COWRA REGION

NSW DPIE: **Sustainability Advantage**

NSW GOVERNMENT NET ZERO PILOT PROJECT – COWRA COUNCIL

17 May 2021

100% renewables

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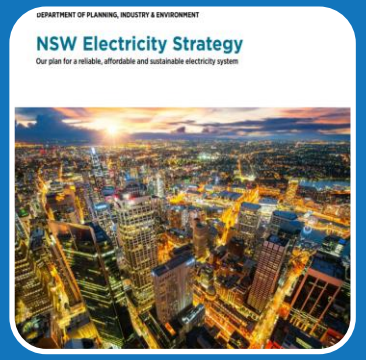
About the NSW Net Zero Plan

NSW's plan to lead the transition to Net Zero Emissions by 2050

Net Zero Plan Stage 1: 2020-2030

- Reduce emissions by up to 35% by 2030, the first stage of transition to net zero emissions by 2050
- Emissions reduction initiatives across key sectors including energy, transport, waste, agriculture, mining, carbon finance



NSW Electricity Strategy

- Affordable, reliable and sustainable electricity
- Supports investment in new generation, demand response and energy efficiency and increase State's energy resilience

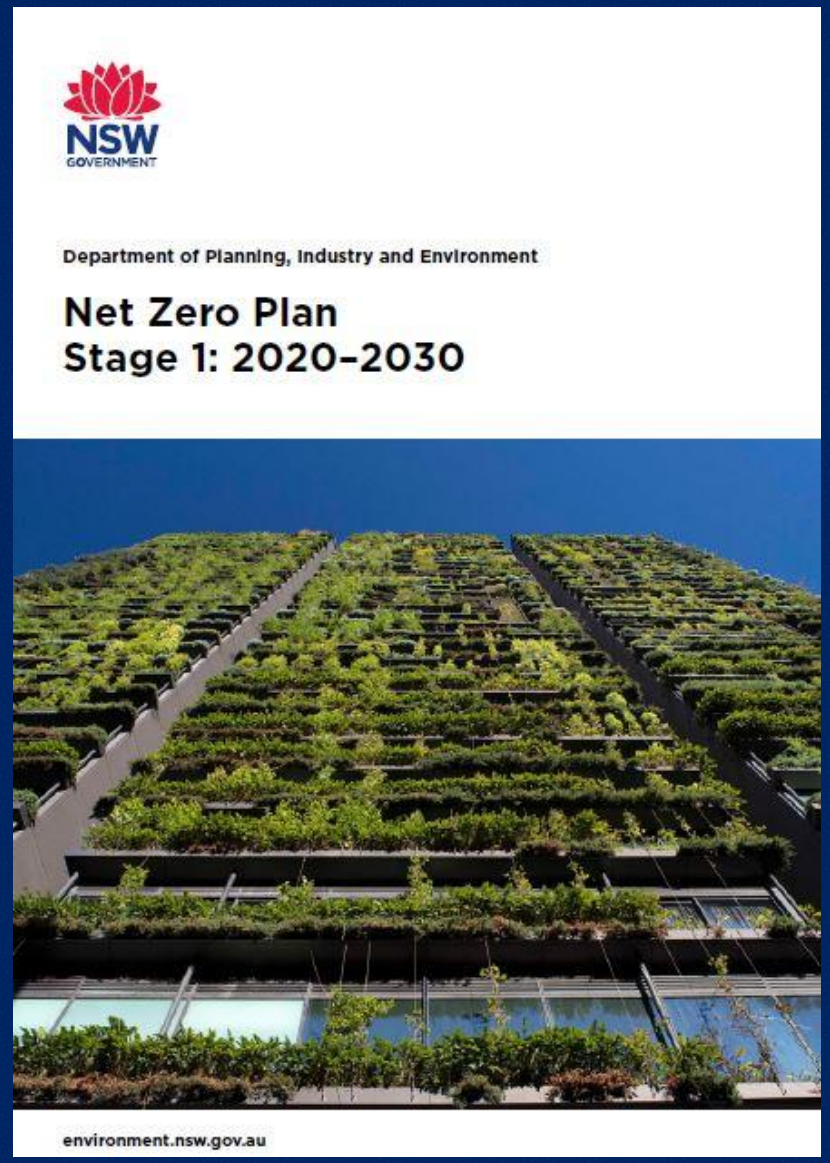
NSW GOVERNMENT

Combined they will support almost 2,400 new jobs, and $11.6 billion of new investment in NSW - mostly in regional areas!

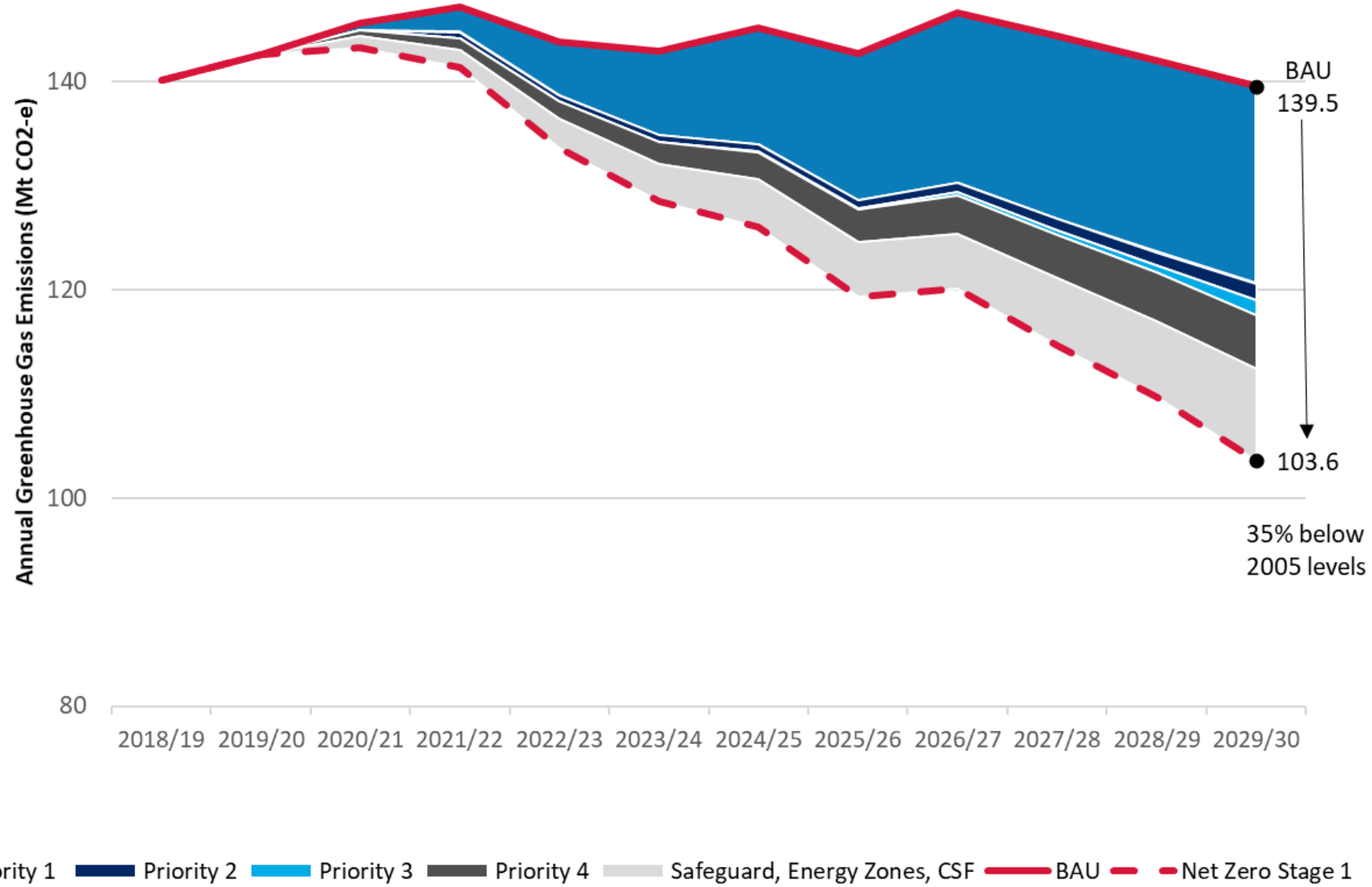
Net Zero Plan

Four key priorities

1. Drive uptake of proven emissions reduction technologies
2. Empower consumers and businesses to make sustainable choices
3. Invest in the next wave of emissions reduction innovation
4. Ensure the NSW Government leads by example



Net Zero Plan emissions abatement



* Original modelling from Net Zero Plan is being refined and subject to updates

Project Scope of work

Scope and stages of the net-zero plan development

1 PRELIMINARY ENGAGEMENT

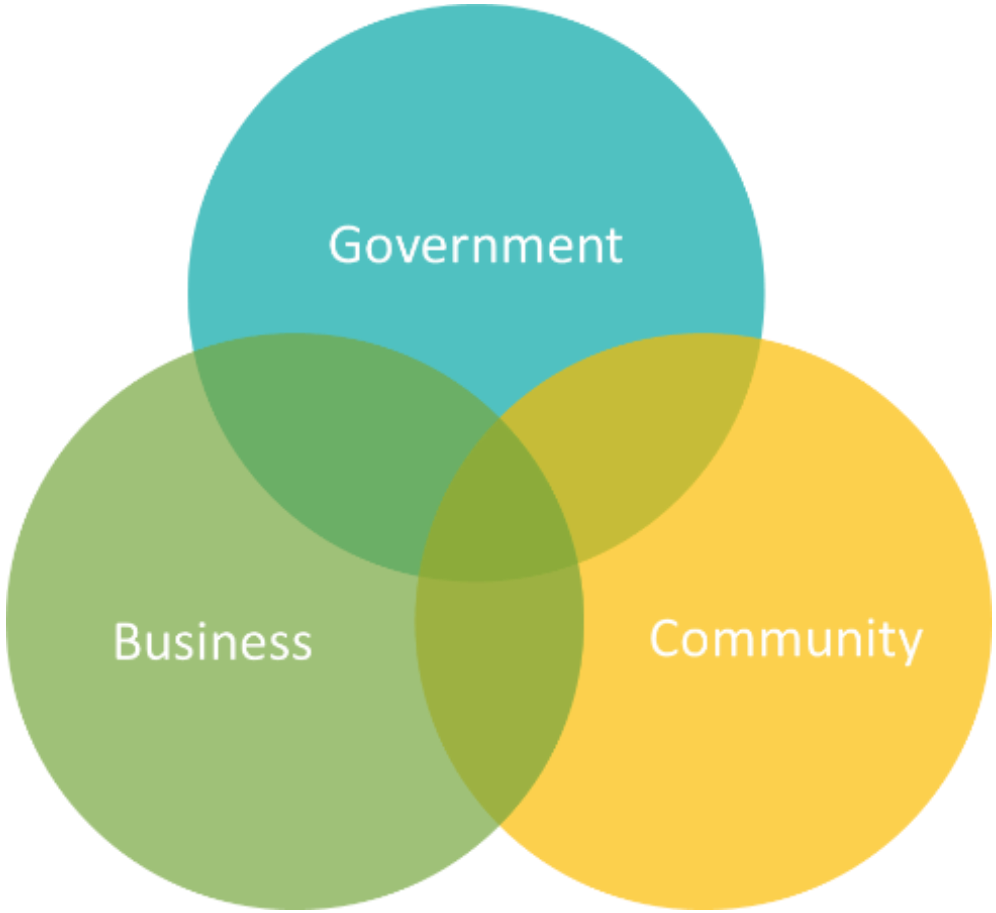
2 KICK-OFF/ DIAGNOSTIC

3 BASELINE DEVELOPMENT

4 EMISSIONS REDUCTION OPPORTUNITIES

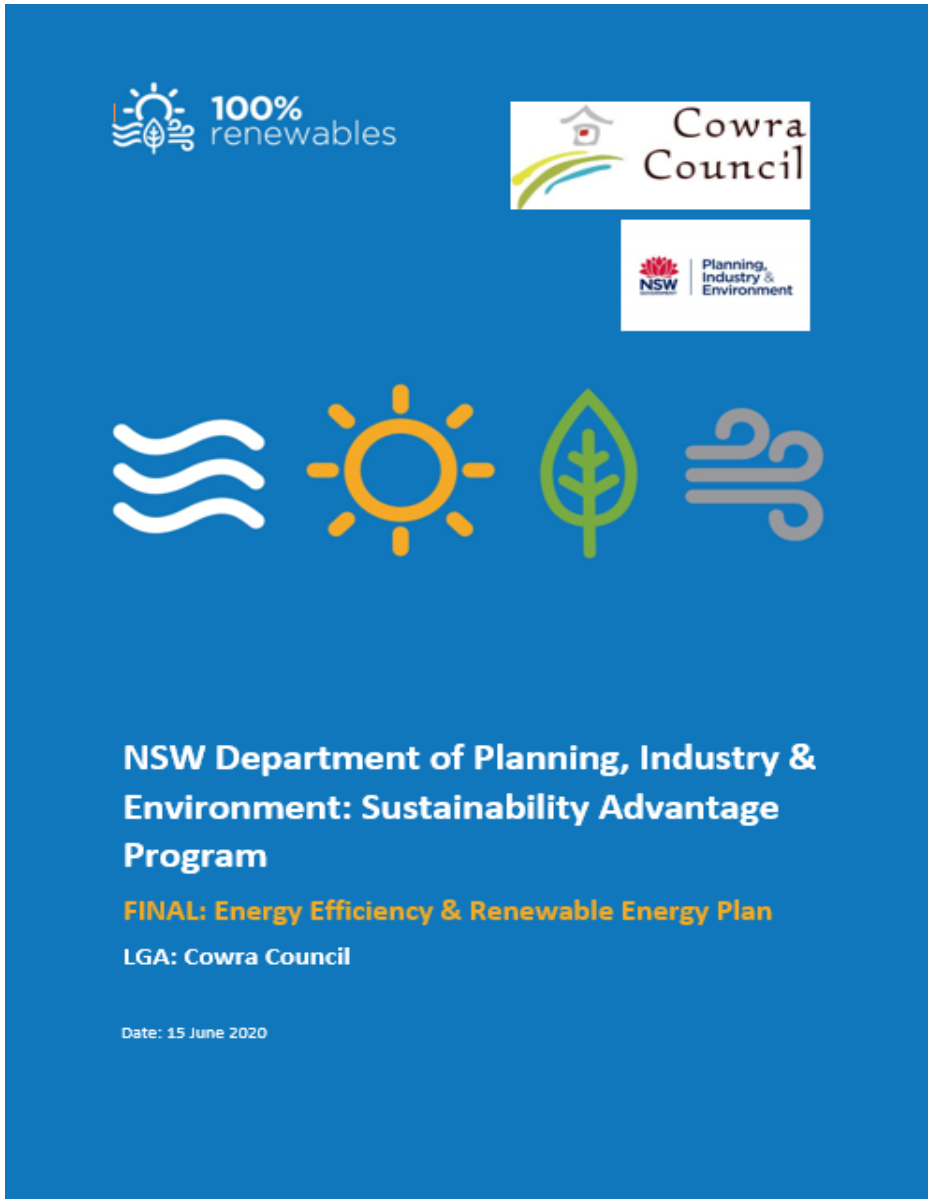
5 FINAL ROADMAP RECOMMENDATIONS

6 NET ZERO COMMITMENT



One of three net zero pilot projects for the Cowra region - Cowra Council, Industry, and Community

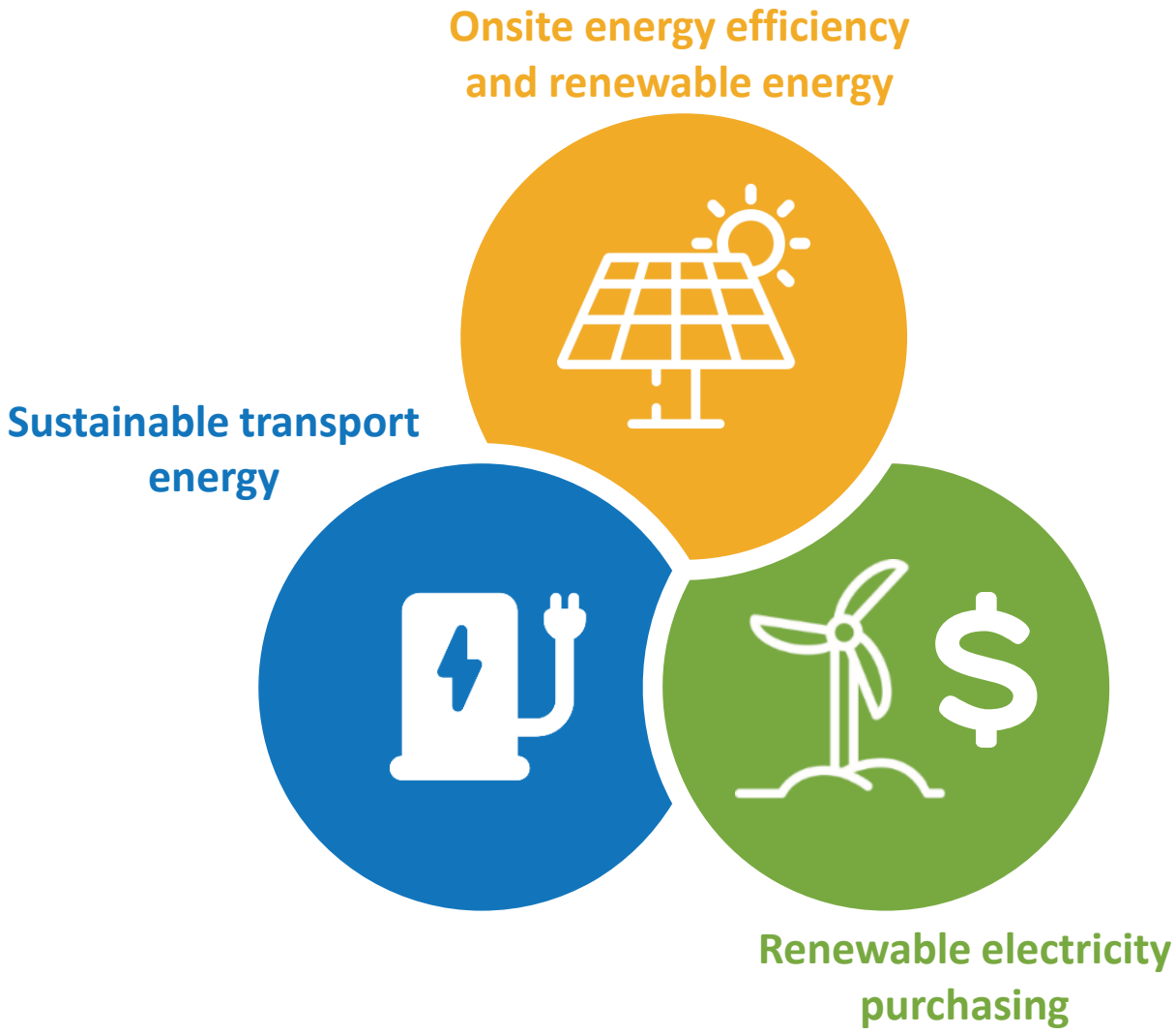
Council's emissions reduction plans and greenhouse gas emissions



100% RENEWABLE ENERGY BY 2030

Council has recently finalised and endorsed the Energy Efficiency & Renewable Energy Plan 2020. With the adoption of the Efficiency & Renewable Energy Plan 2020, Council hopes to achieve 100% renewables in its operations by 2030.

Energy Efficiency & Renewable Energy Plan



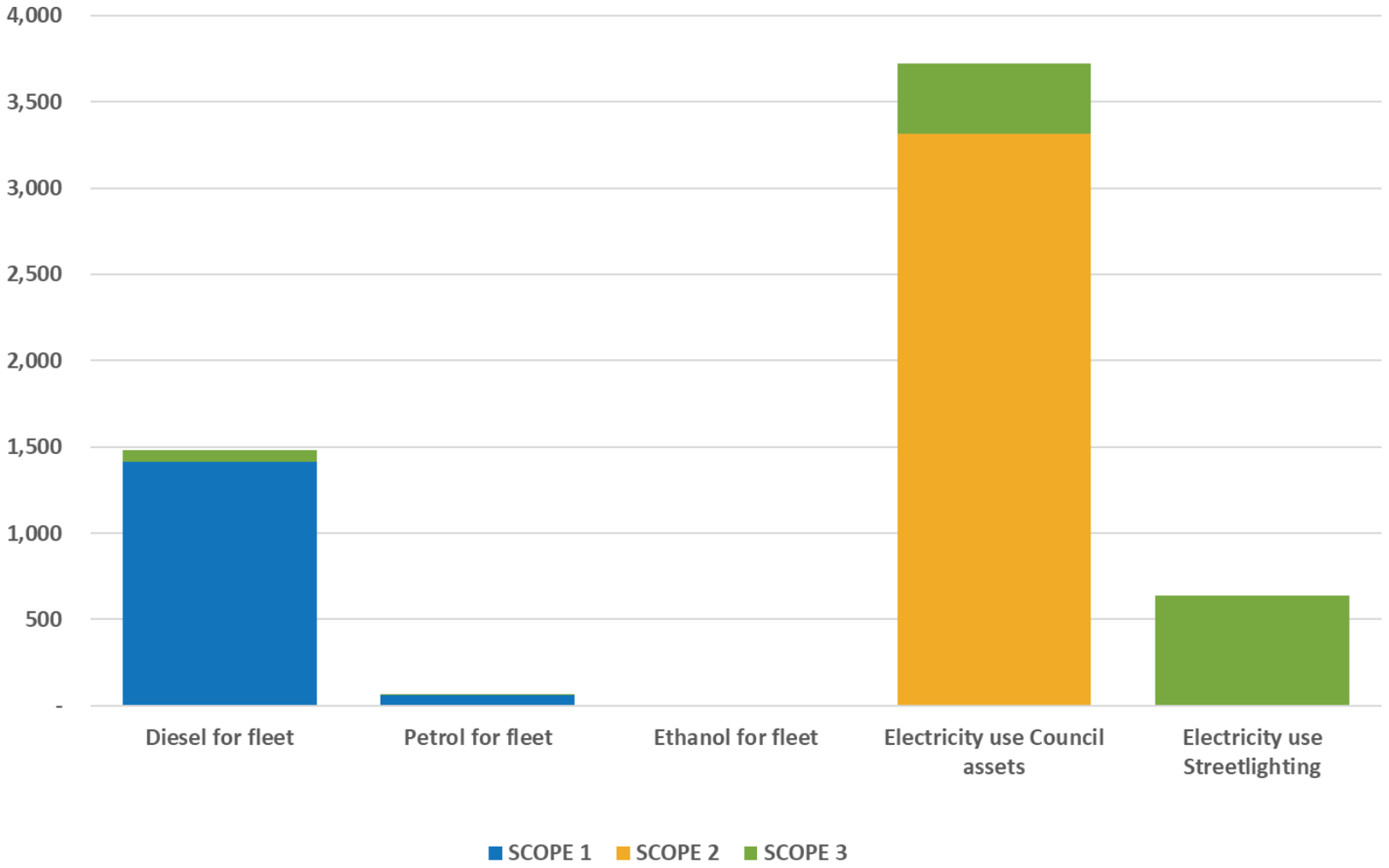
These initiatives are currently being progressed

Over 20 actions to improve efficiency and install renewable energy (and later, battery storage) across 10 sites plus streetlights.

Continuous improvement actions across lighting, air conditioning and IT systems.

Organised actions into short, medium and long term suggested plans that will help Council to engage with, develop and implement opportunities for renewable energy purchasing and sustainable transport.

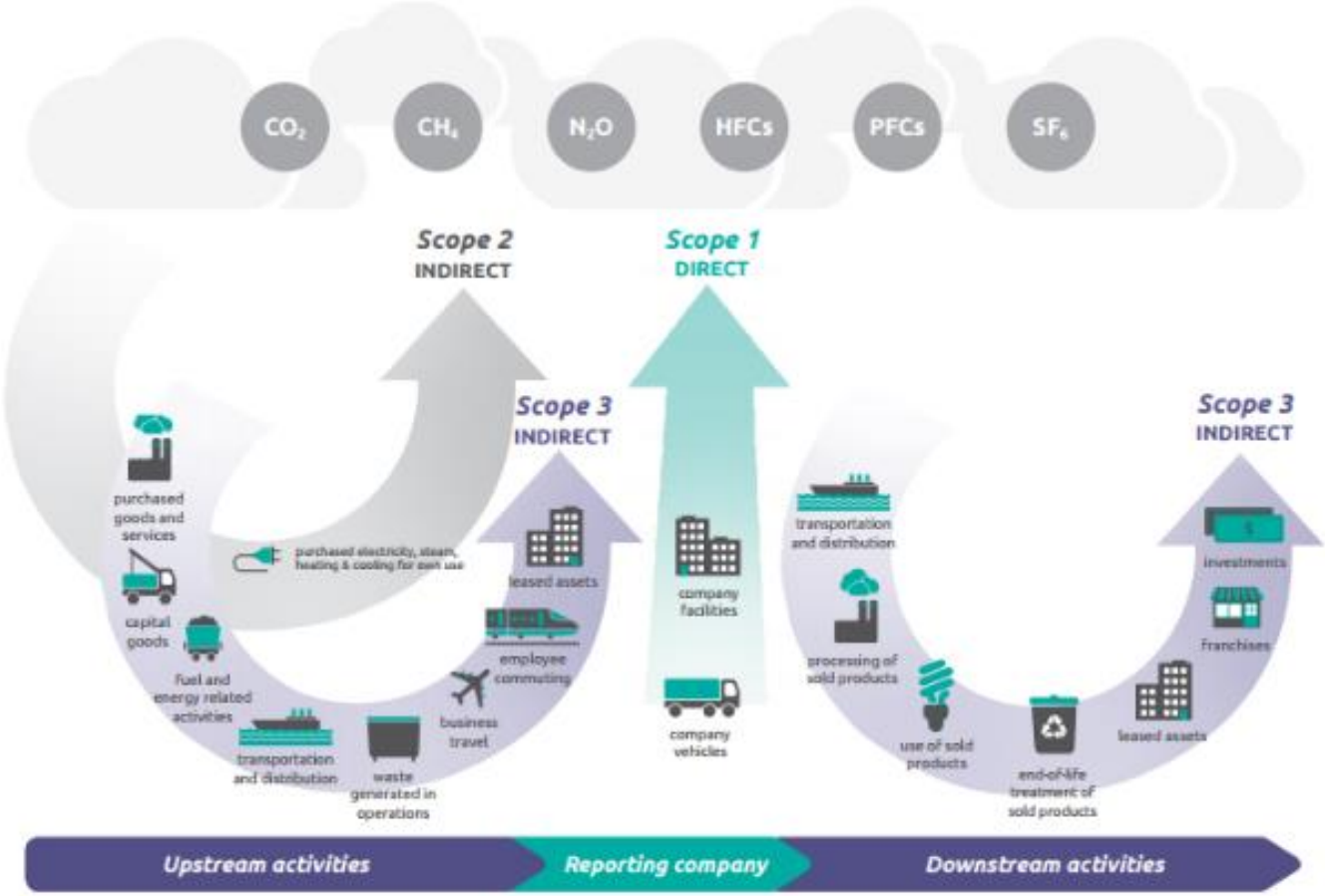
Carbon footprint for Energy Efficiency & Renewable Energy Plan



- Plan focuses on energy-related emissions.
- Electricity for Council assets + streetlighting.
- Diesel and petrol for fleet.
- Emissions of ~5,900 t CO_2-e

What emissions sources are added for this Net Zero strategy?

