is based on the apportionment of state level data sets down to local areas. Clarence Valley can complement data such as the snapshot with locally-sourced data that can offer different insights and may highlight or suggest greater or lesser emphasis be placed on different emissions sources. Key additional sources are highlighted below.

6.1.1 Electricity

Essential Energy reports electricity data by customer type at a whole-of-LGA level for each financial year. Solar export data is also reported. Energy consumed by large single-site customers (high voltage) are excluded from their reporting. Comparing emissions in Clarence Valley for Essential Energy-reported data we see a sizeable ~40% difference with the snapshot estimates. Essential Energy data is updated annually and should be tracked alongside updated snapshot information to evaluate trends in LGA emissions from electricity.

TABLE 14: COMPARING ESSENTIAL ENERGY & SNAPSHOT CARBON FOOTPRINT FOR CLARENCE VALLEY LGA

	Emission Sources	Ironbark - BZE footprint for 2018-19 t CO ₂ -e	Essential Energy data for 2018-19 t CO ₂ -e	% difference
	Electricity	349,500	207,377	-40.7%
	Residential	146,800	111,039	-24.4%
	Commercial	85,700	96,338	-52.5%
	Industrial	117,000		

6.1.2 Transport


For transport, population data for Clarence Valley and NSW⁴² were extracted from profile.id while fuel sales data in NSW were extracted from the Department of Industry, Science, Energy and Resources’ Australian Petroleum Statistics⁴³. Using a top-down methodology which correlates fuels sales to LGA population, fuel use in Clarence Valley was estimated. This sees a more modest 20% difference to snapshot estimates, and provides Council with a top-down comparison for future reference.

⁴¹ Developed via collaboration between World Resources Institute, C40 Cities Climate Leadership Group and ICLEI – Local Governments for Sustainability (ICLEI).

⁴² <https://profile.id.com.au/clarence-valley>

⁴³ <https://www.energy.gov.au/publications/australian-petroleum-statistics-2019>

TABLE 15: COMPARING TRANSPORT STATISTICS & SNAPSHOT CARBON FOOTPRINT FOR CLARENCE VALLEY LGA

	Emission Sources	Ironbark - BZE footprint for 2018-19 t CO ₂ -e	Aust Petroleum Stats (scaled) data for 2019 t CO ₂ -e	% difference
	Transport	287,800	221,626	-23.0%
	On road	283,800	209,314	-26.2%
	Domestic air travel	4,000	12,312	207.8%

6.1.3 Waste

Clarence Valley Council tracks and reports emissions from waste in the LGA; in particular it is the operator of the Grafton Regional landfill site as well as the operator of wastewater treatment sites, which give rise to fugitive emissions of methane and nitrous oxide.

The landfill operates a gas flare which ensures that methane emissions from waste are burned and only release CO₂ to atmosphere. Hence emissions from landfill are greatly reduced. Both waste input to the landfill as well as the volume of methane gas burned are recorded by Council. Similarly, Council tracks and reports on emissions of greenhouse gases from its wastewater operations on an annual basis.

This provides two accurate data points that can be tracked to provide additional comparison with snapshot estimates going forward.

6.1.4 Agriculture & land use

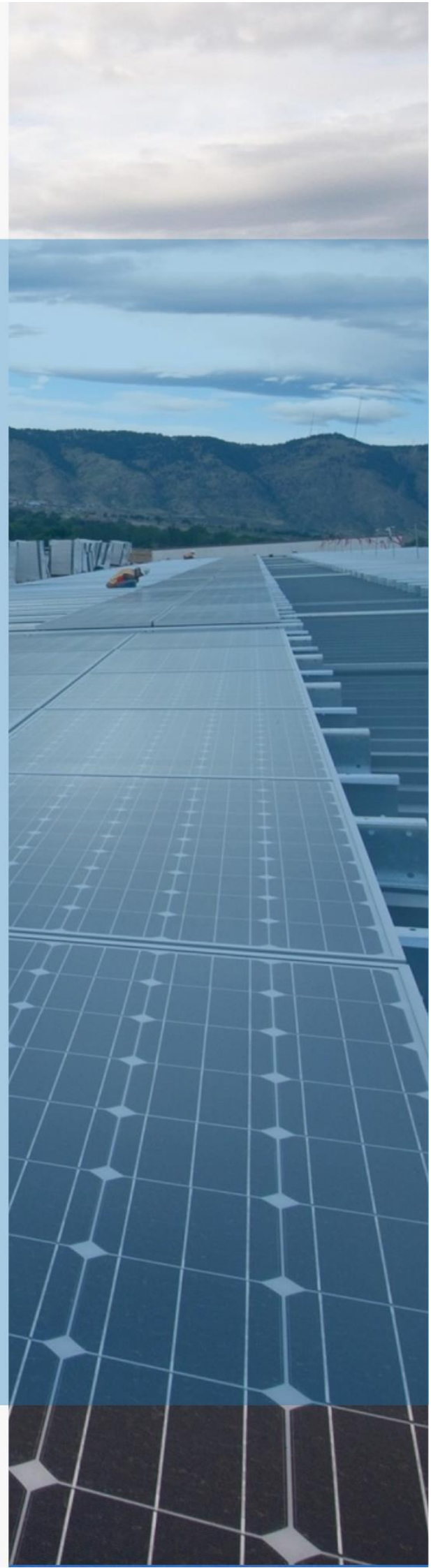
Based on community feedback, it is understood that emissions from agriculture may be much higher than reported, and land use may be a net emitter of greenhouse gas emissions rather than a net sink as indicated by the modelling. Factors underpinning this may include land clearing for agriculture and residential development, and changes in total forested area.

This local knowledge is important and information and data sources that can contribute to a greater understanding of the impact of agriculture and land use in Clarence Valley in the region's net emissions from these sources should be collected and maintained to help shape responses to these source and abatement & sequestration opportunities.



Abatement potential

Clarence Valley LGA's
emissions and energy
reduction
opportunities



7 Clarence Valley's Energy & Emissions Reduction options

7.1 Measures available to reduce Clarence Valley's footprint

With 82% of the region's greenhouse gas emissions associated with the consumption of electricity for homes and business, and fuel for transport, any significant efforts to decarbonise in coming decades will need to focus on these areas. Emissions from agriculture, land use and waste are also significant, and will also be part of future emissions reduction efforts.

Emissions reduction is the responsibility of all levels and sections of the community. Residents, businesses and all levels of government need to act themselves as well as work together if long-term successful outcomes are to be achieved.

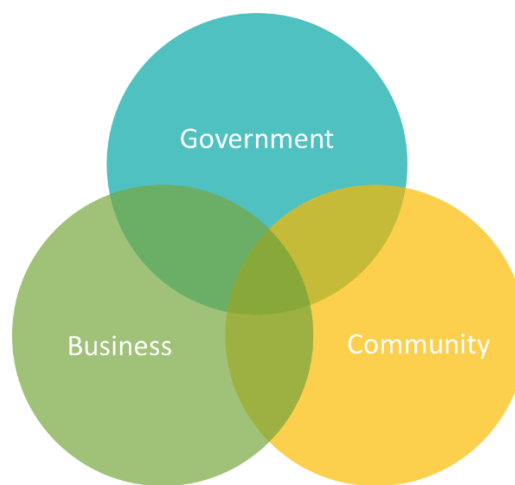


FIGURE 27: RESIDENTS, BUSINESS & GOVERNMENTS MUST WORK TOGETHER TO REDUCE EMISSIONS

Given the areas of emissions and the regional profile, this Community Energy and Emissions Reduction Strategy focuses on nine main areas of action that, implemented together in a sustained way, can significantly reduce emissions. These nine abatement areas are:

1. Grid decarbonisation
2. Buying clean energy (e.g. via a renewable energy power purchase agreement or PPA)
3. Community and regional clean energy generation (grid-side)
4. Behind-the-meter solar (i.e. onsite solar)
5. Energy efficiency
6. Sustainable transport
7. Waste Management
8. Sequestration
9. Agriculture

These nine measures are illustrated in the graphic below. A summary of the scope, scale, cost-effectiveness and risks associated with each of these measures is presented that can enable the success of the community's abatement efforts. This is then followed by recommended action plans that will enable the Clarence Valley community to achieve long term abatement.

GRID DECARBONISATION

As more renewables feed into the grid, carbon emissions for electricity will decline

BUYING CLEAN ENERGY

Buy energy via GreenPower®, carbon neutral electricity or a renewable energy power purchase agreement (PPA)

COMMUNITY AND REGIONAL CLEAN ENERGY GENERATION

Develop and participate in local and regional renewable energy generation projects

BEHIND-THE-METER SOLAR

Onsite generation of electricity with solar panels, which may be used, stored for later use, or exported to the grid

ENERGY EFFICIENCY

Adopt energy efficient technologies and practices to reduce emissions



SUSTAINABLE TRANSPORT

Buy efficient, low and zero emissions vehicles and implement EV infrastructure

WASTE MANAGEMENT

Reduce emissions from waste through lower consumption, less waste and effective resource recovery and treatment

SEQUESTRATION

Sequester carbon by tree planting, protecting forests, and by protection and restoration of wetlands and seagrasses

AGRICULTURE

Increase carbon sequestration and reduce livestock methane emissions

FIGURE 28: NINE CATEGORIES OF EMISSIONS SAVING FOR CLARENCE VALLEY LGA

7.2 Grid decarbonisation



Description

In NSW there are five coal-fired power stations with combined 10,240 MW capacity that supply most of the State’s electricity and make up the majority of electricity sector emissions (Liddell, Vales Point B, Eraring, Bayswater and Mount Piper). The state is largely self-reliant for power, with this supplemented by interstate links as and when required. Since 2010 three coal-fired power stations with 1,744 MW of capacity have closed in NSW (Wallerawang C, Redbank and Munmorah).

In recent years over 6,000 MW of wind and solar energy generation capacity has been built in NSW, together with nearly 2,350 MW of rooftop solar PV capacity, and in recent years rooftop solar installations have accelerated. A total of 11,000 MW of capacity in two Renewable Energy Zones was recently announced for the State’s Central West Orana and New England regions.

As more coal-fired power stations approach the end of their life – announced closures are in 2022, 2028, 2034, 2035 and 2043 respectively for the five active coal-fired power stations noted above – they will be replaced with mostly renewable energy. This is most likely to be from large-scale wind and solar PV, together with Distributed Energy Resources (DER) and demand-side measures.

Assuming this, the future carbon intensity of the NSW grid will decline, gradually until around 2035, then accelerating towards zero by the mid-2040s. The grid emissions intensity will be influenced by a range of factors, and AEMO’s Integrated System Plan 2020⁴⁴ (ISP2020) models five scenarios with differing assumptions for key influencing factors including demand drivers, DER uptake, emissions, large-scale renewable build cost trajectories, investment and retirement considerations, gas market settings and coal price settings, together with assumptions regarding policy settings and transmission infrastructure development.

The resultant scenario outcomes for closure of large-scale generators in the NEM is illustrated below, highlighting the potential for a rapid transition to renewables.

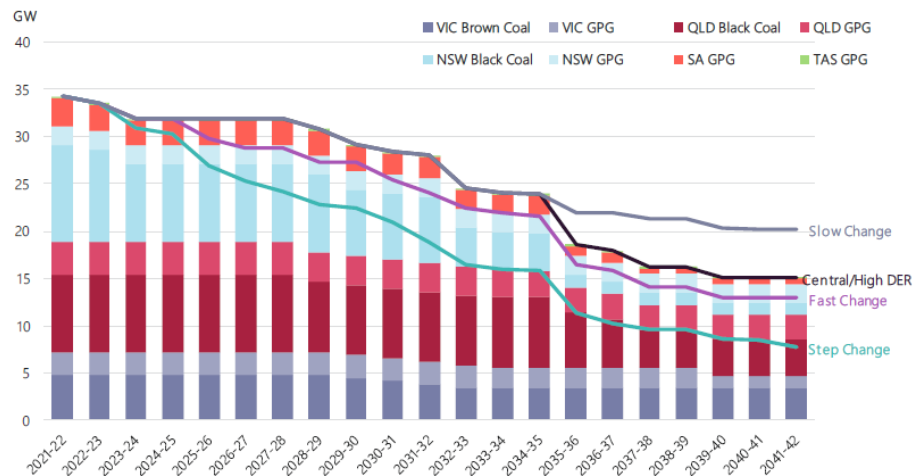


FIGURE 29: AEMO MODEL OF NEM COAL + GAS GENERATION CAPACITY & SCENARIOS⁴⁵

⁴⁴ AEMO: <https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp>

⁴⁵ AEMO, ibid

The NSW Government's *Electricity Infrastructure Investment Act 2020* may facilitate an even more rapid transition to renewables in NSW than the AEMO Step Change scenario, and future ISP forecasts will reflect any new scenario modelling.



Scope for abatement

The above potential scenarios for transitioning to renewables in the NSW grid and the associated reduction in carbon intensity would have a significant impact on GHG emissions in the Clarence Valley community. **A largely renewable energy grid, allied to electrification of transport would see much of the region's 633 kt CO₂-e from electricity and fuel be eliminated.**

Under most of AEMO's scenarios (excepting Step Change) the majority of this impact would not be seen until the late-2030s and in to the 2040s', and under a Step Change scenario this would still not be seen until the 2030s. Hence, if the Clarence Valley Community wants to see its emissions decline at a faster rate, then significant abatement through energy efficiency, more onsite solar PV and battery storage, and switching to electric vehicles powered with renewables will be required.



Risks and mitigation

A slower change to the carbon intensity of grid electricity could see a slower rate of change in emissions intensity of grid electricity. The community has little influence over the rate of change in the grid carbon intensity, and the main risk mitigation strategy is to try and build capacity across Clarence Valley to respond with local solutions to reduce emissions.

Community Climate Change Committee and business groups and Clarence Valley Council could have a role through advocacy for rapid change to the State's electricity supply mix where this can yield lower emissions and lower energy prices for consumers, potentially with other Councils and representative organisations.



Costs and benefits

There is no direct cost to the Clarence Valley community associated with decarbonisation of the electricity grid, excepting impacts on energy pricing in future.

7.3 Energy efficiency



Description

Energy efficiency remains the cheapest form of greenhouse gas abatement, and there are opportunities across all sectors and technologies to make energy savings.

Building energy efficiency studies typically show potential cost-effective savings of 30%+ from energy efficiency measures applied to existing commercial buildings, and similar or greater savings for existing residential housing stock (for example recent reports to COAG Energy Council^{46,47}).

With more than 25,000 homes and with more than 1,900 businesses occupying commercial building premises (half of employment in Clarence Valley is in the health / social services, retail, education, public administration, accommodation & food service sectors), this represents the level of savings potentially available to residents and businesses in the region.

Building energy efficiency measures can include:

TABLE 16: EXAMPLES OF BUILDING ENERGY EFFICIENCY MEASURES

Building Energy Services	Examples of Energy Efficiency Opportunities
Heating, ventilation and air conditioning (HVAC)	<ul style="list-style-type: none"> • Improved insulation and shading, including outdoor blinds • Building sealing to reduce air leakage • Choose optimum set temperatures for summer and winter • Energy-efficient split and packaged air conditioning units • Energy efficient chillers • Variable speed pumps and fans
Lighting	<ul style="list-style-type: none"> • LED lighting • Occupancy controls in offices • Daylight control in well-lit areas • Dimming controls – e.g. for external lights at night
Appliances and equipment	<ul style="list-style-type: none"> • Select efficient appliances – e.g. >5-Star • Use no-energy equipment such as clothes lines • Choose low standby power and unplug appliances at the wall after use

46

<http://coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/Trajectory%20Addendum%20-%20EY-Achieving%20Low%20Energy%20Existing%20Commercial%20Buildings%20in%20Australia.pdf>

47

<http://coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/Report%20for%20Achieving%20Low%20Energy%20Homes.pdf>

Metering and monitoring	<ul style="list-style-type: none"> • Monitor usage and take action when consumption is higher than normal • Set a target to reduce energy and track performance
Building Management Systems	<ul style="list-style-type: none"> • Optimise start and end times for energy equipment • Build in smart controls such as economy cycle, optimum start-stop and holiday programming
Hot water	<ul style="list-style-type: none"> • Heat pump hot water systems • Solar hot water • Optimise temperature set points • Insulate pipework

The region also has nearly 180 businesses involved in mining and manufacturing, as well as 979 businesses involved in agriculture. These businesses will also have energy efficiency opportunities in lighting, hot water, air conditioning and appliances. They will also typically have other industrial equipment and processes which offer scope for energy savings, including:

TABLE 17: EXAMPLES OF INDUSTRIAL ENERGY EFFICIENCY MEASURES

Building Energy Services	Examples of Energy Efficiency Opportunities
Electric motor systems, pumps, fans, etc	<ul style="list-style-type: none"> • Re-design of pipework and valve setup • Variable speed drive controls • Select premium efficiency motors
Process equipment	<ul style="list-style-type: none"> • Retrofit or upgrade to more energy efficient process technology or control • Upgrade motor systems in processes • Implement control / SCADA upgrades to optimise energy use
Refrigeration	<ul style="list-style-type: none"> • System insulation / sealing • Electronically commutated evaporator motors • High efficiency compressors, evaporator and condenser fans • Optimise temperature setpoints and head pressure controls • Air curtains & rapid-roll doors • Link lighting with cold room locking
Air compressors	<ul style="list-style-type: none"> • Reduce leaks • Energy efficient nozzles / controls • Use blowers or other methods to minimise compressed air use • Variable speed drive compressor • Heat recovery

In addition to existing houses and businesses, there is also scope for energy efficiency in new buildings. In NSW the potential savings has been estimated by ClimateWorks Australia to be between 19% and 56% depending on the type of building⁴⁸ compared with 2018 building code standards. Progressive changes to the National Construction code and potentially to BASIX over time can see savings in new buildings unlocked.

