



Northern Rivers Joint Organisation
(NRJO)

RENEWABLE ENERGY BLUEPRINT for the NORTHERN RIVERS

Final

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Renewable Energy Blueprint



1 Foreword

Covering the NSW local government areas of Ballina Shire, Byron Shire, Kyogle, Lismore City, Richmond Valley and Tweed Shire, the Northern Rivers is the most north-easterly region of New South Wales. Famous for its spectacular landscapes, from the natural beauty of its beaches to its rich hinterland, the Northern Rivers is a dynamic region that prides itself on its commitment to sustainability and entrepreneurial drive.

In June 2018, the six councils came together to form the Northern Rivers Joint Organisation (NRJO) with the vision to be a unified region of well connected, integrated communities that affords its people a unique balance of place, lifestyle, and opportunity. To deliver this vision NRJO defined key regional priorities, including the promotion of innovative, sustainable energy, water, and waste management.

Communities across the region care deeply about minimising the impact of human activity on the environment and have a proven track record of adopting new and innovative approaches to reducing their carbon footprint, particularly when it comes to renewable energy.

The Northern Rivers has been at the forefront of renewable energy uptake in Australia. It is home to Australia's first community-owned renewable energy retailer, NSW's largest bioenergy generation plants, Australia's first solar garden, Australia's first ever council-operated and community-owned solar farm, and the region has among the highest levels of rooftop solar in the country.

The Northern Rivers has a growing population with a growing energy demand that will increase further with the uptake of electric vehicles. As the energy landscape in Australia evolves, the Northern Rivers is looking to build on its record on sustainability and access to a strong transmission and local electricity network and will develop and implement new opportunities like utility-scale and mid-scale solar farms in suitable areas and new bioenergy projects that create clean energy and turn waste into valuable products.

Local councils are very keen to support businesses who want to invest in the region. There is government support available to help you get your projects off the ground, and planning and network operators have capacity and well documented processes to help you with your projects. The community and business are ready to upskill and to build on their experience in developing, piloting, and implementing innovative renewable energy solutions, to accelerate the integration of more solar, batteries, electric vehicles, and smart controls into the electricity network, and to play their role in the emerging hydrogen economy.

Through these initiatives the Northern Rivers will attract more investment to the region, create more education, training, and employment opportunities, keep money in the region, help to accelerate the decarbonization of the economy, and include the whole community in this transformation.

The six local councils of NRJO are committed to working with investors, government, business and community groups to help bring investment opportunities that bring more renewable energy to the Northern Rivers region.

2 Giving the green light to renewable energy in the region

Boosting renewable energy in the Northern Rivers is about the region's capacity and renewable energy resources, and about Government policies and support that are driving the energy transition. But it is also about the enabling local mechanisms, experience and expertise which make the development of renewables possible.

2.1 Local experience and innovation

The Northern Rivers is at the forefront of the renewable energy transition and is an ideal region to develop and implement new solutions to accelerate the change.

- ✓ Australia's first community-owned renewable energy retailer, Enova, was established in the region in 2016,
- ✓ Australia's first community-owned and council-operated solar project, *Farming the Sun*, was implemented in Lismore in 2017, which also saw one of the first floating solar installations in the country,
- ✓ Power Up is the region's electric vehicle strategy, paving the way for the region to develop the charging infrastructure and grow the local EV market,
- ✓ Enova and Good Car Co! are helping to accelerate the uptake of EVs through a bulk-buy program aimed at the secondary EV market and delivering affordable vehicles to local drivers,
- ✓ Several mid-scale solar farms have been proposed and stepped through the social license, pre-planning, and development application process, providing a rich resource that will guide future similar projects in the region,
- ✓ The country's first Solar Garden was developed by Enova at the North Coast Community Housing (NCCH) in Lismore, providing access to solar for community housing tenants and four community groups,
- ✓ Nearly 45% of dwellings have solar installed, one of the highest uptake rates in Australia,
- ✓ Local expertise is at the center of three of seven projects that have received funding from the NSW Government's Regional Clean Energy Fund,
- ✓ Enova led the development of a microgrid feasibility assessment in the Byron Bay Arts & Industry Estate through the NSW Government's Knowledge Sharing Initiative,
- ✓ The region's bioenergy resources have been mapped and regional opportunities for single-site and biohubs identified through feasibility studies,
- ✓ Six councils have between them installed more than 3 megawatts of solar PV, from rooftop to ground mount and floating systems, and from a few kilowatts to several hundred kilowatts

2.2 Connecting to the grid

The transmission and distribution networks in the Northern Rivers are strong and provide opportunities for the right projects in the right locations to be developed. Connection application processes for standard and negotiated low voltage connections, and for high voltage connections are clearly set out.

These processes continue to evolve; for example, Essential Energy's Preliminary Connection enquiry process provides proponents of mid-scale solar farms with a rapid low-cost way to determine if their

selected location will be able to connect to the grid, and a high-level indication of possible network upgrades that may be required if a proposal proceeds to a detailed feasibility study.

The goal of having a '100% renewables-ready grid' by 2025 presents challenges to all transmission and distribution network providers, and Essential Energy is actively working to improve its network's capability to dynamically manage constraints and work with customers and third parties using tariffs and smart technology to shape the network's profile and enable a 'two-way' grid. Managing the connection and integration of battery storage, electric vehicles and higher levels of solar PV penetration are at the heart of these challenges that the network is responding to.

2.3 Streamlined planning processes

Planning processes for connection of renewable energy generation in NSW have been streamlined significantly and mean that proponents of many renewable energy projects in the Northern Rivers can progress their projects with clarity.

Large-scale solar farms proposed for the Northern Rivers are using the NSW Government's State Significant Development (SSD) process to progress their projects. Local councils in the region are key partners in the process and are happy to consult with proponents early to help confirm whether social license to operate exists and to work collaboratively through the planning process as required.

Amendments in recent years and proposed to the State Environmental Planning Policy (Infrastructure) make it easier for small-scale solar and battery storage projects to be developed and will make the time to develop and connect projects in the region faster, paving the way for continued rapid uptake of solar as well as connection of battery storage systems for homes.

Many proposals to develop projects such as mid-scale solar farms, mini-hydro or bioenergy are classified as Local Development or Regional Development. Historically there have been few applications to develop such projects, however in the recent past and currently there has been higher interest by landowners and developers.

The local councils of NRJO are committed to working collaboratively to help provide appropriate guidance to proponents of renewable energy generation at this level, recognising there may be numerous important environmental and other aspects to any proposal and that there are differences in land use, local environments, and planning requirements between councils.

2.4 Social license and engagement

Securing the social license to develop and operate a renewable energy project is one of the most important elements to assess and seek in the early stages of a proposed project, and to continue to reaffirm over the life of a project. This concept reflects community support to build and operate a project and having this is considered essential and good practice.

The Northern Rivers Joint Organisation supports and encourages developers and landowners to assess, consult and achieve a social license to operate as early in their proposed project as possible. While this process may take time, it can avoid delays or cancellation of projects, and may also be able to pre-empt and overcome objections and secure community support.

The social licence to operate bioenergy projects in the region was assessed and reported on by the Sustain Northern Rivers Energy Working Group in 2016¹, and is a valuable resource for anyone looking to develop such projects.