- Aiming to capture more emissions associated with Council's activities – direct and indirect
- Broadly – to align with Climate Active
- Operations as well as supply chain – upstream and downstream. For e.g.
  - Diesel, petrol for fleet
  - Electricity in Council & streetlights
  - Waste to landfill
  - Wastewater emissions
  - Purchased goods and services
  - Refrigerants
  - Capital works



100% renewables

Upstream activities


Purchased goods and services


Capital goods


Upstream fuel and energy


Transportation and distribution


Waste from operations


Business travel


Staff commuting


Leased assets

UPSTREAM SCOPE 3

Your organisation's activities

SCOPE 1

Burning of fossil fuels, refrigerant loss

SCOPE 2

Electricity consumption

SCOPE 1 AND 2

Downstream activities


Transportation and distribution


Processing of sold products


Use of sold products


End-of-life treatment of sold products


Leased assets


Franchises


Investments

DOWNSTREAM SCOPE 3

Cowra Council's carbon footprint in FY20

Same scope as EE & RE Plan

- Emissions of 5,536 t CO_2-e – similar to estimated 2016/17 emissions for the Energy Efficiency & Renewable Energy Plan

Including capital works, waste and other supply chain emissions

- Emissions of 21,963 t CO_2-e – almost 4 x energy-related emissions

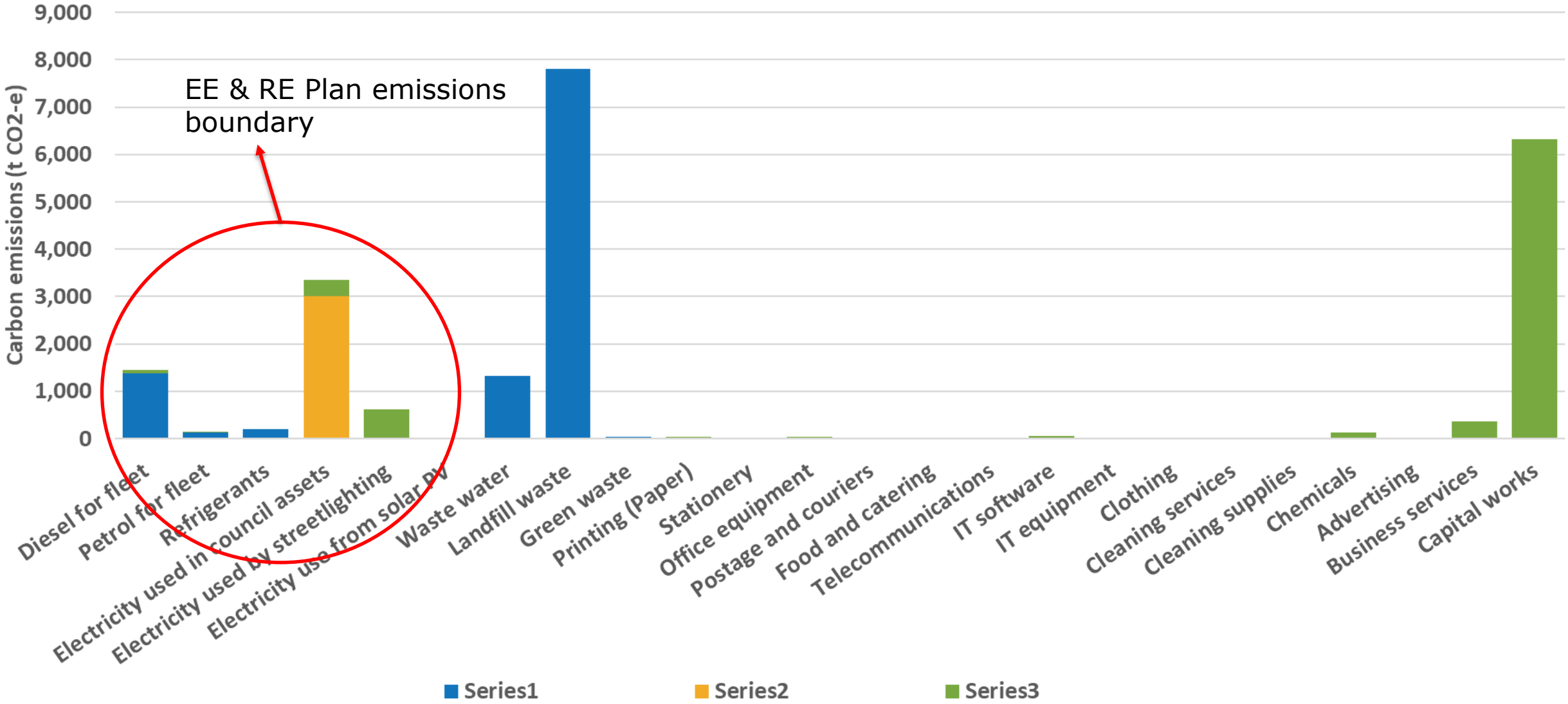
What else could be considered in a Climate Active compliant carbon footprint?

- Staff commute, contractor fuel use, Council's investments for example

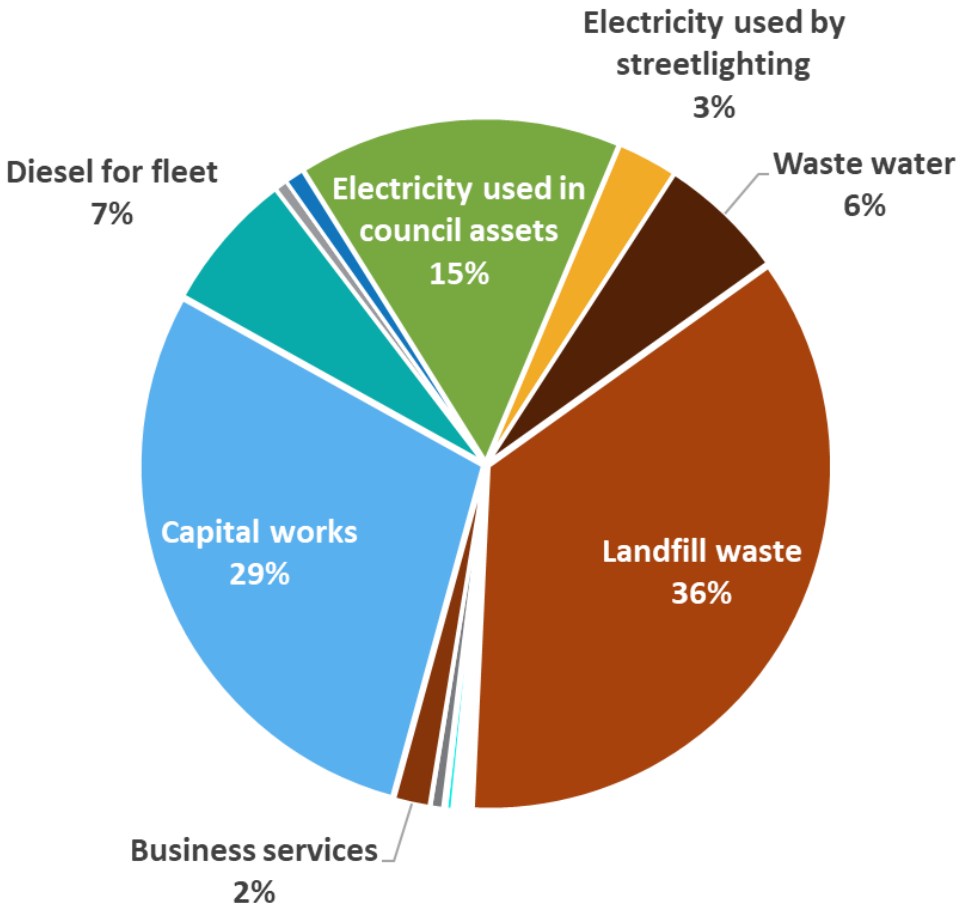
Council's carbon footprint

	Emission source	Activity data	Units	Scope 1 t CO_2-e	Scope 2 t CO_2-e	Scope 3 t CO_2-e	Total	%
	Diesel for fleet	505	kL	1,372		70	1,442	6.6%
	Petrol for fleet	53	kL	124		7	130	0.6%
	Refrigerants	1,042	kg	196			196	0.9%
	Electricity used in council assets	3,716,819	kWh		3,011	335	3,345	15.2%
	Electricity used by streetlighting	688,046	kWh			619	619	2.8%
	Electricity use from solar PV	32,534	kWh				0	N/A
	Waste water	1,317	t CO2-e	1,317			1,317	6.0%
	Landfill waste	5,075	tonnes	7,815			7,815	35.6%
	Green waste	787	tonnes	36			36	0.2%
	Printing (Paper)	45,273	$			33	33	0.1%
	Stationery	27,732	$			20	20	0.1%
	Office equipment	112,031	$			30	30	0.1%
	Postage and couriers	68,426	$			25	25	0.1%
	Food and catering	30,625	$			12	12	0.1%
	Telecommunications	155,577	$			25	25	0.1%
	IT software	367,532	$			61	61	0.3%
	IT equipment	100,310	$			18	18	0.1%
	Clothing	70,029	$			7	7	0.0%
	Cleaning services	56,329	$			8	8	0.0%
	Cleaning supplies	1,670	$			1	1	0.0%
	Chemicals	345,172	$			124	124	0.6%
	Advertising	101,647	$			14	14	0.1%
	Business services	4,117,833	$			363	363	1.7%
	Capital works	9,195,031	$			6,323	6,323	28.8%
	TOTAL:			**10,860**	**3,011**	**8,092**	**21,963**	**100.0%**

Council's carbon footprint



Council's carbon footprint



21,963 tonnes

01 Landfill waste (36%)

02 Capital works (29%)

03 Electricity in Council assets (15%)

04 Diesel (7%)

05 Wastewater (6%)

Net zero diagnostic

Diagnostic session

- 100% Renewables developed and ran a net zero diagnostic session with Cowra Council's key stakeholders on 8th March 2021
- The primary objectives were to:
  - Extend the organisation's thinking about emissions and climate impacts beyond 'operational' emissions and into their upstream and downstream impact
  - Extend the organisation's thinking beyond 'operational' aspects of energy and emissions to consider a bigger picture that encompasses their climate risk and future impacts on their services

Diagnostic session

- Cowra Council's stakeholders self-assessed performance in twelve key areas
  - Commitment to climate action
  - Business strategy and plans
  - Climate (physical) risk and adaptation
  - Market, product and service risk and innovation
  - Emission reduction targets
  - People
  - Financing
  - Procurement
  - Emission reduction opportunities
  - Emissions measurement and reporting
  - Communications and reporting
  - Audit and achievement

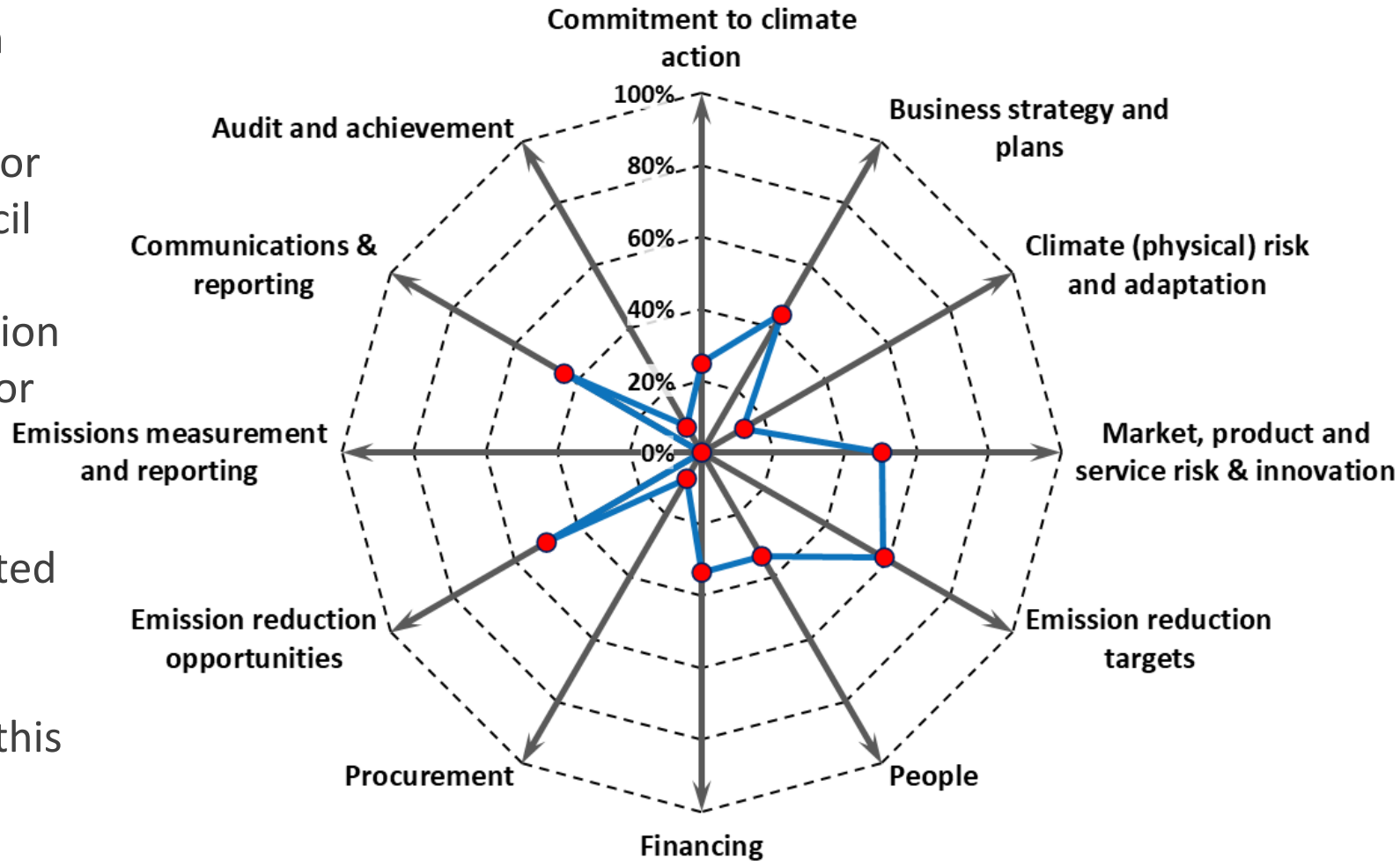

DIAGNOSTIC
RESULTS
SUMMARY

Net-zero diagnostic summary of results

Characteristic	Score		% Score
	Actual	Max	
Commitment to climate action	*3*	*12*	*25%*
Business strategy and plans	*4*	*9*	*44%*
Climate (physical) risk and adaptation	*2*	*15*	*13%*
Market, product and service risk & innovation	*6*	*12*	*50%*
Emission reduction targets	*7*	*12*	*58%*
People	*4*	*12*	*33%*
Financing	*3*	*9*	*33%*
Procurement	*1*	*12*	*8%*
Emission reduction opportunities	*6*	*12*	*50%*
Emissions measurement and reporting	*0*	*12*	*0%*
Communications & reporting	*4*	*9*	*44%*
Audit and achievement	*1*	*12*	*8%*
GRAND TOTAL	**41**	**138**	**30%**

Net-zero diagnostic summary of results

- Overall achievement level: 30%
- Emissions and climate risks are acknowledged and are considered in Council's business planning.
- Emissions reduction targets are set for energy-related emissions, and Council is committed to EPA targets for diverting waste from landfill. Reduction opportunities have been identified for energy-related emissions.
- Council has more work to do to formally assess all of its climate-related risks and opportunities, and to integrate this with strategic and operational planning, and to reflect this in financing and procurement functions, as well as in climate commitments and reporting.




DIAGNOSTIC
RESULTS
DETAILED

Commitment to climate action

Commitment to climate action

Characteristic	Score	
	Actual	Max
We have a documented climate change policy (or equivalent), which includes quantitative targets for our operations	1	3
The policy is communicated to all employees (e.g. part of onboarding) and is regularly reviewed (at least within the last three years)	1	3
Our climate commitment and targets extends to our value chain and our products / services, based on our assessment of our climate risks and our carbon footprint	0	3
We are seen as a climate action leader by our stakeholders (staff, clients, supply chain partners, business, sector peers, and NGOs, etc.), who know our policy and commitments	1	3
Total score	**3**	**of 12**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Business strategy and plans

Business strategy and plans

Characteristic	Score	
	Actual	Max
We have an emissions reduction plan focused on our operations	3	3
Our business strategy extends to our value chain in terms of emissions reduction and climate risks in our supply chain	0	3
Our business strategy encompasses a comprehensive net-zero strategy and implementation plan, covering operations, supply chain and climate risk and response.	1	3
Total score	**4**	**of 9**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Climate (physical) risk and adaptation

Climate (physical) risk and adaptation

Characteristic	Score	
	Actual	Max
We are aware of physical climate risks that relate to our organisation and supply chain.	2	3
We have assessed the likelihood and impacts of physical climate risks across our organisation and supply chain.	0	3
We have developed a risk management plan that addresses all extreme and high risks at a minimum.	0	3
Climate risks and adaptation measures are fully integrated into our business strategy, operational and capital works plans. We have established a budget, KPIs, accountability, and are training our staff and contractors in the risk management plan.	0	3
We regularly update our risk management plan to reflect the latest climate science and resulting risks.	0	3
Total score	**2**	**of 15**

Explanation of scores:

0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Market, product and service risk & innovation

Market, product and service risk & innovation

Characteristic	Score	
	Actual	Max
Our business has recognised that climate change may lead to risks to our current market, products and services, as well as opportunities for innovation and growth	3	3
We have assessed risks to our markets, our products and/or services from climate change (e.g. policy, technology, reputation and market risks)	1	3
We have assessed opportunities for new markets and new products/services in a low carbon environment	1	3
Our business strategy reflects the risks and opportunities that climate change and a net zero economy will bring	1	3
Total score	**6**	**of 12**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Emission reduction targets

Emission reduction targets

Characteristic	Score	
	Actual	Max
We have set a target to reduce emissions (and/or increase renewable energy) in our operations and these are reviewed regularly	3	3
We have set targets to reduce emissions in our value chain and these are reviewed regularly	0	3
We have set a net zero emissions target to be achieved by 2050 or earlier	3	3
Our net zero emissions goal covers scopes 1, 2 and 3 sources and includes interim targets	1	3
Total score	**7**	**of 12**

Explanation of scores:
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Emission reduction targets

People

Characteristic	Score	
	Actual	Max
One or more qualified people in our organisation are responsible for management of our energy and emissions task	3	3
Our organisation trains and educates staff on our climate/emissions policy, targets and plans	1	3
Our suppliers and contractors are informed and aware of our climate/emissions policy, targets and plans, including our expectations of them	0	3
Our staff and other stakeholders are positively influenced and motivated by our goals to reach net zero emissions	0	3
Total score	**4**	**of 12**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Financing

Financing

Characteristic	Score	
	Actual	Max
Committed emissions reduction projects are routinely funded within our operating budget	1	3
We have assessed the full cost impact of our emissions reduction strategy as well as the financial savings and return on investment	2	3
We have considered a range of funding options and have a clear financing strategy to achieve our net zero goals	0	3
Total score	**3**	**of 9**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Procurement

Procurement

Characteristic	Score	
	Actual	Max
Our procurement practices usually ensure that low-emissions products and services are considered or selected in purchasing decisions	1	3
We have a procurement policy that commits our organisation to use sustainable procurement principles when designing or selecting new products and services	0	3
Qualified staff are trained in our sustainable procurement policy and practices, and apply these in all purchasing decisions	0	3
Our sustainable procurement policy and training is updated regularly, and specifications are continuously improved to reflect best practice in sustainable procurement	0	3
Total score	**1**	**of 12**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Emission reduction opportunities

Emission reduction opportunities

Characteristic	Score	
	Actual	Max
We have assessed emissions reduction opportunities in our business in the last few years	3	3
We implement emissions reduction projects in our business routinely (e.g. every year)	2	3
Our major project and capital works processes integrate emissions reduction objectives and whole-of-life approach to design and plant selection, including assessment of future climate-related risks and impacts	0	3
We have a comprehensive roadmap to net zero emissions based on an assessment of abatement opportunities, costs and benefits	1	3
Total score	**6**	**of 12**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

Emissions measurement and reporting

Emissions measurement and reporting

Characteristic	Score	
	Actual	Max
We collect data and develop our scope 1 and scope 2 emissions inventory at least annually, and look at trends in emissions and key performance indicators	0	3
We extend our inventory to include our significant scope 3 greenhouse gases based on an assessment of our value chain emissions	0	3
We include greenhouse gas emissions in public reports, and have reported our emissions to our customers and other stakeholders	0	3
We prepare and publicly report audited annual scope 1, 2, and 3 emissions aligned with world's best-practice	0	3
Total score	**0**	**of 12**

Explanation of scores:
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Communications & reporting

Communications & reporting

Characteristic	Score	
	Actual	Max
We communicate our policy, targets, performance and plans for emissions reduction internally.	2	3
We communicate our policy, targets, and expectations to our suppliers.	0	3
We communicate our policy, targets, performance and plans for emissions reduction externally.	2	3
Total score	**4**	**of 9**

Explanation of scores:
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Audit and achievement

Audit and achievement

Characteristic	Score	
	Actual	Max
We have achieved emissions reductions in our organisation based on measured trends	1	3
We audit and assess the efficacy of our emissions reduction strategy on a regular basis and use results to inform revisions to the strategy	0	3
We are on track to achieve deep cuts in our emissions aligned with our net zero goal	0	3
We celebrate success in emissions reduction with our staff and stakeholders	0	3
Total score	**1**	**of 12**

Explanation of scores:
0 = never/no, **1** = occasionally/partially, **2** = usually/more yes than no, **3** = 100%, all the time/done comprehensively

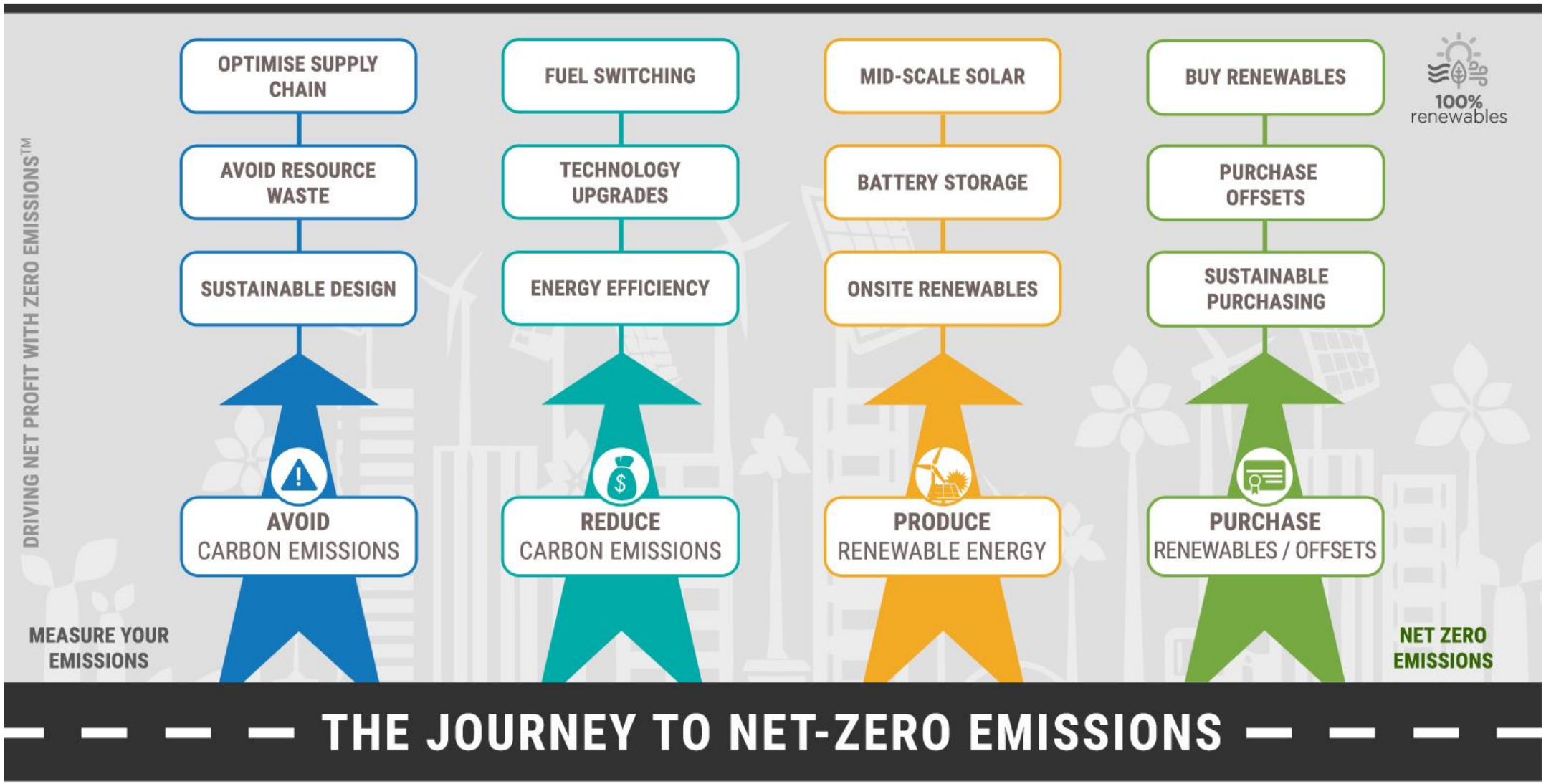
Pathway to Net zero emissions

NET-ZERO EMISSIONS

Reduce
Remove

Focus on deep decarbonisation,
then balance remaining emissions by
removing carbon from the atmosphere