By 2041, there will be nearly 29,500 dwellings in the Clarence Valley, nearly 4,600 more than in 2016. This presents opportunities to lock in low energy / renewable energy solutions at design and planning stages for commercial buildings. Savings in new residential dwellings in NSW is subject to changes in BASIX by the NSW Government.

As part of the NSW Government's Net Zero plan, the NSW Government will target improvement in energy efficiency by:

- improving the Building Sustainability Index (BASIX) to provide a pathway to deliver cost-effective, low emissions outcomes for residential buildings.
- advocating for the expansion of the NABERS rating scheme to major building types including schools, retirement living, industrial warehouses, retail tenancies and supermarkets.
- establishing an expanded Energy Efficiency Program that will focus on initiatives that reduce electricity bills, ease pressure on the electricity grid and reduce emissions and will include support for vulnerable households and small businesses. The NSW Government will consider extending initiatives such as the Solar for Low Income Households or LED street lighting replacement through the Energy Efficiency Program.



Scope for abatement

As noted, studies of energy efficiency across sectors shows that cost-effective savings of over 30% in existing buildings and 19-56% in new buildings are feasible. A 30% saving in stationary energy equates to 105,000 t CO₂-e based on current greenhouse gas emissions from stationary energy. This potential increases, when taking into account new building in the region, and declines over time as the grid becomes greener.



Risks and mitigation

- Implementation of solar without consideration of energy efficiency can mean the business case / payback for efficiency measures is then weakened. Energy users can optimise their investments by considering energy efficiency as well as solar. For example invest in LED lights as well as solar PV, sized to meet the new estimated energy use after LEDs are installed.
- Just like solar, there are barriers to renters in houses and businesses that limit what they can do to improve their energy efficiency. Often they can only influence lighting and some appliance technologies (like TVs, washing machines and refrigerators), but cannot control air conditioning technology, hot water services, clothes dryers and thermal comfort

⁴⁸ https://www.climateworksaustralia.org/wp-content/uploads/2018/07/ASBEC-CWA-Built-to-Perform-Fact-Sheet_NSW.pdf

measures such as insulation. There is currently no mechanism to drive improved energy performance of existing rental homes. The NSW Net Zero Plan will include measures in the Energy Efficiency Action Plan that will seek to support energy efficiency measures in the residential sector.

- Access to information about potential opportunities, programs and incentives to support energy efficiency is often a key barrier to the uptake of energy efficiency opportunities. A range of opportunities exist to help increase / improve access to information that can help people make more informed decisions on energy using equipment, including via State Government programs under the Net Zero Stage 1 Plan, via Council's website or workshops, or via business and community groups, for example.



Costs and benefits

Energy efficiency is often referred to as 'the first fuel' and estimates of savings potential are based on what is estimated to be cost effective with existing technologies.

A saving of 30%+ in electricity use in the Clarence Valley could save residents and businesses around \$25 million annually. If this is taken to have an average payback on initial investments of four years, then a total investment of \$100 million could see this potential unlocked over time.

Of course, many energy efficiency measures come at little or no cost. Changing practices by energy users, draught-proofing houses and simple low-cost controls for energy systems in businesses can have a significant impact in terms of savings.

7.4 Behind-the-meter solar



Description

Solar PV is a well-established technology, and more than 20% of Australian homes and an increasing number of businesses are installing solar panels to reduce their grid energy costs and greenhouse gas emissions. Uptake of battery energy storage (BESS) remains low but is expected to become more cost effective in future.

As highlighted above, the Clarence Valley region has embraced solar energy, with nearly 39.5 MW of installed capacity, including 8,024 small systems, 401 systems larger than 10 kW and a single system larger than 100 kW as at September 2020.

According to modelling using Australian PV Institute (APVI) data, the opportunities available to the Clarence Valley community from solar PV is still largely untapped, despite the impressive achievements to date. In fact, APVI’s analysis indicates that there is scope for nearly 608 MW of solar panels, capable of generating 844,000 MWh of electricity. This is more than the electricity consumed by all homes and business in Clarence Valley, in addition to the electric-equivalent energy needed to meet all current on-road transport energy demand.

In order to illustrate what the Clarence Valley community could achieve if it continues to choose solar, three scenarios were modelled. As solar continues to become cheaper, battery storage becomes cheaper and electric vehicles start to become the norm, it is reasonable to expect that solar systems will increase in size. This is reflected in the rate of increase in solar generation in the three scenarios.

- **Scenario 1:** Steady uptake of solar in residential and business sectors, under which 45% of the available capacity in the region will be achieved by 2050 (including on new dwellings). In addition to current solar systems this will see:
 - 300 new residential solar PV systems installed every year with an average capacity of 7.3 kW, increasing by 0.3 kW every year
 - 105 new business solar PV systems installed every year with an average capacity of 30 kW, increasing by 0.6 kW every year
 - Under this scenario solar energy can generate 380,000 MWh of electricity by 2050

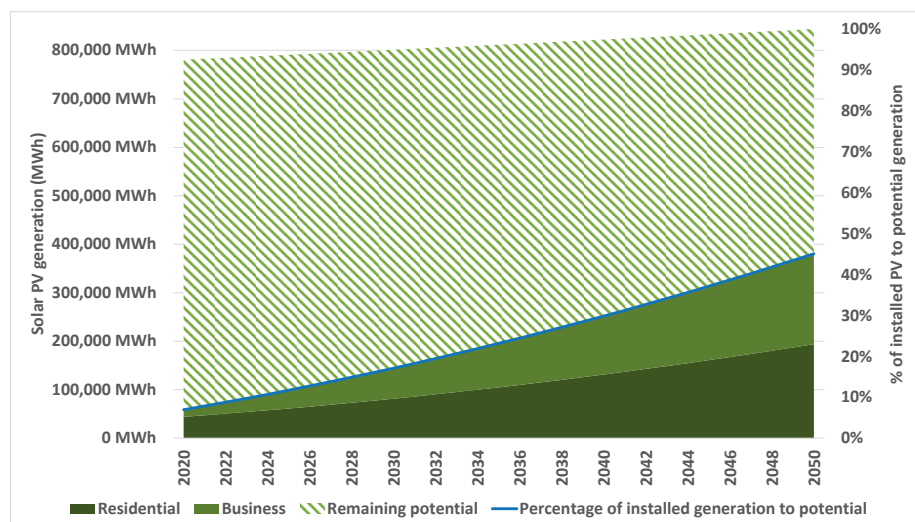


FIGURE 30: SCENARIO 1: 'STEADY' UPTAKE OF SOLAR PV IN CLARENCE VALLEY LGA

- Scenario 2:** Moderate uptake of solar in residential and business sectors, with an estimated 70% of the available capacity installed by 2050. This will see:
 - 400 new residential solar PV systems installed every year with an average capacity of 7.3 kW, increasing by 0.5 kW every year
 - 110 new business solar PV systems installed every year with an average capacity of 45 kW, increasing by 1.0 kW every year
 - Under this scenario solar energy can generate 589,000 MWh of electricity annually by 2050

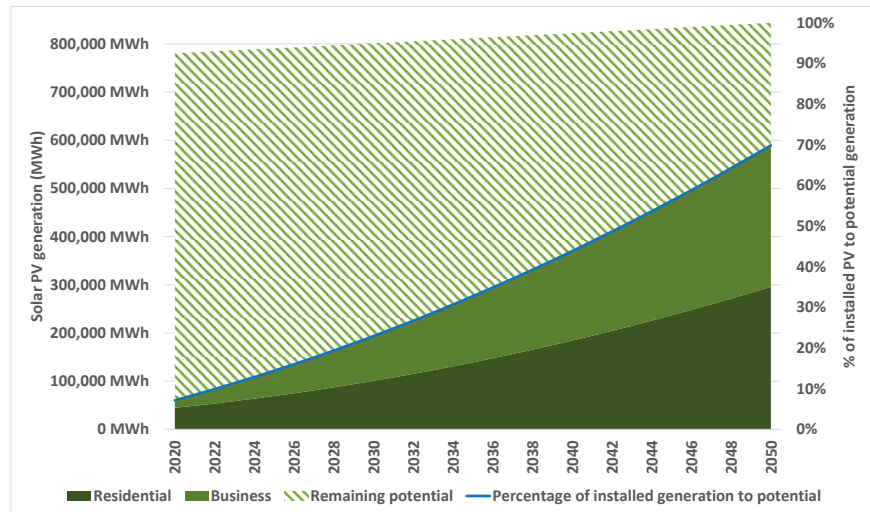


FIGURE 31: SCENARIO 2: ‘MODERATE’ UPTAKE OF SOLAR PV IN CLARENCE VALLEY LGA

- Scenario 3:** Accelerated uptake of solar in residential and business sectors, with 100% of the available capacity installed by 2050. This will see:
 - 617 new residential solar PV systems installed every year with an average capacity of 7.3 kW, increasing by 0.6 kW every year
 - 110 new business solar PV systems installed every year with an average capacity of 50 kW, increasing by 1.8 kW every year
 - Under this scenario solar energy can generate 861,000 MWh of electricity annually by 2050

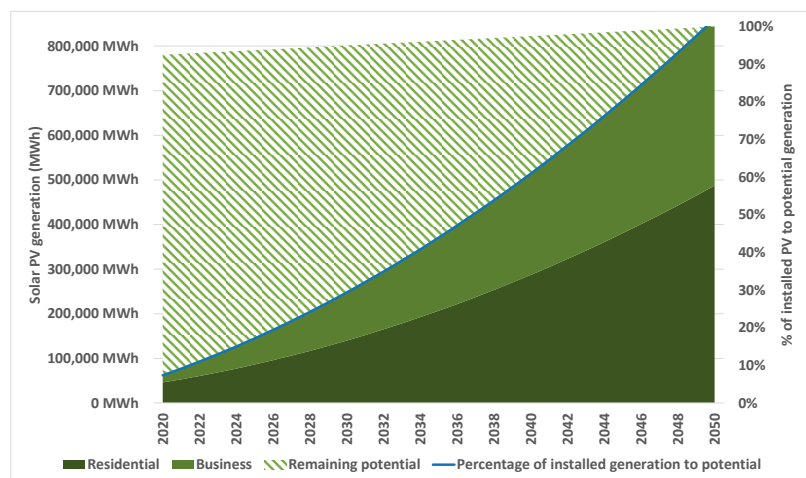


FIGURE 32: SCENARIO 3: ‘ACCELERATED’ UPTAKE OF SOLAR PV IN CLARENCE VALLEY LGA

The potential for solar PV to directly supply demand, to store for later self-consumption or export to the grid, and to power electric vehicles can be unlocked in numerous ways, with some examples highlighted below:

Increase solar PV uptake in separate homes and business, and in medium-density developments

- **Houses & small business**
 - Residential and small business energy rates are typically from 20-30c/kWh, with feed-in-tariffs (FiT) for solar exported to the grid typically around one-third of this or less. The combination of high electricity prices, FiTs and falling solar panel prices means that the business case for solar PV is stronger than it has ever been, and this is reflected in the uptake by the community to date.
 - In addition to houses and businesses installing solar for the first time, there is potential for houses and businesses who already have solar to expand their system and make more savings, particularly with batteries and electric vehicles.
 - Owner-occupiers are in the best situation to install solar.
- **Medium to large business**
 - Commercial and government premises often have good potential for solar PV because they satisfy several 'attractiveness' criteria for solar, such as:
 - Large roof spaces,
 - Long-term tenure and
 - High daytime energy consumption
 - In addition to business premises, there are numerous schools, early education and aged care facilities in the Clarence Valley. Co-benefits of schools installing PV include the education benefits that can be realised when the project outcomes are used within the education program.
 - Recently the NSW Government eased planning approval requirements for solar, lifting the threshold for Council approval from 10 kW up to 100 kW, lowering barriers to business installing solar on their premises.
- **Medium density housing**
 - Over 11% of dwellings in Clarence Valley are medium density, where it is more challenging to install solar. Solar can potentially be installed to service common property energy demand, or by agreement of the body corporate could be installed to serve the energy demand of some or all owners / tenants.
 - There are also opportunities for solar and storage solutions to be implemented as a 'behind-the-meter' solution with generated energy on-sold to residents.
 - Numerous apartment buildings have successfully installed solar PV solutions in recent years and this success can be replicated in Clarence Valley.

Increase solar PV uptake by renters & low income houses

- Renters are generally left out of the solar market as they have no authority to install solar on their premises and tend to not have the security of tenure that would make this a viable investment.
 - The Victorian Government recently unveiled the Solar for Rentals program⁴⁹ which offers landlords a rebate of up to \$1,850 for the installation of solar PV panels on their property. Eligible landlords can also apply for an interest free loan of up to \$1,850 to further reduce upfront costs. This program will incentivise landlords to invest in solar for their rental properties, furthermore, the interest free loan option allows for the loan repayment to be split between the renter and the landlord up to a maximum of 50%.
 - Other models for increasing solar PV uptake by renters include Solar for Rentals (previously SunTenants) by Solar Analytics, in which owners install PV systems and see a return via increased rental payments that are lower than the cost savings made by the lessee. In this way both parties receive a benefit. In the Solar for Rentals model, they act as the intermediary handling the metering and monitoring, as well as payment transactions
- Low income houses are similarly disadvantaged in gaining access to solar, often due to renting their home, and also limited access to capital to install solar even if permitted to do so.
 - Enova, a community electricity retailer in Northern NSW, has developed a 35 kW 'solar garden' system on a 19-home social housing development in Lismore. This delivers savings to the 19 tenants, four community organisations and North Coast Community Housing
 - The NSW State Government, in partnership with the Land and Housing Corporation (LAHC) and Aboriginal Housing Office, has installed solar PV on about 5,000 social and Indigenous housing properties across regional NSW, in a program that commenced in 2017.

Models such as these – and others – offer a way into the market for tenants in both housing and business situations.

Battery storage

Battery storage allows for the implementation of larger solar PV systems, which results in greater emissions reduction. The main targets at present are residential (stand-alone, in micro-grids and in Virtual Power Plants or VPPs), and utility-scale. There may be a role for batteries (fed from off-peak electricity, as well as solar) in resolving local network and transmission-level constraints. This could further enable renewables uptake.

The NSW Net Zero plan outlines the establishment of the Energy Security Safeguard (Safeguard), which will extend and expand the existing Energy Savings Scheme (ESS) under the Safeguard name. The Safeguard will support the uptake of demand shifting and peak reduction technologies such as household batteries. Furthermore, NSW is

⁴⁹ <https://www.solar.vic.gov.au/solar-rental-properties>

currently piloting the Empowering Homes program⁵⁰ in the Hunter region, where participants are given interest free loans of up to \$14,000 for a solar and battery system. On completion of the pilot the program will roll out to the rest of NSW for up to 300,000 households, reducing the barriers to entry for household batteries.

The current residential payback is around 10+ years. Recent price trends⁵¹ for residential storage shows limited price reduction over the last few years for batteries.