NRJO encourages proponents of solar farms, at large and mid-scale, to refer in the first instance to ARENA’s published guidance on SLO for these developments². This highlights five building blocks of social licence and highlights five best practice elements of community engagement that proponents should start with to frame their approach.

Five building blocks of SLO assessment	Five best practices of community engagement
1. Reliability and efficiency	1. Tailored to the specific needs of a community
2. Visual impacts	2. Long-term
3. Environmental impacts	3. Initiated early in the process
4. Economic and employment impacts	4. Flexible
5. Health impacts	5. Demonstrates a genuine commitment to the principles of community engagement from the developer

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¹ 2016: Social licence for bioenergy: Prospects in the NSW Northern Rivers, a Northern Rivers BioHubs project led by Sustain Energy. Report compiled by Dr Richard Parsons February 2016

² IPSOS, Summary report: Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry, funded by ARENA

3 Local support and government initiatives in favour of renewable energy

The enthusiasm for the development of renewable energy in the region means that project proponents can access support at multiple levels across councils, state organisations, industry bodies, businesses and community groups. This network of professionals and experts can provide guidance and share knowledge on opportunities and site identification, planning and connection processes, technical expertise, community engagement, and more.

3.1 Local Government

Councils are highly committed to the development of renewable energy and are a very valuable source of information and support for renewable energy proponents. They have an intimate knowledge of local conditions and will be able to provide guidance in early planning and community engagement.

Local council contacts are shown below; your local council's economic development or planning department may be the ideal place to start to discuss your renewable energy proposal.

Council	Website	Email	Phone
Ballina Shire	https://ballina.nsw.gov.au/	council@ballina.nsw.gov.au	1300 864 444
Byron Shire	https://www.byron.nsw.gov.au/	council@byron.nsw.gov.au	1300 811 942
Kyogle	https://www.kyogle.nsw.gov.au/	council@kyogle.nsw.gov.au	02 6632 1611
Lismore City	https://lismore.nsw.gov.au/		02 6625 0500
Richmond Valley	https://richmondvalley.nsw.gov.au/	council@richmondvalley.nsw.gov.au	02 6660 0300
Tweed Shire	https://www.tweed.nsw.gov.au/	tsc@tweed.nsw.gov.au	02 6670 2400

Additionally further guidance and information can be obtained through the **Northern Rivers Joint Organisation**, through their webpage: <https://www.northernriversjo.nsw.gov.au/contact-us>.

3.2 State and Commonwealth programs

Below are links to the various programs supporting the development of renewable energy and economic development in general in the Northern Rivers.

NSW Government's Net Zero Plan Stage 1	https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan
NSW Government's Electric Vehicle Strategy	https://www.nsw.gov.au/initiative/nsw-governments-electric-vehicle-strategy
NSW Hydrogen Strategy	https://www.energy.nsw.gov.au/renewables/renewable-generation/hydrogen
NSW Government's Net Zero Industry and Innovation Program	https://www.energysaver.nsw.gov.au/reducing-emissions-nsw/net-zero-industry-and-innovation
Regional Clean Energy Fund (RCEF)	https://www.energy.nsw.gov.au/renewables/clean-energy-initiatives/regional-community-energy
NSW Office of Regional Economic Development	https://www.investregional.nsw.gov.au/contact/contacts-details-and-assistance/

Regional Job Precincts (RJP)	https://www.nsw.gov.au/snowy-hydro-legacy-fund/special-activation-precincts/regional-job-precincts
Solar for Low-Income Households	https://www.energysaver.nsw.gov.au/browse-energy-offers/household-offers/apply-solar-low-income-households
Empowering Homes solar battery loan program	https://www.energysaver.nsw.gov.au/browse-energy-offers/household-offers/apply-empowering-homes-solar-battery-loan-offer
Australian Renewable Energy Agency (ARENA)	https://arena.gov.au/
Regional Australia Microgrids Pilot Program	https://arena.gov.au/funding/regional-australia-microgrid-pilots-ramp/
Advancing Renewables Program (ARP)	https://arena.gov.au/funding/advancing-renewables-program/
Australia’s Bioenergy Roadmap	https://arena.gov.au/knowledge-bank/australias-bioenergy-roadmap-report/
Clean Energy Finance Corporation (CEFC)	https://www.cefc.com.au/
Clean Energy Innovation Fund	https://www.cefc.com.au/where-we-invest/special-investment-programs/clean-energy-innovation-fund/
Australia’s National Hydrogen Strategy	https://www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf

3.3 Available funding options

Whether looking at establishing a commercial renewable energy project or intending to complete a feasibility study, there is a range of potential funding sources that can be accessed for renewable energy proponents.

Many of the programs mentioned in this blueprint will be of special interest to investors, however there are more programs that are accessible, not all of them being necessarily dedicated to renewable energy.

Please refer to the three links below to help you find a funding option that fits your project.

- NSW Government grants <https://www.nsw.gov.au/grants-and-funding>
- Information, grants, services and support from across government www.business.gov.au
- The Australian Government's centralised grants hub www.grants.gov.au

3.4 Community and advocacy groups

Regional Development Australia (RDA) NSW – Northern Rivers: RDA Northern Rivers is a not-for-profit, community-based organisation funded through the Australian Government’s Regional Development Australia Initiative. They have an active role in the community with a clear focus on growing strong and confident regional economies that harness competitive advantage, seize on economic opportunities and attract investment.

They can be contacted on their website: <https://www.rdanorthernrivers.org.au/about/contacts/>

Zero Emissions Byron (ZEB): ZEB is a thriving volunteer-led, non-profit entity whose purpose is to accelerate Byron Shire's transition to net zero emissions by continuously engaging the local community to increase their uptake of emission reduction activities.

They can be contacted on their website: <https://zerobyron.org/contact-us/>

Community Power Agency: The Community Power Agency is a not-for-profit organisation with expertise that enables and advocates for community energy. They support communities across Australia to engage in and benefit from the transition to renewable energy.

They can be contacted on their website: <https://cpagency.org.au/contact/>

Total Environment Centre (TEC): Originally TEC was formed by the save the national park and rainforests movement of the 1970s, today they also advocate for renewable energy by encouraging innovation, a more flexible modern energy market, and incentivising government investment.

They can be contacted on their website: <https://www.tec.org.au/contact>

Enova Community: Based in Byron Bay, Enova Community Ltd is the not-for-profit arm of Enova Community Energy. A registered charity, they work to help all members of the community reduce their energy use and access renewables.

They can be contacted on their website: <https://www.enovaenergy.com.au/contact>

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4 The Northern Rivers of New South Wales

In its Strategic Regional Priorities 2019-2022, NRJO set out its vision “for the Northern Rivers to be a unified region of well connected, integrated communities that affords its people a unique balance of place, lifestyle and opportunity”, and for the region to be known to the nation and the world for its:

- outstanding environmental and scenic values
- commitment to sustainability
- respect for Aboriginal culture
- openness to visitors
- entrepreneurial drive
- creative and collective spirit and culture
- support of primary producers

4.1 A snapshot of the Northern Rivers

The region, home to the Bundjalung people for thousands of years, covers an area of more than 10,000 square kilometres and is now home to nearly 250,000 people and 25,000 businesses. Over the next twenty years the region’s population will grow to nearly 300,000 residents. As the population grows, mainly in coastal areas, housing stocks will increase from 110,000 homes today to over 130,000. Energy demand will also grow, both from population changes and from electric transport.