The Pathway to net-zero while driving financial performance



Emissions reduction opportunities

BEHIND-THE-METER SOLAR

ENERGY EFFICIENCY

RENEWABLE ENERGY POWER PURCHASING

WASTEWATER

SUSTAINABLE PROCUREMENT

SUSTAINABLE TRANSPORT

OFFSETS

WASTE TO LANDFILL

GOVERNANCE AND LEADERSHIP

Scope 3 opportunities

CAPITAL WORKS

FOOD AND CATERING

BUSINESS SERVICES

CLEANING SERVICES

IT SOFTWARE

ADVERTISING

CHEMICALS

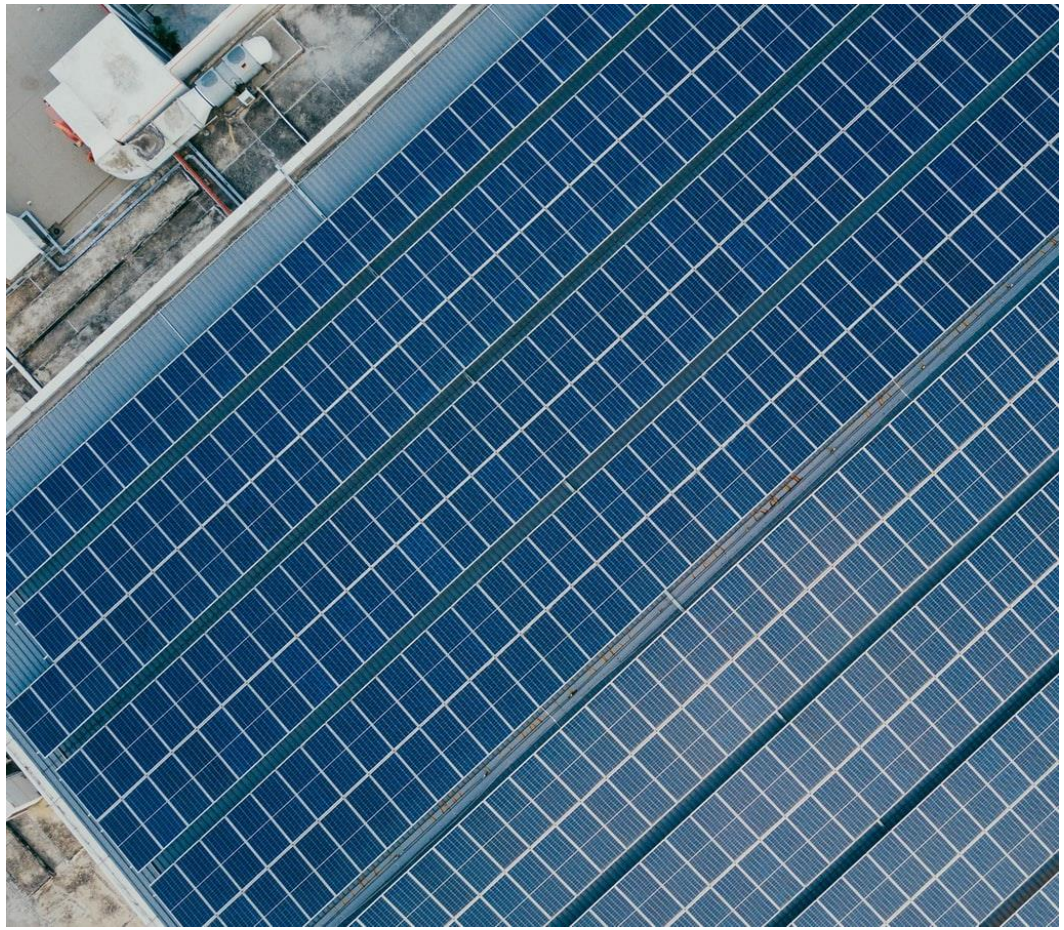
TELECOMMS

OTHER

1

Onsite solar PV

- Short term opportunities:
  - Installation of 197 kW of solar PV across 5 sites – average payback of 4.9 years
- Medium term opportunities:
  - Installation of 136 kW of solar PV across 3 sites – average payback of 3.8 years
- Long term opportunities:
  - Installation of 198 kW of solar PV and 50 kWh of battery storage across 2 sites – average payback of 7.3 years



2

Energy efficiency

- LED street lighting upgrade
- LED lighting upgrades in buildings
- Installation of VSD controls
- Upgrade with energy efficient air conditioning equipment on replacement
- Upgrade with energy efficient ICT equipment on replacement

3

Renewable power purchasing

- Become more informed about renewable energy purchasing via PPAs ahead of Council's next procurement cycle
- Progress (if feasible financially) with the procurement of a proportion of Council's electricity from renewables
- Progressively increase the amount of renewable energy purchased

Wastewater

- Stay abreast of emissions estimation and measurement from WWTP systems
- Assess plant design and operation techniques over time that could lead to lower direct emissions (e.g. N_2O)

5

Sustainable procurement

- Make purchasing decisions based on the entire life cycle of costs and environmental impacts.
- Draw on Local Government Sustainable Procurement guidelines to inform:
  - Policy development
  - Education & training of staff
  - Update product and service specifications to reflect low-emissions objectives
- Extend to all purchased goods and services over time

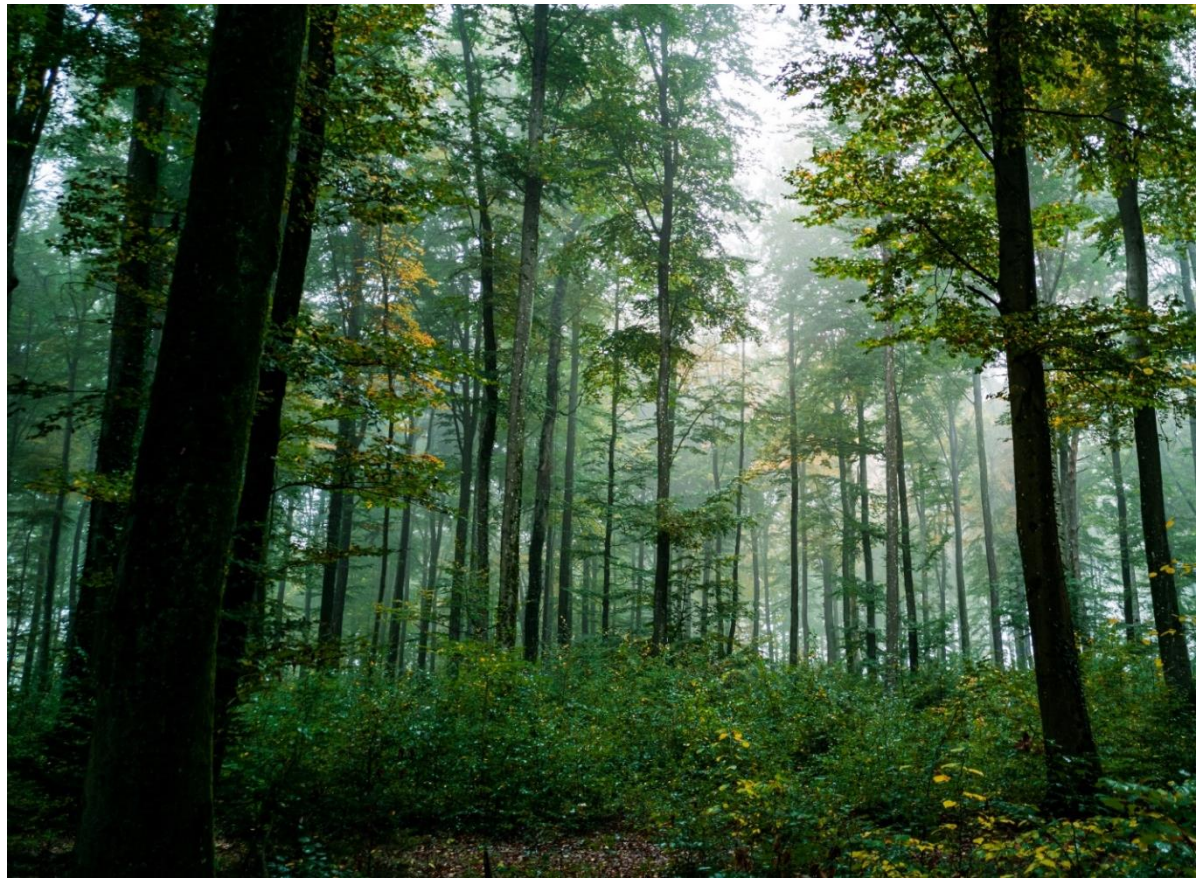
6

Sustainable transport

- Consider the development of EV charging infrastructure on Council land
- Assess the costs and benefits of hybrid passenger cars within Council's fleet
- In Council's vehicle strategy, integrate planning to shift Council's towardsEV
- Stay abreast of developments in EV incentives, policy and other support, and incorporate these in Council's planning process for its transport fleet

Carbon offsets

- Aim to maximise emissions reduction for Council's energy use
- Minimise emissions from waste
- Monitor wastewater emissions and review processes
- Progressively implement sustainable procurement that reduces energy and supply chain emissions over time
- Consider purchasing offsets (ideally removals / sequestration) to reach net zero emissions



8

Waste

- Encourage & educate residents and businesses to reduce emissions from waste through their own purchasing, use and disposal actions
- Continue to lead and look to reduce emissions through collection and management systems, and continue to collaborate with other councils, regional waste bodies, State Government and resource management companies to drive towards lower emissions and circular economy methods
- Work with regional waste bodies, State Government and others to develop its waste management strategy to 2030

Governance and leadership

- The implementation of management and governance systems for the plan, and commitment and authority to act at relevant levels to reduce emissions, is also key for success.
- A leadership group that brings together key stakeholders from cross-functional areas in Council

Suggested actions and net zero roadmap

Business-as-usual emissions projection

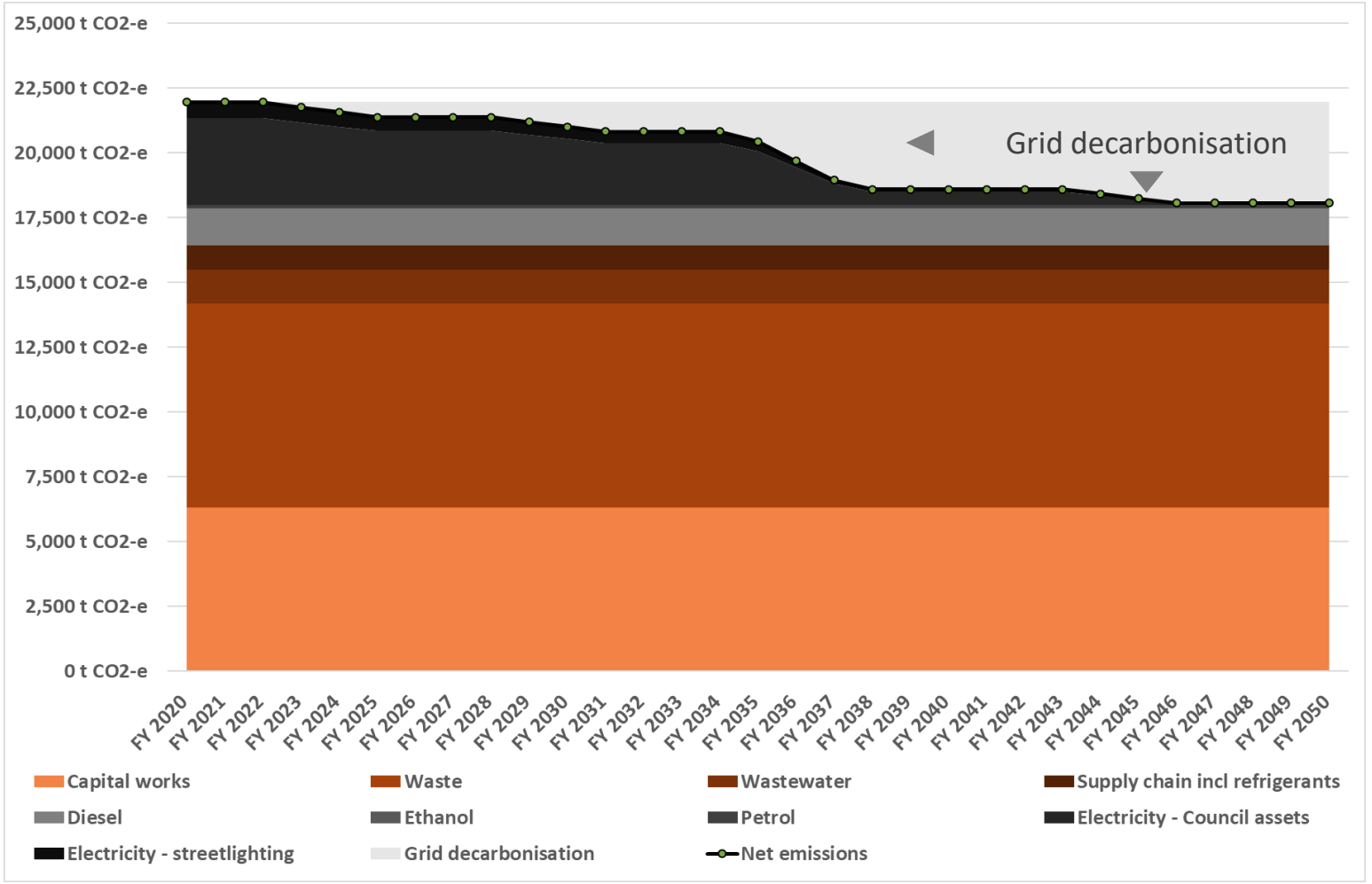
Assumptions

- Cowra's population is expected to remain relatively static in coming years
- Dwelling numbers will stay roughly the same as well
- Without action this can be assumed to lead to similar outcomes in terms of waste emissions and services provided by Council
- A BAU estimate of 0% growth in emissions under a BAU scenario is assumed

Business-as-usual emissions projection

This graph shows a business-as-usual (BAU) projection for all emission sources.

As coal-fired power stations retire and more renewables enter the grid, Cowra's emissions from electricity use will decrease.



Net Zero strategy for Cowra Council

Key strategies	Description
Energy Efficiency & Renewable Energy Plan	Around 25% of Council's emissions are associated with its energy-related activities. Acting to reduce these as per the adopted EE&RE Plan can help Council to achieve most of the emissions reductions required by 2030 to align with the NSW Government's 2030 objective for emissions reduction.
Waste to landfill	Achieving emissions reduction in waste is crucial to Council achieving long term deep cuts in emissions for all of its operations. The 20-Year Waste Strategy for NSW being developed by NSW Government (through the EPA), the next strategic plan of NetWaste and Cowra Council's waste strategy will need to identify, develop and implement measures that further educate communities, increase waste diversion from landfill, create regional solutions and develop uses for problem wastes for Cowra such as glass.
Capital works	Much of Council's capital works is associated with road and pavement construction and maintenance. Materials selection (towards low embodied emissions products that are fit-for-purpose) and procurement solutions will need to be developed that can help Council to source materials with lower carbon impact.
Other supply chain emissions	Council's procurement of goods and services can be refined through policy, education/training and implementation of practices that seek to source low emissions solutions to meet Council's needs.
Wastewater emissions	These may be up to 6% of Council's carbon footprint, and are difficult to both monitor and control except through plant upgrades / re-design.

Potential net-zero actions

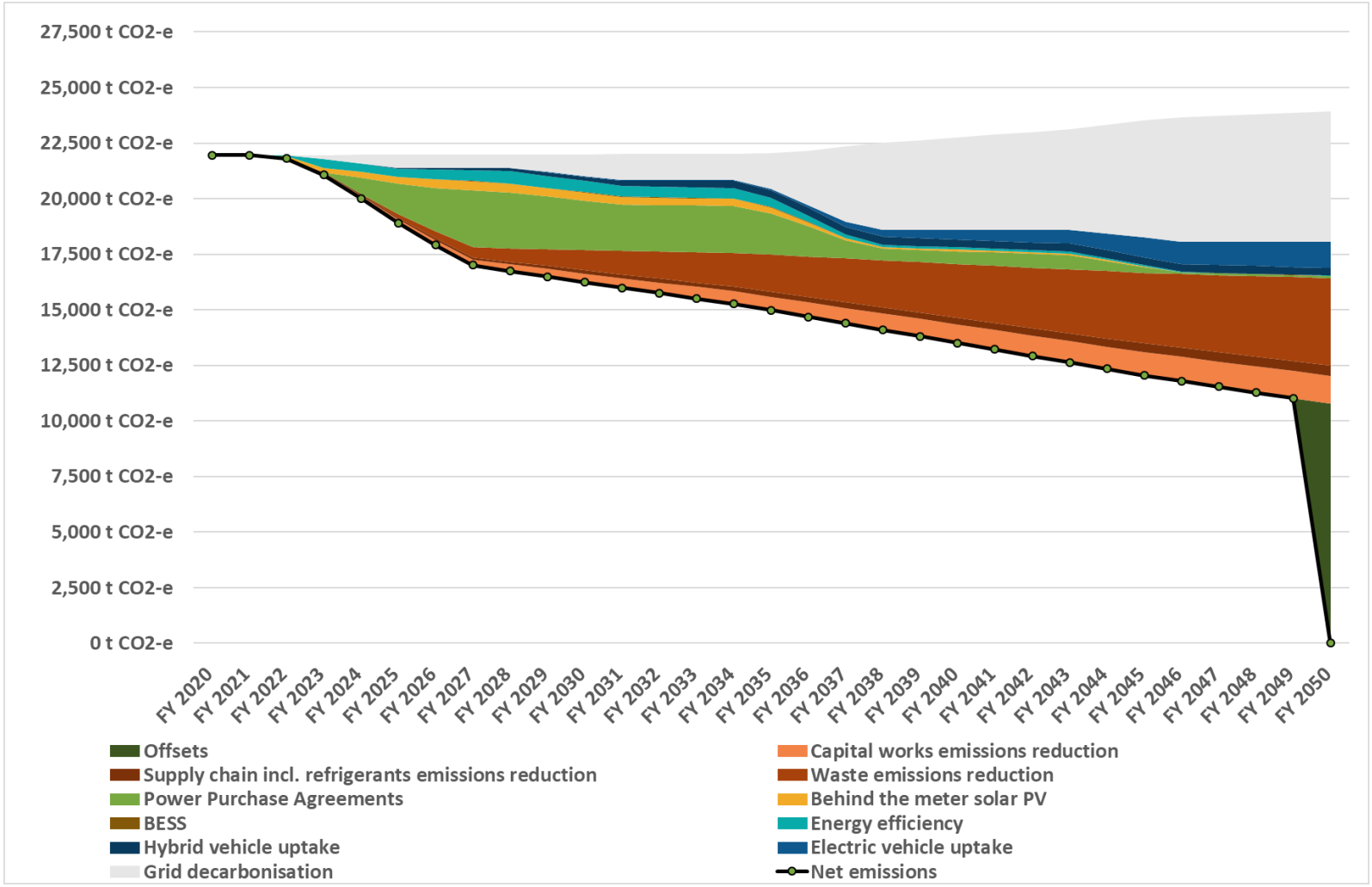
Abatement opportunity	Opportunity description and model inputs
Behind the meter solar PV	Implement all identified behind the meter solar PV opportunities in the Energy Efficiency & Renewable Energy Plan by 2030, aligned with recommended short, medium and long term plans
Battery energy storage system	Implement all identified battery energy storage system opportunities in the Energy Efficiency & Renewable Energy Plan by 2030, aligned with recommended short, medium and long term plans
Energy efficiency	Implement all identified energy efficiency opportunities in the Energy Efficiency & Renewable Energy Plan by 2030, aligned with recommended short, medium and long term plans
Power purchase agreements	• Progressive uptake to 100% renewables PPA from FY2024 to FY2027 • Retain at 100% renewables PPA from FY2028 onwards
Hybrid and electric vehicles uptake	• Progressive electric vehicle uptake for fleet passenger vehicles from FY2022 to FY2030 • Progressive hybrid vehicle uptake for utes (assumed 50% of diesel consumption) from FY2025 to FY2035 then progressive switch to electric vehicle from FY2035 to FY2045 • Progressive electrification of plant equipment (assumed 50% of diesel consumption) from FY2035 to FY2050
Waste-to-landfill emissions reduction	Reduce waste to landfill emissions by 50% by FY2050 with a linear improvement rate assumed from FY2025 onwards through the following measures: • Reduce contamination in recycling bins through education and review of bin sizing • Increase waste diversion rates • Assess feasibility of landfill gas flaring or waste-to-energy

Potential net-zero actions

Abatement opportunity	Opportunity description
Supply chain incl. refrigerants emissions reduction	Reduce supply chain incl. refrigerants emissions by 50% by FY2050 with a linear improvement rate assumed from FY2022 onwards through the following measures: • Develop sustainable procurement policies which includes preference to carbon neutral goods and services • Conduct annual review of sustainable procurement policies • Switch to low GWP refrigerants such as R32 which will reduce the refrigerant emissions by around 60%
Capital works emissions reduction	Reduce emissions from capital works by 20% by FY2050 with a linear improvement rate assumed from FY2022 onwards through the following measures: • Progressively increase recycled asphalt in road base • Work with EPA, RMS and regional partners to include glass in road materials • Source materials for road works (cement, concrete, bitumen, etc.) from suppliers with low carbon footprint material / low embodied emissions • Assess the benefits of linking with for e.g. Materials & Embodied Carbon Leaders' Alliance (MECLA) to become informed about low embodied emissions opportunities

Net zero emissions roadmap

- A net zero roadmap shows the timing and impact of cost-effective actions that reduce emissions over time to reach the net zero target by FY2050.
- By FY2030, an emissions reduction from BAU emissions can be achieved which is in-line with the 35% reduction target based on FY2005 emissions.
- This roadmap considers the following abatement opportunities:
  - Solar behind the meter
  - Battery energy storage system (BESS)
  - Energy efficiency
  - Power purchase agreements
  - Hybrid and electric vehicle uptake
  - Waste emissions reduction
  - Supply chain incl. refrigerants emissions reduction
  - Capital works emissions reduction
- By FY2050, based on the modelled roadmap, Council's carbon offset requirement could be 10,768.5 t CO_2-e.



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NET ZERO ROADMAP - PILOT PROJECT WITH COWRA COMMUNITY

Summary report

06 June 2021

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1 Project background

100% Renewables was engaged by the NSW Department of Planning, Industry & Environment: **Sustainability Advantage Program** to develop a ***Community Net Zero Emissions Strategy for Cowra***. This project accompanies a net zero strategy for Cowra Council, and is aimed at helping the Cowra community put a framework around many of the pre-existing community efforts and future efforts to drive the region's climate response.

2 What was done?

100% Renewables implemented the following:

- An emissions footprint for Cowra Local Government Area that uses the BZE snapshot report.
- Developed and summarised a regional snapshot of population, housing, transport and industry, along with expected growth over time.
- Engaged with a number of key region stakeholders including Council, CLEAN, CNSWJO, Japanese Gardens, the local tourism body, and local businesses across community services, retail, aged care and equipment supply to gauge local climate knowledge / attitudes and identify opportunities for abatement that would be prevalent in the community.
- Developed a climate change response survey which was deployed via Cowra Council's communications, with 64 community responses over a 2 week period.
- Identified actions in nine key areas of abatement (grid decarbonisation, buying clean energy, community and regional clean energy generation, behind-the-meter solar, energy efficiency, sustainable transport, waste management, agriculture and forestry), against the key levers available to the region's stakeholders to influence outcomes (strategies, planning controls, infrastructure, education & training, financial and other incentives, individual action, leading by example, collaboration, advocacy and awards / recognition.
- Developed a regional abatement scenario to net zero by 2050 including aligning with 2030 State government targets.

3 What was achieved / recommended?

Identified 44 (draft) actions that could be implemented across Cowra that could drive a local response to climate change through abatement and land use / sequestration measures.

Achieved a level of engagement with the Cowra community at NFP, Council, business and community / resident levels that can be built on to achieve broader consensus on how the community can respond to climate change.

4 What are the challenges and program opportunities?

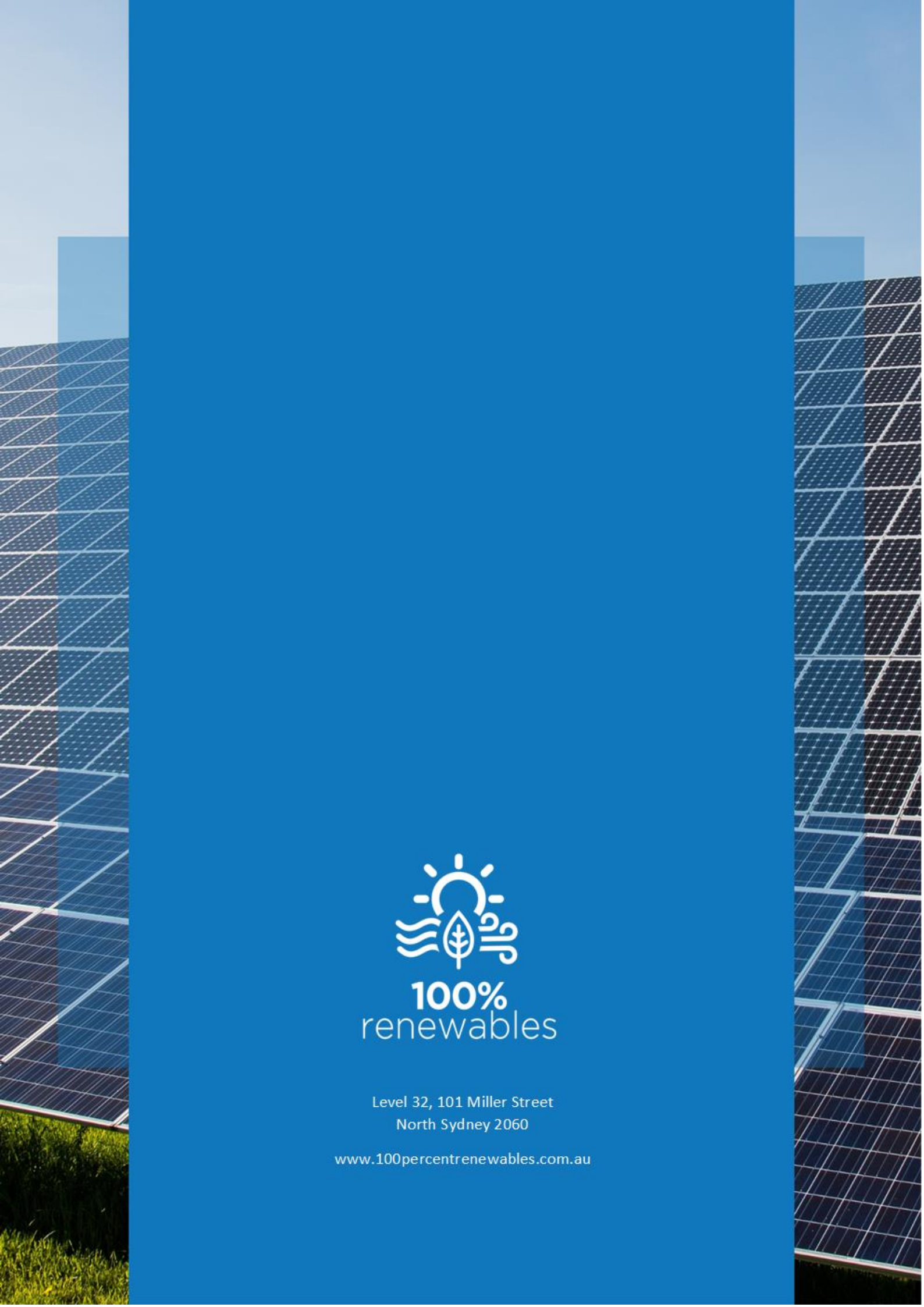
The draft Community Net Zero Emissions Strategy is a basis for a conversation with the Cowra community about the need to reduce emissions and possible pathways and actions to enable this to happen. Moving forward, key actions that will be necessary to drive this process include:

1. Much wider community consultation: this can happen through surveys of the community, through the conduct of workshops with the community, and through the conduct of focus

group sessions with key stakeholder groups for example. Direct sector-level engagement with agricultural and industrial businesses must be central to this wider engagement as this is where much of the region's emissions come from.

    a. This can be initiated by the development of an exhibition draft of the strategy to be put to the community, and adoption of the strategy following this process, potentially including a community-wide target for emissions reduction.