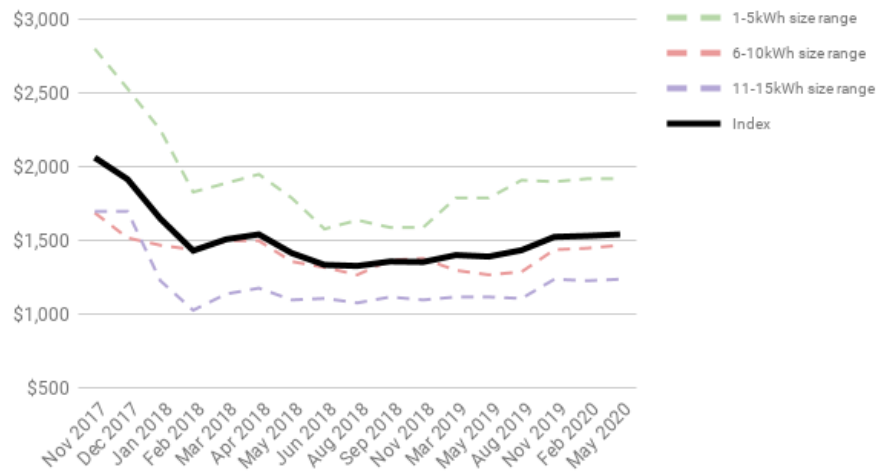


FIGURE 33: RECENT BATTERY + INVERTER PRICE TRENDS FOR SMALL-SCALE SYSTEMS

Financial incentives will help to drive uptake of battery storage until prices decline and the need for support drops (as has been seen in South Australia for example). Greater uptake of batteries will help to unlock the potential savings for consumers, potentially including:

- More self-consumed ‘free’ energy,
- Peak demand reduction savings for business,
- Payments for participating in grid support,
- Payments for participating in Virtual Power plants (VPP),
- Top-up with offpeak power to use in peak charging periods,
- Peer-to-peer (P2P) trading, allowing energy to be shared with others subject to regulatory change

Several states in Australia have developed incentive programs to increase uptake of Battery Energy Storage System (BESS). These programs target homeowners and business owners to assist them financially when investing in BESS. Some programs provide subsidies or rebates while others provide interest free loans or feed-in-tariff rates. Examples of current programs are highlighted below.

⁵⁰ <https://energysaver.nsw.gov.au/households/solar-and-battery-power/empowering-homes-solar-battery-loan-offer>

⁵¹ Solar Choice Battery Price Index – May 2020 - <https://www.solarchoice.net.au/blog/battery-storage-price#:~:text=Solar%20Choice's%20Battery%20Storage%20Price,batteries%20are%20worth%20their%20while.>

TABLE 18: STATES' BATTERY FINANCIAL INCENTIVES 2020

State	Incentive program	Scheme summary
NSW	Empowering Homes solar battery loan offer ⁵²	Loan of up to \$14,000 for solar PV and battery system Loan of up to \$9,000 for retrofitting a battery system
ACT	Next Generation Energy Storage Grants ⁵³	Maximum incentive of \$24,750 based on \$825/kW for storage
SA	Home Battery Scheme ⁵⁴	Maximum battery subsidy of \$3,000, decreasing as uptake rises
VIC	Solar Homes Program (Battery) ⁵⁵	Maximum subsidy of \$4,171 for solar battery
WA	Distributed Energy Buyback Scheme ⁵⁶	Feed-in-tariff of up to 10 cents/kWh for residential battery installations
NT	Home and Business Battery Scheme ⁵⁷	Up to \$6,000 for battery installations



Scope for abatement

The abatement potential if the full APVI-modelled capacity is implemented exceeds current fuel and electricity demand in Clarence Valley. Even if a 'steady' growth in solar is seen over the next 30 years emissions in the Clarence Valley can be reduced by an estimated 342 Mt CO₂-e based on current grid emissions intensity.

Although over 37% of dwellings have installed solar and this figure is growing, suggested targets for solar in the region may be better expressed as the percent of the total potential for generation that has been implemented. For example, set solar sub-targets of 30% of the generation potential by 2030, 50% by 2040 and 70% by 2050.



Risks and mitigation

Risks include:

- Solar and battery system installations carry 'normal' risks associated with such installations, and appropriate safe work plans and methods will apply in all cases.
- Modelled estimates are based on roof area and will not necessarily account for factors such as electrical system constraints, current electrical and metering systems, heritage, roof structures, ownership / tenure, on-roof objects and others. On-ground assessment of individual factors will determine site-by-site feasibility and other works required to make solar and batteries a feasible option.
- Some of the most significant risks to realising the solar potential relate to rental, low income and medium to high density dwellings, with information, split

⁵² <https://energysaver.nsw.gov.au/households/solar-and-battery-power/empowering-homes-solar-battery-loan-offer>

⁵³ <https://www.actsmart.act.gov.au/what-can-i-do/homes/discounted-battery-storage>

⁵⁴ <https://homebatteryscheme.sa.gov.au/>

⁵⁵ <https://www.solar.vic.gov.au/solar-battery-rebate>

⁵⁶ <https://www.wa.gov.au/organisation/energy-policy-wa/household-renewable-energy-overview>

⁵⁷ <https://nt.gov.au/industry/start-run-and-grow-a-business/grow-your-business/business-grants-and-funding/home-and-business-battery-scheme>

incentive and other barriers leading to much lower uptake compared with owner-occupier dwellings and business. State, local governments and community & business advocates all have roles to play in helping to overcome these barriers and ensure all sections of the community have access to this opportunity.



Costs and benefits

- Solar PV on owned homes and businesses has been demonstrated to be a cost-effective solution, with paybacks of typically three to six years.
 - More work is needed to make solar models for tenants viable for both tenants and owners and to overcome split incentive and information barriers that result in low uptake.
 - Batteries remain cost prohibitive in most cases, and most States have some form of incentive / subsidy scheme aimed at increasing uptake that will drive battery prices down and unlock new cost saving opportunities.
 - Electric vehicles remain expensive, however in the near future this will no longer be the case. The business case for expanding solar PV systems and installing batteries to provide 'free' fuel to motorists will improve over time.
-

7.5 Buying clean energy



Description

Electricity consumption accounts for 35% of the Clarence Valley community’s carbon footprint. **The single biggest opportunity to reduce electricity emissions is to purchase renewable energy** and/or renewable energy offsets. There are multiple ways that clean energy can be purchased. The most obvious example for households and businesses is GreenPower®, although uptake has historically been low because of the added costs for this. There is also an option to purchase carbon-neutral electricity. This is achieved by the electricity retailer purchasing Australian and overseas carbon offsets (not necessarily based on renewable energy) to make their retail electricity supply carbon neutral. This option is currently only available from a few electricity retailers. As part of the NSW NetZero plan, enhancements will be made to the EnergySwitch program which will show the emissions performance of different electricity and gas retailers making it easier for consumers to choose retailers with lower emissions.

In recent years other opportunities have emerged, including renewable energy buyers’ groups, and corporate PPAs where (typically) large corporations are entering into Power Purchase Agreements with renewable energy developers and retailers. Purchasing groups are still a new idea. Establishing a corporate PPA is complex, time-consuming and contains approaches and risks not previously considered by most consumers. These take time and resources to resolve. Retail PPAs aimed at mid-sized energy users are also emerging.



Scope for abatement

Theoretically, all of the Clarence Valley LGA’s energy demand can be met by purchasing renewable energy. This could include existing and new electricity demand, and future fuel switching for passenger vehicles to electric vehicles (EVs) or to hydrogen made with renewable electricity.

Practically, this transition will take time. Buying renewable energy is typically more expensive for small energy users, so many users simply choose the least cost offer available to them. It is currently large users and buying groups with large purchasing power who are seeing cost savings from buying renewables. However the electricity market for renewables is rapidly evolving and it will become increasingly feasible for smaller energy users to benefit.

The time to transition to electrification of vehicles supplied with renewable electricity is likely to take decades. In most cases this will occur when decisions are taken to replace old vehicles, where there is a cost-benefit to the user, incentives, cash or finance to pay any premium for low emissions technology, and availability of electric vehicles that meet users’ requirements.



Risks and mitigation

Some potential risks include:

- Cost of renewable energy for smaller users such as households and small business does not fall to the same level as ‘regular’ electricity offers and uptake is low.
- It is difficult to measure the success of any initiatives to get the community to purchase renewables.

- As with grid decarbonisation, there is a risk that the transition to renewables does not occur quickly, and there is slow development of new renewables leading to low availability of renewable energy to purchase.

Mitigation of these risks can include:

- Large energy users such as Clarence Valley Council may be in a position to 'lead by doing' by entering into a renewable energy PPA, if energy prices and risk are no different than regular power supply offers.
- Multiple medium to large energy users may be able to join a buying group to source power under a renewable energy PPA. For example the Melbourne Renewable Energy Project (MREP) includes numerous businesses and local councils in the Melbourne area.
- Surveys could be carried out periodically of the residential and business community to get an insight into awareness and uptake of renewable energy purchasing.



**Costs and
benefits**

- There are typically cost premiums for Greenpower® and carbon neutral electricity, so the user agrees / decides they wish to pay more for their energy to come from renewables
 - Many renewable energy PPAs are over contract periods from 7-15 years, and are usually compared with forecasts models of the wholesale electricity market over several years. Anecdotally most PPAs deliver cost savings to their customers, though this will depend on risk mitigation measures taken, as well as actual wholesale and LGC prices compared with forecasts developed at the time deals were entered into, compared with agreed renewable energy prices.
-

7.6 Community and regional clean energy generation



Description

Community energy

Community energy projects provide opportunities for residents and businesses to participate in local efforts to implement clean energy and bring economic benefits to the region. Across Australia, and across NSW numerous communities are participating in projects and efforts to increase renewables, increase local participation and literacy, and increase regional economic benefits.

Community energy can involve energy supply projects such as renewable energy installations and storage, and energy reduction projects such as energy efficiency and demand management. Community energy can even include community-based approaches to selling or distributing energy – e.g. Enova Energy, established in 2016.

Models of community energy that have been delivered and are being developed across Australia have varying financial, contractual, technical, technology, scale and ownership arrangements. Interest in community energy projects is high, and well over 100 projects have been implemented in recent years.

There is a significant body of information and ‘how to’ available through the [National Community Energy Strategy](#), the [Community Owned Renewable Energy \(CORE\) guide](#), and the updated [Small Scale Community Solar Guide](#), which were developed by the [Coalition for Community Energy \(C4CE\)](#)⁵⁸. ARENA has also sponsored a [Community Renewable Energy Financing Toolkit](#), which was developed by Frontier Impact Group.

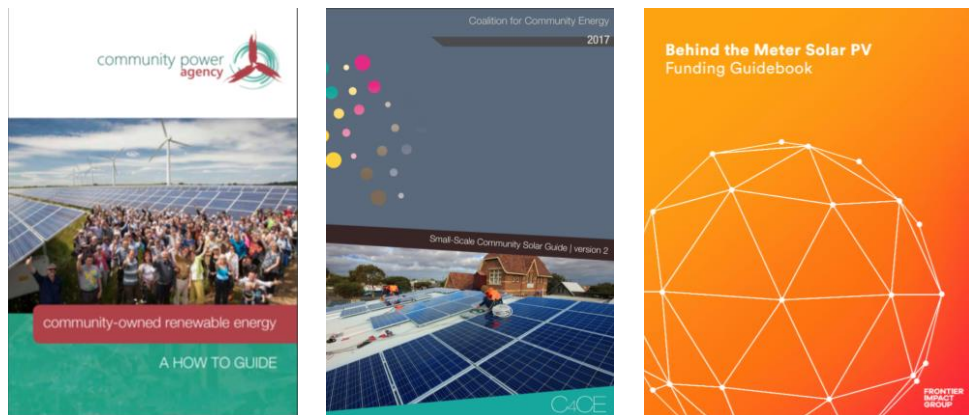


FIGURE 34: COMMUNITY ENERGY GUIDANCE MATERIALS

There are numerous examples of community energy projects across Australia, including prominent projects such as Lismore City Council and Farming the Sun’s floating solar array at the East Lismore treatment plant, and Enova Energy’s North Coast Community Housing (NCCH) Solar Garden. These projects showcase

⁵⁸ The National Community Energy Strategy was a collaboration of the Institute for Sustainable Futures (UTS), Embark, Repower Shoalhaven, Moreland Energy Foundation, ClearSky Solar Investments and Starfish Initiatives, funded by ARENA. The solar guide from this publication was updated in 2017, written by Community Power Agency as a collaborative effort with Pingala, Starfish Initiatives, Macedon Ranges Sustainability Group, The Hub Foundation in Castlemaine, CORENA, Repower Shoalhaven, Bendigo Sustainability Group and Environmental Justice Australia.

innovative projects in the north coast area that could inspire other local regional projects to be initiated.



FIGURE 35: NCCH SOLAR GARDEN & LISMORE’S FLOATING SOLAR⁵⁹

Recently, Regional Community Energy Fund (RCEF) grants were awarded to seven projects across NSW. These projects are worth around \$15.4 million, and will lead to the development of 17.2MW in electricity generation and up to 17.9MW/39.3MWh of energy storage. Funding supplied by NSW Government will leverage a further \$36 million in private investment. These projects are tabulated below⁶⁰.

TABLE 19: REGIONAL COMMUNITY ENERGY FUND GRANT RECIPIENTS

Recipient	Project Title	Primary technology and capability	Location (closest town)
Byron Bay Solar Farm Holdings	Byron Bay Solar Farm + Battery Storage Facility	5 MW Solar PV 5 MW / 10MWh battery	Ewingsdale
Energise Gloucester	Gloucester Community Solar Farm	0.5 MW Solar PV	Gloucester
Community Energy for Goulburn	Goulburn Community Dispatchable Solar Farm	1.2 MW Solar PV 0.4 MW / 0.8MWh battery	Goulburn
Pingala - Community Renewables for Sydney	Haystacks Solar Garden	1 MW Solar PV	Grong Grong
Manilla Community Renewable Energy	Manilla Community Solar	4.5MW Solar PV 4.5 MW / 4.5MWh battery 2 MW /17MWh hydrogen energy storage system	Manilla
ITP-NHT DevCo	Orange Community Renewable Energy Park	5 MW Solar PV Up to 5 MW / 5 MWh battery	Orange
Enova Community Energy Ltd	Shared Community Battery Scheme	1 MW / 2MWh battery	Regional NSW

⁵⁹ Sourced from <https://www.ncch.org.au/> and <https://www.ciel-et-terre.net/>

⁶⁰ Sourced from <https://energy.nsw.gov.au/renewables/clean-energy-initiatives/regional-community-energy>

Regional clean energy generation

The announcement of Renewable Energy Zones (REZ) by the NSW Government will see around 11,000 MW of new renewable energy generation developed in New England and Central West Orana in coming years. In AEMO’s Integrated System Plan (ISP2020) they highlight nine potential REZs’ in NSW over the long term including three in the north and central areas of the state, with wind, solar, battery storage and pumped hydro projects all potentially being developed.

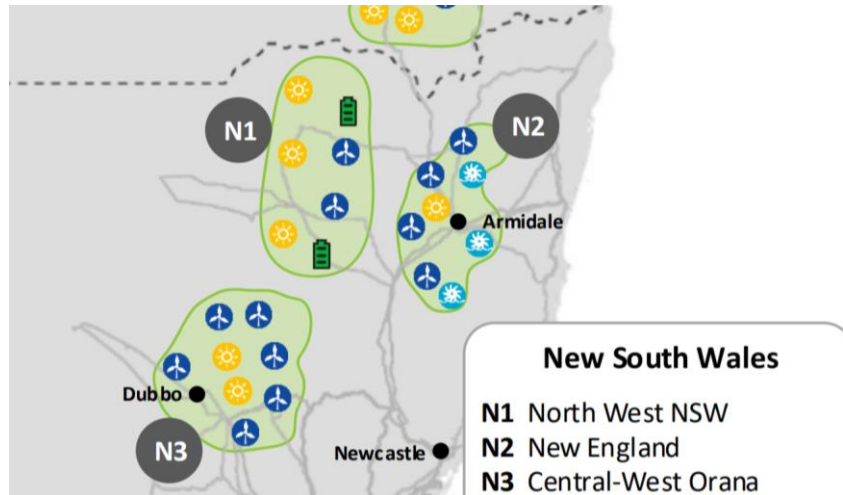


FIGURE 36: POTENTIAL NORTH & CENTRAL NSW REZ⁶¹

In addition to providing opportunities for employment in the region in coming years, many regional renewable energy projects involve both community co-investment as well as Community Enhancement Funds (CEF) to support the development of community initiatives. The Australian Wind Alliance (AWA) highlights some of the initiatives that can be supported by a CEF in a local community.