The diversity of the region is seen from the rapidly growing urban and coastal area of Tweed Heads in the north, to Evans Head in the south, and from the iconic Byron Bay in the east to Woodenbong and Tabulam in the west of Kyogle. These places bound a diverse region of thriving centres, tourist destinations and small village communities, located across an area of great natural beauty, including the region’s beaches, rainforests, mountains, and rural landscapes.

Each area of the Northern Rivers has its own strengths and employment opportunities, from agriculture to manufacturing, to hospitality and the creative arts. The region is well served with road transport, energy, and health services, and is the gateway from New South Wales to South-East Queensland.

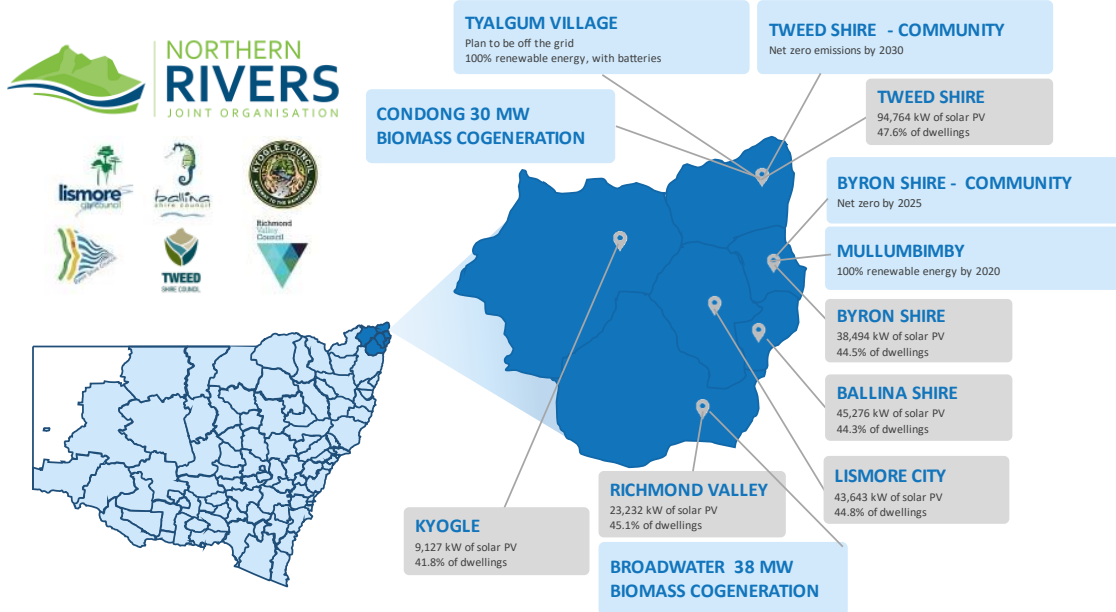
4.2 Regional leadership in clean energy

The promotion of the Northern Rivers’ innovation, entrepreneurial spirit and green, sustainable image is more than words. It reflects the lived and continuing goal of the community to minimise its impact on the environment, reduce emissions and conserve and protect valuable natural resources.

This commitment is seen in the leadership provided by the NRJO member councils and by the community. Ambitious goals set by the six councils in the Northern Rivers region complement action taken by local communities and businesses.

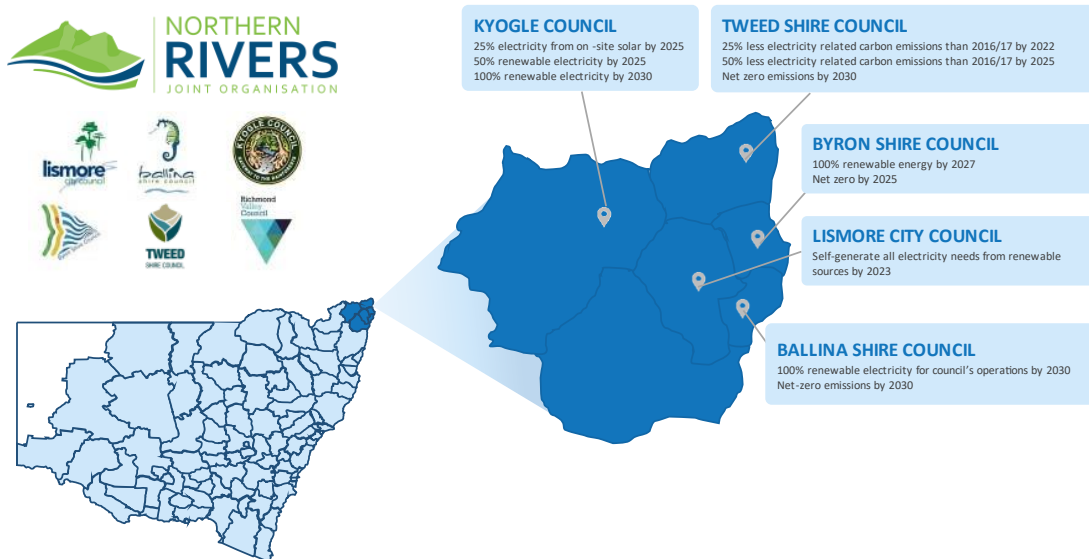
Did you know: the Northern Rivers JO region uses 1,300 gigawatt-hours of electricity each year. The amount of renewable energy generated by the region’s bioenergy and solar PV systems is estimated to be 700 gigawatt-hours annually, more than half of the region’s electricity demand. Every local council area in NRJO has well over 40% of homes supplied with solar, and this figure is approaching 50% in Tweed Shire. As the region’s demand for energy (electricity, transport and fuel for heating) grows there is a commitment to ensure that this is met with locally-develop renewable energy projects.

SOLAR PV UPTAKE, BIOENERGY & COMMUNITY COMMITMENTS



COMMUNITY & BUSINESS RENEWABLE ENERGY COMMITMENTS AND ACHIEVEMENTS

COUNCIL COMMITMENTS MAP



NRJO MEMBER COUNCIL RENEWABLE ENERGY COMMITMENTS

4.3 Government support for renewables providing opportunity for the Northern Rivers

As the Australian energy transition gathers momentum the Northern Rivers is looking to partner with investors and all levels of government to ensure that investment opportunities are created to develop, trial, and implement the technologies and solutions that will help to shape how energy is produced, distributed, stored, controlled and used in the future.

4.3.1 NSW Department of Planning, Industry and Environment

New South Wales’s goal to achieve net zero emissions by 2050 and 50% emissions reduction by 2030, underpinned by its Net Zero Plan Stage 1: 2020–2030³ provides opportunities for the Northern Rivers region to attract investment to develop renewable energy and distributed energy solutions.



NSW GOVERNMENT NET ZERO PLAN STAGE 1 AND RELATED STRATEGIES

4.3.1.1 Renewable Energy Zones

Renewable Energy Zones (REZs) are modern-day power stations, encompassing renewable energy generation, storage such as batteries, and high-voltage poles and wires to deliver electricity.