2. Through this process, the strategy and action plan can be refined, with the identification and confirmation of actions that the community is keen to adopt, and in particular the identification of new and local actions that achieve the aim of creating a local plan for Cowra. While a level of community-specific focus is achieved by the presentation of local emissions profiles and the engagement that has occurred thus far, more detailed and focused consultation should aim to identify significant local projects that can help to drive the climate response.
3. A major challenge will be the identification of key stakeholders in the community that can take a leading role in driving action towards net zero emissions over time, and the identification of resourcing needs that will need to be provided so that implementation of the strategy and action plan can occur.
4. Some of the major abatement opportunities rely on action at Commonwealth and State level to be effective at regional level – planning controls, energy policy and enabling legislation, targets, finance, etc.



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NET ZERO ROADMAP - PILOT PROJECT WITH COWRA COUNCIL

Summary report

06 June 2021

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1 Project background

100% Renewables was engaged by the NSW Department of Planning, Industry & Environment: **Sustainability Advantage Program** to develop a ***Net Zero Emissions Strategy for Cowra Shire Council***. This project builds on prior Sustainability Advantage work to develop an **Efficiency and Renewable Energy Plan** for Council, which was focused on energy-related emissions.

2 What was done?

100% Renewables implemented the following:

- Developed an emissions footprint for Cowra Council including an updated energy-related footprint sourced via Council's billing systems, emissions from waste to landfill based on data supplied by Council, and estimated scope 3 carbon footprint derived from financial expenditure data for Council for 2019/20.
- Developed and ran a net-zero diagnostic session with Cowra Council's stakeholders (ManEx and Councillors) to understand the organisation's current understanding of, and progress towards addressing climate risk to the organisation.
- Identified a range of opportunities that the organisation could consider in the context of reducing emissions for Cowra Council from the baseline.
- Developed a roadmap of emissions reduction opportunities and a roadmap of short, medium and long term actions recommended for Cowra Council.

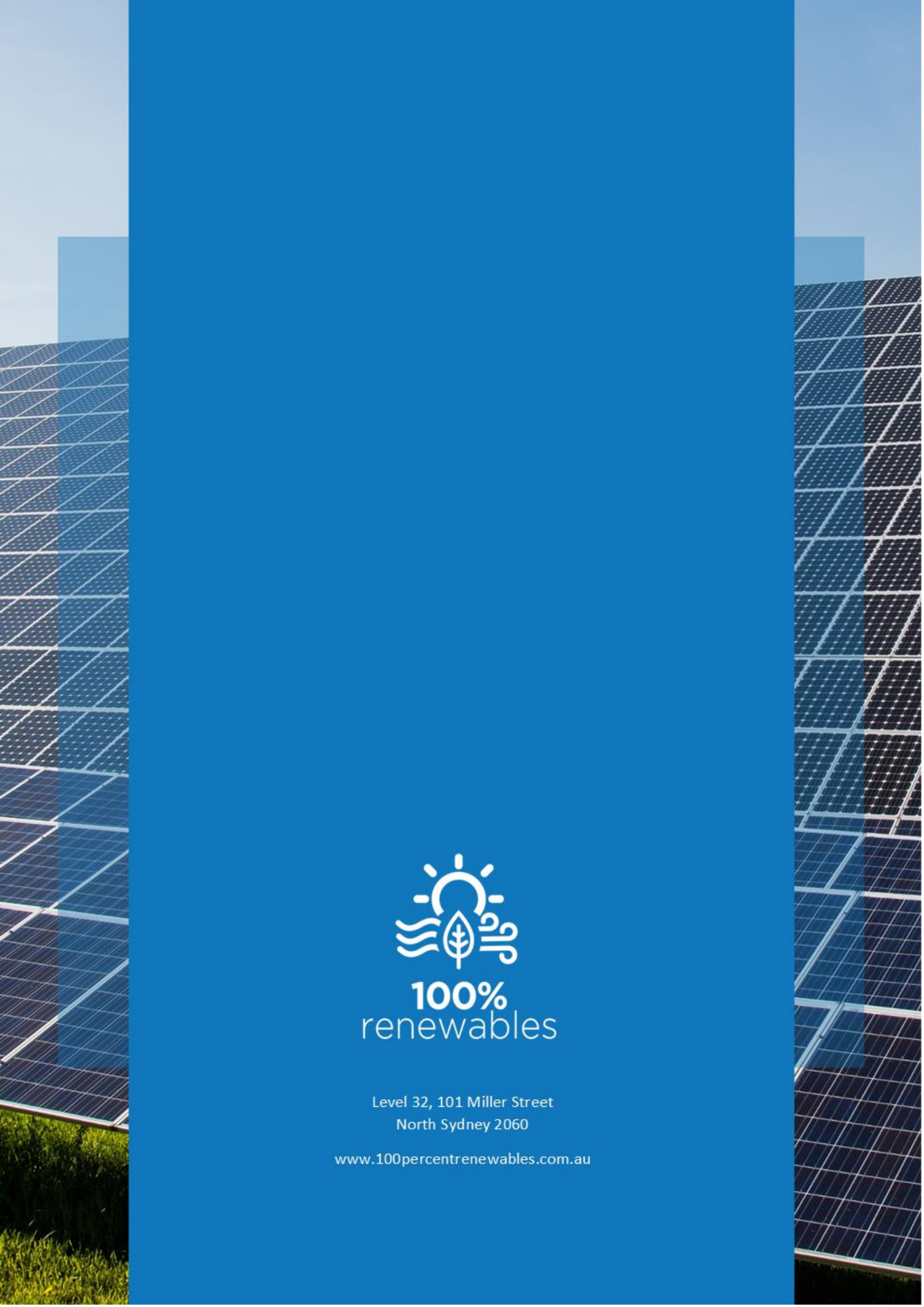
3 What was achieved / recommended?

- The project has raised awareness of indirect (scope 3) greenhouse gas emissions associated with Council's corporate activities, as well as literacy related to what 'net zero' goals are seeking to achieve.
- The diagnostic served to highlight that Council is at an early stage of development in terms of having a holistic climate risk and response that is integrated with strategic and operational planning processes.
- While deeper analysis of Council's supply chain may yield additional important sources of emissions, this assessment clearly highlights and recommends three major response areas – energy, waste and road-based capital works – as being the most important areas to focus on from an emissions reduction perspective.

4 What are the challenges and program opportunities?

- More information and education on what net zero means, emissions scopes, climate risk and organisations' response (mitigation and adaptation) options and opportunities would be beneficial in this case, and is likely to be required over the medium term to see responses embedded in how Council operates.
- Stakeholder engagement levels related to climate change and organisation responses are low to moderate compared with other councils, particularly metropolitan and coastal councils. Greater literacy (per above) and awareness of community attitudes through continuing engagement may be beneficial in raising engagement levels.

    - A community survey of climate change attitudes and views elicited some 64 responses, with an overarching view that climate change is having moderate to severe local impacts and that leadership by Council – among other responses – is an important element of the region's climate response (though views on ambitious targets and impacts are lower than seen in other regions / Councils).
- Council has limited ability to influence emissions from waste, and State-level and regional strategic responses are required to tackle this emissions source.
- Much greater education is needed on both scope 3 emissions sources and on sustainable procurement processes and practices, as well as on the availability (and affordability) of feasible supply chain low / zero emissions solutions for key sources such as road construction and maintenance.



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Cowra Local Government Area

COMMUNITY NET ZERO EMISSIONS STRATEGY

July 2021

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100% Renewables was engaged by the NSW Department of Planning, Industry & Environment: **Sustainability Advantage Program** to develop a ***Community Net Zero Emissions Strategy for Cowra***. This project accompanies a net zero strategy for Cowra Council, and is aimed at helping the Cowra community put a framework around many of the pre-existing community efforts and future efforts to drive the region's climate response.

The driver for the development of this Community Net Zero Emissions Strategy is the agreed need at a global level to reduce greenhouse gas emissions to zero by mid-century, the adoption of a net zero emissions goal by the NSW State Government, and the development of the State's **Net Zero Plan Stage 1: 2020–2030**[1] that responds to this target with the first of three 10-year plans that will set a pathway to net zero emissions by 2050.

1.2 Local emissions and community climate action

A carbon footprint for the Cowra Shire is taken from the Ironbark-BZE Snapshot Report[2] (BZE), which estimates 2018-19 emissions for all Local Government Area (LGAs) in Australia. Estimated emissions in Cowra Shire were 376,800 tonnes of carbon dioxide equivalent. Agriculture accounted for 46% of total emissions, followed by stationary energy (31%) and transport (22%)[3].

TABLE 1: COWRA SHIRE CARBON FOOTPRINT 2018-19

	Emission Sources	Ironbark - BZE t CO2-e
	Stationary Energy	118,200
	Transport	84,000
	Waste	3,600
	Agriculture	171,000
	Land Use	(2,100)
	Total	376,800

The Cowra community has been responding to the challenge of climate change, notably through the installation of 1,811 solar panel systems (29% of all dwellings), with a total installed capacity of nearly 10 megawatts. In 2020 Cowra Council adopted its Energy Efficiency and Renewable Energy Plan, which will see it move towards 100% renewables for its operations over the next decade.

[1] © State of New South Wales 2020. Published March 2020
[2] Snapshot Report – Cowra 2018/19 https://snapshotclimate.com.au/locality/australia/new-south-wales/cowra/2018/fy
[3] https://snapshotclimate.com.au/faq/has-the-data-been-verified/

1.3 Opportunities for Cowra to reduce emissions towards net zero

With 98% of the region's greenhouse gas emissions associated with agriculture, 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 each of these areas. 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.

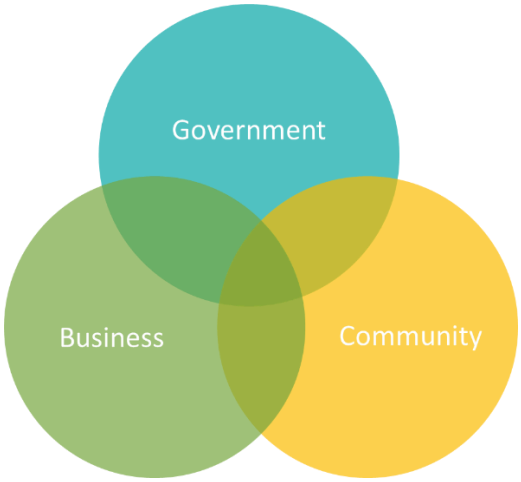

FIGURE 1: RESIDENTS, BUSINESS & GOVERNMENTS MUST WORK TOGETHER TO REDUCE EMISSIONS

This Community Net Zero Emissions 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.

FIGURE 2: NINE CATEGORIES OF EMISSIONS REDUCTION FOR COWRA SHIRE

1.4 Community emissions reduction scenario

There are numerous actions that can be taken at all levels of the community to reduce emissions. This strategy outlines an action plan that addresses all emissions sources in the community, and identifies actions that align with the capacity of the community's stakeholders to act by using one or more of the levers shown below.

FIGURE 3: TEN AREAS OF ACTION FOR STAKEHOLDERS TO HELP THE COMMUNITY REDUCE EMISSIONS

One possible scenario for how the community could transition to net zero emissions is developed, and illustrates the scale and potential timing of action that could see this outcome achieved.

TABLE 2: POSSIBLE EMISSIONS PATHWAY – NET-ZERO BY 2050 FOR COWRA SHIRE

	Abatement area	Emissions Pathway	Equivalent to…
	Energy & renewables: Grid decarbonisation	The grid decarbonises in line with announced/expected closures of coal-fired plants in NSW	Closures of Liddell (2023), Vales Point B (2029), Eraring (2035), Bayswater (2036) and Mt Piper (2044), with some residual emissions assumed for interstate energy imports
	Energy & renewables: Local generation (with solar PV)	Recent trends are sustained for solar PV systems, including capacity, average size and self-consumption levels	~120 residential systems installed every year at an average size of 7.3 kW (max 12 kW) and ~30 commercial systems installed at an average size of 25 kW (max 30 kW)
	Energy & renewables: mid or community scale clean energy generation (bioenergy, mid-scale solar, microgrid)	10 MW of clean energy capacity is progressively installed from 2022 to 2030	Energy generation will depend on technology selection, resource availability and other factors. An indicative utilisation of 60% is used, equivalent to generation of 50,000 MWh of renewable electricity annually
	Energy & renewables: clean energy purchasing	Renewable energy purchasing is feasible, with a progressive	Energy users in the Shire enter into renewable energy power purchase

		uptake to 25% of electricity purchased from 2022 to 2030	agreements assumed at a similar price to 'regular' grid power
	Energy & renewables: energy efficiency	Electricity use has increased by 8% in Cowra over the past seven years, with a 4.5% increase per customer despite the increase in solar. A pathway towards net zero emissions will see greater energy efficiency by say 1% year-on-year from 2022 compared with current trends	More rapid uptake of LED lighting, implementation of energy efficient reverse cycle heating and cooling, energy efficient appliances, energy efficiency in commercial and industrial energy processes, as well as regional initiatives such as streetlighting upgrades
	Sustainable transport	20% of light vehicles and 5% of heavy vehicles are progressively switched to electric from 2025 to 2030, 40% of light vehicles and 25% of heavy vehicles are electric by 2040, and 100% of light vehicles and 100% of heavy vehicles are electric by 2050	Uptake that is broadly in line with AEMO forecasts of passenger vehicle uptake (AEMO forecasts suggest very low uptake of EVs until after 2025, with around 40% of vehicles potentially being EV by 2040). 100% Renewables indicative estimate for heavy fleet.
	Waste management	Emissions from waste are assumed to progressively reduce by 20% from 2025 to 2030, 70% by 2040 and 100% by 2050	This may require the introduction of FOGO, reduced contamination in recycling, increased education and waste reduction initiatives and circular economy initiatives across the region.
	Low emissions agriculture	Emissions from agriculture are assumed to progressively reduce by 20% from 2025 to 2030, 70% by 2040 and 100% by 2050	As part of the NSW net-zero plan, low emissions agriculture is trialled to observe the effectiveness and rolled out across NSW

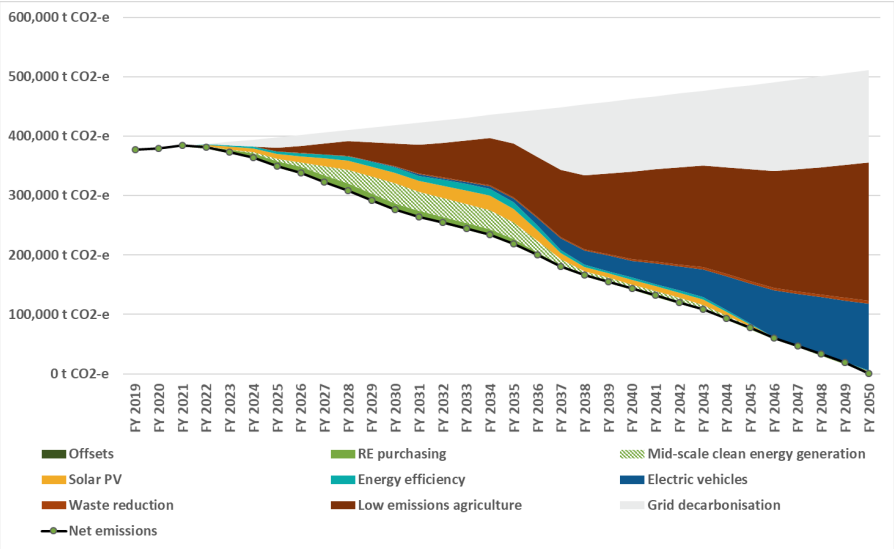

FIGURE 4: NET ZERO EMISSIONS – POSSIBLE PATHWAY FOR COWRA SHIRE TO 2050

1.5 Next steps

This draft Community Net Zero Emissions Strategy is a basis for a conversation with the Cowra community about the need to reduce emissions and possible pathways and actions to enable this to happen.

Moving forward, key actions that will help to drive this process include:

1. Development of an exhibition draft of this strategy to be put to the community, and adoption of the strategy following this process.
2. Community consultation: this can happen through surveys of the community, through the conduct of workshops with the community, and through the conduct of focus group sessions with key stakeholder groups (e.g. in parallel with the release of an exhibition draft strategy).
3. Through this process, the strategy and action plan can be refined, with the identification and confirmation of actions that the community is keen to adopt, and in particular the identification of new and local actions that achieve the aim of creating a local plan for Cowra.
4. Consideration and adoption of a net zero emissions target for the community that is aligned with the NSW government targets or looks to achieve net zero emissions earlier than 2050.
5. The identification of key stakeholders in the community that can take a leading role in driving action towards net zero emissions over time, and the identification of resourcing needs that will need to be provided so that implementation of the strategy and action plan can occur.

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Background & context

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 *Climate Action Tracker*[4] below shows that current global climate action policies will lead to a projected temperature rise of about 3.1°C.

The World Economic Forum's (WEF) Global Risks Report 2021[5] highlights adverse climate change-related outcomes as among the most likely to occur with the highest impacts to the global economy. Specifically, the WEF report highlights key climate risks to include climate action failure, biodiversity loss, human environmental damage, extreme weather, and natural resource crises.

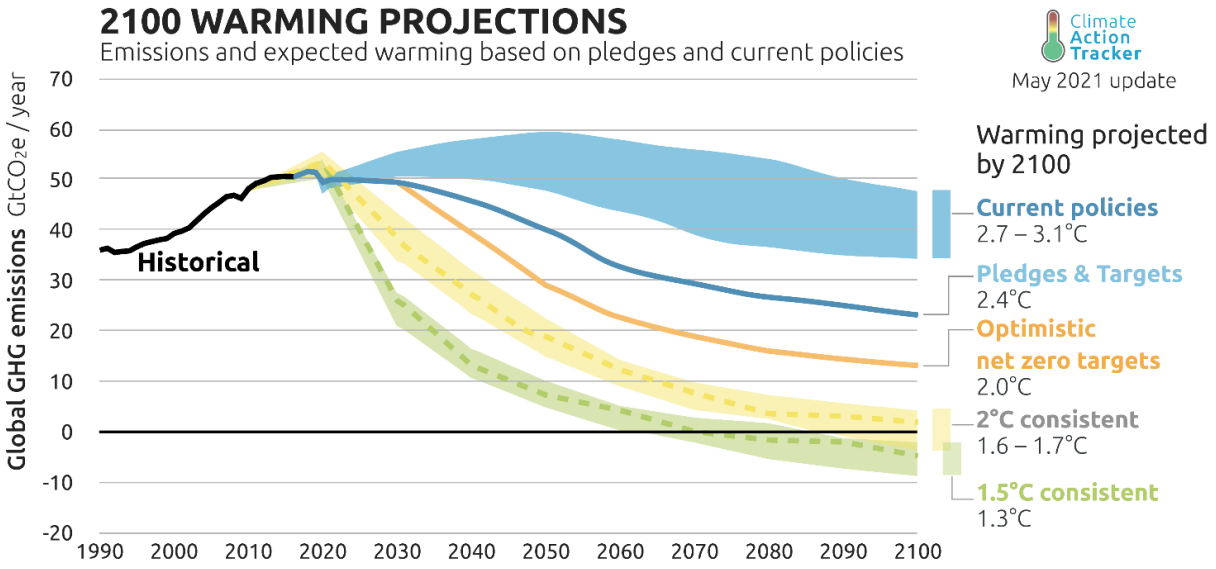

FIGURE 5: THE CLIMATE ACTION TRACKER'S WARMING PROJECTIONS FOR 2100, VARIOUS POLICY SCENARIOS

Responding to these risks, countries have adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (Global Goals)[6], and signed the Paris Agreement to limit global warming[7]. 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[8].

[4] https://climateactiontracker.org/global/temperatures/
[5] http://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2021.pdf
[6] Sourced from https://www.un.org/sustainabledevelopment/development-agenda/
[7] Sourced from https://www.un.org/sustainabledevelopment/climatechange/
[8] Sourced from https://www.ipcc.ch/news_and_events/pr_181008_P48_spm.shtml

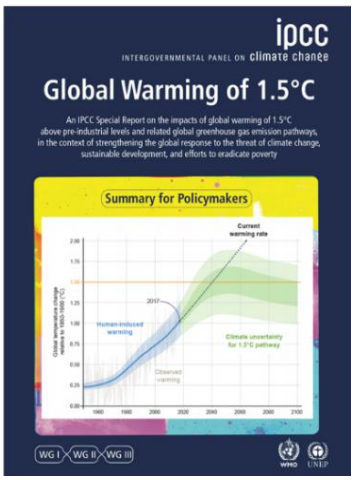

FIGURE 6: GLOBAL CONTEXT FOR ACTION ON CLIMATE

The IPCC is currently in its sixth assessment report cycle (AR6), and their synthesis report is due to be released in 2022, which will bring together the latest science, evidence and projections for global warming.

The primary call to action in science and international agreements is for countries to reach 'net zero emissions' by mid-century or earlier. 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 such as Cowra for example, this could require concerted action across all sectors covering all major emissions sources, including:

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

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 committed Australia to source 20% of its electricity from renewable energy sources by 2020, and this has been achieved. Another key initiative is the Climate Solutions Fund, formerly the Emissions Reduction Fund, which sources abatement from eligible activities via periodic auction processes.

FIGURE 7: AUSTRALIA'S RENEWABLE ENERGY AND CARBON GOALS – NATIONAL LEVEL

3.2 NSW State targets

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

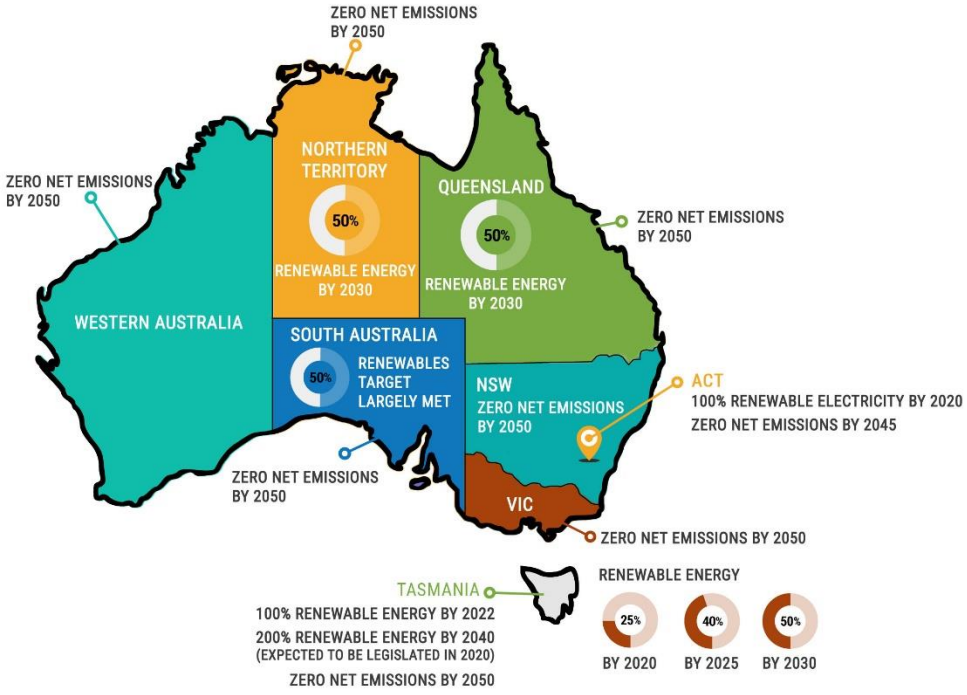

FIGURE 8: AUSTRALIA'S RENEWABLE ENERGY AND CARBON GOALS – STATE & TERRITORY LEVEL

Supporting the State's commitment to reach net zero emissions by 2050, in 2020 the NSW Government released its **Net Zero Plan Stage 1: 2020–2030**[9]. This is the first of three 10-year plans to be released that will set a pathway to net zero emissions by 2050.

In addition the NSW Government has developed an **NSW Electricity Strategy**[10] which will help the State to deliver on its goal to attract renewable energy investment. On 25th November 2020 the NSW Government passed its *Electricity Infrastructure Investment Bill* 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 Wales[11].

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. Several additional REZs' will also be developed in future.

The figure below shows the approximate locations of the Central West Orana REZ.