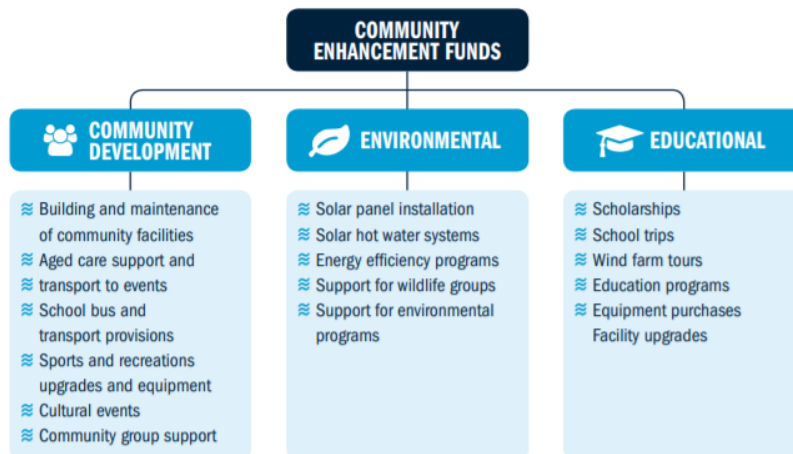


FIGURE 37: POSSIBLE USES OF A COMMUNITY ENERGY FUND (CEF)⁶²

⁶¹ Sourced from <https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp>

⁶² Australian Wind Alliance, Building Stronger Communities: Wind’s Growing Role in Regional Australia

Future large-scale renewable energy generation projects in the region may offer opportunities for co-investment (subject to boundaries for eligible investors) and/or CEFs (subject to local renewable energy generation opportunities).

Locally, efforts are being made to investigate the potential for the Nymboida hydroelectric power station to be re-commissioned. This former 5 MW power station generated clean energy from the 1920s until it was closed in 2013.



Scope for abatement

The scope for abatement of the Clarence Valley LGA would depend on the scale and type of community energy projects, and treatment of LGCs generated from projects developed in the region.

It is likely that abatement from community energy initiatives will be relatively small, however the flow-on benefits from community energy, as well as from co-investment and from support provided via CEFs from large-scale renewable energy projects, are potentially significant. These include increased literacy, potentially leading to wider uptake of DER in the community and accelerated decarbonisation, improved local economies and improved social outcomes.



Risks and mitigation

Risks associated with community energy projects include:

- Resources – often led by volunteer efforts in the community. Capacity building and building support locally to invest time in these projects is challenging
- Finding host / suitable sites – in many cases a host who can absorb the power generated is better from a financial perspective, however some models want to show tenants how they can participate in renewables and electricity is generated direct to the grid (e.g. solar gardens)
- Technical & regulatory risks relating to technology selection, grid connection, project registration, business case assessment, engaging with solutions providers and determining the best fit
- Legal, contractual and financial risks are numerous and complex, and need people with the right expertise and time to invest in understanding and managing these

These are examples and other risks may apply and would need to be identified, assessed and managed / mitigated as part of the project development. The resources highlighted above are aimed at helping proponents of community energy to step through all project development steps so that these can be overcome.

Within Clarence Valley, community members and groups, businesses, community energy retailers and Clarence Valley Council may all have roles to play in developing these opportunities. For example, Council could assist by:

- Providing information via its website on community energy and links to key sites and case examples.
- Facilitating presentations by community energy organisations who wish to explore opportunities in the LGA.

- Providing meeting spaces and potentially expertise to help community groups progress a project – e.g. grant application.

For regional renewable energy generation projects that go ahead in coming years, the main aspects that would need to be considered include employment opportunities for Clarence Valley locals, and any opportunities to co-invest or see local communities benefit from regional projects where applicable.

**Costs and
benefits**

The benefits of community energy projects are that they demonstrate leadership, make renewable energy affordable for participants, and provide a fair return on investment for community investors. They provide accessibility to renewable energy for people who cannot install solar PV. They also forge new community partnerships, provide energy education and literacy, local sustainable investment and showcase a model for further community energy projects.

7.7 Sustainable transport



Description

According to BZE emissions from transport in the Clarence Valley LGA were 287,800 t CO₂-e in 2018/19, with nearly all of this associated with road transport. There is no further breakdown by type of vehicle. As noted above, data collected by Roads and Maritime Services (RMS⁶³) show that at the end of 2018/19 there were 60,673 vehicles registered in Clarence Valley.

TABLE 20: RMS DATA ON REGISTERED VEHICLES IN CLARENCE VALLEY AT END 2018/19

Category of Vehicle	Vehicle Type	Clarence Valley	
Light Vehicles	<i>Passenger Vehicles</i>	17,542	
	<i>Off-road Vehicles</i>	13,248	
	People movers	326	
	Small Buses	230	
	Mobile Homes	195	
	Motorcycles	1,852	
	Scooters	44	
	<i>Light Trucks</i>	8,287	
	Light Plants	18	
	Light Trailers	16,733	
	Other Vehicles	4	
	All	58,480	
	Heavy Vehicles	Buses	141
		<i>Heavy Trucks</i>	1,236
<i>Prime Movers</i>		245	
Heavy Plants		59	
Heavy Trailers		513	
All		2,194	
All Vehicles	Grand Total	60,673	

Vehicles that will lead to the highest consumption of fuel are highlighted in ***bold + italics***, and include passenger vehicles, off-road vehicles such as utility vehicles, light trucks, heavy trucks and prime movers, together making up a little over 40,000 registered vehicles.

A range of measures can help to reduce greenhouse gas emissions from transport. These include, for example:

- Changing to low and zero-emissions vehicles, including small cars, hybrids, electric vehicles (powered with renewables) and hydrogen vehicles (e.g. heavy vehicles)
- Demand control measures like reduced car-pooling, car-sharing, and driver education
- Improved and increased public transport, and
- Increased active transport such as walking and cycling, including the development of infrastructure for safe bike use in Clarence Valley towns

⁶³ https://www.rms.nsw.gov.au/about/corporate-publications/statistics/registrationandlicensing/tables/table1111_2019q4.html

As part of the NSW Net Zero plan, the state government has developed the *Electric and Hybrid Vehicle Plan*⁶⁴ which is focused on three key areas:

- vehicle availability
- charging points, and
- customer information

The NSW Government will expand this by developing the *Electric Vehicle Infrastructure Model Availability Program*⁶⁵. This program will assist:

- Co-funding of EV fast charging infrastructure
- Encouraging fleet owners to procure EVs
 - These fleet vehicles are owned for 3-5 years only which will create a second-hand market for EVs to garner further sales in EVs
- Supporting amendments to BASIX to ensure new homes are EV-ready

Further, in the *Future Transport Strategy 2056* prepared by the NSW Government, the following are plans in the transportation sector to achieve the objectives of the Net Zero plan:

- Encourage a shift from private car use to public transport
- Promote low emission vehicles
- Transition to a cost-effective, low emission energy supply, using power purchasing to increase renewable energy mix (e.g. energy use in trains)
- Work with industry partners on new fuel-efficient vehicle technologies and transition to a low emissions passenger vehicle fleet.

In June 2021 the NSW Government announced \$490 million in funding, which includes:

- Waiving stamp duty on eligible EVs under \$78,000
- \$3,000 upfront rebates on 25,000 eligible EVs under \$68,750
- \$171 million for EV charging incl \$131 million for ultra fast charging
- \$33 million to help shift government fleets to electric
- 50% target for new vehicles to be EV by 2030, and
- No new road user tax until 30% of new vehicle sales are EV

Current EV charging infrastructure in Clarence Valley

Data by the Electric Vehicle Council indicates there are currently a small number of EV chargers in the Clarence Valley local area, including an NRMA DC rapid charger at the Council's Grafton Regional Library.

⁶⁴ <https://future.transport.nsw.gov.au/plans/nsw-electric-and-hybrid-vehicle-plan>

⁶⁵ <https://electricvehiclecouncil.com.au/nsw-government-shows-real-leadership-with-ev-incentives-in-net-zero-plan/>

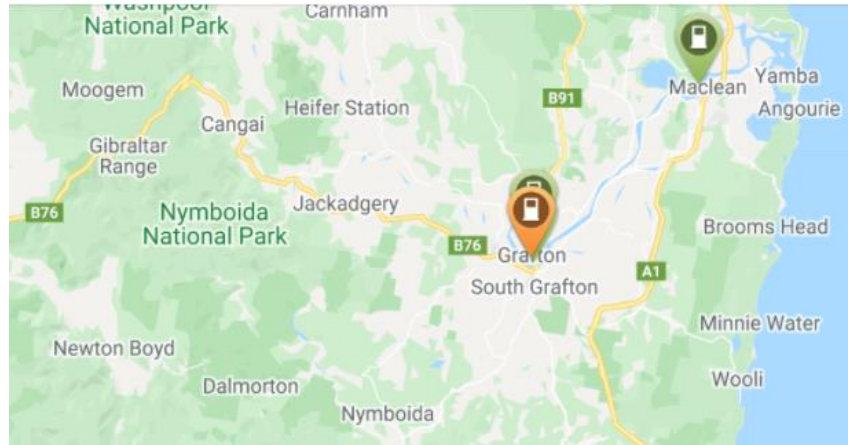


FIGURE 38: EV CHARGERS IN CLARENCE VALLEY LGA – ELECTRIC VEHICLE COUNCIL

Current and continued growth in EV charging infrastructure by government (local and State) and by private operators (e.g. holiday parks, motels, shopping centres) will facilitate uptake of EVs.

Projected growth in electric and fuel cell vehicles

CSIRO’s updated projections for AEMO’s forecasting of electricity market scenarios⁶⁶ includes updated forecasts for electric and fuel cell vehicles (principally Hydrogen). Their projected sales share for all electric vehicle types is shown below. A key takeaway from this chart is the **strong likelihood of rapidly increasing EV sales during this current decade** under most scenarios.

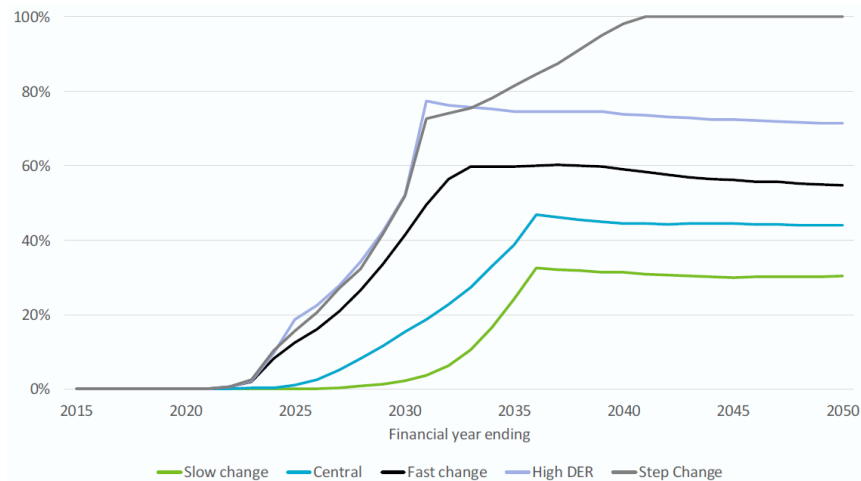


FIGURE 39: PROJECTED SALES SHARE OF ELECTRIC VEHICLES BY AEMO SCENARIO (CSIRO)

Modelling by CSIRO also includes forecasts of national EV and fuel cell vehicles under each scenario, highlighting that passenger vehicles will dominate sales volumes, followed by light commercial vehicles. Within these forecasts Long-range and short-range battery electric vehicles (SREVs and LREVs) will dominate, and Plug-in Hybrid Electric Vehicles are forecast to account for a small fraction of sales

⁶⁶ CSIRO 2020, Projections for small-scale embedded technologies, Paul Graham and Lisa Havas June 2020

under all scenarios. Numbers of fuel cell vehicles in all scenarios are small, but since they mostly power heavy vehicles their impact on future electricity use is large.

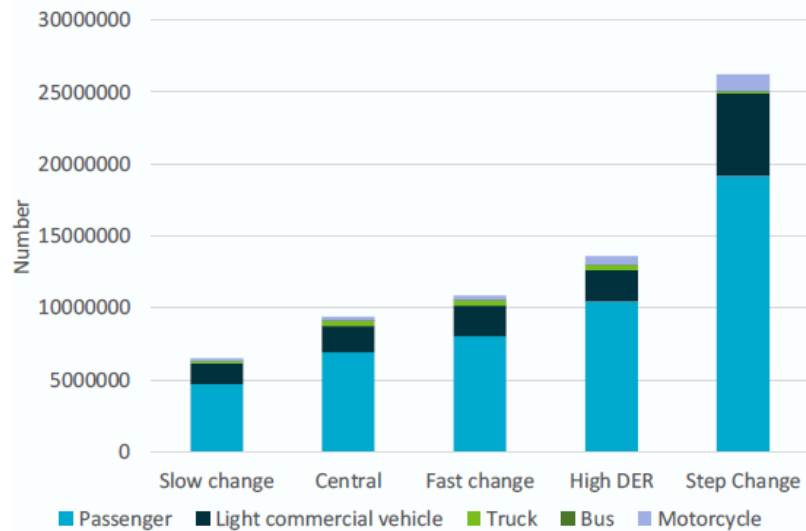


FIGURE 40: PROJECTED ELECTRIC AND FUEL CELL VEHICLES BY MODE (CSIRO)



Scope for abatement

The overall scope for greenhouse gas emissions reduction from transport is significant in the long term, however while zero emissions is a long term target under the State’s net zero goal by 2050, the short to medium term scope for abatement is more modest.

The speed of emissions reduction will depend on the rate of adoption of EVs and hybrids, and on selection of renewable energy as the fuel source. This in turn will depend on programs that support EV infrastructure, purchasing and leasing, consumer information, as well as model availability and serviceability in regional areas.



Risks and mitigation

- Many of the key risks – such as EV charging, making homes EV-ready, prices for electric vehicles, and model availability are acknowledged and are the focus of much of the NSW Government’s efforts to stimulate this market.
- Model availability and serviceability *in regional areas* is an important factor in Clarence Valley, and engagement by Council and business groups for example with State Government programs is encouraged to help ensure that regional aspects are adequately assessed in developing support measures for EVs.
- Close to one third of registered vehicles (excluding trailers) in Clarence Valley are off-road, such as utility vehicles. EV model availability for these vehicles is limited at this time, and most major manufacturers do not have full-electric models in their fleet at this time. This potentially slows the rate of EV uptake compared with areas having much higher proportion of on-road passenger vehicles.
- Measurement of the abatement from transport at an LGA level is inherently difficult, and modelling at higher (State or national) levels may fail to show local success in promoting and adopting EVs. Other more

localised measures of the success of sustainable transport measures may be required.

- While the change to EVs may be able to be tracked, it will be more difficult to know what is supplied from renewables (purchased or rooftop) v regular grid power.



Costs and benefits

EVs and Hybrids are currently selling at premiums to ICE vehicles, however as more options come into the market, it is likely that the costs for EVs and Hybrids will become cost competitive. The added value of reduced maintenance costs of EV vehicles is also likely to increase uptake.

Some forecasts of EV pricing suggest that price parity for passenger vehicles will be reached by the mid-2020s.

7.8 Waste management



Description

According to the NSW Government’s Net Zero Plan Stage 1: 2020–2030⁶⁷:

- *Organic waste, such as food scraps and garden trimmings, makes up about 40% of red-lidded kerbside bins. When sent to landfill, the decomposing material releases methane that may not be captured. However, when this waste is managed effectively, through proper composting and recycling processes, methane emissions can be substantially reduced, soils can be regenerated to store carbon and biogas can be created to generate electricity.*

According to modelled estimates by BZE, emissions from waste in Clarence Valley LGA are 24,800 t CO₂-e, with 18,000 t CO₂-e related to landfill and the balance from wastewater. Since Clarence Valley Council operates both the region’s main landfill as well as wastewater treatment, a second dataset exists, and for 2018/19 emissions from landfill as measured by Council are similar to the modelled BZE figures.

For the Grafton Regional Landfill site, methane generated from waste is collected and flared in order to reduce emissions. This system has been in place for a number of years, and continues to capture and combust gas generated at the landfill from legacy and non-legacy waste.