The Northern Rivers is not in a designated REZ, but has excellent transmission infrastructure and attractive land, particularly to the south and west of the region that could host large solar and battery storage projects that could power a significant proportion of the region’s electricity needs.

4.3.1.2 Community renewable energy

The Northern Rivers has an unmatched commitment to develop, trial and implement renewable energy solutions that will increase local energy resilience, overcome barriers to the development of distributed energy resources, attract new and grow existing businesses in the region, and retain money in the regional economy to support further growth. Among the numerous initiatives that the region has developed several have been with the support of and in partnership with the NSW Government, including:

- Enova’s microgrid feasibility assessment through the NSW Government’s Knowledge Sharing Initiative at the Byron Bay Arts & Industry Estate,

³ Department of Planning, Industry and Environment, Net Zero Plan Stage 1: 2020–2030, © State of New South Wales 2020. Published March 2020, via <https://www.environment.nsw.gov.au/topics/climate-change/net-zero-plan>

- Community Power Agency's development of community renewable energy resources and guidance (Community Owned Renewable Energy (CORE)), which has helped numerous local renewable energy projects across Australia,
- Funding and skilled resources from the Northern Rivers are supporting and leading the development of several projects under the Regional Clean Energy Fund (RCEF)

4.3.1.3 NSW household renewable programs

The Northern Rivers is an ideal place for investment in solar with nearly 45% uptake across the region. NSW Government programs such as the *Solar for Low-Income Households* and the *Empowering Homes solar battery loan program* will provide opportunities for local business to grow and work with the community to increase uptake as these programs and future programs are scaled up and rolled out to all regions.

4.3.1.4 Electric vehicles

Electric Vehicles (EVs) powered by renewables is the future of passenger and other transport, and the uptake of EVs will increase the uptake and expansion of solar and battery storage. The region is ready to participate in and take advantage of opportunities including developing regional charging infrastructure, accessing government funding for initiatives through the NSW Government's Electric Vehicle Strategy, bulk buys of EVs and tariff trials for charging, and encourages investment to help make this happen.

4.3.1.5 Hydrogen hubs

The Northern Rivers region has a high level of interest in this emerging sector, and many of the region's entrepreneurs, developers and researchers are actively engaged with the NSW Hydrogen Strategy, and with understanding the regional investment opportunities that can be developed through the Strategy, through local renewable energy projects and association with the planned Hunter green hydrogen hub.

4.3.1.6 Net Zero Industry and Innovation

Announced in October 2021 the NSW Government's Net Zero Industry and Innovation Program provides opportunities for businesses in the Northern Rivers to work with Government to meet their objective of partnering with business to reduce emissions through the acceleration of clean technology.

Focus areas of the program, such as Clean Technology Innovation and High Emitting Industries provides opportunities for researchers and industry in the Northern Rivers to collaborate with Government, across the priority areas of electrification, land and primary industries and power fuels including hydrogen.

4.3.2 Australian Renewable Energy Agency

In September 2021 the Australian Renewable Energy Agency (ARENA) released its future investment priorities, reflecting those initiatives it will focus on over the next few years. Amongst the priorities of the agency, several are relevant in the context of the development of and investment in renewables in the Northern Rivers, including:

- Optimise the transition to renewable electricity, on and off-grid through funding for innovation in enabling ultra-low-cost renewable generation, supporting flexible demand and improving the economics of energy storage, and

- Deliver the targeted programs in the 2020-21 Federal Budget, including the Regional Australia Microgrids Pilot Program, with \$50 million over six years to improve the resilience and reliability of power supply for regional and remote communities.

In November 2021 ARENA released the Australia's Bioenergy Roadmap report⁴. Highlighting the opportunity that bioenergy represents for regional development, the report reveals the potential for bioenergy to both reduce emission and divert waste from landfill while delivering regional jobs and economic benefits. The Federal Energy Minister announced \$33.5 million in funding to implement it. This is on top of more than \$118 million already provided by the federal government to help fund bioenergy projects. With significant potential bioenergy resources, the Northern Rivers is ready to work with industry and governments to unlock this potential and to help bioenergy to reach its full potential in the region, particularly through ARENA-supported initiatives to assess resources, identify potential industry and policy reforms to support a bioenergy market.

4.3.3 Regional Development Australia Northern Rivers

Regional Development Australia Northern Rivers (RDA Northern Rivers) has a focus on economic growth opportunities in the region that leverage the region's competitive advantages, including its innovative and collaborative approaches to business, education, training, and skills development capabilities, particularly in collaboration with Training Services NSW.

RDA Northern Rivers also has a long history of practice in and alignment with the sustainability sector and has worked closely with the Sustain Northern Rivers Energy Working Group and others over many years. The development of the renewable energy sector in the region, allied to RDA's collaborative work with NRJO and other regional groups, business, and government, provides an opportunity to evaluate what the emerging workforce requirements are for businesses in the region, and what the skills and training needs are that can be delivered to meet this demand.

Central to this assessment will be a clear focus on the renewable energy solutions that reflect the real opportunities for jobs growth and economic potential for the Northern Rivers.

4.3.4 NSW Office of Regional Economic Development

The NSW Office of Regional Economic Development works closely with the region's local councils and NRJO to advance key regional priorities, set out in the *Northern Rivers Regional Economic Development Strategy 2018 – 2022*, and the *Tweed Shire Regional Economic Development Strategy 2018 – 2022*.

Renewable energy generation as an 'enabling industry' and the potential to develop a regional renewable energy industry were identified within these strategies. With the adoption by the NSW Government of a net zero emissions target by 2050 (and 50% emissions reduction by 2030), more recent interest in utility-scale renewable energy and battery storage opportunities in the region, and with rooftop solar having increased in capacity by 250% since 2018, the next REDS provide an opportunity for the ORED, NRJO and its member councils to consider the role renewables can play as

⁴ Australia's Bioenergy Roadmap, Enea and Deloitte for ARENA, 2021. Published November 2021, via <https://arena.gov.au/knowledge-bank/australias-bioenergy-roadmap-report/>

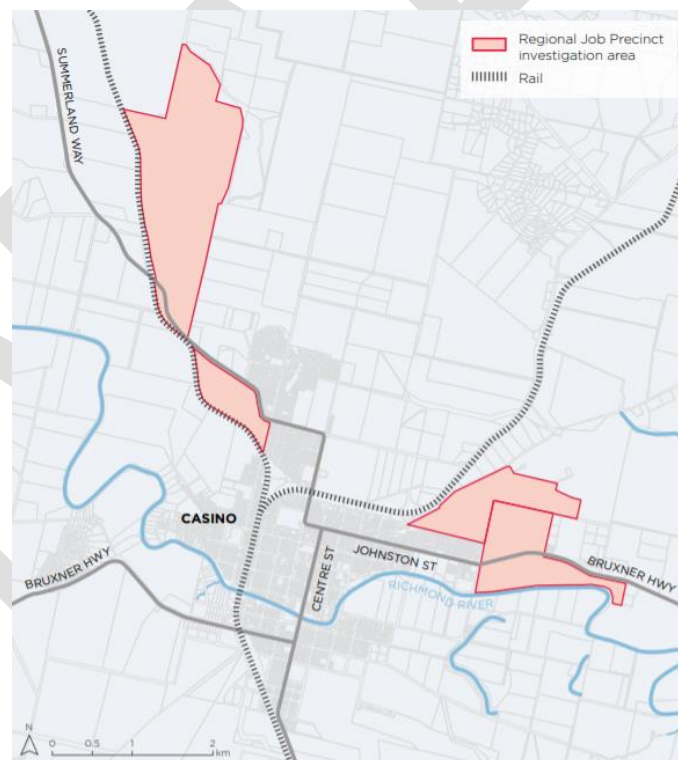
a driver of growth for the region over the next five years, including the scope to attract investment and create jobs in bioenergy, large-scale solar, small-scale solar and electric vehicles.