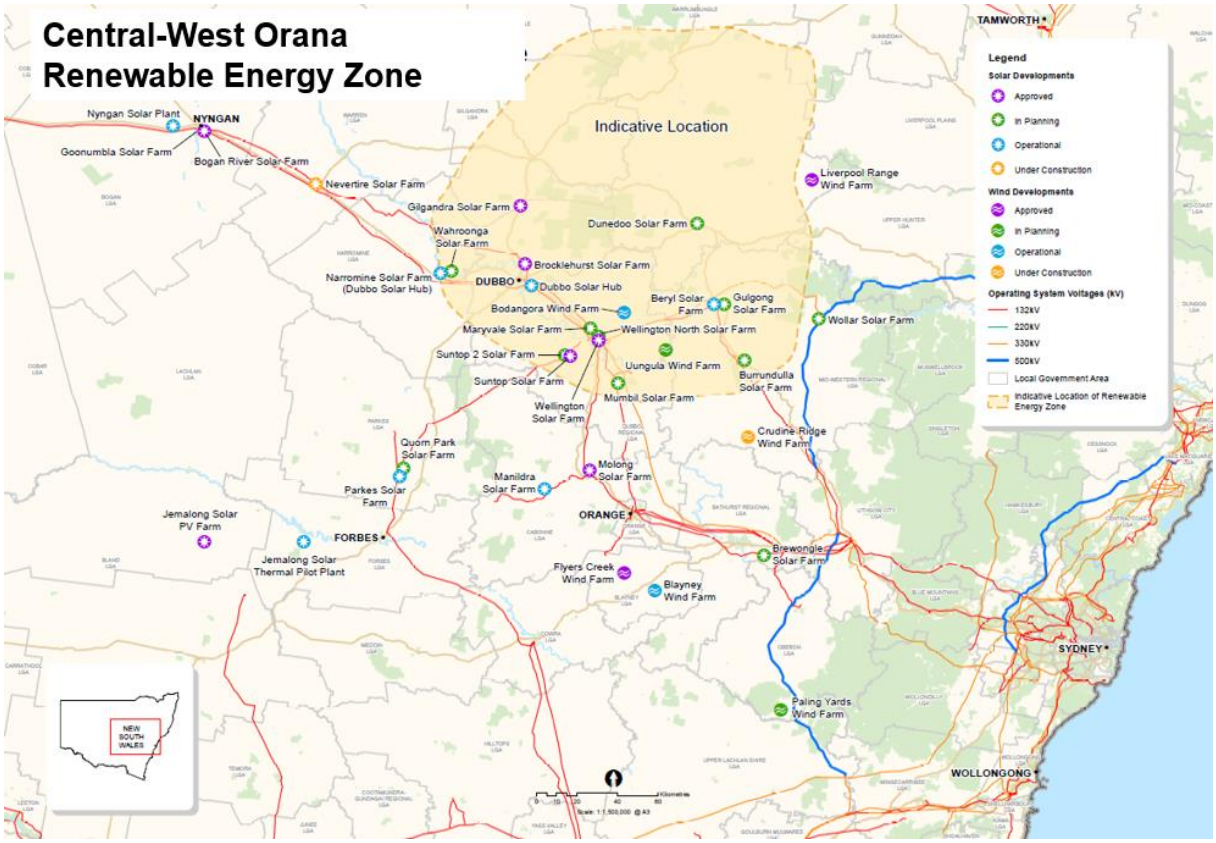

FIGURE 9: INDICATIVE CENTRAL-WEST ORANA NSW RENEWABLE ENERGY ZONE

[9] © State of New South Wales 2020. Published March 2020

[10] https://energy.nsw.gov.au/renewables/renewable-energy-zones

[11] https://www.parliament.nsw.gov.au/bill/files/3818/XN%20Electricity%20Infrastructure%20Investment%20Bill.pdf

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. More than 25.8% of NSW dwellings have now installed solar, and more than 5,800 MW of solar is now installed in NSW. Of this more than 3,000 MW is installed on homes and on businesses across the state.

Additionally, communities across Australia have been developing solar, wind, bioenergy and hydro projects that are owned locally and provide benefit to the communities they are located in. The NSW Government has supported Community Power Agency to develop a 'how-to' guide to developing community renewable energy projects[12]. The NSW Government is also implementing the Regional Community Energy Fund (RCEF) grant funding project[13]. 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 $36 million in private investment.

3.3.1 Solar PV uptake in Cowra

Cowra Shire is in the middle of local government areas in terms of the uptake of solar hot water and solar PV. According to the Australian Photovoltaic Institute (APVI), Cowra Shire has:

- 1,811 PV installations, a 29% penetration rate, at April 2021, with almost 10 MW of installed capacity. Refer to the APVI map with Cowra Shire details highlighted below.
- 1 installation of over 100 kW, 151 installations over 10 kW and less than 100 kW, and 1,659 installations of less than 10 kW.

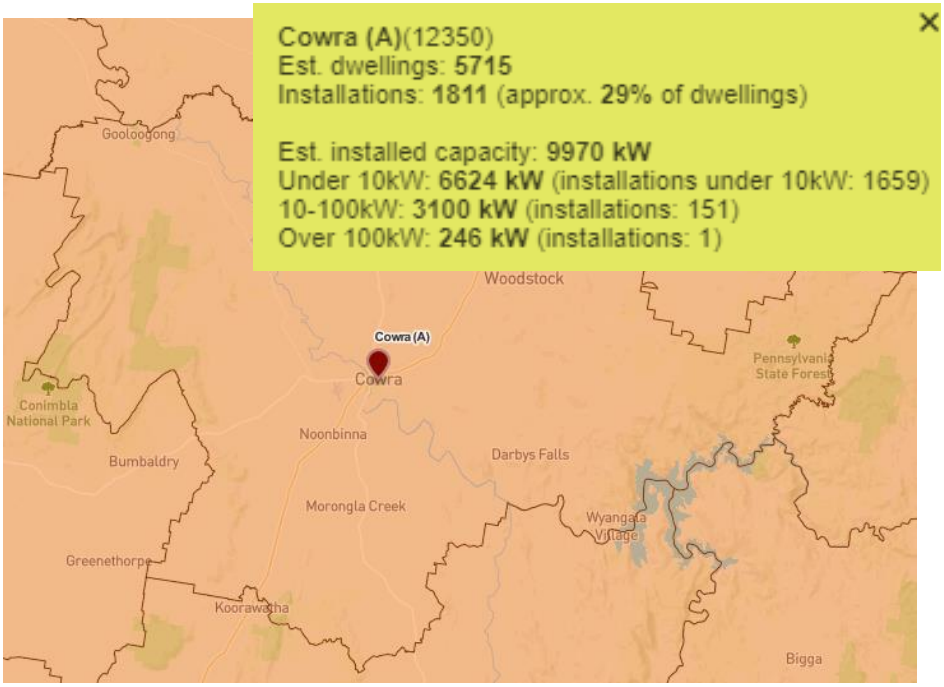

FIGURE 10: COWRA SHIRE SOLAR PV INSTALLATIONS, APRIL 2021

[12] https://www.environment.nsw.gov.au/resources/communities/cpa-community-energy-how-to.pdf
[13] https://energy.nsw.gov.au/renewables/clean-energy-initiatives/regional-community-energy

3.3.2 Case Study: Enova's Shared Community Battery – "The Beehive Project"[14]

The Beehive Project is a multi-partner effort led by *Enova Community Energy* to trial a shared community battery and peer-to-peer solar energy trading project involving up to 500 households. The Beehive Project will allow households, whether they have solar or not, to share and trade rooftop solar between themselves, and access benefits from the community battery when it is needed.

How will The Beehive Project work?

This project paves the way for distributing solar energy throughout streets, neighbourhoods and communities - and helping everyone get the most out of the solar energy generated from their rooftop panels.

Instead of unused solar energy going back to the grid, it provides a way of enabling it to continue circulating amongst a community of participants so that more value can be gained by all.

The project involves:

- The Community battery itself, a 1 megawatt (1.07MW) Tesla Megapack battery with 2 megawatt hour (2.14MWh) of capacity, around the size of a shipping container, which can power approximately 115 homes each day, based on an average usage of 19kWh per household);
- Powertracer, an online peer-to-peer energy web-based trading and sharing platform developed by *Enosi*;
- Up to 500 participants, with and without roof top solar panels; and,
- A research team at the *University of Newcastle* to track and monitor the project.

The battery is called a "shared community battery" because the stored energy will be distributed amongst households that don't have to be geographically located close to the battery, thanks to smart technology. The peer-to-peer trading aspect of the project means every day households have the opportunity to greater access more renewable energy, at a price they can decide on.

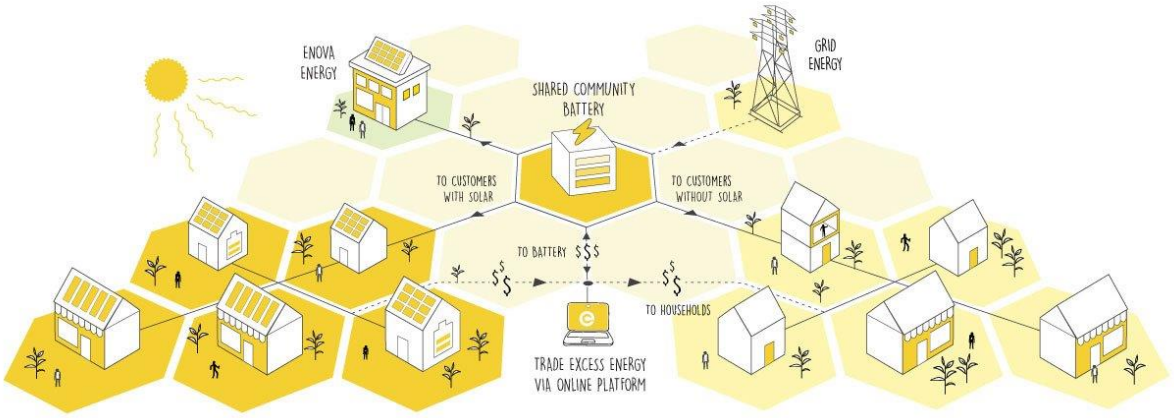

FIGURE 11: ILLUSTRATION OF THE BEEHIVE PROJECT LED BY ENOVA COMMUNITY ENERGY

[14] Information sourced from: https://www.enovaenergy.com.au/shared-community-battery

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Community emissions

Cowra community profile and 2018-19 carbon footprint

4 Cowra community profile

4.1 Population

Latest figures for 2020 indicate that Cowra Shire has a population of 12,730[15]. Since 2006, there has been a slight decrease in population.

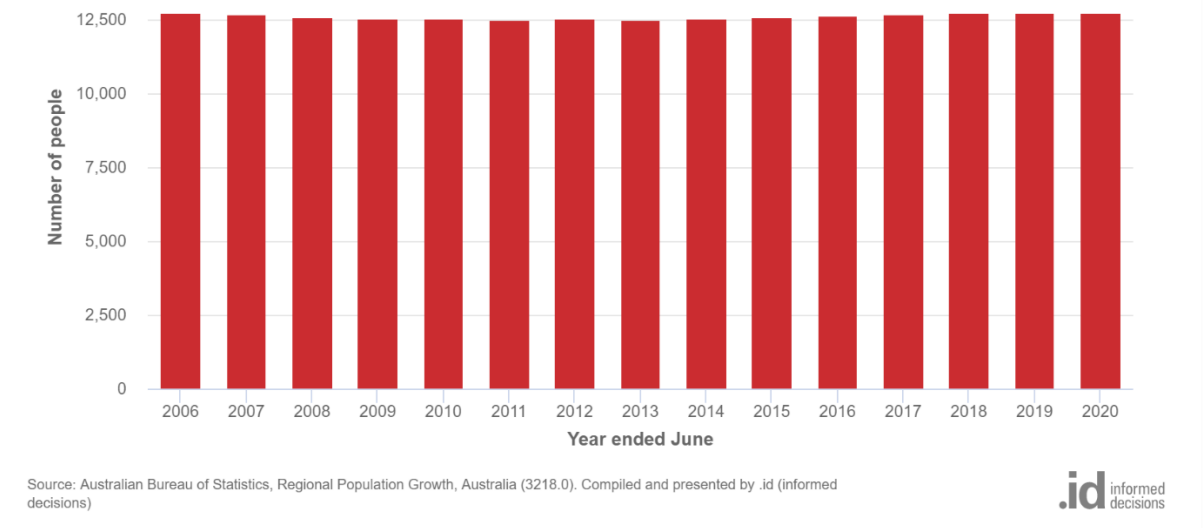


FIGURE 12: COWRA SHIRE ESTIMATED RESIDENT POPULATION FROM 2006-2020

In the *Cowra Shire Council – 2019 NSW Population Projections* report, the 2041 population is projected to have just 150 more people than the 2016 population, occupying 6,400 dwellings, a small increase on today. The projection considered natural change factors (births less deaths) and migration.

4.2 Residential dwelling number and types

Most people in Cowra Shire live in free-standing dwellings, at more than 88% of total dwellings in 2016. There has been a slight increase in dwelling numbers from 2011 to 2016, in total and across most housing types except for high density and 'other' types as shown in the table below.

TABLE 3: DWELLING TRENDS IN COWRA SHIRE FROM 2011 TO 2016[16]

Cowra Shire - Dwellings	2016		2011	
Dwelling type	**Number**	**%**	**Number**	**%**
Separate house	5,310	88.9	5,270	89.7
Medium density	508	8.5	427	7.3
High density	14	0.2	16	0.3
Other	142	1.1	165	1.1
Total Private Dwellings	**5,974**	**100.0**	**5,878**	**100.0**

[15] https://profile.id.com.au/cowra/population
[16] Sourced from Profile.id https://profile.id.com.au/cowra/dwellings

4.3 Transport

According to data collected by Roads and Maritime Services (RMS[17]) at the end of 2018/19 there were a total of 16,201 vehicles registered in Cowra Shire, with a breakdown as estimated below.

TABLE 4: RMS DATA ON REGISTERED VEHICLES IN COWRA SHIRE AT END 2018/19

Category of Vehicle	Vehicle Type	Cowra Shire
Light Vehicles	*Passenger Vehicles*	*4,170*
	Off-road Vehicles	*3,180*
	Light Trucks	*2,848*
	Other light vehicles	667
	Light Trailers	4,395
	Sub-total	***15,261***
Heavy Vehicles	Buses	33
	Heavy Trucks	*408*
	Prime Movers	*161*
	Heavy Trailers/plant	338
	Sub-total	***940***
All Vehicles	**Grand Total**	**16,201**

Light vehicles will be a mix of petrol fuelled and diesel fuelled. Most or all heavy vehicles will be diesel fuelled, and will consume far more fuel per vehicle than light vehicles.

4.4 Industry

In 2018-19, Agriculture, Forestry and Fishing was the biggest industry sector in terms of output in Cowra Shire, followed by Manufacturing, then Construction. Together these three sectors accounted for nearly 50% of the region's output of $1,074 million.

TABLE 5: OUTPUT BY INDUSTRY SECTOR IN COWRA SHIRE, FY 2019-20[18]

Cowra Shire local area	2019/20		2014/15	
Industry	**$m**	**%.**	**$m**	**%.**
Agriculture, Forestry and Fishing	232.1	21.6	254.1	24.9
Manufacturing	148.4	13.8	127.8	12.5
Construction	129.4	12	97.1	9.5
Health Care and Social Assistance	80	7.4	66.3	6.5
Public Administration and Safety	78.8	7.3	64.3	6.3
Wholesale Trade	55.7	5.2	39.3	3.8

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

[18] Sourced from profile.id http://economy.id.com.au/cowra/output-by-industry

Education and Training	52.8	4.9	45.2	4.4
Rental, Hiring and Real Estate Services	47.2	4.4	44.4	4.3
Transport, Postal and Warehousing	46.3	4.3	55	5.4
Retail Trade	42.2	3.9	49.9	4.9
Accommodation and Food Services	37.2	3.5	39.7	3.9
Other industries	124.3	11.7	138.3	13.5
Total industries	**1,074.3**	**100.0**	**1,021.3**	**100.0**

4.5 Agriculture & Forestry

4.5.1 Agriculture

Agriculture is the largest industry in Cowra Shire by output and employment. According to profile.id, the value of agricultural commodities in 2015/16 was $154 million,

TABLE 6: VALUE OF COWRA SHIRE AGRICULTURAL PRODUCTION 2015-16[19]

Commodity	$ Value 2015-16	% of total
Vegetables (melons, pumpkins, etc)	44,078,966	28.6
Livestock slaughtering (cattle, sheep, some pigs)	36,203,118	23.5
Cereal crops (wheat)	21,309,591	13.8
Crops for Hay	15,368,528	10
Wool	14,427,023	9.4
Other broadacre crops (Canola)	10,788,742	7
Milk	8,050,374	5.2
Nurseries & cut flowers	2,522,474	1.6
Grapes (wine and table)	1,305,939	0.8
Nuts	46,387	0
Eggs	22,275	0
Agriculture - Total Value	**154,123,417**	**100**

According to the Cowra Shire Regional Economic Development Strategy 2018-2022[20], a key priority is to "sustain and develop the region's agricultural advantage". Among the key actions and infrastructure priorities identified for the region are:

- Digital Connectivity: fast and reliable internet access (NBN rollout) as well as mobile reception in the Cowra Shire would facilitate on-farm uptake of spatial technology to enhance productivity.
- Investigate options for composting organic waste at the Cowra Materials Recycling Facility.
- Continue to work closely with Cowra's DPI Agricultural Research and Advisory Station for testing innovation and technology in the sector.

[19] Sourced from profile.id http://economy.id.com.au/cowra/value-of-agriculture
[20] https://www.nsw.gov.au/sites/default/files/2020-05/Cowra%20Shire%20REDS.pdf

4.5.2 Forestry

According to ABARES, in 2014–15, the total plantation area in the Central West region was about 87,000 hectares, comprised of less than 100 hectares of hardwood plantations and 86,910 hectares of softwood plantations. In 2016 there were about 1.7 million hectares of native forests in the Central West region, of which 901,600 hectares were privately managed, while 518,800 hectares were in conservation reserves and 159,500 hectares were on Crown land. 250,800 hectares were in multiple use public forest available for timber production. There were 137,500 hectares in multiple use native forest available for wood production.

5 Cowra Shire's 2018-19 carbon footprint

A carbon footprint for the Cowra Shire is taken from the Ironbark-BZE Snapshot Report[21] (BZE), which estimates 2018-19 emissions for all Local Government Area (LGAs) in Australia. The emission sources reported consist of stationary energy, transport, waste, agriculture and land use. Agriculture accounted for 46% of total emissions, followed by stationary energy (31%) and transport (22%)[22].

TABLE 7: COWRA SHIRE CARBON FOOTPRINT 2018-19

	Emission Sources	Ironbark - BZE t CO2-e
	Stationary Energy	118,200
	Transport	84,000
	Waste	3,600
	Agriculture	171,000
	Land Use	(2,100)
	Total	376,800

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

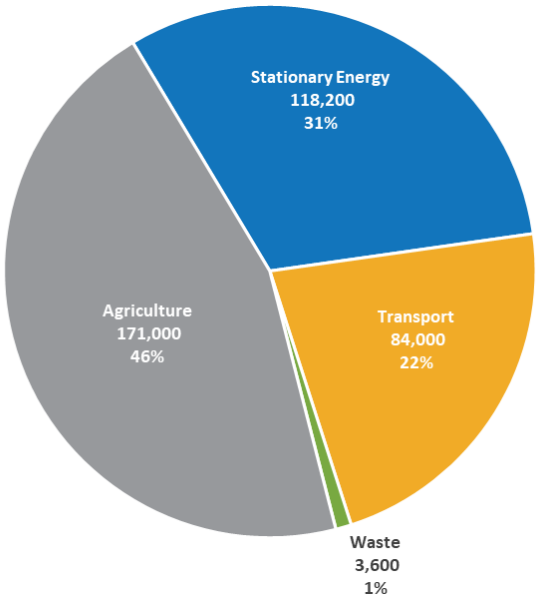


FIGURE 13: COWRA SHIRE CARBON FOOTPRINT (EXCL LAND USE)

[21] Snapshot Report – Cowra 2018/19 https://snapshotclimate.com.au/locality/australia/new-south-wales/cowra/2018/fy

[22] 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 8: DETAILED BREAKDOWN OF COWRA SHIRE CARBON FOOTPRINT

Emission Sources	Ironbark - BZE footprint t CO_2-e
Stationary Energy	**118,200**
Electricity	**116,500**
Residential	*30,500*
Commercial	*22,400*
Industrial	*63,600*
Gas	**1,700**
Residential	*400*
Commercial	*300*
Industrial	*1,000*
Transport	**84,000**
On road	*84,000*
Waste	**3,600**
Landfill	*1,700*
Water	*1,900*
Agriculture	**171,000**
Land Use	**(2,100)**
Total	**376,800**

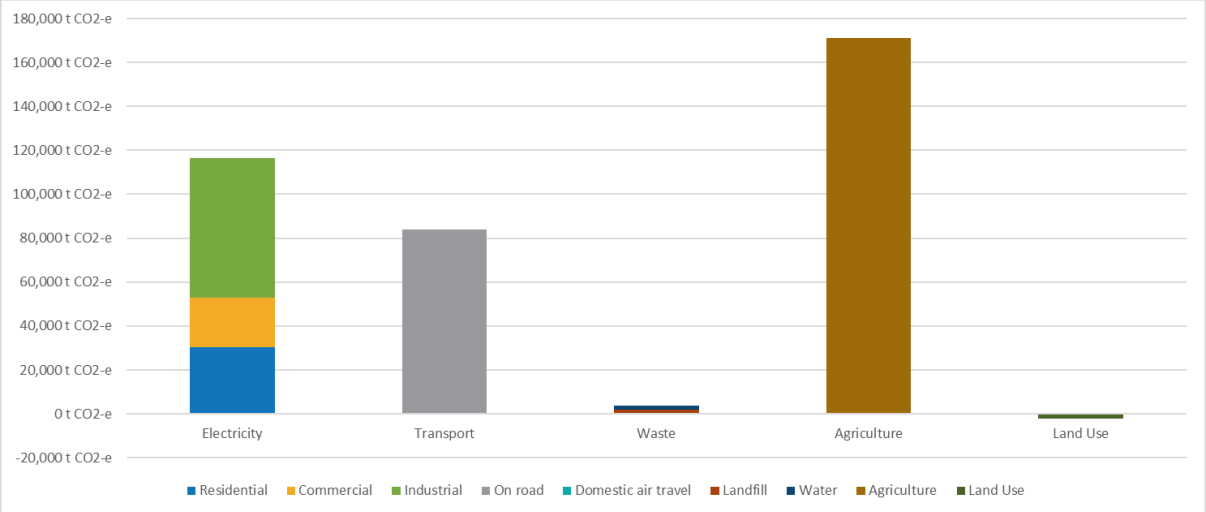
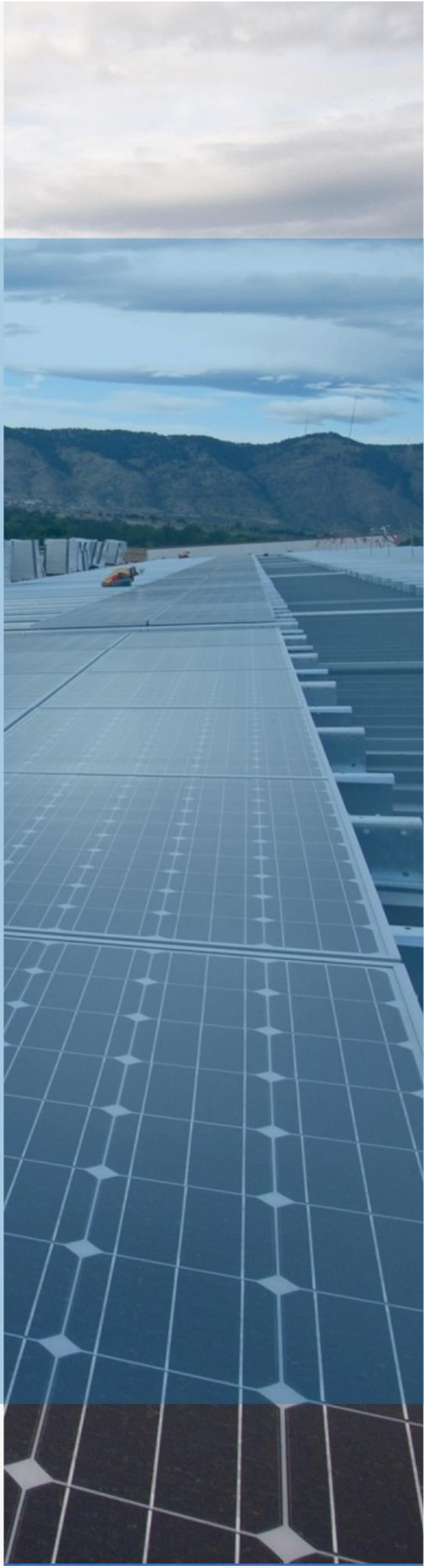


FIGURE 14: DETAILED BREAKDOWN OF COWRA SHIRE CARBON FOOTPRINT

100% renewables

Abatement potential

Cowra Shire's emissions and energy reduction opportunities



6 Cowra Shire's Energy & Emissions Reduction options

6.1 Measures available to reduce Cowra's carbon footprint

With 98% of the region's greenhouse gas emissions associated with agriculture, 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 each of these areas.

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.

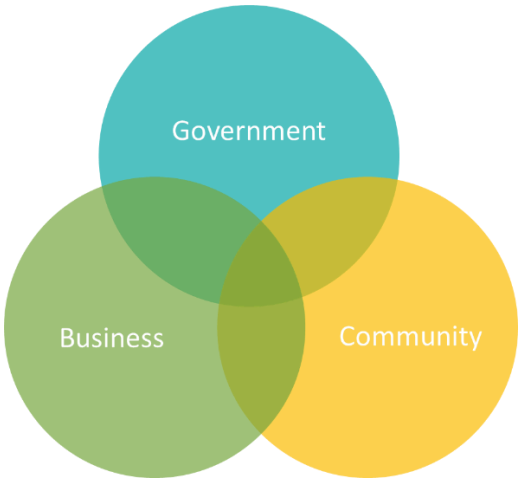


FIGURE 15: RESIDENTS, BUSINESS & GOVERNMENTS MUST WORK TOGETHER TO REDUCE EMISSIONS

Given the areas of emissions and the regional profile, this Community Net Zero Emissions 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.