Helping to further drive emissions from waste down, the NSW Government’s Net Zero Plan has a commitment to setting a target of net zero emissions from organic waste by 2030. Measures that the Net Zero Plan highlights for implementation in order to achieve this include:

- *support local councils to provide communities with best-practice food and garden waste management infrastructure*
- *ensure composts or other organic soils are of the highest quality for land application*
- *facilitate the development of 'waste to energy' facilities in locations that have strong community support, provided those facilities meet strict environmental standards*
- *update regulatory settings to ensure residual emissions from the organic waste industry are offset.*

The plan outlines that opportunities for local processing will be fully explored and that disposal costs for Councils and ratepayers will be minimised.

These targets would build on pre-existing targets under the EPA’s 2014-2021 WARR Strategy, including:

- avoiding and reducing the amount of waste generated per person in NSW
- increasing recycling rates to 70% for municipal solid waste and 70% for commercial and industrial waste, and
- increasing waste diverted from landfill to 75%.

⁶⁷ <https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan>

Reducing emissions from wastewater will depend on measures that Clarence Valley Council is able to develop and implement, and may require monitoring, process and technology changes over the long term to be feasible.



Scope for abatement

In the context of the community's overall greenhouse gas emissions, waste is a small fraction. However waste is highly visible, has numerous aspects other than carbon emissions, and is an environmental and sustainability issue that engages much of the community.

So the overall scope for abatement is small – up to 18,000 t CO₂-e per annum if emissions from organic waste currently sent to landfill are reduced to zero, and higher if emissions from wastewater can be reduced.



Risks and mitigation

Efforts to increase recycling rates, divert waste from landfill and to flare methane generated at the Grafton Regional landfill have already helped to reduce emissions from waste in the region.

Achieving further reductions will depend on successful collaborations between State Government and Clarence Valley Council as well as other regional councils in relation to post-collection side measures (100% organics processing, material recovery), and the ability for further MSW processing technologies and/or waste-to-energy technologies to satisfy EPA requirements.

It will also depend on the success of consumer side infrastructure and education measures (i.e. waste reduction/reduced consumption, household composting/worm farms, 100% recycling rates).



Costs and benefits

The costs and benefits of waste reduction measures for Clarence Valley Council are not known at this time and are not assessed here. These would be assessed for identified key opportunities between key stakeholders such as council and the State Government.

7.9 Agriculture



Description

Greenhouse gas emissions from agriculture in Clarence Valley are estimated to be 115,500 t CO₂-e, equal to 15% of the LGA's carbon footprint. The major agriculture activities in the region that will give rise to these emissions are beef and cattle farming, and cropping – particularly sugar cane.

Methane and nitrous oxide emissions associated with livestock farming, as well as potentially from lime application, fertiliser application and residue burning in sugar cane farming as part of farming operations may all be relevant in terms of emissions from this sector.

In livestock farming research has and is being conducted to measure methane emissions, and to identify potential abatement measures, including by the Commonwealth Government, CRCs and partners in industry and academia⁶⁸. Recently (August 2020) CSIRO formed of a new company to commercialise a livestock feed additive made from the seaweed, which has reported methane emissions reduction in beef and dairy cattle of over 80% in research trials. These, farming methods such as regenerative agriculture and rotational cell grazing, and other opportunities associated with land and soil management can reduce emissions from agriculture in the region.

In sugar cane growing some of the opportunities to reduce the sector's emissions⁶⁹ may include fertiliser reduction (particularly nitrogen), elimination of cane burning, optimisation of transport routes / distances, and potentially production of biogas from wastes. The sector has had engagement with carbon reporting, abatement and sequestration initiatives for many years, such as the Renewable Energy Target (cogeneration from bagasse), Carbon Farming Initiative and others, and is aware of its opportunities to cost-effectively reduce emissions.

In its Net Zero Plan 2020-2030 the NSW Government has committed to developing a *Primary Industries Productivity and Abatement Program* focused on:

- commercialising low emissions technology in the dairy, wool and red meat industries
- connecting small landholders to carbon markets
- underwriting project risks from trialling new approaches to carbon sequestration
- developing premium land-based carbon markets that deliver stronger environmental and social outcomes compared to traditional low-cost abatement programs



No detailed breakdown of emissions beyond the modelled estimates reported here has been carried, by agricultural activity or emissions type. It is

⁶⁸ <https://www.agriculture.gov.au/ag-farm-food/climatechange/australias-farming-future/livestock-emissions>

⁶⁹ In the sugar cane industry it was assumed that emissions associated with sugar milling and refining are included as industrial GHG emissions and not agriculture sector emissions

Scope for abatement acknowledged that the use of a top-down modelled estimate of emissions from agriculture may under-estimate this sector's contribution to regional emissions, and by extension to the potential for abatement from agriculture. The development of region-specific emissions estimates should be undertaken as part of the implementation of this strategy.

No resources were identified that report on the region's abatement potential from agriculture.



Risks and mitigation

This has not been assessed in this plan.



Costs and benefits

This has not been assessed in this plan.

7.10 Sequestration



Description

Forestry

The Clarence Valley LGA is predominantly rural, with expanding residential areas and some industrial and commercial land uses. The total land area is 10,440 square kilometres, of which approximately 28% is forested, both managed for conservation and available for logging. This resource is 62% privately managed and 38% managed by Forests NSW. Clarence Valley alone holds almost 50% of the Northern Rivers region timber resource as shown below. 93% of the total timber resource in the Clarence Valley is Native Forest, around 7% is Hardwood Plantation and less than 1% is Softwood Plantation⁷⁰.

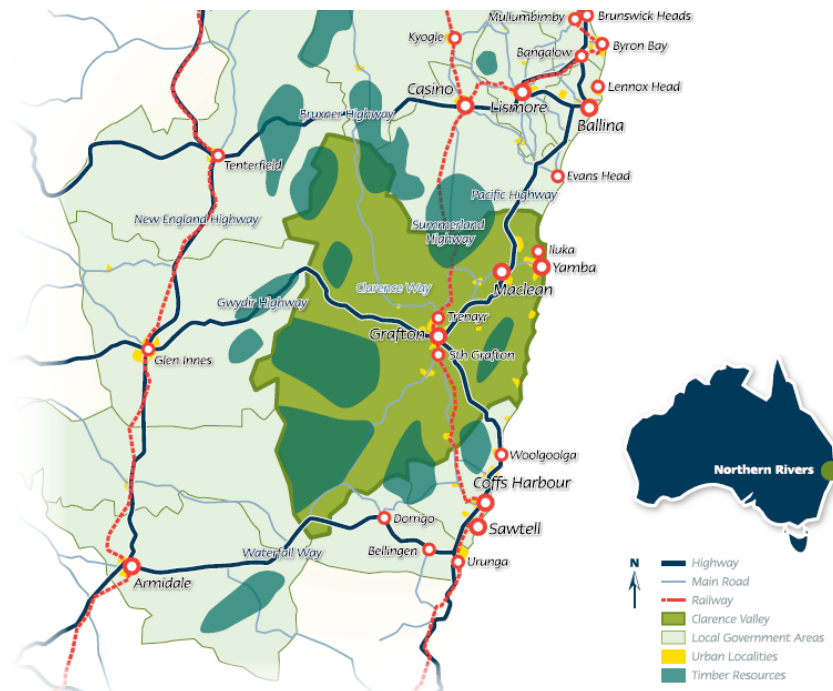


FIGURE 41: FORESTED REGIONS OF CLARENCE VALLEY LGA

From an emissions perspective land use in the LGA is estimated to be a net sink, with -4,700 t CO₂-e of emissions in 2018-19. This is the net sum of all land use activities, of which forestry is one activity.

The scope for forestry and other land use activities to contribute towards future abatement in the Clarence Valley region will be influenced by a range of factors and initiatives, such as the NSW Government’s Net Zero Plan 2020-2030 *Primary Industries Productivity and Abatement Program*, NSW Climate Change Fund initiatives⁷¹ (e.g. \$4 million for tree planting & wildlife projects, \$37.5 million for the Five Million Trees initiative and \$244 million for private land conservation through the Biodiversity Conservation Trust), the Commonwealth Government’s Emissions Reduction Fund, as well as changes in land use by land

⁷⁰ Investing in the timber heartland – Clarence Valley: <https://www.clarence.nsw.gov.au/page.asp?f=RES-QCS-51-36-10>

⁷¹ <https://www.environment.nsw.gov.au/topics/climate-change/nsw-climate-change-fund/programs>

owners and other forestry activities (e.g. NSW government \$46 million post-bushfire support to regrowth and expansion of seedling nurseries, including in Grafton).

Wetlands management and restoration

There is wide recognition that wetlands can play an important role in “blue carbon” storage / sequestration, among many other benefits they provide. Conversely, degraded wetlands can be a large source of emissions of CO₂.

Blue Carbon initiatives are known to be at least 10 times more effective at sequestering carbon than other forest vegetation types⁷². Seagrass beds, mangroves and saltmarshes store large amounts of carbon. They draw in carbon as they grow, and much of this is later transferred into the rich organic soils held by their roots. That carbon can remain in the soil for thousands of years, making wetland protection, management, and restoration important long-term natural climate solutions.

There can be wide variability in the amount of carbon stored in different wetlands, and variability in sequestration rates. Figures cited in literature range from more than 500 g CO₂ per m² per annum to more than 3,000 g CO₂ per m² per annum in some locations^{73,74}.

Blue carbon sequestration through restoration of the region’s coastal wetlands is a potentially significant part of any strategy for achieving net zero emissions in the Clarence Valley area.



Scope for abatement

This has not been assessed in this plan.



Risks and mitigation

This has not been assessed in this plan.



Costs and benefits

This has not been assessed in this plan.

⁷² <https://climatechange.lta.org/wetlands/>

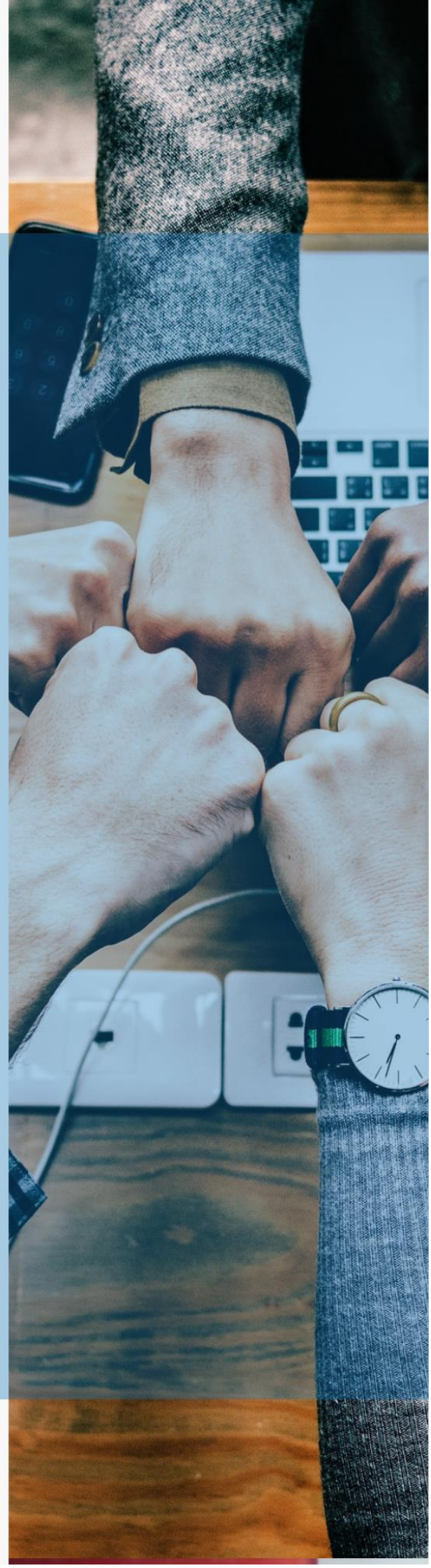
⁷³ <https://www.bluecarbonlab.org/victoria-blue-carbon/>

⁷⁴ Brown, D. R., Johnston, S. G., Santos, I. R., Holloway, C. J., and Sanders, C. J. (2019). Significant organic carbon accumulation in two coastal acid sulfate soil wetlands. *Geophysical Research Letters*, 46, 3245–3251. <https://doi.org/10.1029/2019GL082076>



Engagement

Community survey
and engagement
with key
stakeholders



8 Community engagement on energy & emissions reduction

A key element of the development of this Energy and Emissions Reduction Strategy was engagement with key stakeholders. Three approaches have informed the development of the strategy, including:

- Survey of the community via Council’s ‘bang the table’ community engagement platform, conducted during May to September 2020,
- Direct engagement with key groups to inform the development of the draft strategy, including Council staff, business representative groups, and a community climate action group, and
- Feedback received from community members and groups on the exhibition draft of the strategy

The results of these consultations are summarised below.

8.1 Community consultation results

Q1: How important do you think climate change issues are?



FIGURE 42: COMMUNITY CONSULTATION – IMPORTANCE OF CLIMATE CHANGE

Q2: What emission reduction target should the community aim for in the LONG term?

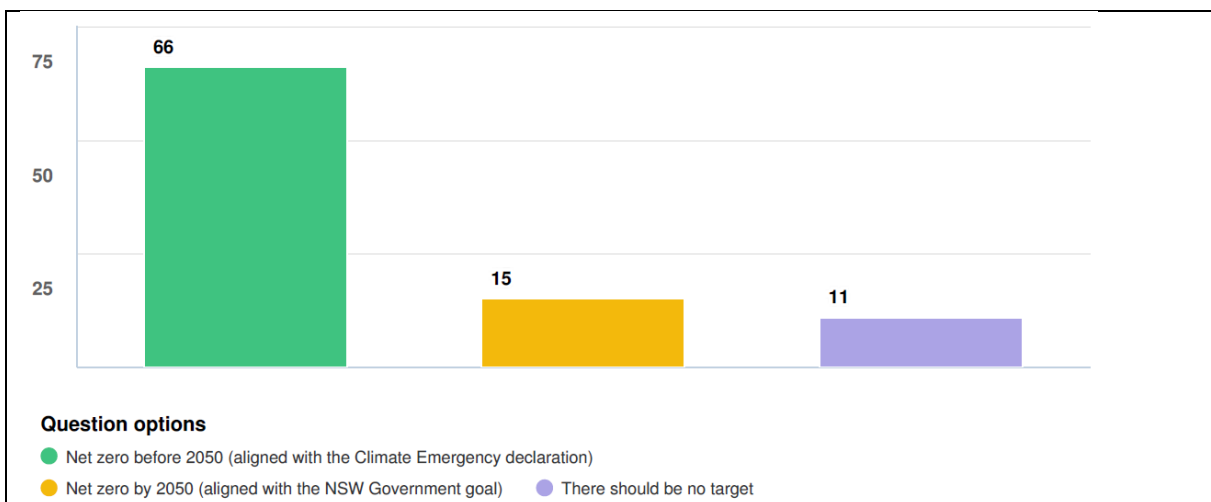


FIGURE 43: COMMUNITY CONSULTATION – LONG TERM EMISSIONS REDUCTION TARGET

Q3: What emission reduction target should the community aim for in the MEDIUM term?

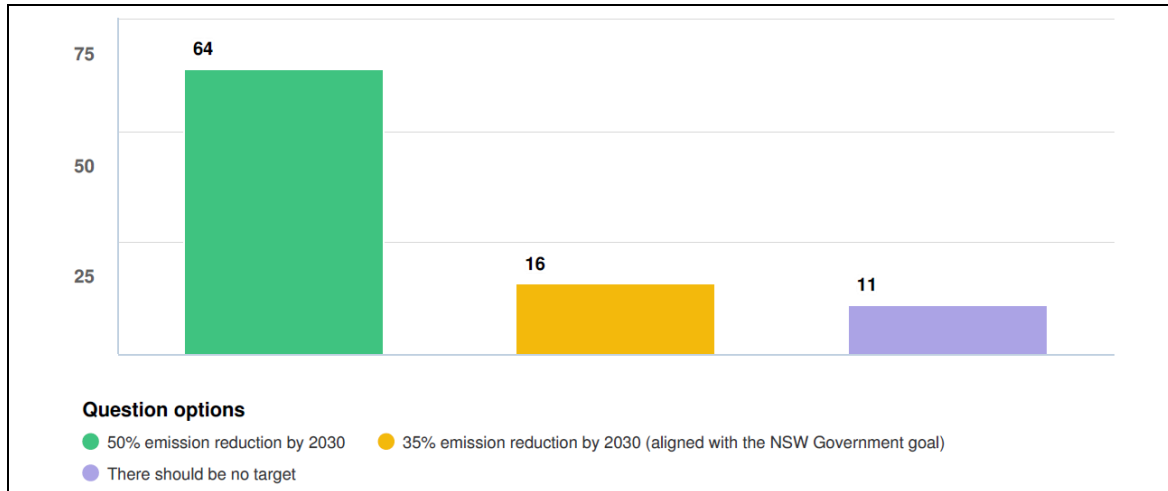


FIGURE 44: COMMUNITY CONSULTATION – MEDIUM TERM EMISSIONS REDUCTION TARGET

Q4: With 1 being the most important, please rank the following 12 actions we could take as a community to reduce emissions.