4.3.5 About the Richmond Valley Regional Job Precinct

The NSW Government’s Special Activation Precincts (SAP) and Regional Job Precincts (RJP) are providing planning support to help fast-track approvals in key regional locations that will drive growth, investment and development opportunities.

Casino in the Richmond Valley is one of four RJPs that is being developed, centered on the creation of *a hub focused on high-value agriculture, food processing, manufacturing, distribution and renewable energy*, building on established industries in the region and in Casino in particular. A regional waste-to-energy facility is also being considered for Richmond Valley.

The planned Casino Job Precinct is ideally situated at the intersection of the east-west Bruxner Highway and the north-south Summerland Way, and on the North Coast railway line, and will build on an area with existing large industry and approved development areas. The opportunities for the development of renewable energy solutions for the Job Precinct will be identified and evaluated as planning progresses to the completion of a master plan for the precinct.



RICHMOND VALLEY REGIONAL JOB PRECINCT INVESTIGATION AREA⁵

⁵ <https://www.nsw.gov.au/snowy-hydro-legacy-fund/special-activation-precincts/regional-job-precincts/richmond-valley-regional-job-precinct>

5 Renewable energy potential in the Northern Rivers

5.1 A growing population with a growing energy demand

With an increasing population the demand for stationary energy may continue the current observed trend, which averages 1.02% increase per annum since 2014, to reach 1,400 gigawatt-hours per annum by 2040. In addition, the transport sector will transition towards electric vehicles, further increasing electricity demand.

If all passenger, light commercial and heavy vehicles were powered with electricity by 2040, the total demand for energy could be more than 2,500 gigawatt-hours annually by this time. And if some of the region's heavy vehicles were powered with hydrogen then this energy demand could be even greater.

It is in alignment with the region's sustainability values that the renewable energy generated in the region be at least able to meet the local energy demand of the region. It is also aligned with the region's sustainability values that the whole of the community has access to and can benefit from the renewable energy transition.

Farming the Sun case study

Lismore City Council was the first regional council in Australia to commit to reach 100% renewables for its electricity needs in 2015. A key element of its strategy to achieve this goal is to maximise on-site solar PV installations. Through an innovative partnership between Council and community members, Lismore Community Solar developed two 99 kW solar farms at the Goonellabah Sports and Aquatic Centre and the East Lismore Sewerage Treatment Plant. The East Lismore system is an award-winning floating solar array, the largest of its kind in Australia when constructed. These council operated, community owned solar farms demonstrate leadership, increase solar capacity and literacy in the region, provide cost savings and emissions reduction to council, and provide community solar system owners with a financial return for their investment.



LISMORE CITY COUNCIL'S FLOATING SOLAR ARRAY THROUGH 'FARMING THE SUN'

5.2 Strong electricity grid moving towards 100% renewables-ready

The Australian Energy Market Operator (AEMO) has set itself a goal for the electricity grid to be capable of running on 100% instantaneous renewable energy by 2025. This level has already been reached in South Australia, and levels in excess of 60% were achieved in the National Electricity Market (NEM) in September 2021. AEMO notes that:

- 90% of energy generation investment since 2012 has been in wind and solar,
- The fastest growing part of the generation mix is rooftop solar on homes and business,
- There are more than 55 GW of new renewable energy proposals in the generation pipeline, close to the total capacity of the grid

AEMO is partnering with distribution companies through its NEM Distributed Energy Resources Program to help them to innovate to ensure that grid stability is maintained at times of high solar and wind penetration. AEMO recognizes that the role of large-scale storage through batteries and pumped hydro, of consumers and communities through the use and aggregation of stored solar capacity, and of managing how and when electric vehicles are charged will all be integral to reaching AEMO's goal of a 100% renewables-ready grid by 2025.

The electricity network in the Northern Rivers is strong, and the transmission system and the Essential Energy-owned distribution system provide opportunities for generation and storage technologies in the right locations to be connected. Essential Energy is working through its Evolve DER Project and its Network Visibility Trial Program to model and trial a range of distributed energy solutions to understand the impacts on the grid and opportunities to maximise the DER hosting capacity of the grid.

With its high uptake of rooftop solar, pioneering work on community and shared renewable energy resources, and its leading work with EV planning and EV bulk buy initiatives the Northern Rivers is an ideal region for distributed energy integration to be trialed and demonstrated.

5.3 What are the key renewable energy opportunities in the Northern Rivers?

The Northern Rivers region's natural renewable energy advantages are in solar PV and bioenergy, with some 700 gigawatt-hours of electricity generated by these technologies each year, more than half of the region's current electricity needs. Bioenergy generation is primarily from two biomass cogeneration systems at Broadwater and Condong, while solar PV systems are highly distributed across the region's rooftops. While solar resources are not as significant as in other regions of Australia, at 16-18 MJ/m² they are still very high by global standards and well able to support commercially feasible generation.

Large-scale solar and rooftop solar on homes and businesses, offer opportunities to scale up the region's renewable energy generation significantly, enhanced by growth in electric vehicles, opportunities to develop behind-the-meter microgrid solutions, and by opportunities to accelerate the uptake of battery energy storage at grid, community and small-scale.

Bioenergy generation and mid-scale solar farms provide opportunities to complement these renewable energy solutions, meet a proportion of the region's energy demand and increase resilience and opportunities for energy sharing, and supporting access to segments of the community who are

unable to access renewable energy. The emerging hydrogen market may also provide opportunities for the regional economy.

At this time these are the main renewable energy and related opportunities that should be pursued in the Northern Rivers. The region is open to the exploration of new renewable energy solutions, and as offshore wind energy develops and pumped hydro projects are built to support the creation of dispatchable electricity these will be followed and the potential in the Northern Rivers reviewed.

Technologies such as mini and micro hydro are unlikely to deliver a significant fraction of the region's energy needs, but there are nonetheless opportunities that can be developed in the right situations.

Onshore wind energy resources are lower than those available in other regions of NSW and so the focus of wind energy growth is in areas with greater resources, particularly on the Great Dividing Range. Geothermal energy resources in NSW are small and low compared with other regions of Australia. Neither of these technologies appear to offer significant potential for regional development in the Northern Rivers at this time.