FIGURE 16: NINE CATEGORIES OF EMISSIONS REDUCTION FOR COWRA SHIRE

6.1.1 Grid decarbonisation

The closure of NSW's remaining five coal fired power stations over the next two decades, and the construction of new renewable energy zones (REZ) will see the state's electricity-related emissions be reduced towards zero. AEMO's Integrated System Plan 2020[23] (ISP2020) models five scenarios for how the grid will decarbonise over this time. The scenario outcomes for closure of large-scale generators in the NEM is illustrated below, highlighting the potential for a rapid transition to renewables.

The NSW Government's *Electricity Infrastructure Investment Bill* may facilitate a more rapid transition to renewables in NSW, and future ISP forecasts will reflect any new scenario modelling.

A largely renewable energy grid, allied to electrification of transport would see much of the region's ~200 kt CO_2-e from electricity and fuel be eliminated over time.

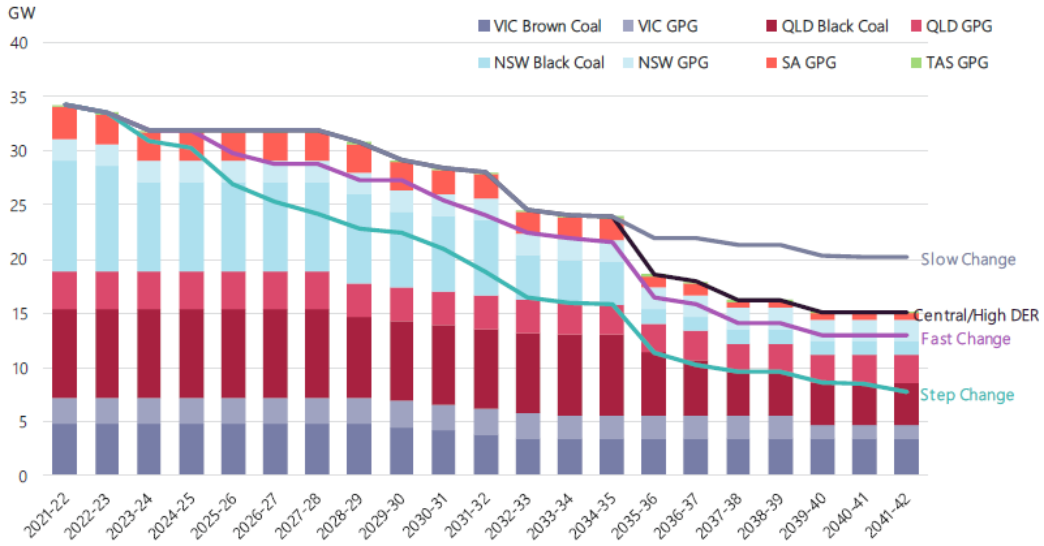


FIGURE 17: AEMO MODEL OF NEM COAL + GAS GENERATION CAPACITY & SCENARIOS[24]

6.1.2 Buying clean energy

Electricity consumption accounts for 30% of the Cowra community's carbon footprint. The single biggest opportunity to reduce electricity emissions quickly is to purchase renewable energy and/or renewable energy offsets. This can be done through the purchase of GreenPower®, purchasing carbon-neutral electricity, and entering into an agreement for the supply of renewables through a Power Purchasing Agreement (PPA). Typically PPAs have been entered into by large businesses, and the purchase of GreenPower® and carbon neutral electricity is readily accessible for residents and small business.

Purchasing of clean energy can cost a premium compared with a regular power supply agreement.

[23] AEMO: https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp
[24] AEMO, ibid

6.1.3 Community and regional clean energy generation

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. 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[25]). ARENA has also sponsored a Community Renewable Energy Financing Toolkit, which was developed by Frontier Impact Group.

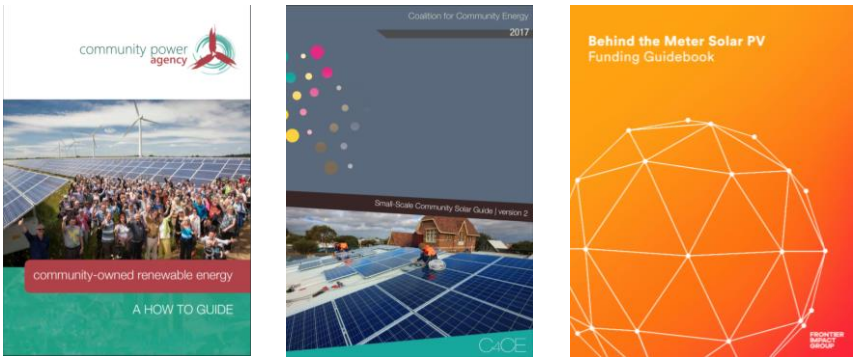


FIGURE 18: COMMUNITY ENERGY GUIDANCE MATERIALS

6.1.4 Behind-the-meter solar

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 Cowra community has embraced solar energy, with nearly 10 MW of installed capacity. According to modelling using Australian PV Institute (APVI) data, there is scope for nearly 220 MW of solar panel generation capacity, capable of generating 314,000 MWh of electricity. This is more than the electricity consumed by all homes and business in Cowra.

The scenario below illustrates the potential for rooftop solar to contribute to the region's emissions reduction efforts.

- **Scenario**: Steady uptake of solar in residential and business sectors, under which 34% 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:

[25] 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.

- 120 new residential solar PV systems installed every year with an average capacity of 7.6 kW, increasing by 0.3 kW every year until reaching a max capacity of 12 kW per installed system.
- 30 new business solar PV systems installed every year with an average capacity of 25 kW, increasing by 0.6 kW every year until reaching a max capacity of 30 kW per installed system.
- Under this scenario solar energy can generate 110,000 MWh of electricity by 2050

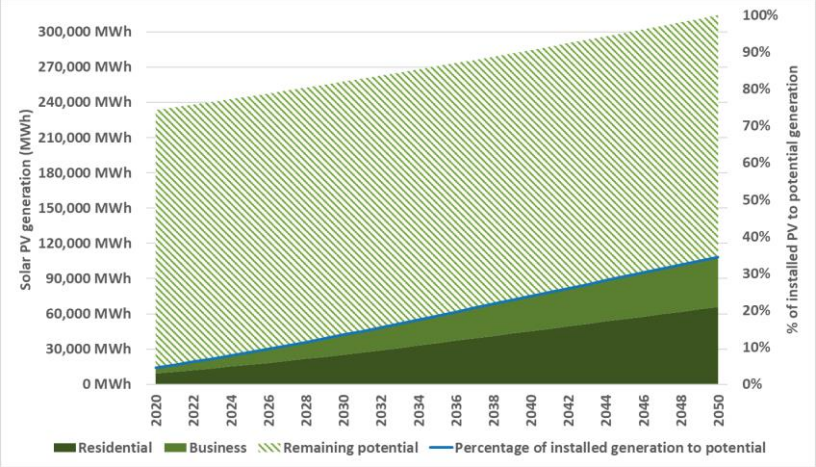


FIGURE 19: SOLAR PV SCENARIO: 'STEADY' UPTAKE OF SOLAR PV IN COWRA SHIRE

6.1.5 Energy efficiency

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 cost-effective savings potential of 30%+ from energy efficiency in existing commercial buildings, and similar or greater savings for residential housing (for example recent reports to COAG Energy Council[26,27]). With almost 6,000 homes and over 1,300 businesses (including over 500 farm businesses), this represents significant emissions and cost savings potentially available to residents and businesses in the region.

Typically, efficiencies in energy use can come from changing operating / consumption behaviours and practices, buying energy efficient appliances, and installing energy efficient LED lights, variable speed drive (VSD) motors, refrigeration equipment, smart controls and air conditioning technology.

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

26
http://coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/Trajectory%20Addendum%20-%20EY-Achieving%20Low%20Energy%20Existing%20Commercial%20Buildings%20in%20Australia.pdf
27
http://coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/Report%20for%20Achieving%20Low%20Energy%20Homes.pdf

56% depending on the type of building[28] compared with 2018 building code standards. Progressive changes to the National Construction Code and to BASIX over time can see savings in new buildings unlocked, requiring action by Commonwealth and the NSW State Governments.

6.1.6 Sustainable transport

Measures to reduce greenhouse gas emissions from transport include, for example:

- Changing to low and zero-emissions vehicles, including small cars, hybrids, electric vehicles (powered with renewables) and potentially hydrogen vehicles (e.g. heavy vehicles)
- Demand control measures like car-pooling, car-sharing, and driver education
- Improved and increased public or community transport, and
- Increased active transport such as walking and cycling

As part of the NSW NetZero plan, the state government initially developed the *Electric and Hybrid Vehicle Plan*[29] which is focused on three key areas:

- vehicle availability
- charging points, and
- customer information

The NSW Government is expanding this by developing the *Electric Vehicle Infrastructure Model Availability Program*[30]. 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

In June 2021 the 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 Cowra

Data by the Electric Vehicle Council shows that there are currently a small number of EV chargers in the Cowra local area, including an NRMA DC rapid charger at the Council's library and art gallery.

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

[29] https://future.transport.nsw.gov.au/plans/nsw-electric-and-hybrid-vehicle-plan

[30] https://electricvehiclecouncil.com.au/nsw-government-shows-real-leadership-with-ev-incentives-in-net-zero-plan/

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.

FIGURE 20: EV CHARGERS IN COWRA SHIRE – ELECTRIC VEHICLE COUNCIL

Projected growth in electric and fuel cell vehicles

CSIRO's updated projections for AEMO's forecasting of electricity market scenarios[31] includes updated forecasts for electric and fuel cell vehicles. Their projected sales share for all electric vehicle types is shown below. A key takeaway from this chart is the **likelihood of rapidly increasing EV sales during this current decade** under several scenarios.

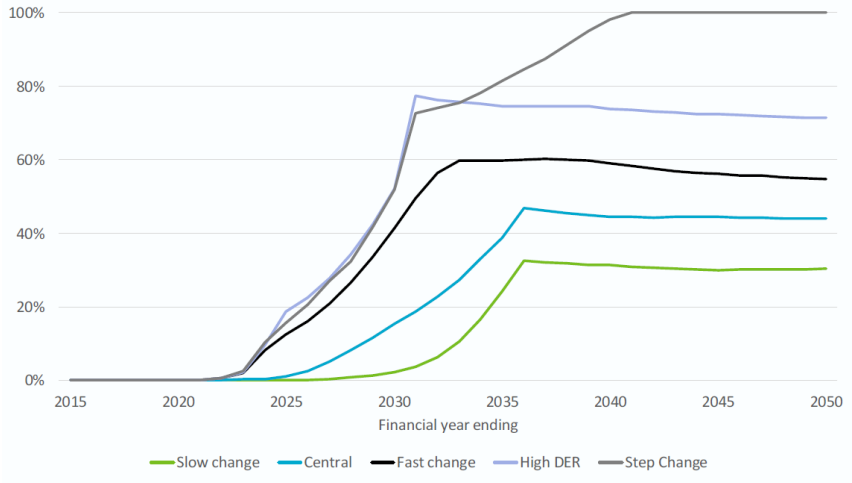


FIGURE 21: PROJECTED SALES SHARE OF ELECTRIC VEHICLES BY AEMO SCENARIO (CSIRO)

6.1.7 Waste management

According to the NSW Government's Net Zero Plan Stage 1: 2020–2030[32]:

- *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*

[31] CSIRO 2020, Projections for small-scale embedded technologies, Paul Graham and Lisa Havas June 2020
[32] https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan

and recycling processes, methane emissions can be substantially reduced, soils can be regenerated to store carbon and biogas can be created to generate electricity.

While emissions from waste in Cowra are estimated to be small relative to other sources, waste is nonetheless a prominent emissions source in the community, and a focus on aspects such as increasing recycling rates, diversion of waste from landfill, solutions for re-use of materials such as glass (e.g. in road base), and reduced consumption of plastics are important elements in an overall community response to climate change.

The NSW Government's Waste and Sustainable Materials Strategy 2041 and the NSW Plastics Action Plan have now been released and are available on the DPIE website[33]. Key measures committed over the next six years, underpinned by $356 million in funding, are:

- phasing out problematic single-use plastic items
- financial incentives for manufacturers and producers to design out problematic plastics
- having government agencies prefer recycled content
- mandating the separation of food and garden organics for households and selected businesses
- incentivising biogas generation from waste materials

Targets that are set out in the strategy include:

- reduce total waste generated by 10% per person by 2030
- have an 80% average recovery rate from all waste streams by 2030
- significantly increase the use of recycled content by governments and industry
- phase out problematic and unnecessary plastics by 2025
- halve the amount of organic waste sent to landfill by 2030
- reduce litter by 60% by 2030 and plastics litter by 30% by 2025
- triple the plastics recycling rate by 2030

6.1.8 Agriculture and forestry

Agriculture is the largest source of greenhouse gas emissions in the Cowra region. This will result in particular from enteric fermentation in cattle, as well as from nitrogen in fertilisers, manure management, and crop residue burning.

While land use is estimated to be a net 'sink' for carbon emissions in the Cowra region, further tree planting / coverage and land / soil management practices may enable the sequestration of more emissions as part of the region's emissions reduction or net zero strategy over time.

[33] https://www.dpie.nsw.gov.au/our-work/environment-energy-and-science/waste-and-sustainable-materials-strategy

6.2 Examples of low emissions action in the Cowra community

Many in the Cowra community have been responding to the challenge of climate change. Examples highlighted here serve to show a range of current responses and potential opportunities for the community.

6.2.1 Japanese Gardens

The Japanese Gardens and Cultural Centre in Cowra are the largest such gardens in the Southern Hemisphere and are an important cultural and tourist attraction in the region. The Gardens were opened in 1979.

Energy demand to operate the buildings, lighting and irrigation systems is high, and a ground mount solar array has been identified as one option that can help to reduce this cost. The Directors and management of the Gardens have also identified the need for water conservation and water quality initiatives, potentially including the development of a wetland filtration system.

FIGURE 22: IMAGE OF THE JAPANESE GARDENS AND CULTURAL CENTRE, COWRA

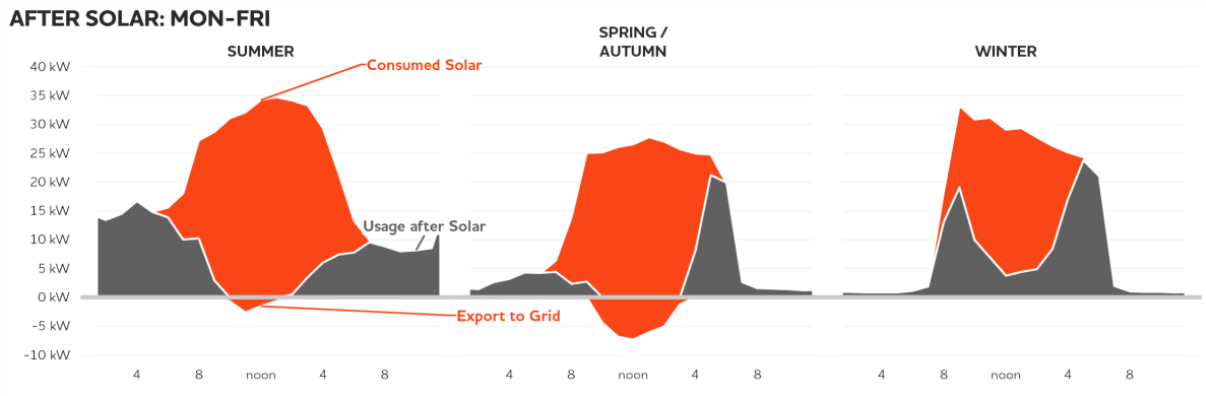


FIGURE 23: MODELLED IMPACT OF SOLAR PV ON SEASONAL ELECTRICITY DEMAND

6.2.2 Cowra Council Renewable Energy Plan

Cowra Council has been working on sustainability initiatives for many years and in 2020 they finalised and endorsed their ***Energy Efficiency & Renewable Energy Plan 2020***. This plan contains many new renewable energy options for Council infrastructure which will be rolled out over the coming years. In 2021/22 for example, Council plans to implement solar projects at its water and wastewater treatment plants and the works depot.

Building from these projects and an upgrade to the Shire's streetlights to energy efficient LED technology, Council hopes to achieve 100% renewables for Council operations by 2030 through implementation of more projects and by sourcing its electricity from renewable energy projects.

Council also became a member of the Cities Power Partnership, a collaboration network of over 140 councils across Australia, working towards common goals of clean energy and net zero emissions. As part of its pledge to the CPP, Council has committed to:

1. Power council operations by renewable energy and set targets to increase the level of renewable power for council operations over time.
2. Install renewable energy (solar PV and battery storage) on council buildings.
3. Roll out energy efficient lighting across the municipality.
4. Use council resources to support the uptake of renewable energy.
5. Support local community renewable energy projects and encourage investment in community energy.

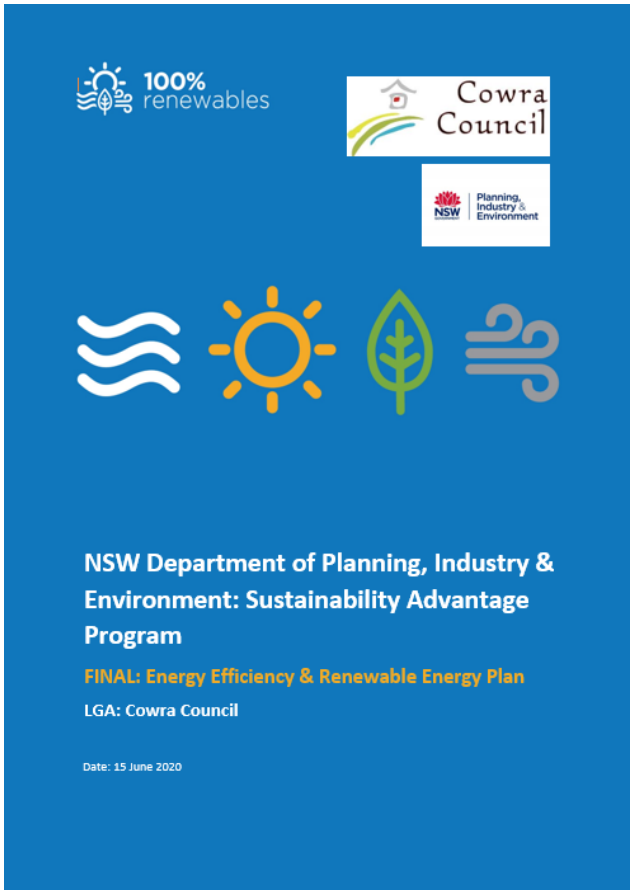


FIGURE 24: COWRA COUNCIL, ENERGY EFFICIENCY & RENEWABLE ENERGY PLAN, 2020

6.2.3 Cowra Low Emissions Action Network (CLEAN)

Cowra Low Emissions Action Network (CLEAN Cowra Ltd) is a regional community organisation which advocates for community-owned renewable energy [34]. At the heart of CLEAN's work is the development of a microgrid based on solar PV and batteries to meet part of the energy demand of some large industrial businesses in Cowra, to be augmented with a $14 million bioenergy project that utilises waste resources from industrial processing and agricultural residues to generate clean electricity, biogas, and heat and useful agricultural co-products. This circular economy model will reduce waste, create local employment, reduce emissions and increase the region's energy self-sufficiency.

The planned 1 megawatt solar and battery microgrid has received grant funding of more than $1 million through the Regional and Remote Communities Reliability Fund, which will help bring the microgrid project to investment readiness.

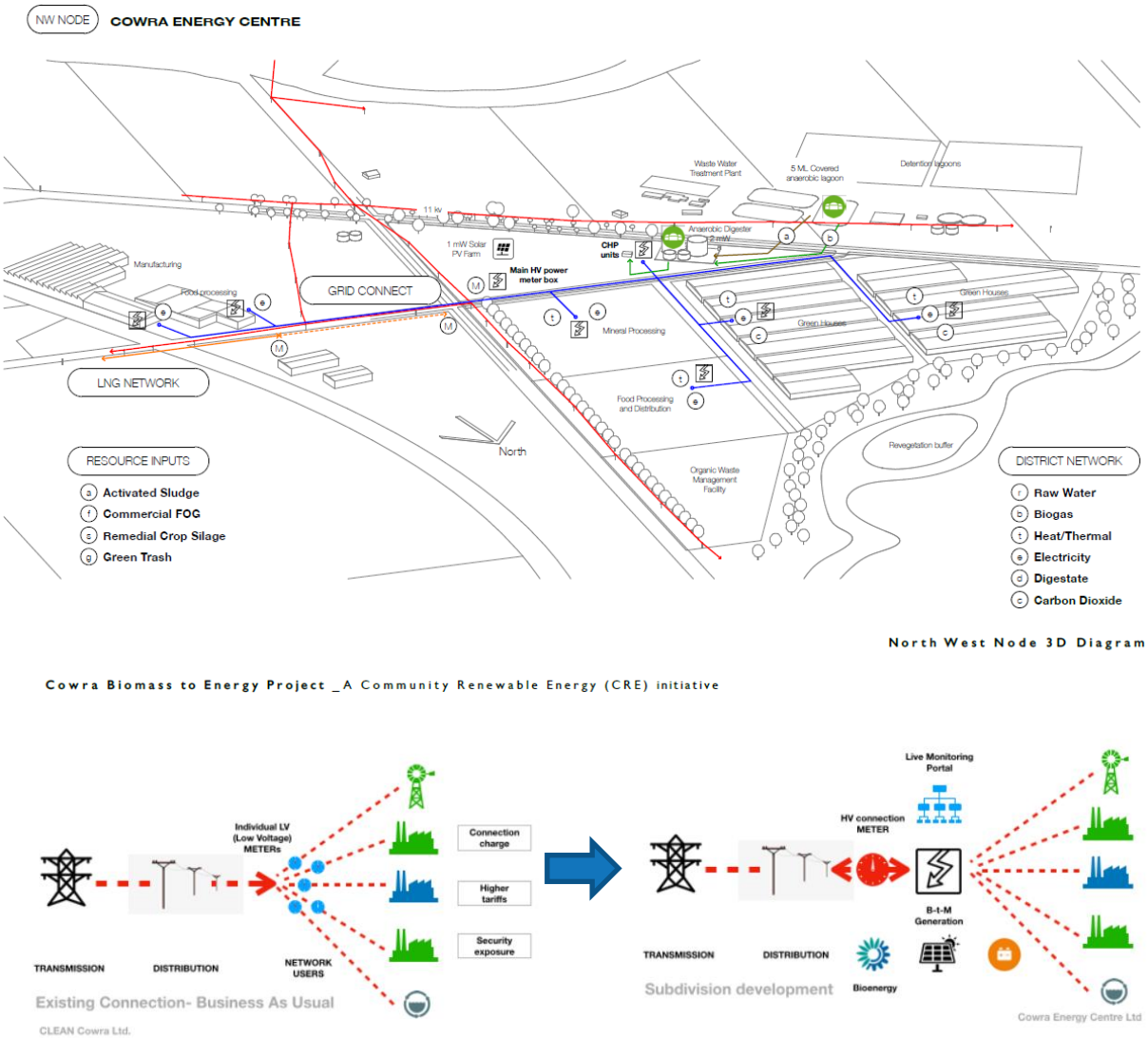


FIGURE 25: ILLUSTRATIONS OF THE CLEAN MICROGRID AND BIOENERGY PROJECT

[34] http://www.clean.org.au/

The project has undertaken numerous studies relating to resources, technology solutions, grid connection and regulatory aspects, and is currently working with several project partners to get a detailed insight to the energy demands of end users, to help with optimal design and sizing of the microgrid project.

6.2.4 Waste management

Waste in Cowra is sent to and managed at the Cowra Materials Recycling Facility (MRF). According to Council this facility currently achieves a kerbside recycling rate of 90% and a waste diversion rate of 52%. The MRF also processes recyclables from Weddin Shire.

As well as processing much of the region's recyclables, the MRF has a 20 kW solar PV array located on the roof of the MRF, and this can supply around one third of the facility's power needs. Council's Energy Efficiency and Renewable Energy Plan has looked at options for Council to expand this solar array and install batteries in future, so that more of the site's energy needs can be met with renewables.

Cowra Council is a member of NetWaste, a voluntary regional waste group formed in 1995 to provide collaborative approaches to waste and resource management. NetWaste covers 40% of the state and delivers services to 26 local councils. Among NetWaste's key strategic priorities are waste reduction, increasing resource recovery, reducing greenhouse gas emissions, education, and improving recycling and composting.

FIGURE 26: COWRA COUNCIL'S MATERIALS RECYCLING FACILITY (MRF)

6.2.5 Cowra Information & Neighbourhood Centre (CINC)

The Cowra Information & Neighbourhood Centre provides a wide range of services across the Cowra region, across youth, aged, families, community and disability. Initiatives such as Cowra Home Modification and Maintenance, and community morning teas help to improve homes' thermal comfort, update lights and appliances, and see lower levels of food waste.

CINC operates from three properties in Cowra, and Cowra Community Transport operates from the main facility on Vaux Street. With regular daytime operation and electricity use of around 45-50,000 kWh per year, the implementation of a 15 kW solar PV system on the roof of CINC's main building could reduce power from the grid by around 24,000 kWh per year, around half of current usage.

FIGURE 27: POTENTIAL SOLAR INSTALLATION AT CINC

In addition, most of the lighting at CINC is from older fluorescent lamps, and this accounts for around one quarter of all power usage. Recent upgrades to kitchen facilities was done with newer LED lighting, which uses around 60% less power. If CINC can upgrade the rest of the lights in the centre, power use would fall further, saving around 15% of the centre's power bill.

Appliances such as fridges and freezers are also large users of electricity, and ensuring these are kept in good condition, and selecting 4 and 5-Star appliances when replacing older appliances will further lower power use in the longer term.

Fuel use and costs are high for the Cowra Community Transport service, with five vehicles in use and travelling both locally as well as on longer routes to Canberra and Sydney from time to time. With high utilisation the business case to upgrade to hybrid vehicles and to electric vehicles in future is likely to be good, and will provide opportunities to significantly reduce operating costs for fuel and vehicle maintenance. As electric vehicle charging networks expand and as more electric vehicles become available this opportunity can be looked at.

6.2.6 Solar on Cowra dwellings

As highlighted earlier, the Cowra community has embraced rooftop solar, with nearly 10 MW of installed capacity across some 1,811 systems, or 29% of all dwellings.