TABLE 21: CLARENCE VALLEY COMMUNITY PREFERENCES FOR CLIMATE ACTION

Overall rank (1-12)	Option	Average rank (responses)
1	Install renewable energy such as solar power and batteries on homes and business	4.45
2	Install large scale renewable energy to replace coal fired power generation	4.94
3	Set a target to reduce community emissions	5.59
4	Encourage energy efficiency actions within homes and business	5.64
6	Work with developers/project home builders to construct low energy homes	6.01
5	Explore the development of a medium scale community solar farm	6.04
7	Plant more trees	6.28
8	Waste avoidance and recycling	6.43
9	Increase usage of active transport – walking and cycling	7.42
10	Reduce emissions in agriculture, such as manure management, carbon sequestration in soil, etc.	7.67
11	Encourage ownership of fuel-efficient motor vehicles	8.04
12	Install electric vehicle charging stations	8.72

Q5: How can Council help with reducing emissions in the community?

TABLE 22: CLARENCE VALLEY COMMUNITY VIEWS ON COUNCIL CLIMATE PRIORITIES

Option	Responses
Lead by example and reduce Council's emissions	76

Update planning controls for new developments	66
Collaborate with other regional councils on climate action and adaptation	66
Provide education, training and workshops on energy efficiency and renewables	63
Provide financial incentives to households and business	63
Lobby state and Commonwealth government for action on climate	61
Provide infrastructure, such as electric vehicle charging, low-emissions road material	58
Recognise climate leaders in the community	57
Other	17

Q6: How much impact are you currently experiencing from events such as bushfires, floods, drought and other climate change impacts?

TABLE 23: CLARENCE VALLEY COMMUNITY VIEWS ON CURRENT CLIMATE IMPACT

Option	Responses
No current impact	18
A small impact now	25
A fair amount of impact now	33
A great deal of impact now	14
Not sure	1

Q7: What are the most important actions that can be taken to help adapt to climate change?

TABLE 24: CLARENCE VALLEY COMMUNITY VIEWS ON PRIORITY ACTIONS TO ADAPT TO CLIMATE CHANGE

Option	Responses
Plant more shade trees in our shopping districts and parks	73
Improve community resilience to natural disaster	60
Construct shade structures over playgrounds and at parks	46
Develop a network of public heat refuges	36
Other	28

It is clear from the responses by the Clarence Valley community that:

- Climate change is an important issue and impacts are being felt by the community now,
- The community should aim to decarbonise in line with science,
- Solar and batteries, grid decarbonising, energy efficiency (existing and new development) and community solar are key local priorities in the near term,
- Urban tree cover and increase local resilience are most important to help the community adapt

The community was also asked to identify how they believe community climate action groups and business groups can help to drive community climate action. Responses are included in Appendix A.

8.2 Council, community climate group and business engagement

Direct engagement with key stakeholders was carried out via online forums, which outlined the purpose and scope of the project and sought input on two key questions:

1. What levers does each stakeholder organisation / group have to drive abatement in the community?
2. What are stakeholder organisation / group’s big ideas to drive emissions reduction in Clarence Valley?

Stakeholder groups included Clarence Valley Council, Community Climate Change Committee, as well as discussions with two of the region’s business chambers. Responses from stakeholder groups are summarised below.

8.2.1 Levers available to influence emissions

TABLE 25: SUMMARY OF LEVERS AVAILABLE TO KEY STAKEHOLDER GROUPS TO INFLUENCE EMISSIONS

Stakeholder	Lever	Action	
Council	Planning controls	Review opportunities to further encourage renewables and review off-grid options	
	Infrastructure	Review opportunities available to provide better transport options in the region, including bus routes, cycle ways, etc	
	Education		Help business be more aware of their carbon footprint, for example through a carbon footprint calculator
			Conduct workshops to educate the community regarding native species replanting and vegetation management
			Increase awareness on waste management, including how to compost, how to use recycled material, etc – through partnerships with schools, newsletters and the like
			Draw on volunteer networks to help influence the community regarding emissions reduction
			Promote awareness of events such as Earth Overshoot Day or similar, to highlight the urgency of climate action
		Use innovative approaches to educate the community on sustainability – for example via creative programming at the region’s Gallery and other cultural facilities	
Lead by example	Reduce Council’s emissions, and demonstrate leadership in areas such as – for example, use of compensatory planting and offsetting for infrastructure projects, and publicise these		
Financial incentives	Review opportunities for Council to incentivise emissions reduction activities in the community		
Advocacy	Electricity is the biggest emissions source, so this should be targeted with local renewables, Council should advocate for incentives that help community to access these opportunities		
Community organisation	Collaboration	There are many community groups with similar objectives, and these could be brought together to target key goals, share ideas and educate communities	
	Education	Community groups can run workshops to educate, bring people along and mobilise local efforts	

	Lead by example	Lead as individuals and spread ideas through contacts and media / social media channels
	Advocacy	Call for leadership by others such as Council, advocate for incentives, policy change on climate
Business groups	Lead by example	Business groups can set an example for their members through their own efforts to be more sustainable in their operations and communications
	Recognition	As part of business excellence awards, local sustainability / climate leadership categories could potentially be sponsored
	Education	Events such as breakfast sessions could potentially support raising awareness of climate / sustainability, such as from guest speakers. Business groups could provide information to members via regular communications including links – for example to programs, incentives or Council initiatives. This could be via newsletters, social media, and links to training and workshops (e.g. provided by TAFE)
	Collaboration	Business representative groups collaborate on a range of issues affecting and benefitting members, and could potentially support key measures that reduce emissions and costs
	Advocacy	Business groups could advocate to State Government where there are issues that impact their members and where there are opportunities that members could access

8.2.2 Big ideas to drive emissions reduction in Clarence Valley

Stakeholder	Category	Description of idea
Council	Renewable energy	Support efforts to see more renewables implemented at all levels, including in Council operations, and small to commercial-scale projects in the community
	Renewable energy	Target and promote solar and batteries as electricity is the largest source of emissions. Advocate for government incentives to accelerate this
	Community renewables	Assist local community groups to develop sustainable energy opportunities
	New building	Lobby for changes to BASIX, and as part of new urban release areas promote the use of solar and passive / low energy design
	Agriculture	Engagement with farming communities, education and implementation of lower-impact practices in the agricultural sector (e.g. regenerative agriculture), development of carbon offset initiatives in the region
	Forestry / vegetation	Develop and advocate for programs that increase native tree coverage and increased vegetation, including new conservation areas
	Waste management	Use events such as Clean Up Australia Day to educate and promote lower demand, good waste management / reuse / recycling practices

Community organisation	Education	Partner with schools and universities in the region to engage youth about their vision and ideas for the region’s climate, access data and research on local sustainable practices – e.g. land management
	Address barriers	Barriers – particularly for tenants – to uptake of renewables and energy efficiency are significant, and overcoming these can unlock significant potential abatement
	Renewable energy	Develop information, incentives, community retailers, community solar projects (e.g. that target NGO / NFP hosts and solar gardens that target renters) and other resources to unlock the potential of solar and batteries in the community
	Waste management	Greater focus on circular economy thinking and waste reduction. In particular a greater focus on greatly reducing plastics in our economy is needed
	Agriculture	Work with industry groups for major agricultural produce to develop emissions reduction solutions
	Sustainable transport	Develop infrastructure to support more active transport options in the region, and plan strategically for future transport opportunities
	Blue carbon	Develop mangrove / wetland restoration and expansion projects in the region

8.3 Clarence Valley CEERS exhibition draft feedback

Exhibition of the draft Clarence Valley Community Energy and Emissions Reduction Strategy (CEERS) elicited feedback from a number of community members and groups. This feedback has been taken into account in the preparation of this final strategy. Some of the key themes and actions recommended in this feedback includes:

- Regional ambition to reach net zero well before 2050
- Greater emphasis on regenerative agriculture practices to sequester carbon
- A focus on ‘blue carbon’ as a potentially significant means of sequestering carbon in the region’s wetlands
- Improved carbon accounting going forward that draws on more and local information sources, so that a more accurate picture of emissions from areas such as agriculture, land use change and forestry is created, better informing the region’s climate action strategies
- Greater emphasis on solar and battery storage opportunities at community and grid scale



Abatement scenario

Potential emissions
reduction pathways
aligned with a 1.5°C
warming scenario



9 Community emissions reduction scenario

The previous sections highlight that there is local concern about climate change, and the community wants to see action to reduce emissions in line with science. There is widespread support for local renewables, reflecting the widespread use of solar in Clarence Valley, and support for seeing batteries rolled out to increase solar uptake. There is support for measures that include renters and owners, as well as support for community solar initiatives.

The community is also interested to see opportunities for emissions reduction accelerate in areas such as energy efficiency (particularly in new buildings), agriculture, forestry, wetlands and waste management. At this time there is less focus overall on sustainable transport compared with other measures, though there is a recognised need to plan for future opportunities here.

In order to decarbonise, there are many pathways that may be taken, and the timing and scale / scope of action to reduce any particular source of emissions will change over time.

To illustrate how emissions might reduce over time, this strategy presents a scenario that would align with the community's indicated preference.

1. Net zero emissions scenario by 2040, with at least 35% emissions reduction by 2030.

With the scenario shown below is an accompanying table highlighting the level of effort that may be required by the community in terms of number and size of solar PV systems, level of energy efficiency, decisions to purchase renewable energy for electricity supply, and the rate of uptake of electric vehicles, for example. An 'accelerated' grid decarbonisation scenario is used in the 2040 net-zero pathway. The purpose of this scenario is twofold.




- Firstly, it illustrates that in the context of longer term goals such as 2040, changes to the grid fuel mix will be the single most important factor in getting to net zero emissions, and
- Secondly, even if the grid decarbonises rapidly as modelled, there is a significant role for consumers – households and businesses – to act early to significantly reduce their own emissions to align with a science-based pathway towards net zero emissions.

The table below describes the scenarios in terms of what changes *could* be needed in each abatement area in order for the outcomes to be achieved. It is important to note this is intended only to illustrate one abatement scenario and to demonstrate that sustained action by all segments of the community and State & Commonwealth stakeholders *can* drive emissions down. The relative contribution and the exact contribution by different abatement options, and the potential contribution from sequestration in forests and the region's wetlands will alter the actual pathway towards net zero emissions.

9.1 Scenario 2: Net-zero by 2040

The following inputs are modelled to derive this abatement scenario for Clarence Valley LGA.

TABLE 26: POSSIBLE EMISSIONS PATHWAY – NET-ZERO BY 2040

	Abatement area	Emissions Pathway	Equivalent to...
	Energy & renewables: Grid decarbonisation	The grid decarbonises at an accelerated rate earlier than announced/expected closures of coal-fired plants in NSW	Early closures of Liddell (2023), Vales Point B (2027), Eraring (2031), Bayswater (2033) and Mt Piper (2039), with some residual emissions assumed for interstate energy imports
	Energy & renewables: clean energy purchasing	Renewable energy purchasing is feasible with say a 65% uptake by 2030 and 100% by 2040	Energy users in the LGA enter into renewable energy power purchase agreements assumed at a similar price to 'regular' grid power
	Energy & renewables: Local generation (with solar PV)	Recent trends are sustained for solar PV systems, including capacity, average size and self-consumption levels	~400 residential systems installed every year at an average size of 7.3 kW and ~100 commercial systems installed at an average size of 45 kW
	Energy & renewables: energy efficiency	Recent energy consumption trends are maintained, with total electricity consumption increasing in line with population increase, then increasing further to account for accelerated uptake of electric vehicles	Council-led initiatives, declining offpeak hot water, increased installation of heat pump and solar hot water systems, lower energy demand per new apartment compared with the average, and any other factor pushing total energy demand down serves to offset expected growth in the total LGA population and growth in the number of dwellings in the area
	Sustainable transport: private	20% of light vehicles and 5% of heavy vehicles are electric by 2030, 40% of light vehicles and 25% of heavy vehicles are electric by 2035, and 100% of light vehicles and 100% of heavy vehicles are electric by 2040	AEMO forecasts suggest very low uptake of EVs until after 2025, with around 40% of vehicles potentially being EV by 2040 (100% Renewables estimate). In this scenario, an accelerated uptake is assumed.
	Waste management	Emissions from waste are assumed to reduce by 50% by 2030 in a linear pathway from 2020	This would likely see the consumer side (i.e. waste reduction/reduced consumption, household composting/worm farms, higher recycling rates), and post-collection side (more organics processing, material recovery).
	Low emissions agriculture	Emissions from agriculture are assumed to reduce by 50% by 2030, 80% by 2035 and 100% by 2040	As part of the NSW net-zero plan, low emissions agriculture is trialled to observe the effectiveness and the roll out across NSW is accelerated

The chart below captures this scenario and shows the emissions reduction pathway.

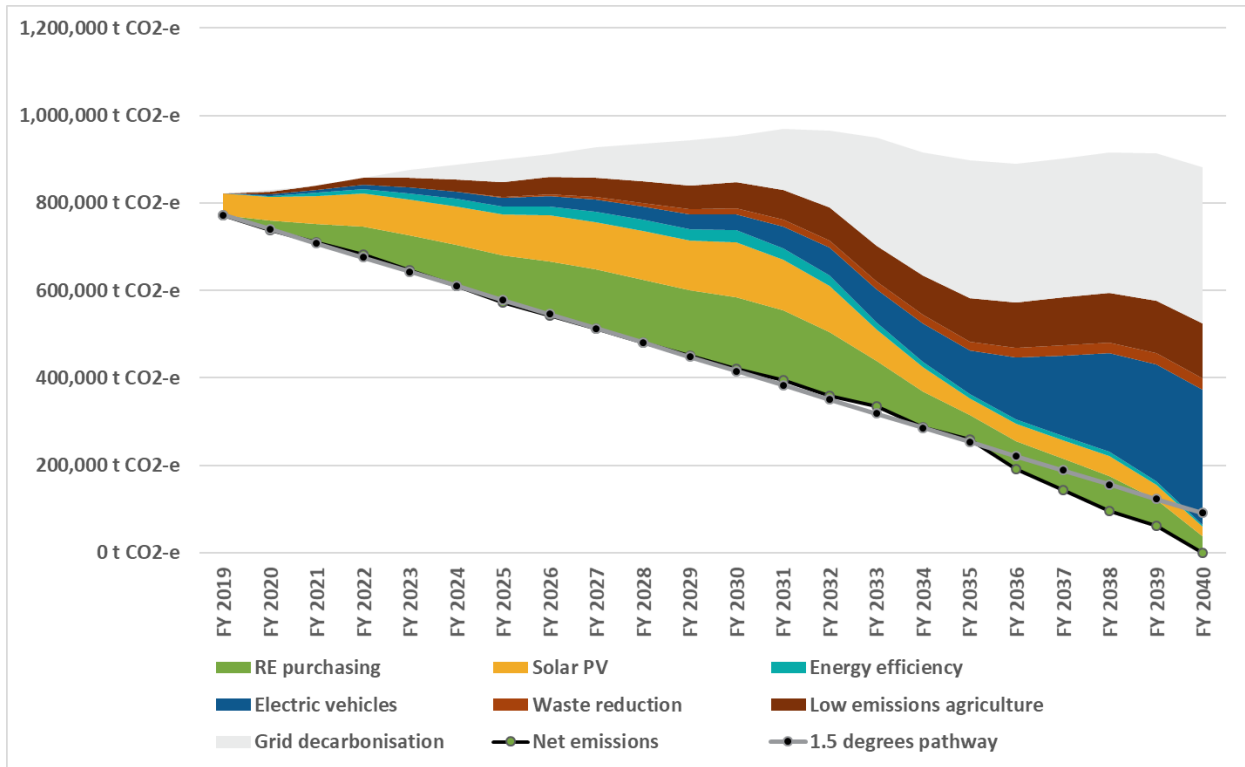
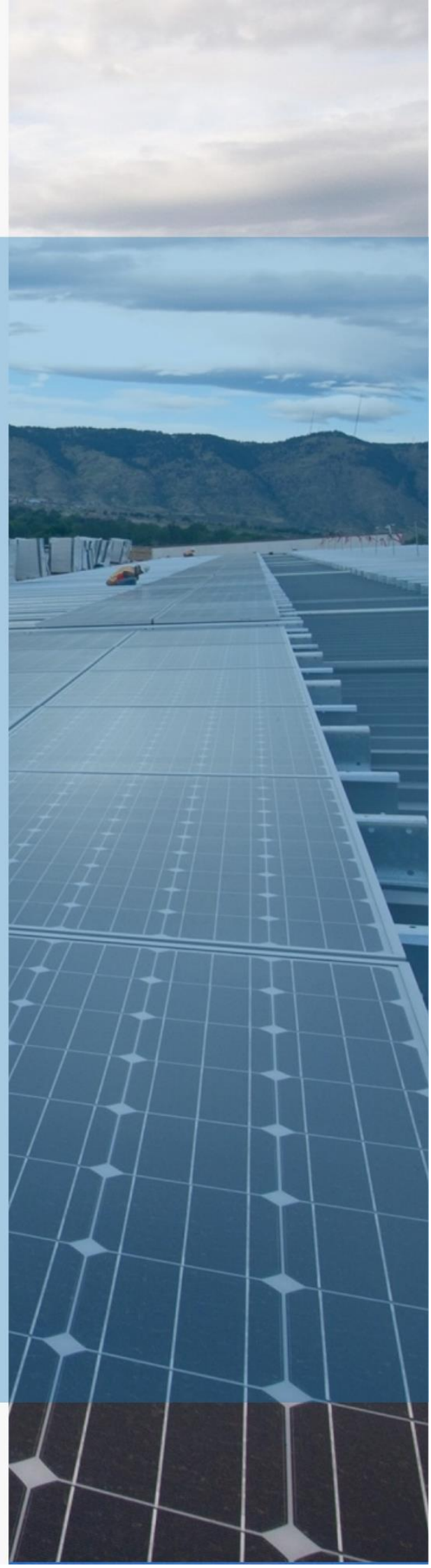