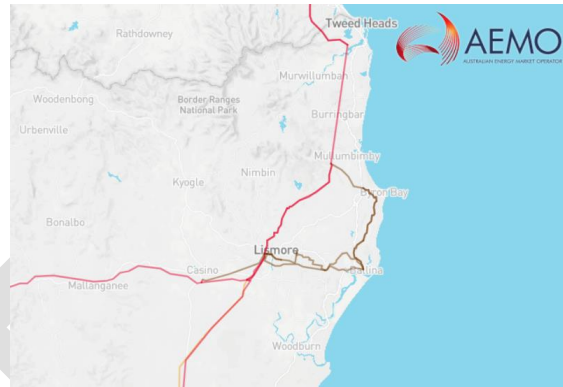
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5.3.1 Welcoming large-scale solar

- Though not within a designated REZ the Northern Rivers offers attractive prospects for large-scale solar and battery storage
- The region is well served with a 132 kV transmission line linking Tweed Heads to Lismore and Casino, and extending both west and south towards Tenterfield and Grafton
- A 330 kV transmission line extends from near Casino south towards Grafton, in parallel to the existing 132 kV line
- The region is also well served with extensive 66 kV transmission through Tweed Heads to Murwillumbah, and from Mullumbimby to Byron, Ballina and Lismore, and further through to Casino and Kyogle
- Several areas in the region in close proximity to transmission assets have land that will be well suited to the development of solar projects
- The State Significant Development planning process provides a streamlined pathway for the right projects to be developed
- In 2021 a number of large-scale solar projects and a grid-scale battery have been proposed in the Northern Rivers
- One project for a 100 MW solar farm with a 100 MWh BESS near Myrtle Creek in the Richmond Valley area has progressed to a Scoping Study report with the NSW Department of Planning
- The capacity of proposed projects is more than 500 MW, which could occupy from 1,000 to 1,500 hectares of land

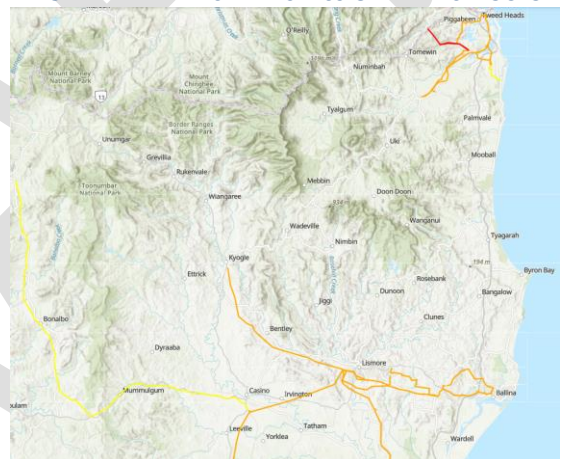


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NORTHERN RIVERS TRANSMISSION INFRASTRUCTURE



NORTHERN RIVERS DISTRIBUTION INFRASTRUCTURE⁸

⁶ Image from: <https://www.energy.nsw.gov.au/renewables/renewable-generation/solar-energy>

⁷ Image from: <https://www.aemo.com.au/aemo/apps/visualisations/map.html>

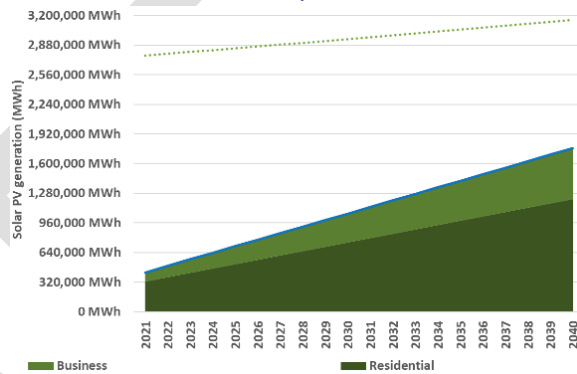
⁸ Image from <https://essentialenergy.maps.arcgis.com/apps/webappviewer/>

5.3.2 Scaling up small scale solar

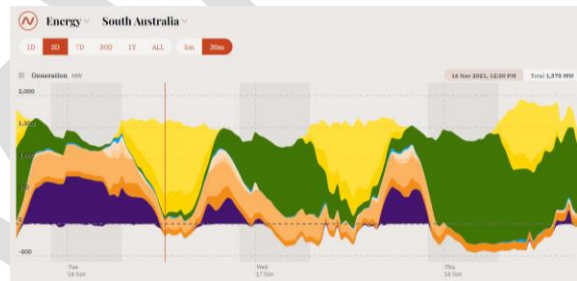
- Rooftop solar is the Northern Rivers’ biggest ‘power plant’, with more than 260 MW of solar PV installed
- Nearly 45% of buildings have solar, generating 20% of the region’s electricity
- The region has significant added scope for solar PV, with less than 20% of the potential generation developed to date
- With continued growth at current rates in the number and size of systems installed, the region can meet well over 50% of its future electricity needs from rooftop solar
- The Northern Rivers can aim to emulate South Australia where rooftop solar has periodically met close to 90% of the State’s electricity demand in recent months
- Realising this potential is linked to several factors, including developing bankable and scalable solar solutions for renters, the development of battery and EV markets, making solar and energy sharing feasible for apartments, supporting low-income households, and replacing & upgrading older solar systems as they age



TWEED REGIONAL AQUATIC CENTRE SOLAR



MAINTAINING CURRENT ROOFTOP SOLAR GROWTH



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OPENNEM ROOFTOP SOLAR IN SOUTH AUSTRALIA, 16-18 NOVEMBER 2021

Tweed Regional Aquatic Centre Solar

In 2019 Tweed Shire Council inaugurated a 165kW solar panel installation at the Tweed Regional Aquatic Centre (TRAC) in Murwillumbah. This system is expected to reduce the pool’s mains electricity costs by around \$42,500 a year and generate the equivalent to around 24% of TRAC’s energy requirements, saving 200 tonnes of greenhouse gas emissions a year.

⁹ Image from: <https://www.tweed.nsw.gov.au/environment/climate-sustainability/sustainable-operations>

¹⁰ Image from <https://opennem.org.au/energy/sa1/?range=3d&interval=30m>

Supported by funding from the NSW Government through the Stronger Country Communities Fund, this project participates to the council’s commitment to produce 25 per cent of their own electricity from renewable sources by 2022, and 50 per cent by 2025.

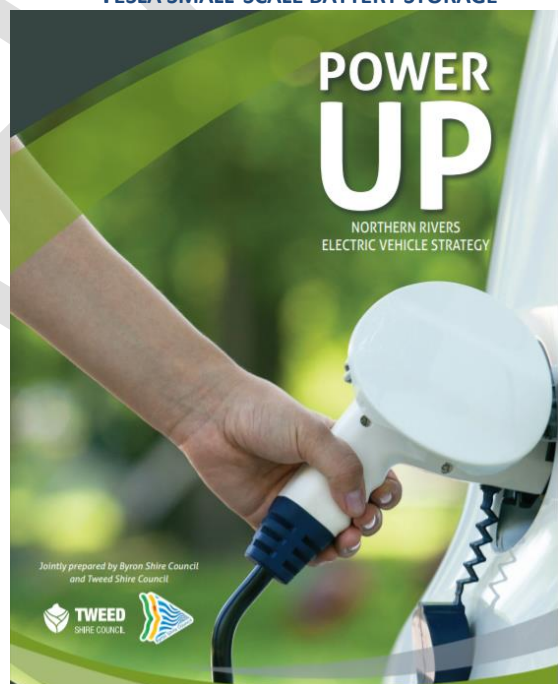
In April 2021, Tweed Shire Council further committed to a two-year program of renewable energy and energy-efficiency works across its facilities and voted to move to phase two of its Renewable Energy Action Plan — which includes 10 solar projects worth more than \$1 million with the aim to achieve net zero emissions from electricity usage by 2030.