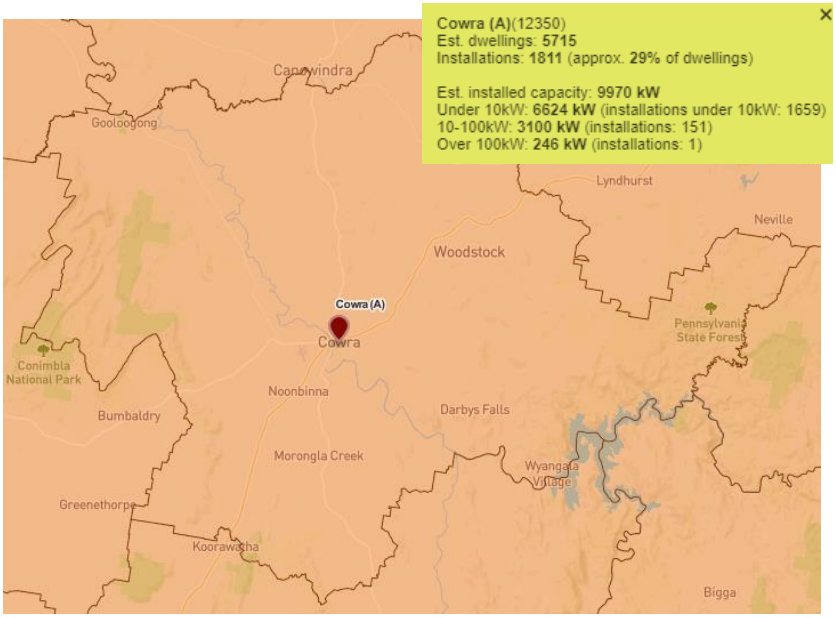


FIGURE 28: COWRA SHIRE SOLAR PV INSTALLATIONS, APRIL 2021

6.2.7 Shoes 4 You

Shoes 4 You is a local high street retailer in Cowra. As part of a recent move of premises a strong focus was placed on energy efficiency and renewable energy that will reduce energy costs and emissions associated with the business.

All new lighting in the store uses LED technology, which saves around 60% compared with older fluorescent lights. A 40 kW solar PV array on the roof of the shop will see much of the site's power needs met with renewables, including most of the air conditioning needs in summer. A further aspect of fitout works that were implemented was the installation of wall insulation between the shoe shop and the next door retail space, which will further improve the energy efficiency of the store.

FIGURE 29: 40 KW SOLAR PV SYSTEM ON SHOES 4 YOU, COWRA

6.2.8 Central NSW Joint Organisation

Central NSW Joint Organisation (CNSWJO) is a regional collaboration of councils in Central NSW, including the Local Government Areas of Bathurst , Blayney, Cabonne, Cowra, Forbes, Lachlan, Oberon, Orange, Parkes, Weddin, and Central Tablelands County Council. CNSWJO is recognised as a leading organisation advocating on agreed regional positions and priorities for Central NSW, and lobbies State and Federal Governments to present a more compelling case for the region's priorities[35].

CNSWJO has been proactively working with their council members to develop and implement several regional projects. Some of the key projects that CNSWJO has undertaken recently to assist their local council members include:

- **Southern lights LED streetlighting** – The JO has worked with Essential Energy to roll out LED lights across local council regions. As streetlighting tends to be one of the largest energy users for a Council, this project can quickly reduce greenhouse gas emissions from Council's operations.
- **EV charging infrastructure** – To ensure the Central New South Wales region is well positioned for the rapidly evolving electrification of road transport, CNSWJO and Evenergi have developed a '*Regional EV Charging Infrastructure in Central NSW*' report to assist Councils in implementing EV charging infrastructure across the region. The report details the impact, financial benefits, and opportunities for EV chargers in Central New South Wales.
- **Renewable Energy PPAs** – Recently, CNSWJO has worked with DPIE to secure up to $50,000 for its Council members, for aggregated electricity procurement support through its Sustainable Councils and Communities Program. In the current market, such bulk purchases are integral to making the price for renewables competitive with 'regular' power prices. Therefore, support from CNSWJO for bulk purchase of renewable energy for multiple Councils can achieve cost-effective prices to source renewable energy.

The Department of Planning, Industry and Environment, in conjunction with the Central NSW Joint Organisation, has been facilitating the development of plans and energy efficiency, solar and battery storage projects for its members. The Joint Organisation is seeking to develop bulk procurement opportunities for its members, which can help to improve the financial cases of opportunities outlined in Cowra Council's Energy Efficiency & Renewable Energy Plan 2020.

[35] https://www.centralnswjo.com/about

100% renewables

Abatement scenario

Potential emissions reduction pathway to reach net zero emissions by 2050

7 Community emissions reduction scenario

New South Wales government has a target to reach net zero emissions by 2050, and to reduce emissions by 35% (from 2005 levels) by 2030. Across the state and within regions the pathway to reach these outcomes will differ, and the timing and scale 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 2050 target. The table below highlights the level of effort that could be required by the community in terms of number and size of solar PV systems, level of energy efficiency, waste reduction, local mid-scale clean energy generation, agriculture emissions reductions, decisions to purchase renewable energy for electricity supply, and the rate of uptake of electric vehicles, for example. An expected grid decarbonisation scenario is used in the net-zero pathway.

7.1 Scenario: Net-zero emissions by 2050

TABLE 9: POSSIBLE EMISSIONS PATHWAY – NET-ZERO BY 2050

	Abatement area	Emissions Pathway	Equivalent to…
	Energy & renewables: Grid decarbonisation	The grid decarbonises in line with announced/expected closures of coal-fired plants in NSW	Closures of Liddell (2023), Vales Point B (2029), Eraring (2035), Bayswater (2036) and Mt Piper (2044), with some residual emissions assumed for interstate energy imports
	Energy & renewables: Local generation (with solar PV)	Recent trends are sustained for solar PV systems, including capacity, average size and self-consumption levels	~120 residential systems installed every year at an average size of 7.3 kW (max 12 kW) and ~30 commercial systems installed at an average size of 25 kW (max 30 kW)
	Energy & renewables: mid or community scale clean energy generation (bioenergy, mid-scale solar, microgrid)	10 MW of clean energy capacity is progressively installed from 2022 to 2030	Energy generation will depend on technology selection, resource availability and other factors. An indicative utilisation of 60% is used, equivalent to generation of 50,000 MWh of renewable electricity annually
	Energy & renewables: clean energy purchasing	Renewable energy purchasing is feasible, with a progressive uptake to 25% of electricity purchased from 2022 to 2030	Energy users in the Shire enter into renewable energy power purchase agreements assumed at a similar price to 'regular' grid power
	Energy & renewables: energy efficiency	Electricity use has increased by 8% in Cowra over the past seven years, with a 4.5% increase per customer despite the increase in solar. A pathway towards net zero emissions will see greater energy efficiency by say 1% year-on-year from 2022 compared with current trends	More rapid uptake of LED lighting, implementation of energy efficient reverse cycle heating and cooling, energy efficient appliances, energy efficiency in commercial and industrial energy processes, as well as regional initiatives such as streetlighting upgrades

	Sustainable transport	20% of light vehicles and 5% of heavy vehicles are progressively switched to electric from 2025 to 2030, 40% of light vehicles and 25% of heavy vehicles are electric by 2040, and 100% of light vehicles and 100% of heavy vehicles are electric by 2050	Uptake that is broadly in line with AEMO forecasts of passenger vehicle uptake (AEMO forecasts suggest very low uptake of EVs until after 2025, with around 40% of vehicles potentially being EV by 2040). 100% Renewables indicative estimate for heavy fleet.
	Waste management	Emissions from waste are assumed to progressively reduce by 20% from 2025 to 2030, 70% by 2040 and 100% by 2050	This may require the introduction of FOGO, reduced contamination in recycling, increased education and waste reduction initiatives and circular economy initiatives across the region.
	Low emissions agriculture	Emissions from agriculture are assumed to progressively reduce by 20% from 2025 to 2030, 70% by 2040 and 100% by 2050	As part of the NSW net-zero plan, low emissions agriculture is trialled to observe the effectiveness and rolled out across NSW

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

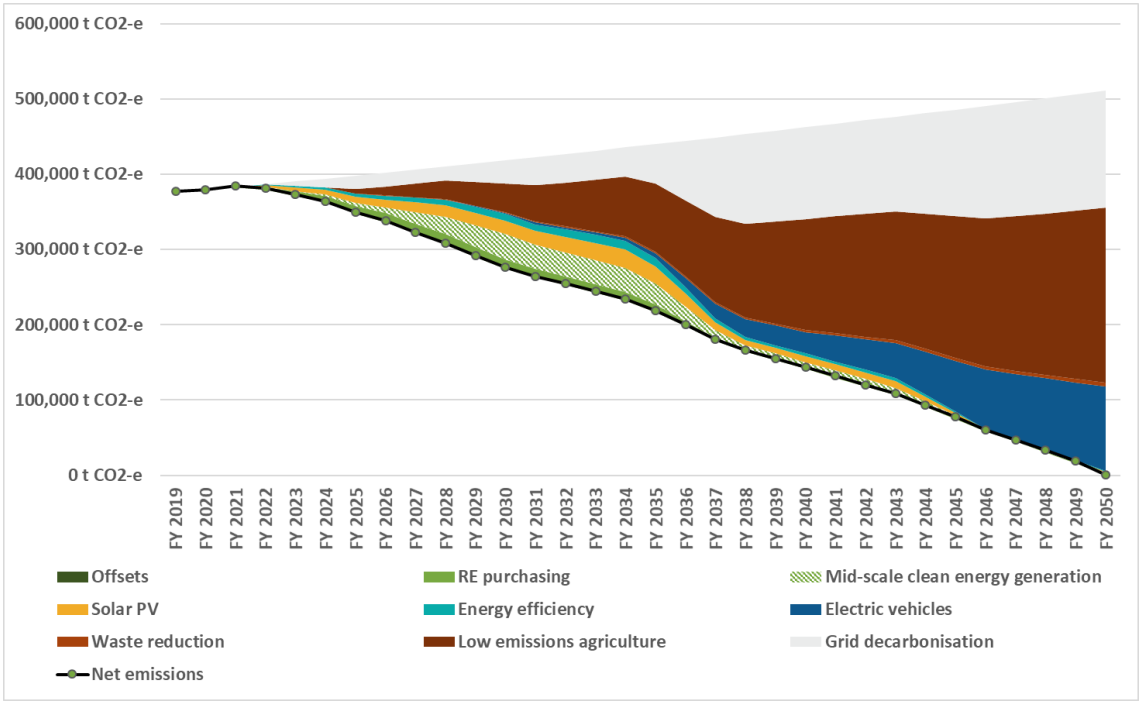
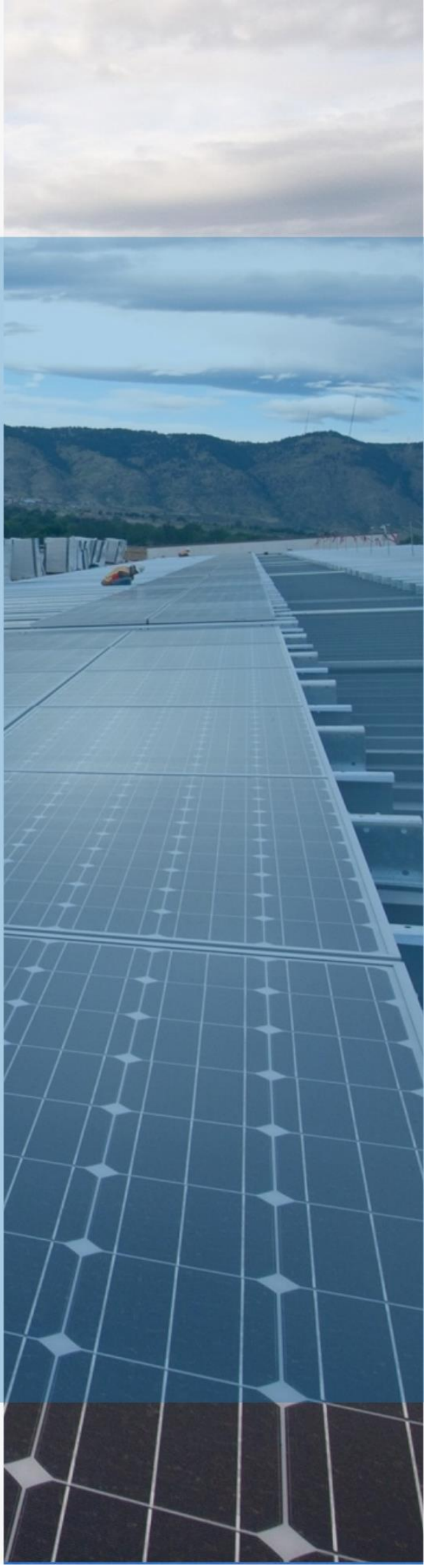


FIGURE 30: NET ZERO EMISSIONS – POSSIBLE PATHWAY FOR COWRA SHIRE TO 2050

100% renewables

Action plan

Suggested actions for Cowra's community to drive emissions reduction



8 Community energy and emissions reduction action plans

This analysis of the Cowra community's greenhouse gas emissions, examples of emissions reduction action by the community, and opportunities to reduce emissions shows that there is a strong interest in, and feasible solutions that can see deep cuts made to the region's emissions in coming decades, to achieve net zero emissions by 2050 in line with State Government targets.

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.

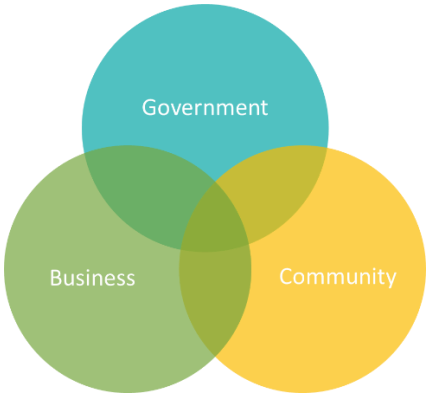


FIGURE 31: RESIDENTS, BUSINESS & GOVERNMENTS MUST WORK TOGETHER TO REDUCE EMISSIONS

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. The capacity of different groups and individuals in the community to influence emissions reduction is assessed and summarised in Appendix A.

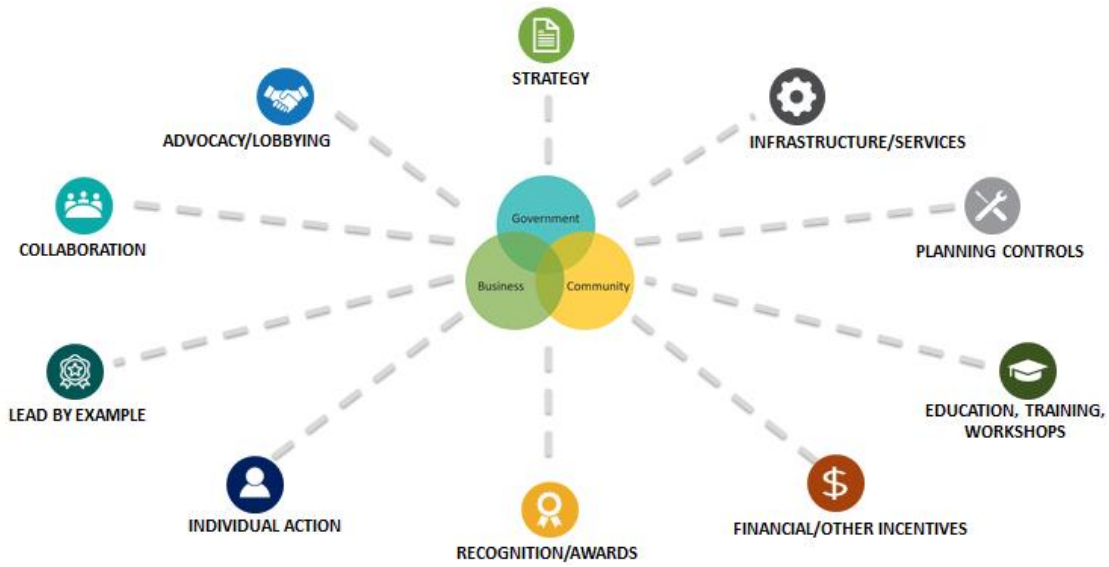


FIGURE 32: TEN AREAS OF ACTION FOR KEY STAKEHOLDERS TO HELP THE COMMUNITY REDUCE EMISSIONS

The recommended action plan for the community is presented below taking these influence levers into account.

8.1 Cowra Community Net Zero Emissions Action Plan

TABLE 10: COWRA COMMUNITY NET ZERO EMISSIONS ACTION PLAN

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
AE1	All Emissions	All Energy & Emissions Reduction	Collaboration; Education, Training, Workshops	Undertake community consultation on achieving net zero emissions	This community net zero emissions strategy draws on current emissions, local action and known and emerging opportunities for greenhouse gas emissions reduction. To be adopted by the Cowra community, deeper consultation, via survey, social media, face-to-face and virtual workshops and focus groups is recommended to generate buy-in, solicit more ideas on how the community can reduce emissions, and identify individuals, groups and organisations interested and capable of taking leading roles in the strategy implementation.	• Cowra community • Cowra Council • Business representative groups • Community climate action, sustainability groups
AE2	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 Cowra community. Consider sub-targets such as goals for solar PV, battery storage, electric vehicle uptake in the community, regenerative agriculture, etc.	• Cowra Council • Cowra community
AE3	All Emissions	All Energy & Emissions Reduction	Lead by Example	Appoint a community emissions reduction officer or leadership group	A net zero emissions strategy and plan requires leadership and sustained effort to implement, including community and business engagement, collaboration with stakeholders, development and deployment of information resources and tools, and advocacy for local or regional clean energy opportunities.	• Cowra community • Cowra Council • Business representative groups • Community climate action, sustainability groups
AE4	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)	• Cowra Council
AE5	All Emissions	All Energy & Emissions Reduction	Recognition / Awards, Advocacy	Recognise community leaders in sustainability	Consider the establishment of awards that recognise excellence in climate change response in the Cowra community, and/or advocate for local business demonstrating climate action leadership in other awards. As an example the Cowra Business Awards could include an award for climate leadership.	• Cowra Council • Business representative groups • Community climate action, sustainability groups

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
SE1	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.	• Cowra Council • Community climate action, sustainability groups • Business representative groups
SE2	Stationary Energy	Buying clean energy	Lead by Example	Council's renewable energy purchasing	As described in its Energy Efficiency & Renewable Energy Plan, as part of its regular power purchasing Cowra Council will look to increase renewable energy supply to its operations through a renewable energy Power Purchase Agreement (PPA), with a goal to reach 100% renewable electricity supply by 2030.	• Cowra Council
SE3	Stationary Energy	Buying clean energy	Individual Action	Business and individuals' renewable energy purchasing	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 *DPIE Northern NSW Renewable Energy Blueprint for Local Governments*, 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.	• Individual residents & businesses
SE4	Stationary Energy	Buying clean energy	Collaboration	Group / consortium purchase of 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 Cowra 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.	• Cowra Council • Central NSW Joint Organisation • Business representative groups • Individual businesses
SE5	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	• Cowra Council • Community climate action, sustainability groups

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
					be collated and made available via ratepayer and member communication channels.	• Business representative groups
SE6	Stationary Energy	Community and regional clean energy generation	Individual Action, Collaboration	Host a community renewable energy project	Individual businesses or groups of businesses can consider hosting and/or participating in a local renewable energy project, which could be owned by or benefit the community. Examples may include the CLEAN microgrid and bioenergy project, a local solar farm or 'solar garden' that those locked out from installing solar on their premises can purchase shares in to offset their electricity consumption. This type of opportunity could be initiated in collaboration with a community climate action or sustainability group, for example.	• Individual businesses • Community climate action, sustainability groups
SE7	Stationary Energy	Community and regional clean energy generation	Lead by Example	Facilitate and/or host a community renewable energy project	Cowra 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.	• Cowra Council
SE8	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 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.	• Cowra Council • Community climate action, sustainability groups
SE9	Stationary Energy	Behind-the-meter solar	Individual Action	Install solar PV and battery storage systems	Individuals and businesses in Cowra 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.	• Individual residents & businesses
SE10	Stationary Energy	Behind-the-meter solar	Lead by Example	Implement solar PV projects to achieve Council's renewable energy targets	Cowra Council's Energy Efficiency & Renewable Energy Plan sets out numerous opportunities for solar PV at Council's facilities, with some scope in future to expand these to incorporate battery storage. In implementing its Plan Council will implement all cost-effective solar and battery storage opportunities at its facilities.	• Cowra Council

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
SE11	Stationary Energy	Behind-the-meter solar	Lead by Example, Collaboration	Implement solar and storage across the region's education facilities	Implementation of solar on education facilities (early education + K-12, TAFE) has the dual benefit of cost & emissions savings for schools, and the education / learning benefit for students.	• Individual schools • State Government (Education) • Independent, catholic and other school organisations
SE12	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 solar & storage opportunity (e.g. via SunSpot https://apvi.org.au/sunspot/) and the likely costs and benefits to them. As a key stakeholder, Cowra Council can also provide education / training workshops, and could potentially coordinate events such as renewable energy expos that brings reputable suppliers to the community.	• Cowra Council • Community climate action, sustainability groups
SE13	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.	• Cowra Council • Community climate action, sustainability groups • Business representative groups
SE14	Stationary Energy	Behind-the-meter solar	Planning Controls	Review planning controls for residential and commercial buildings	Council's planning processes, documents and controls may be able to encourage and/or incentivise developers, builders or owners to provide for or install solar panels and battery energy storage in new or refurbishment projects. These can be reviewed from time to time to determine the case for guidance to be changed, for example if or as National Construction Code and BASIX are reviewed.	• Cowra Council • State Government • Commonwealth Government
SE15	Stationary Energy	Behind-the-meter solar	Financial / Other Incentives, Collaboration	Develop solar energy and battery storage solutions for low	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	• Cowra Council • Community Housing Providers • State Government

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
				income and social housing	solar and battery storage initiatives that help them to lower their energy costs.	
SE16	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.	• Cowra Council • Community climate action, sustainability groups • Business representative groups
SE17	Stationary Energy	Behind-the-meter solar	Financial / Other Incentives, Collaboration	Evaluate opportunities to reduce solar and battery costs through 'bulk-buy' or similar programs.	Some successful bulk-buy programs have been initiated and developed in regional NSW to increase awareness of solar and help residents and business get access to lower costs for solar PV, solar hot water and heat pumps, such as the New England North West Power Package. Like community renewable energy initiatives, bulk buy programs typically require large amounts of voluntary support.	• Cowra Council • Community climate action, sustainability groups
SE18	Stationary Energy	Energy efficiency	Individual Action	Implement energy efficiency improvements – including changes to practices, retrofits and new works	Individuals and businesses in Cowra can implement energy efficiency in their homes and business operations through better awareness of energy waste, implementation of cost effective retrofits such as LED lights and motor controls, and investment in energy efficient appliances, air conditioners, heat pump and solar hot water systems, and process technologies for example.	• Individual residents & businesses
SE19	Stationary Energy	Energy efficiency	Lead by Example	Implement energy efficiency projects to achieve Council's emissions reduction targets	Cowra Council's Energy Efficiency & Renewable Energy Plan includes energy efficiency measures that will reduce Council's carbon footprint. The largest savings will come from rolling out LED streetlighting across the Shire.	• Cowra Council
SE20	Stationary Energy	Energy efficiency	Education / Training / Workshops	Develop and deliver information resources on	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 energy technologies &	• Cowra Council • Community climate action, sustainability groups

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
				energy efficient technologies and practices	appliances, for owners and renters, for base/common areas and tenancies in leased commercial buildings and multi-unit dwellings. As a key stakeholder, Cowra Council can also provide education / training workshops, and could potentially coordinate events such as energy expos that brings reputable suppliers to the community.	
SE21	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.	• Cowra Council • Community climate action, sustainability groups • Business representative groups
SE22	Stationary Energy	Energy efficiency	Planning Controls	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 energy efficient design and technologies in new or refurbishment projects, beyond code requirements. These can be reviewed from time to time to determine the case for guidance to be changed, for example if or as National Construction Code and BASIX are reviewed.	• Cowra Council • State Government • Commonwealth Government
SE23	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.	• Cowra Council • Community Housing Providers • State Government
SE24	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 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.	• Cowra Council • Community climate action, sustainability groups • Business representative groups
TR1	Transport	Sustainable transport	Individual Action	Choose hybrid or electric vehicles	Numerous hybrid vehicle models are available and cost effective for most road users. As electric vehicles and	• Individual residents & businesses

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
				when purchasing a new car	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	Transport	Sustainable transport	Lead by Example, Collaboration	Cowra Council leadership on transition to low and zero emissions vehicles	Cowra Council can 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.	• Cowra Council • Central NSW Joint Organisation • State Government
TR3	Transport	Sustainable transport	Infrastructure / Services, Collaboration	Cowra Council, CNSWJO & other stakeholders to collaborate on EV charging infrastructure	With the announcement of $490 million in funding to support the development and rollout of EV charging infrastructure and incentivise EV vehicle purchases, and with CNSWJO's recent development of an EV charging plan for the Central west region of NSW, there is a clear opportunity to continue to collaborate to ensure that Cowra is connected along with the rest of the region to this rapidly developing opportunity for regional emissions reduction and long term cost saving for residents and business.	• Cowra Council • Central NSW Joint Organisation • State Government • Business representative groups
TR4	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. Cowra Council will engage with key stakeholders in Cowra, the region, State Government, motoring associations, business groups 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.	• Cowra Council • Central NSW Joint Organisation • State Government • Business representative groups
TR5	Transport	Sustainable transport	Strategy, Infrastructure / Services	Update and implement Council's Active Transport Plan for the region	Cowra Council developed a Cowra Bike Plan and Pedestrian Access Mobility Plan (PAMP) in 2014. This and other plans relevant to promoting active transport within the region can be reviewed and updated, and supporting infrastructure and	• Cowra Council

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
			Education / Training / Workshops		services developed as part of Council's normal Operational Plan and Delivery Program works.	
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 encourage or ensure that charging infrastructure suitable for future electric vehicle charging, is incorporated in new and refurbishment works.	• Cowra Council
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, and engage in more active modes of transport. As a key stakeholder, Council can also provide education / training workshops, and could potentially coordinate events that showcase future transport options to the community.	• Cowra Council • Community climate action, sustainability groups • Business representative groups
TR8	Transport	Sustainable transport	Financial / Other Incentives	Provide financial incentives and 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. Cowra Council can assess the scope for incentives to be made available to businesses installing public EV charging infrastructure at their premises.	• Cowra Council • Community climate action, sustainability groups • Business representative groups • Individual businesses
WA1	Waste	Waste management	Individual Action	Reduce waste generation	Individual residents and businesses can help to reduce emissions from waste through their own purchasing, use and disposal actions.	• Individual residents & businesses
WA2	Waste	Waste management	Lead by Example, collaboration	Leading practice in waste collection and management	Cowra Council manages the Cowra Materials Recycling Facility and has successfully reduced greenhouse gas emissions through high recycling rates. Council will continue to lead and look to reduce emissions from waste through its collection and management systems, and will continue to	• Cowra Council • NetWaste • State Government