FIGURE 45: 2040 NET ZERO EMISSIONS ALIGNED WITH 1.5C – POSSIBLE PATHWAY FOR CLARENCE VALLEY



Action plan

Suggested actions
by Clarence Valley
community to drive
emissions reduction



10 Community energy and emissions reduction action plans

This analysis of the Clarence Valley community’s greenhouse gas emissions, stakeholder views and opportunities to reduce emissions have shown that there is a strong interest in, and feasible solutions that can see deep cuts to the region’s emissions in coming decades, whether to achieve net zero emissions by 2050 in line with State Government targets, or by 2040 which is more closely aligned with community aspirations.

As noted, action by all levels of government, business and individuals, as well as collaboration between these groups is important if such cuts to emissions are to be achieved.



FIGURE 46: RESIDENTS, BUSINESS & GOVERNMENTS MUST WORK TOGETHER TO REDUCE EMISSIONS

Action by stakeholders that can help the community respond to climate change and reduce emissions can typically be organised into ten categories, illustrated below. Different stakeholders will be able to respond in different ways, and to a greater or lesser extent on each of these.



FIGURE 47: TEN AREAS OF ACTION FOR KEY STAKEHOLDERS TO HELP THE COMMUNITY REDUCE EMISSIONS

The recommended action plan for the community is presented below taking these influence levers into account. Firstly, the capacity for different groups and individuals in the community to influence emissions reduction is assessed and summarised in the table below.

10.1 Summary of abatement potential and key stakeholder influence

The preceding sections set out a summary of the potential within the Clarence Valley region to reduce its greenhouse gas emissions. The table below summarises this potential, together with the potential roles and influence of key stakeholders in the community.

TABLE 27: SUMMARY OF KEY STAKEHOLDER INFLUENCE ON ABATEMENT POTENTIAL IN CLARENCE VALLEY

Abatement Category	Summary of GHG abatement potential in Clarence Valley	Influence of key community stakeholders in achieving abatement potential					
		Individual residents & businesses	Business representative groups	Community climate action, sustainability groups	Clarence Valley Council	NSW Government	Commonwealth Government
Grid de-carbonisation	Very high – in the medium to long term the NSW grid may be largely or wholly supplied with renewable energy	Very low – individuals and businesses can participate in processes that call for public submissions	Low – business representative groups can participate in processes that call for public submissions	Low – community groups can participate in processes that call for public submissions	Low – Clarence Valley Council can participate in processes that call for public submissions and advocate for local participation and jobs where applicable	Very high – State Government policies to create Renewable Energy Zones and target Net Zero emissions, and membership of AEMO, can facilitate investment in large-scale renewables	Very high – Commonwealth Government climate policies, cooperation on energy policy with the States and membership of AEMO can facilitate investment in large-scale renewables
Buying clean energy	Medium – energy users can elect to buy renewable energy, but price premiums will limit uptake	Medium – large energy users may be able to negotiate a renewable energy power agreement at a favourable rate, small users are less able to achieve this outcome	Low – business groups can share information with their members and advocate for market changes to make access to affordable renewables easier	Low – community groups can share information with their networks and advocate for market changes to make access to affordable renewables easier	Medium – Clarence Valley Council, as a large energy user, can enter into a renewable energy PPA to supply some or all of its power needs, and encourage others to do likewise	High – State Government, as a large energy user, can enter into a renewable energy PPA to supply some or all of its power needs	High – Commonwealth Government, as a large energy user, can enter into a renewable energy PPA to supply some or all of its power needs
Community and regional clean energy generation	Low – the overall abatement scope for this is low but the education and regional renewable	High – individuals and businesses can participate as hosts, buyers and/or owners of renewable energy	Low – business groups can share opportunities to host or participate in community	High – many local renewable energy projects are initiated and developed by climate action groups & partners	Medium – Council may be able to provide information, meeting space, help with planning,	High – State Government has supported the development of guides, and projects with grant assistance	High – Commonwealth Government has supported the development of projects with grant assistance

Abatement Category	Summary of GHG abatement potential in Clarence Valley	Influence of key community stakeholders in achieving abatement potential					
		Individual residents & businesses	Business representative groups	Community climate action, sustainability groups	Clarence Valley Council	NSW Government	Commonwealth Government
	energy literacy benefits are high	generated from local projects	renewables with members		and potentially host a community renewable energy project		
Behind-the-meter solar	High – APVI modelling indicates scope for solar energy that exceeds energy demand for the region	Very high - houses and businesses can use solar to meet daytime energy demand, store excess solar and in future power electric vehicles	Medium – business groups can share information with their members and advocate for incentives for batteries and EV cars and charging infrastructure	Medium – community groups can share information with their networks and advocate for incentives for batteries and EV cars and charging infrastructure	Medium – Council can install solar on its buildings, and can help ratepayers with information on solar, batteries, and signal their goals in planning documents	High – NSW Government Net Zero Plan aims to continue to reduce barriers to solar and batteries. Financial incentives for batteries will help to accelerate uptake	Very high – incentives provided by the Renewable Energy Target (RET) legislation continue to lower the cost of installing solar
Energy efficiency	High – efficiency improvement of ~30% would significantly lower energy costs for residents and businesses	Very high – houses and businesses can install LEDs, buy efficient appliances, install efficient air conditioning, motor and control systems to reduce energy use and cost	Low – business groups can share information with their members and link them to programs and incentives for energy efficiency	Low – community groups can share information with their networks and link them to programs and incentives for energy efficiency	Medium – Council can improve its energy efficiency, can help ratepayers with information on energy efficiency, and influence efficiency through its planning process, and by advocating for more stringent efficiency provisions	Very high – NSW Government can significantly influence the efficiency of new build through changes to BASIX and participation in NCC / BCA changes. It can incentivise existing buildings and industry to be more energy efficient	Very high – Comm Government can significantly influence the efficiency of new build through changes to NCC / BCA changes. It can incentivise existing buildings and industry to be more energy efficient
Sustainable transport	Medium – electric vehicles (if supplied with renewables) will reduce emissions in	Medium – in the period to 2030 purchase of new EVs will reduce GHG	Low – business groups can share information with their members and	Low – community groups can share information with their networks and	Medium – Council can lead by moving its passenger fleet to hybrid and	Very high – State Government EV support through the Net Zero Plan will	Very high – the 2020-2025 Future Fuels Fund, support to EV manufacturing and

Abatement Category	Summary of GHG abatement potential in Clarence Valley	Influence of key community stakeholders in achieving abatement potential					
		Individual residents & businesses	Business representative groups	Community climate action, sustainability groups	Clarence Valley Council	NSW Government	Commonwealth Government
	the medium term, abatement from larger vehicles will take longer	emissions mainly when supplied from renewables, electrification / greening of off-road and heavy vehicles will occur over the long term	link them to programs and incentives for electric vehicles, EV charging infrastructure and regulatory changes	link them to programs and incentives for electric vehicles, EV charging infrastructure and regulatory changes	electric vehicles, can provide information to residents and business, and can support EV charging infrastructure	help to accelerate uptake of EVs, and support to develop a hydrogen economy may help to build the case for H ₂ as a fuel for heavy vehicles in future	potential future initiatives can significantly influence EV vehicles costs and uptake
Waste Management	Low – emissions from waste are low relative to other sources	Medium – management / lowering of waste and separation of waste streams by individuals and businesses helps to reduce emissions	Low – business groups can share information with their members and link them to programs and incentives for waste management	Low – community groups can share information with their networks, initiate and develop local re-use cooperatives and link people to programs and incentives for waste management	High – as operator of landfill and wastewater treatment facilities Council can influence emissions through technology and waste collection / treatment	Very high – NSW Government’s Net Zero Plan targets zero emissions from organic waste, and policies, incentives and technologies will be required to see this achieved by 2030	The National Waste Policy and associated Action Plan, and support to initiatives such as the Fight Food Waste CRC illustrate the Commonwealth’s capacity to influence waste and associated GHG emissions
Agriculture & Forestry (including Land use)	Potentially high – future potential relies on research and successful commercialisation of enteric fermentation abatement measures being successful, as well as net changes to land use	High – through implementation by farmers and land owners of feasible measures to reduce livestock emissions, change & manage use of fertilisers, soil carbon, land use / clearing and manure mgt, and afforestation	Medium – business groups can lead research, share information and advocate for incentives and policy changes to increase opportunities for farmers and land owners	Low – community groups can share information with their networks and link them to programs and incentives for abatement from agriculture, and participate in local land use change actions	Medium – Council’s support to sugar, fishing, timber, cattle and other agricultural activities can include support to assessments of regional renewable energy. Council can also support and/or develop regional biodiversity initiatives	Very high – NSW Net Zero Plan flags support to primary industries that can see emissions reduction and sequestration from livestock and land use activities	Very high – measures delivered in collaboration with NSW Government as well as Carbon Farming Initiative (under the ERF) underline the scope for Commonwealth to influence abatement

10.2 Clarence Valley Community Energy and Emissions Reduction Action Plan

TABLE 28: CLARENCE VALLEY COMMUNITY ENERGY AND EMISSIONS REDUCTION ACTION PLAN

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
AE1	All Emissions	All Energy & Emissions Reduction	Lead by Example	Set a community emissions reduction target	Set a target for greenhouse gas emissions reduction by the Clarence Valley community, aligned with the aspiration of the community. Consider sub-targets such as goals for solar PV (e.g. 50% of generation potential reached by 2040), battery storage, electric vehicle uptake in the community, low-carbon (regenerative) agriculture, wetlands restoration, etc.	<ul style="list-style-type: none"> Clarence Valley Council Clarence Valley community
AE2	All Emissions	All Energy & Emissions Reduction	Lead by Example	Appoint a community emissions reduction officer	Support and enable community action on climate change by providing tools and resources and recruiting a dedicated climate change community liaison officer in Council, who would look to work with key stakeholders to advance actions in this strategy over time (possible grant funds)	<ul style="list-style-type: none"> Clarence Valley Council
AE3	All Emissions	All Energy & Emissions Reduction	Lead by Example	Measure and monitor community emissions	Establish a process to regularly re-assess the emissions of greenhouse gases by the community, and trends in both overall emissions and in bottom-up metrics such as solar and EV uptake (e.g. every three years for community emissions, annually for bottom-up metrics)	<ul style="list-style-type: none"> Clarence Valley Council
AE4	All Emissions	All Energy & Emissions Reduction	Lead by Example	Reduce Council's supply chain emissions through sustainable procurement	Clarence Valley Council can demonstrate how their procurement decisions can impact on the wider emissions reduction task. Sustainable purchasing considers environmental, social, economic as well as governance and their influence on buying decisions. In addition to factors such as value-for-money and buying locally, the carbon emissions associated with products and services Council buys can be impacted when this aspect is taken into account. This could lead to, for example, lower embodied emissions in cement, concrete and other building / road materials that Council buys, and lead to suppliers buying clean energy for their own businesses.	<ul style="list-style-type: none"> Clarence Valley Council

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
AE5	All Emissions	All Energy & Emissions Reduction	Recognition / Awards	Recognise community leaders in sustainability	Continue awards that recognise excellence in sustainability in the Clarence Valley community, including climate change. For example this could expand on existing “Living Sustainably Awards”.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE1	Stationary Energy	Grid de-carbonisation	Advocacy / Lobbying	Advocate for local opportunities in the transition to renewables	As Renewable Energy Zones (REZ) are developed, advocate for the development of feasible local renewable energy generation and storage opportunities and for jobs for Clarence Valley workers in these new generation projects.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE2	Stationary Energy	Grid de-carbonisation	Advocacy / Lobbying	Advocate for local opportunities in the transition to renewables	Investigate and advocate for participation in opportunities to co-invest in future large-scale renewable energy generation projects in the region, and to participate in Community Energy Funds (CEFs) for any local projects.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE3	Stationary Energy	Grid de-carbonisation	Education / Training / Workshops	Inform the local community about the transition to renewables	The next 15 years will see an unprecedented change in the way electricity is generated, stored and dispatched in NSW, with Renewable Energy Zones (REZ) becoming the new power stations. Information and education of the community about these changes will help to increase energy literacy, address perceived risks and concerns, and encourage more sustainable actions by the community.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE4	Stationary Energy	Buying clean energy	Lead by Example	Council to purchase renewable energy for its operations	As part of its regular power purchasing Clarence Valley Council will look to increase renewable energy supply to its operations through a renewable energy Power Purchase Agreement (PPA).	<ul style="list-style-type: none"> Clarence Valley Council
SE5	Stationary Energy	Buying clean energy	Individual Action	Business and individuals’ to purchase renewable energy for their operations and homes	Businesses and residents can elect to purchase some or all of their electricity from renewables, with some large businesses and consortiums having successfully purchased renewables at a saving to regular power prices. Information hubs such as the Business Renewables Centre Australia (BRC-A), information resources such as the <i>DPIE Northern NSW Renewable Energy Blueprint for Local Governments</i> , the <i>GreenPower for Businesses Guide</i> , and the GreenPower website https://www.greenpower.gov.au/ are good resources to help businesses and residents decide to purchase renewable energy.	<ul style="list-style-type: none"> Individual residents & businesses