5.3.3 Integrating batteries and electric vehicles to scale solar

- Storage and electric vehicles are key technologies that will accelerate integration of DER into the grid
- The region is ideally positioned to invest in storage with its high solar penetration and accelerating rate of solar uptake
- Local innovation and knowledge of the opportunities and barriers to community-scale batteries makes the region an ideal partner in the evolution of this opportunity
- The region is well advanced with EV planning and its location at the gateway to South-East Queensland and its good road transport network and regional centres make it the ideal place to grow and expand EV networks
- Developing leading initiatives like Enova’s EV Bulk Buy with the Good Car Co demonstrates that the region is embracing EVs
- The Northern Rivers is well placed to increase the uptake of solar, batteries and EVs, and to trial and demonstrate the efficient integration of these with the network through collaboration with investors, governments, regulators and Essential Energy



TESLA SMALL-SCALE BATTERY STORAGE



POWER UP, NORTHERN RIVERS EV STRATEGY

¹¹ Image from: <https://www.energysaver.nsw.gov.au/get-energy-smart/find-technology-guide-your-equipment/battery-storage-guide>

¹² Image from: <https://www.tweed.nsw.gov.au/files/assets/public/documents/environment/climate-amp-sustainability/power-up-northern-rivers-electric-vehicle-strategy.pdf>

Power Up and Enova Electric Vehicle Bulk-Buy

The Northern Rivers Electric Vehicle Strategy (Power Up) identifies the key needs for both a primary network of fast charge stations that would provide EV drivers with full regional accessibility, as well as secondary charge station needs in other commuter and tourism centers that would provide a comprehensive regional charging network. Already there are a number of EVs in the region, and some of the local councils have purchased EVs in their fleet.

Now Enova – the region’s not-for-profit renewable energy retailer – has partnered with Good Car Co. to offer the first *Enova Electric Vehicle Bulk-Buy*. This will make a range of electric vehicle models more affordable and provide access and choice to locals in the Northern Rivers. Interested locals who register are provided with a four-week educational program to help inform decision-making, and access to the bulk buy focused on the secondary EV market, a crucial part in the development of a mature electric vehicle market in Australia.

These initiatives underline the readiness and commitment in the Northern Rivers to embrace and accelerate the uptake of electric vehicles, and to develop the charging networks that will make EVs a clear choice in resident and business’ buying decisions.

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5.3.4 Realizing Northern Rivers' bioenergy potential

- The Northern Rivers is home to two of Australia's largest biomass energy generators at Condong and Broadwater
- Bioenergy resources from municipal, agricultural and other sources are high across the region, have been extensively mapped and social license aspects analysed with the community
- Development of bioenergy in the Northern Rivers will align well with theme 3 of ARENA's Australia's bioenergy roadmap which focuses on complementing low emissions alternatives in road transport and electricity markets
- Studies have indicated the potential for more than 1,100 gigawatt-hours of electricity generation across the broader north coast region, which is a significant fraction of the region's needs
- Bioelectricity generation can contribute to both system strength and inertia by being synchronous and dispatchable
- Biogas produced by anaerobic digestion from local wet feedstock such as municipal and agricultural waste is the most acceptable technology for the community¹³.
- The development of biogas / bioenergy generation at key industrial sites is a significant regional opportunity
- Locations for regional biohubs have been identified through extensive studies, and offer potential for future development in the region
- Security of feedstocks and the valuation of bioenergy outputs such as 'green gas', biofuel for transport, agricultural products, local electricity generation and sharing, potential as feedstock for hydrogen, as well as avoided waste costs are challenges to be overcome if this opportunity is to be developed and the benefits fully realised for the region



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BIOENERGY GENERATION PLANT (ARENA)

¹³ Biogas production by anaerobic digestion is the approach being pursued by Byron Shire Council. Biogas created from this process will be used to produce bioenergy

¹⁴ Image from: <https://arena.gov.au/projects/australian-biomass-for-bioenergy-assessment-project/>

5.3.5 Mid-scale solar

- Typically defined as systems up to 30 MW, but often developed as 5 MW systems or smaller due to simpler registration requirements
- Finding a good location and engaging early to secure social license from the community is an important first step in progressing mid-scale solar
- A number of mid-scale solar farms have been proposed for the Northern Rivers, and a handful are well advanced in their planning. Learnings from these projects can be used to help provide guidance for future projects
- Mid-scale solar farms can be an important way to provide access to segments of the community who are 'locked out' from renewables
- An approach that aggregates potential mid-scale solar farm proposals may provide economy of scale and improve commercial outcomes
- Mid-scale solar farm proponents can work with Essential Energy to get a fast understanding of the potential to connect and possible network upgrades



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CITY OF NEWCASTLE SUMMERHILL 5MW SOLAR FARM



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SUNSHINE COAST COUNCIL'S 15MW SOLAR FARM

Haystacks Solar Garden, providing access to solar power to the broader community

Being established on farmland at Grong Grong in the Riverina, the Haystacks Solar Garden project will demonstrate and enable access to solar power for the community. Haystacks brings together the Sydney-based Pingala cooperative, a farmer and a retailer, with technical support from Community Power Agency and Komo Energy and funding from the Regional Community Energy Fund. Under the project, the 360 members of the co-operative will agree to purchase shares in the solar farm, and in return the electricity retailer will credit them for the electricity generated by the farm on their electricity bill.

Solar gardens provide multiple economic and community benefits by making renewables accessible to everyone and delivering communities more control over their energy future, while keeping the returns in the local economy.

¹⁵ Image from: <https://newcastle.nsw.gov.au/council/news/latest-news/cefc-finance-to-build-newcastle-s-solar-farm>

¹⁶ Image from: <https://www.sunshinecoast.qld.gov.au/Environment/Sunshine-Coast-Solar-Farm>

5.3.6 Understanding opportunities in hydrogen

- Hydrogen is a flexible energy that can be used for vehicle fuel, dispatchable electricity, displacing gas, industrial processes and production of ammonia
- Interest in this emerging market in the Northern Rivers is high, particularly in identifying the potential for the region to add value in the hydrogen value chain
- Links to regional hydrogen hubs and NSW and Federal Government hydrogen strategies will inform the potential opportunities for the Northern Rivers
- Hydrogen production is being actively considered as part of proposed regional mid-scale solar farms



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¹⁷ Image from: <https://www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf>

5.4 A goal for 100% renewables or more for the Northern Rivers

The Northern Rivers Joint Organisation is committed to collaborating with its regional partners, developers, NSW Government and through its member councils to help the Northern Rivers:

- increase regional renewable energy generation,
- attract investment from developers, suppliers and governments to build on achievements to date and scale up to meet the demand of an electrified energy system,
- build regional skills to develop and service the growth in renewables in the region, and
- build local resilience, provide access to renewables to all segments of the community, and retain money within the local region’s economy

An ambition to generate as much renewable energy locally as is consumed for all stationary and electrified transport needs across the Northern Rivers by 2040 could see a mix of large-scale renewables, rooftop solar, and a mix of bioenergy, mid-scale solar and micro-hydro generation. There may be hydrogen generation associated with some solar or bioenergy generation.