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
					collaborate with other councils, regional waste bodies, State Government and resource management companies to drive towards lower emissions and circular economy methods.	
WA3	Waste	Waste management	Strategy, Infrastructure / Services, collaboration	Waste management strategy	Cowra Council will work with regional waste bodies, State Government and others to develop its waste management strategy to 2030, building on previous strategies that have focused on increasing diversion from landfill, composting and other measures to reduce emissions, and looking for opportunities presented by the State Government's recently-released Waste and Sustainable Materials Strategy 2041 and the NSW Plastics Action Plan.	• Cowra Council • NetWaste • State Government
WA4	Waste	Waste management	Education / Training / Workshops	Implement communication and education initiatives to reduce waste generation, alongside waste management strategies	As part of waste management strategies going forward, Cowra Council will look to identify communication and education in the community – individuals, businesses, schools, etc – as part of goals to increase diversion from waste and move towards a circular economy model.	• Cowra Council
AL1	Agriculture & Land use	Agriculture & Forestry (including Land use)	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 use of bio-fertilisers, fertiliser management / optimisation, feedlot emissions, grazing and soil management, clearing practices, manure management, 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.	• Individual residents & businesses

Action Number	Emissions Area	Emissions Reduction Theme	Implementation approach	Action Name	Action Description	Key Stakeholders
AL2	Agriculture & Land use	Agriculture & Forestry (including Land use)	Collaboration	Work with Government and industry stakeholders to promote low carbon outcomes	Council will look to work with key stakeholders in relation to land clearing and forestry development so that regional goals for greenhouse gas emissions and sequestration are taken into account.	• Cowra Council
AL3	Agriculture & Land use	Agriculture & Forestry (including Land use)	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.	• Cowra Council
AL4	Agriculture & Land use	Agriculture & Forestry (including Land use)	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.	• Individual residents & businesses

Appendix A: Capacity of community stakeholders to influence emissions reduction

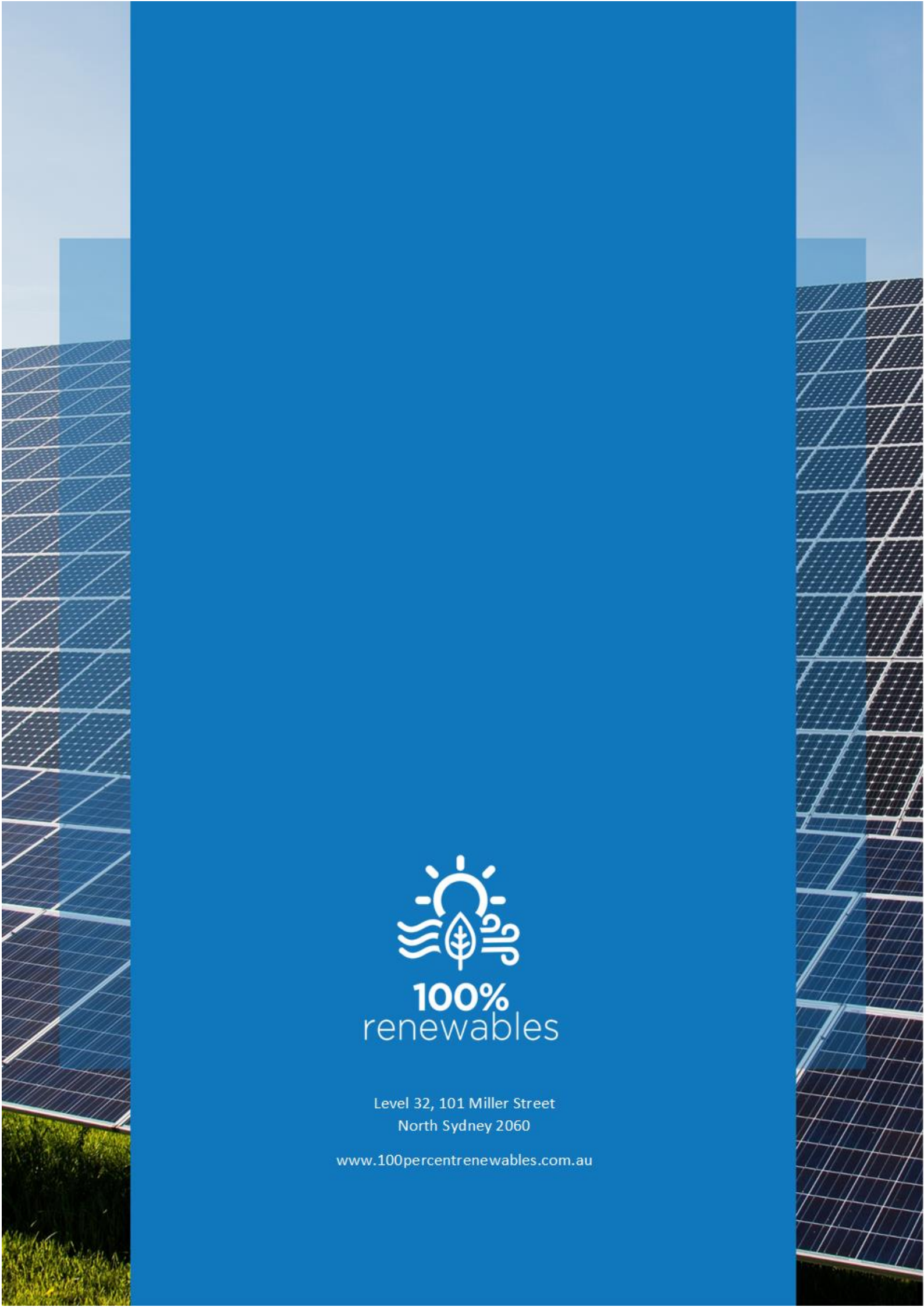
The table below summarises the potential within the Cowra region to reduce greenhouse gas emissions, together with the potential roles and influence of key stakeholders in the community.

TABLE 11: SUMMARY OF KEY STAKEHOLDER INFLUENCE ON ABATEMENT POTENTIAL IN COWRA SHIRE

Abatement Category	Summary of GHG abatement potential in Cowra Shire	Influence of key community stakeholders in achieving abatement potential					
		Individual residents & businesses	Business representative groups	Community climate action, sustainability groups	Cowra 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 – Cowra 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 – Cowra 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	Medium to High – the overall abatement scope for this is high from agricultural and municipal waste	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 Cowra Shire	Influence of key community stakeholders in achieving abatement potential					
		Individual residents & businesses	**Business representative groups**	**Community climate action, sustainability groups**	**Cowra Council**	**NSW Government**	**Commonwealth Government**
		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 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 the medium term,	Medium – in the period to 2030 purchase of new EVs will reduce GHG emissions mainly when	Low – business groups can share information with their members and link them to	Low – community groups can share information with their networks and link them to	Medium – Council can lead by moving its passenger fleet to hybrid and electric vehicles,	Very high – State Government EV support through the Net Zero Plan will help to accelerate	Very high – the 2020-2025 Future Fuels Fund, support to EV manufacturing and potential future

Abatement Category	Summary of GHG abatement potential in Cowra Shire	Influence of key community stakeholders in achieving abatement potential					
		Individual residents & businesses	**Business representative groups**	**Community climate action, sustainability groups**	**Cowra Council**	**NSW Government**	**Commonwealth Government**
	abatement from larger vehicles will take longer	supplied from renewables, electrification / greening of off-road and heavy vehicles will occur over the long term	programs and incentives for electric vehicles, EV charging infrastructure and regulatory changes	programs and incentives for electric vehicles, EV charging infrastructure and regulatory changes	can provide information to residents and business, and can support EV charging infrastructure	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	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 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



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COUNCIL & COMMUNITY SNAPSHOTS AND CASE STUDIES

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1 Cowra Council – snapshot

Cowra Council finalised and endorsed their Energy Efficiency & Renewable Energy Plan in 2020, and aims to achieve 100% renewable electricity in Council's operations by 2030 through the implementation of cost effective energy efficiency and renewable energy measures.

Through its participation in the NSW Government's net zero emissions pilot project, Council has developed an insight into its wider carbon footprint, with emissions from waste, capital works and business services identified to be significant. Council will work towards addressing these emissions to drive towards net zero for Council's operations in line with NSW 2050 net zero target. (LINK TO CASE STUDY).

2 Cowra Council – case study

Cowra Council finalised and endorsed their Energy Efficiency & Renewable Energy Plan in 2020, and aims to achieve 100% renewable electricity in Council's operations by 2030. Actions that underpin this Plan include onsite energy efficiency and solar, sustainable transport, and renewable energy power purchasing. Council will achieve its target through the implementation of cost-effective short, medium and long term actions.

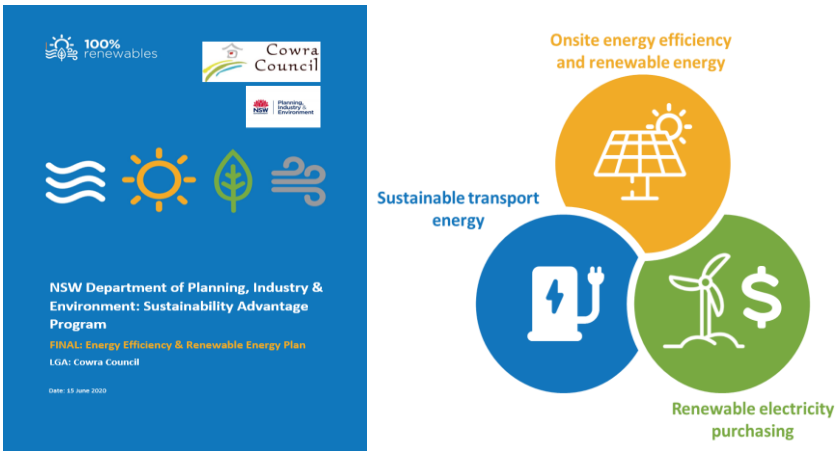


FIGURE 1: COWRA COUNCIL ENERGY EFFICIENCY & RENEWABLE ENERGY PLAN

Through the net zero pilot project, Cowra Council has assessed its wider carbon footprint, encompassing emissions from waste as well as in Council's value chain. The result of this assessment is that Council's estimated scope 1, 2 and 3 greenhouse gas emissions were 21,963 t CO_2-e in 2019/20. Waste and capital works are identified to be the most significant emissions sources, together with energy use for Council's operations.

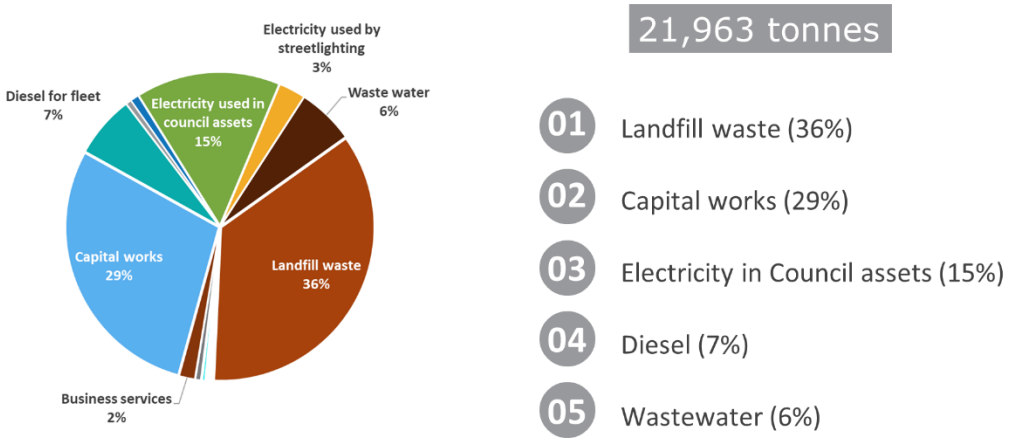


FIGURE 2: COWRA COUNCIL'S TOP 5 GHG EMISSIONS SOURCES

In a diagnostic session with Councillors and senior managers, it was identified that climate risks are acknowledged and are considered in Council's business planning. Council has more work to do to assess all of its climate-related risks and opportunities, to integrate this with strategic and operational planning, and to reflect this in financing and procurement, as well as in climate commitments and reporting.

The pilot project identified and assessed the potential impact of emissions reduction measures that could help Cowra Council to drive towards its renewable energy goal and towards net zero.

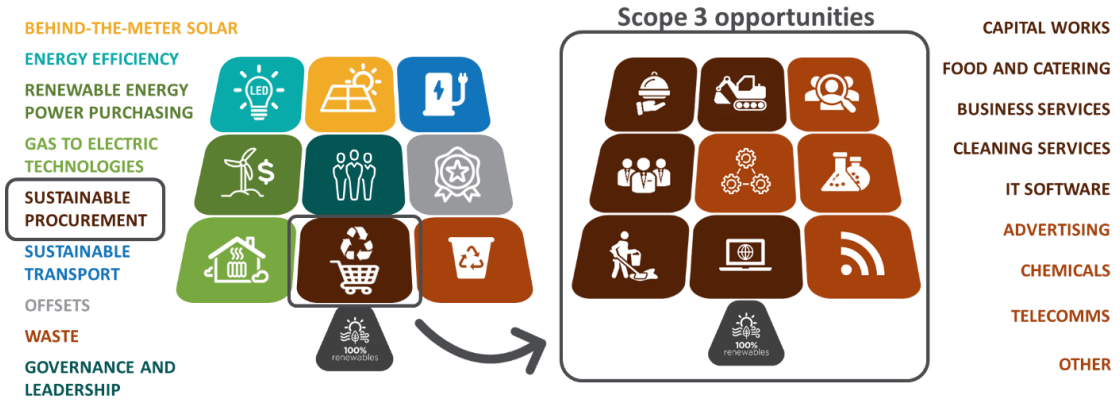


FIGURE 3: ABATEMENT MEASURES TO REDUCE COUNCIL'S EMISSIONS TO NET ZERO

One possible pathway was developed, which highlights key challenges in the areas of capital works and waste management. Council will work with its supply chain partners, NSW State Government and other stakeholders to drive the changes needed to reach net zero, aligned with the NSW Government's goal to achieve this by 2050.

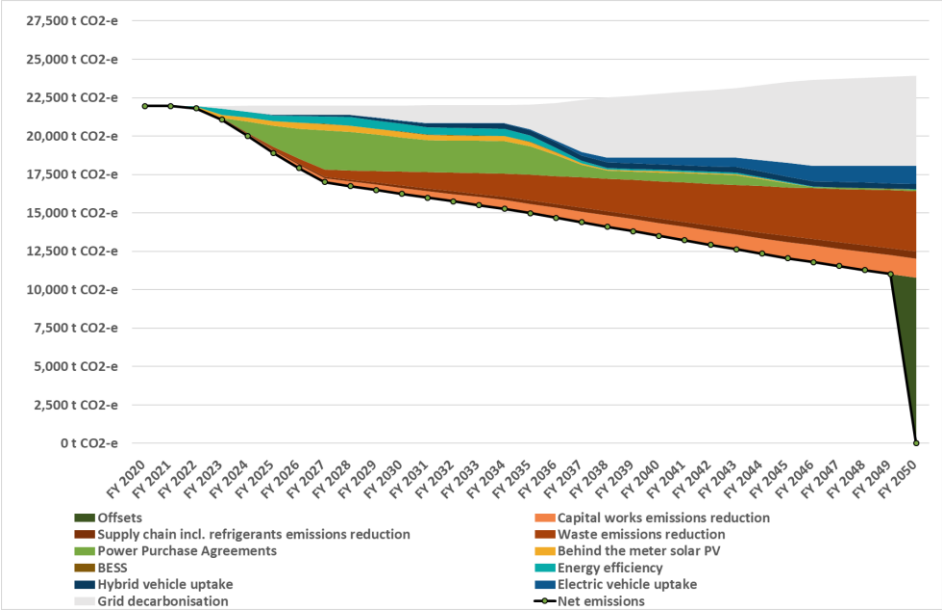


FIGURE 4: POSSIBLE NET ZERO EMISSIONS PATHWAY FOR COWRA COUNCIL

3 Cowra Community – snapshot

Greenhouse gas emissions by the Cowra community were estimated to be 376,800 tonnes of CO_2-e in 2018/19, with the largest emissions source being agriculture, followed by electricity use and then transport. The Cowra community has been responding to the challenge of climate change with 29% of all dwellings installing solar panels, and engagement with businesses in the community has shown high awareness and implementation of sustainable energy initiatives.

A net zero community survey reveals that 78% of the community believe that acting on climate change is important or very important, while more than 80% of respondents want Cowra to reach net zero emissions by or before 2050. (LINK TO CASE STUDY).

4 Cowra Community – case study

The carbon footprint of the Cowra Shire was estimated to be 376,800 t CO2-e in 2018/19, based on modelling by Beyond Zero Emissions. The major sources of greenhouse gases in the region are agriculture (46% of total emissions), followed by stationary energy / electricity consumption (31%) and transport (22%)[1].

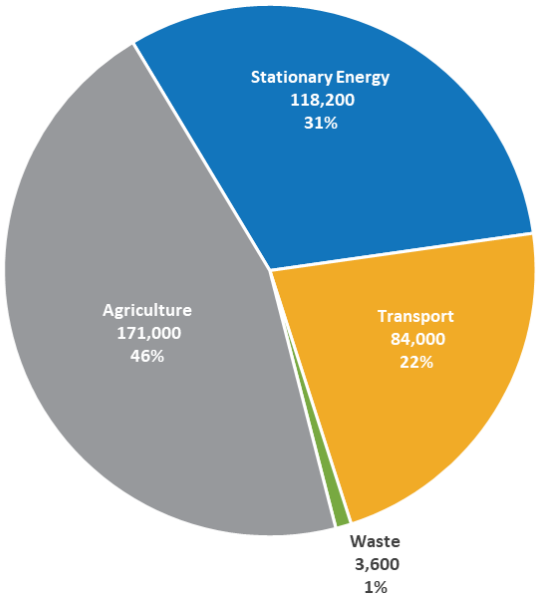


FIGURE 5: COWRA SHIRE CARBON FOOTPRINT IN 2018/19

A net zero community survey was carried out as part of an assessment of the potential for emissions reduction. Responses from the community show that:

1. The community believes that climate change is very important (61%) or important (17%) to them, and two thirds of the community are seeing some impact from climate change now
2. Net zero emissions should be achieved by 2050 aligned with NSW targets (21%) or before this time, aligned with science (63%)
3. 81% of community respondents believe Council has a key role in helping the community to reduce emissions and adapt to climate change
4. The top 5 actions that Council can work with the community on in the next few years include tree planting, waste management and recycling, installing solar and batteries on homes and business, energy efficiency in homes and business, and the development of regional bioenergy and other renewable energy generation projects
5. More than 88% of respondents believe that the most important thing Cowra Council can do is to lead by example in its operations

The survey results were consistent with direct engagement with several organisations in Cowra, which showed high awareness of climate change, strong interest in sustainable energy and a high uptake of energy efficiency and renewable energy. As well as this, 29% of the Cowra community have installed solar panels on their dwelling or business.

An action plan was developed for the Cowra community that identifies 44 actions across nine key emissions reduction opportunities that can help Cowra to achieve net zero emissions in coming

[1] https://snapshotclimate.com.au/faq/has-the-data-been-verified/

decades. The community, business and all levels of government have roles to play to ensure that the region's response is effective, resourced and sustained.

FIGURE 6: NINE CATEGORIES OF EMISSIONS REDUCTION FOR COWRA SHIRE

To illustrate how emissions could be reduced over time, the Cowra Community Net Zero Strategy presents an emissions reduction roadmap that aligns with the NSW Government's 2050 target. While decarbonisation of the electricity grid, sustainable transport and emissions reduction from agriculture will be the major drivers of abatement in later years, action by the community in the coming decade to develop regional renewable energy resources, install solar panels and batteries, purchase green power and be more energy efficient are crucial in helping the region to decarbonise.

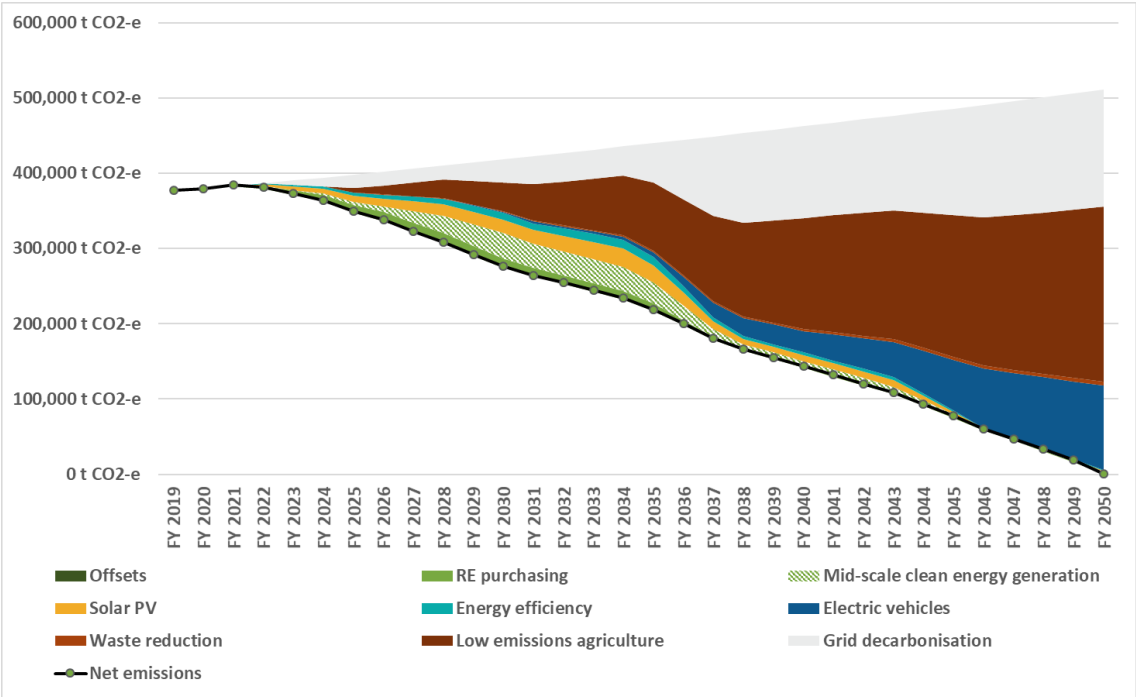
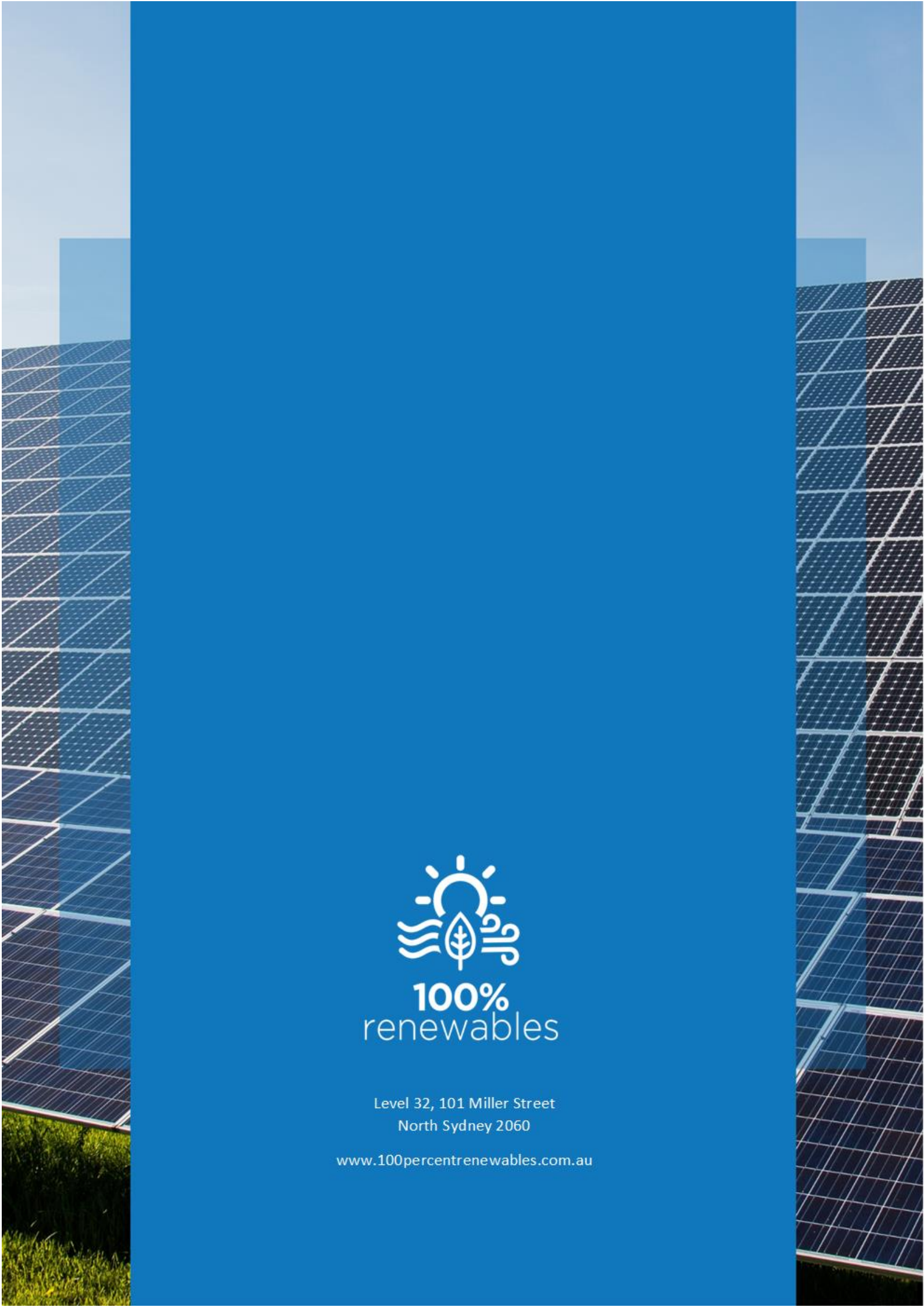


FIGURE 7: NET ZERO EMISSIONS – POSSIBLE PATHWAY FOR COWRA SHIRE TO 2050



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