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
SE6	Stationary Energy	Buying clean energy	Collaboration	Establish a group / consortium to purchase renewable energy	Groups that have formed to purchase renewable energy include the Melbourne Renewable Energy Project (MREP) and the Southern Sydney Regional Organisation of Councils (SSROC). Businesses and Council in the Clarence Valley could work together to determine if there is an opportunity to develop a renewable energy PPA where a mutual benefit in terms of cost savings and long term price certainty can be achieved.	<ul style="list-style-type: none"> Clarence Valley Council Business representative groups Individual businesses
SE7	Stationary Energy	Buying clean energy	Education / Training / Workshops	Inform the local community about purchasing of renewables	Resources that can help make businesses and residents more aware of their options and opportunities to purchase renewable energy in their electricity supply agreement could be collated and made available via ratepayer and member communication channels.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE8	Stationary Energy	Community and regional clean energy generation	Individual Action, Collaboration	Host a community renewable energy project	Individual businesses can consider hosting a renewable energy project on their premises or land, which could be owned by the community for example, or could act as a 'solar garden' that those locked out from installing solar on their premises can purchase shares in to offset their electricity consumption. This could be initiated in collaboration with a community climate action or sustainability group, for example.	<ul style="list-style-type: none"> Individual businesses Community climate action, sustainability groups
SE9	Stationary Energy	Community and regional clean energy generation	Lead by Example	Facilitate and/or host a community renewable energy project	Clarence Valley Council can play a role in community energy projects, either as a host or through the provision of information, space, facilitation or similar services to help projects get established in the community.	<ul style="list-style-type: none"> Clarence Valley Council
SE10	Stationary Energy	Community and regional clean energy generation	Financial / Other Incentives	Seek out grant funding opportunities for community renewable energy projects	There may be opportunities to develop community renewable energy projects (e.g. community solar and batteries) with grant funds from Commonwealth, State or other sources (such as the NSW Regional Clean Energy Fund RCEF). Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
SE11	Stationary Energy	Behind-the-meter solar	Individual Action	Install solar PV and battery storage systems	Individuals and businesses in Clarence Valley can install solar panels on their facilities to reduce daytime energy use. They can look to carry out activities during the daytime when solar energy is free, and they can expand solar systems and install batteries to meet more of their energy needs, including for electric vehicle charging.	<ul style="list-style-type: none"> Individual residents & businesses
SE12	Stationary Energy	Behind-the-meter solar	Lead by Example	Implement solar PV projects to achieve Council's renewable energy targets	Clarence Valley Council's adopted target for renewables is that these will supply 50% of Council's electricity demand by 2030, with the long term goal to source all electricity from renewable energy. In meeting this target Council will implement all cost-effective solar, battery and micro-hydro opportunities at its facilities.	<ul style="list-style-type: none"> Clarence Valley Council
SE13	Stationary Energy	Behind-the-meter solar	Lead by Example, Collaboration	Implement solar and storage across the region's schools	Implementation of solar on schools (early education + K-12) has the dual benefit of cost & emissions savings for schools, and the education / learning benefit for students. A review of current solar on schools will be accompanied by engagement and collaboration to encourage all schools to implement solar (and storage where feasible).	<ul style="list-style-type: none"> Clarence Valley Council Individual schools State Government (Education)
SE14	Stationary Energy	Behind-the-meter solar	Education / Training / Workshops	Develop and deliver information resources on solar and batteries	A range of information resources exist that can help the community take informed decisions to install solar and batteries at their homes and business premises. Resources include information for owners and renters, for buy-outright and solar leasing, for free-standing and multi-unit dwellings, as well as tools to help the community understand the size of their opportunity and the likely costs and benefits to them. As a key stakeholder, Clarence Valley Council can also provide education / training workshops, and could potentially coordinate events such as renewable energy expos that brings reputable suppliers to the community.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups
SE15	Stationary Energy	Behind-the-meter solar	Collaboration	Key stakeholder collaboration to inform the community about solar	Council, community and business groups can influence the community to take up their opportunities for solar and battery energy storage through the coordination of information resources and the use of their communication / media channels to ratepayers, members and colleagues.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
SE16	Stationary Energy	Behind-the-meter solar	Planning Controls, Advocacy / Lobbying	Review planning controls for residential and commercial buildings	Council's planning processes, documents and controls may be able to encourage and/or incentivise developers to provide for or install solar panels and battery energy storage in new or refurbishment projects (beyond what is required by BASIX as set by NSW Government and Section J of the Building Code of Australia as set by the Commonwealth). Council can advocate / lobby for changes to BASIX and the BCA that would mandate standards that would see higher implementation of solar and battery storage in new design.	<ul style="list-style-type: none"> Clarence Valley Council
SE17	Stationary Energy	Behind-the-meter solar	Financial / Other Incentives, Collaboration	Develop solar energy and battery storage solutions for low income and social housing	Energy costs can be disproportionately high relative to income for some segments such as community housing. Collaboration with State Government, Community Housing Providers and other stakeholders can be pursued to ensure that all members of the community are able to participate in solar and battery storage initiatives that help them to lower their energy costs.	<ul style="list-style-type: none"> Clarence Valley Council Community Housing Providers State Government
SE18	Stationary Energy	Behind-the-meter solar	Financial / Other Incentives, Collaboration	Seek out grant funding opportunities for solar and battery storage	There may be opportunities for residents and businesses to access grant funding for solar and battery storage projects from Commonwealth, State or other sources – for e.g. programs to increase battery storage uptake, or to participate in a Virtual Power Plant (VPP) project. Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE19	Stationary Energy	Energy efficiency	Individual Action	Implement energy efficiency improvements – including changes to practices, retrofits and new works	Individuals and businesses in Clarence Valley can implement energy efficiency in their homes and business operations through better awareness of energy waste, implementation of cost effective retrofits such as insulation, LED lights and VSD controls on motor systems, and investment in energy efficient appliances, air conditioners, heat pump and solar hot water systems, and process technologies for example.	<ul style="list-style-type: none"> Individual residents & businesses
SE20	Stationary Energy	Energy efficiency	Lead by Example	Implement energy efficiency projects to achieve Council's	Clarence Valley Council's adopted target for emissions reduction is that these will be at least 40% lower than	<ul style="list-style-type: none"> Clarence Valley Council

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
				emissions reduction targets	2016/17 levels by 2030, not including emissions from landfill. In meeting this target Council will implement all cost-effective energy efficiency opportunities at its facilities.	
SE21	Stationary Energy	Energy efficiency	Education / Training / Workshops	Develop and deliver information resources on energy efficient technologies and practices	A range of information resources exist that can help the community take informed decisions to improve energy efficiency at their homes and business premises. Resources include information on a range of zero-energy actions and behaviours, energy technologies & appliances, for owners and renters, for base/common areas and tenancies in leased commercial buildings and multi-unit dwellings. As a key stakeholder, Clarence Valley Council can also provide education / training workshops, and could potentially coordinate events such as energy expos that brings reputable suppliers to the community.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups
SE22	Stationary Energy	Energy efficiency	Collaboration	Key stakeholder collaboration to inform the community about energy efficiency	Council, community and business groups can influence the community to take up their opportunities for energy efficiency through the coordination of information resources and the use of their communication / media channels to ratepayers, members and colleagues.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
SE23	Stationary Energy	Energy efficiency	Planning Controls, Advocacy / Lobbying	Review planning controls for residential and commercial buildings	Council's planning processes, documents and controls may be able to encourage and/or incentivise designers and developers to include more passive and energy efficient design and technologies in new or refurbishment projects, beyond code requirements. Council can advocate / lobby for changes to BASIX and the BCA that would mandate standards that would see higher implementation of solar and battery storage in new design	<ul style="list-style-type: none"> Clarence Valley Council
SE24	Stationary Energy	Energy efficiency	Financial / Other Incentives, Collaboration	Develop energy efficient solutions for low income and social housing	Energy costs can be disproportionately high relative to income for some segments such as community housing. Collaboration with State Government, Community Housing Providers and other stakeholders can be pursued to ensure that all members of the community are able to participate in energy efficiency initiatives that help them to lower their energy costs.	<ul style="list-style-type: none"> Clarence Valley Council Community Housing Providers State Government

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
SE25	Stationary Energy	Energy efficiency	Financial / Other Incentives, Collaboration	Seek out grant funding opportunities for energy efficiency	There may be opportunities for residents and businesses to access grant funding for energy efficiency projects from Commonwealth, State or other sources – for e.g. programs to install insulation, upgrade to energy efficient appliances, air conditioners or hot water systems. Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
TR1	Transport	Sustainable transport	Individual Action	Choose hybrid or electric vehicles when purchasing a new car	Numerous hybrid vehicle models are available and cost effective for most road users. As electric vehicles and charging infrastructure become more widely available, accessible and cheaper it will be increasingly cost effective for road users to choose low emission vehicles, and to choose renewable energy supply to power EVs.	<ul style="list-style-type: none"> Individual residents & businesses
TR2	Transport	Sustainable transport	Lead by Example, Collaboration	Clarence Valley Council to lead-by-doing in their transition to low and zero emissions vehicles	Clarence Valley Council can continue to buy or lease hybrid and electric vehicles in its fleet, and implement EV charging infrastructure at its facilities, through its fleet strategy. Council can update its strategy from time to time, and collaborate with State Government and regional partners and neighbouring councils to progress to a lower emissions fleet.	<ul style="list-style-type: none"> Clarence Valley Council
TR3	Transport	Sustainable transport	Advocacy / Lobbying	Engage with key stakeholders to ensure the region is well served by EV charging infrastructure and EV sales and servicing	A smooth transition over the coming decades to electric vehicles (and potentially hydrogen vehicles) needs to ensure that regional factors are fully taken into account, so that factors such as sales, servicing, charging and the like are catered for. Council and other key regional stakeholders will engage with State Government in their planning processes to ensure this outcome.	<ul style="list-style-type: none"> Clarence Valley Council State Government Business representative groups
TR4	Transport	Sustainable transport	Strategy, Infrastructure / Services	Develop the region's electric vehicle charging infrastructure	Clarence Valley Council will engage with key stakeholders in Clarence Valley, State Government, motoring associations, business groups, individual businesses (esp where EV charging is an important service to customers and the community) and others to help ensure a coordinated approach to the assessment, planning and implementation	<ul style="list-style-type: none"> Clarence Valley Council State Government Business representative groups Individual businesses

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
					of EV infrastructure that adequately supports the uptake of electric vehicles in the region.	
TR5	Transport	Sustainable transport	Strategy, Infrastructure / Services Education / Training / Workshops Financial / Other Incentives	Update and implement Council's Active Transport Plan for the region	Clarence Valley Council developed active transport resources including a Pedestrian Access and Mobility Plan and a Bicycle Plan in 2015. These and other plans relevant to promoting active transport within the region will be reviewed and updated, and supporting infrastructure and services developed as part of Council's normal Operational Plan and Delivery Program works. In delivering an updated Plan, Council will seek out grant funding opportunities that can accelerate the improvement of pedestrian access and all modes of active transport.	<ul style="list-style-type: none"> Clarence Valley Council
TR6	Transport	Sustainable transport	Planning Controls	Review and amend planning controls to facilitate EV charging infrastructure	Review Council's planning controls for residential, multi-residential and commercial building developments to determine what amendments can be made to ensure that charging infrastructure suitable for future electric vehicle charging, is incorporated in new and refurbishment works.	<ul style="list-style-type: none"> Clarence Valley Council State Government Community Groups
TR7	Transport	Sustainable transport	Education / Training / Workshops	Develop and deliver information resources on hybrid and electric vehicles, and active transport	A range of information resources exist and are emerging that can help the community take informed decisions to purchase hybrid and electric vehicles, install EV charging at their homes and businesses, car pool, and engage in more active modes of transport. As a key stakeholder, Clarence Valley Council can also provide education / training workshops, and could potentially coordinate events that showcase future transport options to the community.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
TR8	Transport	Sustainable transport	Financial / Other Incentives	Seek out grant funding opportunities for electric vehicles and EV charging	There may be opportunities for residents and businesses to access grant funding for electric vehicles and EV charging projects from Commonwealth, State or other sources as this transition takes shape in coming years. Key stakeholders can maintain a watch on potential funding opportunities, and ideally have 'shovel-ready' projects that can seek funding.	<ul style="list-style-type: none"> Clarence Valley Council Community climate action, sustainability groups Business representative groups
WA1	Waste	Waste management	Individual Action	Reduce waste generation	Even though Clarence Valley Council has achieved more than 65% diversion of waste from landfill and has improved	<ul style="list-style-type: none"> Individual residents & businesses

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
					recycling rates, individual residents and businesses can help to further reduce emissions from waste through their own purchasing, use and disposal actions.	
WA2	Waste	Waste management	Lead by Example, collaboration	Leading practice in waste collection and management	Clarence Valley Council manages the Grafton Regional Landfill and has successfully reduced greenhouse gas emissions through its bin collection strategy, composting, higher diversion and recycling rates, and through flaring of methane gas from the landfill for several years. Council will continue to lead and look to reduce emissions from waste through its collection and management systems, and will continue to collaborate with other councils, State Government and resource management companies to drive towards lower emissions and circular economy methods.	<ul style="list-style-type: none"> Clarence Valley Council State Government
WA3	Waste	Waste management	Strategy, Infrastructure / Services	Implement the Solid Waste Management Strategy 2020-27	The Solid Waste Management Strategy 2020-27 details the direction and actions for Clarence Valley Council to improve waste management outcomes, reduce landfill and increase resource recovery. The strategy notes the confidence that the industry can move towards a more circular and sustainable economy, has a strong focus on resource recovery, has communication and education as a key action area, and notes the 2019 declaration of a climate emergency by Council that can drive more urgent action to mitigate and adapt to a warming climate.	<ul style="list-style-type: none"> Clarence Valley Council
WA4	Waste	Waste management	Collaboration	Continue collaboration with North East Waste (NEW)	North East Waste (NEW) is a voluntary regional waste group including the Local Governments of Ballina, Byron, Clarence Valley, Kyogle, Lismore, Richmond Valley and Tweed. The NEW Regional Waste Management Strategy 2013 – 21 aims to achieve more sustainable waste management and better resource recovery in the NE Waste region through a proactive, collaborative approach between Councils, the NSW EPA and communities.	<ul style="list-style-type: none"> Clarence Valley Council NEW Councils
WA5	Waste	Waste management	Education / Training / Workshops	Implement communication and education	Both the Clarence Valley Council solid waste management strategy and the NEW strategy identify communication and education in the community – individuals, businesses,	<ul style="list-style-type: none"> Clarence Valley Council

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
				initiatives from the SWMS and NEW RWMS	schools, etc – as key initiatives to be delivered in the scope and period of these strategies.	
AL1	Agriculture & Land use	Agriculture & Forestry (including land use and wetlands)	Individual Action	Implement feasible opportunities for emissions reduction, sequestration and bioenergy	Owners of agri-businesses and land can contribute to both emissions reduction and carbon sequestration through their farming and land management practices (such as fertiliser management, clearing practices, manure management, grazing management, regenerative agriculture, etc), and may be able to develop or participate in trials and projects for managing enteric fermentation emissions and development of bioenergy resources. Farming businesses can also reduce their emissions through energy efficiency and renewables – e.g. as identified in the guide: Transforming Australian Agriculture with Clean Energy, developed by ARENA with NFF.	<ul style="list-style-type: none"> Individual residents & businesses
AL2	Agriculture & Land use	Agriculture & Forestry (including land use and wetlands)	Strategy, Lead by Example, Planning Controls	Implement Council strategies relevant to carbon sequestration	Council strategies – including Urban Tree Management Strategy, Biodiversity Management Strategy, estuary and coastal management plans and Tree Management policies – recognise the impacts of climate change. Current strategies, and future updates to these strategies and plans, will recognise updated guidance on climate change impacts, include actions to continue to respond to climate risks, include actions that aim to increase the region's sequestration in land, forests and wetlands, and demonstrate Council's leadership to the community. Where applicable, any new requirements relating to trees and other vegetation will be reflected in planning controls.	<ul style="list-style-type: none"> Clarence Valley Council
AL3	Agriculture & Land use	Agriculture & Forestry (including land use and wetlands)	Collaboration	Work with Government, community and industry stakeholders to promote low carbon outcomes	Council will look to work closely with key stakeholders in relation to land clearing, forestry development and wetlands management & restoration so that NSW State goals for greenhouse gas emissions and sequestration are taken into account.	<ul style="list-style-type: none"> Clarence Valley Council

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
AL4	Agriculture & Land use	Agriculture & Forestry (including land use and wetlands)	Education / Training / Workshops	Encourage sustainable farming and land management practices	Work with farmers and land owners to encourage sustainable practices which improve soil & water and reduce or sequester carbon. Work with farmers to identify opportunities for low or net zero emissions farming and land management.	<ul style="list-style-type: none"> State Government (Department of Primary Industries) Clarence Valley Council
AL5	Agriculture & Land use	Agriculture & Forestry (including land use and wetlands)	Financial / Other Incentives	Apply to access financial support or incentives for emissions reduction and sequestration activities	Initiatives such as the Emissions Reduction Fund (ERF) have a range of eligible agriculture and vegetation management measures and can provide a source on income or incentive to reduce and sequester emissions from farming and land management. The NSW Government's Net Zero Plan 2020-2030 includes a commitment to develop a Primary Industries Productivity and Abatement Program to supports primary producers and landowners to commercialise low emissions technologies and maximise revenue from carbon offset programs.	<ul style="list-style-type: none"> Individual residents & businesses



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