Two scenarios show possible generation mixes that could achieve this outcome for the region. One scenario highlights the impact that a small number of large-scale solar farms could have, complementing existing bioenergy generation and more than doubling the installed rooftop solar capacity across the region.

SCENARIO 1 – 45% LARGE-SCALE SOLAR, 30% ROOFTOP SOLAR, 25% OTHER GENERATION

Generation technology	Contribution to generation (fully electric region in 2040)	Annual electricity generation 2040	Installed MW	Number of systems
Large scale solar	50.0%	1,265,389 MWh	722 MW	3 to 5
Rooftop solar	30.0%	759,233 MWh	578 MW	>50,000
Community / mid-scale solar	1.8%	45,554 MWh	26 MW	More than 5
Bioenergy	18.0%	455,540 MWh	69 MW	Existing bioenergy + small additions
Hydro resources	0.2%	5,062 MWh	1 MW	~5 to 10
TOTAL GENERATION & CAPACITY		2,530,778 MWh	1,397 MW	

Another scenario sees a continued acceleration in the region’s rooftop solar uptake, potentially achievable when barriers to entry for many segments of the community are overcome, and where the uptake of electric vehicles and batteries sees more solar installed. Mid-scale solar and bioenergy generation systems also increase in numbers to increase local resilience and retain more money in the local economy. Fewer large-scale solar projects are included in this scenario.

SCENARIO 2 – 25% LARGE-SCALE SOLAR, 45% ROOFTOP SOLAR, 30% MID-SCALE & OTHER GENERATION

Generation technology	Contribution to generation (fully electric region in 2040)	Annual electricity generation 2040	Installed MW	Number of systems
Large scale solar	25.0%	632,695 MWh	361 MW	2 to 3
Rooftop solar	45.0%	1,138,850 MWh	867 MW	>80,000
Community / mid-scale solar	10.0%	253,078 MWh	144 MW	25 to 40
Bioenergy	19.5%	493,502 MWh	75 MW	Existing bioenergy + additions
Hydro resources	0.5%	12,654 MWh	4 MW	~15 to 20
TOTAL GENERATION & CAPACITY		2,530,778 MWh	1,451 MW	

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6 Unlocking the region's economic and other benefits from renewables

The six NRJO member councils are committed to the development and expansion of a local renewable energy production, which will deliver significant benefits to the Northern Rivers region.

6.1 Keeping money in the regional economy

The Australian Energy Market Commission reports average residential electricity prices for NSW in 2020 of 28.98¢/kWh¹⁸. Without local solar electricity would cost the Northern Rivers community some \$370 million annually. With solar Northern Rivers residents and business are saving nearly \$45 million each year on their bills through lower grid usage and export of surplus solar to the grid.

With growth in demand through increased population and more housing, energy spend could exceed \$400 million each year, and with 100% electric vehicles the regional energy spend could rise to more than \$700 million annually, with most of this money leaving the region.

Increasing local renewable energy generation keeps more of this money in the local economy. At 30% of future demand for example, rooftop solar could retain around \$220 million in the local economy each year, and if solar were to meet 45% of future demand, then \$330 million could be kept in the local economy each year. Increased community-scale solar and bioenergy generation would increase this.

6.2 Strengthening regional employment

A strong and growing local renewable energy market will generate more employment opportunities.

The construction and maintenance of renewable energy systems employs a qualified regional workforce which will grow as the number of installed systems accelerates. This will be boosted with the development of large-scale and mid-scale solar farms and bioenergy generation, and with the development of the planned Regional Job Precinct in Casino. This directly responds to the objectives of key regional agencies such as Regional Development Australia Northern Rivers and the NSW Office of Regional Economic Development.

In addition, jobs will be created across the broader renewable energy value chain, for example in the training sector, the recycling or re-use of older solar and battery storage systems and in the emerging circular economy.

6.3 Improving resilience

Renewable energy generation, especially at small and medium scale, can be distributed, that is produced locally, near the customers, as opposed to centralized, which will eventually reduce the stress on the grid and the network costs for all consumers.

¹⁸ Sourced from: <https://www.aemc.gov.au/market-reviews-advice/residential-electricity-price-trends-2020>

In combination with local energy storage, distributed generation has the potential to create microgrids that will provide power to critical infrastructure and homes when it is needed, as well as support edge-of-grid communities during power outages. And unlike conventional diesel generators, which are the most common source of emergency backup power, Distributed Energy Resources (DERs) do not need fuel deliveries, further increasing the system's resilience, especially in case of extended outages.

Totally Renewable Yackandandah

The town of Yackandandah in Victoria has a goal, led by Totally Renewable Yackandandah (TRY), to be 100% renewables and to increase local resilience, savings and reduce emissions. Previously, the town imported power of 3,100 megawatt-hours annually and has had three bushfire threats over a 15-year period. A seven-year project has achieved numerous goals, including:

- Nearly 60% uptake of solar PV across the town,
- Three operating microgrids,
- Multiple bulk buys of solar and heat pump hot water systems,
- Implementation of a community virtual power plant (VPP), and a 274 kWh community battery,
- Provision of an energy coaching service and the launch of community energy retailer, Indigo Energy

TRY has also been awarded a federal grant to assess the feasibility of further community-scale storage and generation to reach 100%, help the regional town develop more reliable, secure, and cost-effective energy solutions, and develop greater resilience for the town during weather extremes and natural disasters.

One of the study's goals is to investigate 'islandability' in the event of a grid outage for a period, for essential services or for the town as a whole. Local resilience is also achieved through the avoidance of future grid upgrades, and through local community engagement and cohesion.

6.4 Increasing business' competitiveness

The transition to renewable energy will provide a cheaper source of electricity to consumers, with wind and solar already the most cost-effective electricity generation technologies ahead of fossil-fuel based generation.

Combined with increased grid reliability from Distributed Energy Resources (DERs), especially the avoidance of black-outs, businesses in the Northern Rivers will have access to cheaper and more reliable electricity.

In addition to pure cost benefits, access to 100% local renewable energy will enable local businesses to meet the increasing demand for products and services that are sustainable. A 2017 study by ARENA found that 80% of Australian consumers believe big businesses should be using more renewable energy, and 64% would pay more for products and services made with renewable energy.

6.5 Unlocking innovation

Positioning the region at the forefront of the renewable energy transition will provide the ability to seize future development opportunities and create the jobs of tomorrow that come with innovation breakthroughs.

Besides technology improvement directly linked to energy generation, innovation will also cover services that can be deployed in support of renewables.

For example, financing and micropayment services will follow the development of microgrids and the monetization of local, discreet storage capacity, such as from electric vehicle batteries.

Furthermore, the vast amount of data that will be generated by smart meters will require new types of artificial intelligence and IT analytical tools to enable the development of smart grids.

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