Power-Full Beechworth

Would a local energy generation and storage network be viable in Beechworth?

Could a single town battery, meter-connected batteries for households and businesses or a combination of these contribute to this historic Victorian town becoming self-generating and able to operate in 'island' mode, disconnected from the wider network?

This is what Totally Renewable Beechworth wants to know.

The community energy group believes that depending on the scale of the investment, this new infrastructure might effectively distribute energy across the community and diversify Beechworth's energy sources to reduce its reliance on the electricity transmission network.

This is why Totally Renewable Beechworth is seeking support for a feasibility study to investigate the idea, ascertain the social, economic, technological and environmental case for this move to renewables and confirm their community's preferred way forward.

The approach:

1.
TRB seeks funding to commission a feasibility study to consider a single town battery, meter-connected batteries for households and businesses, or a combination of the two.

2.
Funding is acquired and TRB prepares a consultants' brief, goes to market and then engages a consultant to undertake the work.

3.
The consultant undertakes feasibility investigations, including community and stakeholder consultation.

4.
The consultant develops a feasibility study report that identifies the community's preferred way forward and any social, economic, technological and environmental case for this. This will include an action plan to guide TRB's next steps to progress the preferred scenario.

5.
TRB receives the consultant's report and considers its next move.

OUTPUTS

Funding application.

Consultants' brief and engagement of appropriately qualified consultant.

Through the community consultation, residents gain improved energy literacy and awareness of renewables and community energy projects.

Feasibility study including an action plan for the preferred scenario.

TRB builds its capacity and energy literacy to ensure local agency to continue the project forward.

Power-Full Beechworth

Could the community work together to create and share electricity? Is it feasible to build a renewable energy generation and storage network in Beechworth? Let's find out.

Beechworth's energy story

The town of Beechworth in northeast Victoria is famous for its rich pioneering history having been built from the wealth of the 1852 goldrush. Now, almost one hundred and seventy years later, the community is looking to mine a different gold: sunlight.

Beechworth's pivot to renewables began in 2017 when a group of residents came together to take control of their energy future. Concerned about escalating costs, carbon emissions and climate change and sick of relying on coal-fired power stations for their electricity, they formed the group Totally Renewable Beechworth (TRB) and set themselves a goal of powering their 3747 post code with 100% renewable energy by the year 2030.

Their efforts have been inspired by the nearby township of Yackandandah whose mini grid-project has that community on track to reach 100% renewable energy sovereignty by 2022. That project has also brought about the creation of Indigo Power, a community-owned energy retailer already branching into Beechworth.

TRB is not alone in setting its ambitious and transformative energy approach. They're one of Australia's one hundred community energy groups[1] and are part of the community energy movement of Indi, a progressive Victorian electorate known as a leader in this space. The group is motivated by community support. So far, TRB has worked hand-in-hand with the regional renewables network to promote energy efficient initiatives. It has raised the local profile of renewable energy and helped to connect residents to community bulk buys for solar panels, batteries and hot water heat pumps.

Their work has not gone unnoticed and in 2019, TRB was recognised as a finalist in the Tidy Towns Sustainable Communities Awards. Since then, they've been working with Indigo Power to launch the Beechworth Community Energy Hub, a local showcase to demonstrate how people can generate, store and share their own renewable electricity.

A number of Beechworth residents have solar systems and the adoption of rooftop solar panels is increasing in pace. All of this is heartening for TRB, who are exploring how the town can harness its community appetite for renewable energy technologies to decentralise and localise energy supply in ways that increase reliability and affordability.

Totally Renewable Beechworth is a community initiative to power the town and the 3747 region with 100% renewable energy by 2030.

[1] Community Energy Map: cpagency.org.au/resources/map/

The scenarios

On behalf of its community, TRB is keen to explore if a local energy generation and storage network like a single town battery, meter-connected batteries at households and businesses - or a combination of the two - could be viable in Beechworth.

Meter-connected batteries

This scenario uses batteries that range in size from three kilowatts to five megawatts connected to electricity meters, mounted on or near buildings with rooftop PV. Excess electricity is stored in the onsite battery.

This system can increase a resident's energy resilience by providing back-up power in times of grid outage, such as during bushfires where households require access to power for pumps and watering systems.

Town-scale battery

This scenario enables any excess electricity that is generated on local rooftops to be banked in a large, centrally-controlled, shipping-container-based battery for use at another time.

Any excess or unused power that customers generate with their solar panels during the day is automatically transferred to the battery. At night customers can draw energy back from the battery to power their homes.

A combination of the two

A different configuration of meter technology plus town-scale storage.

The potential for regional towns like Beechworth to generate the power they need is growing with the cost of renewables coming down as fast as the price of coal-generated electricity rises.

Project rationale

This project is driven by the Beechworth community's hearty support for renewable power options, demonstrated by the local investment in photovoltaic (PV) systems, along with an eagerness to engage in discussions about ways to take action on renewable energy.

- **Community support: the time to move away from fossil fuels is now**
  Feedback from Beechworth residents is that they are receptive to the idea of energy sovereignty. Many households and businesses have installed PV and there is a widespread awareness of nearby Yackandandah's success, along with a regional push towards sustainability and renewable energy. This swelling awareness that the bulk of Beechworth's power comes from brown coal is bolstering an increasing appetite for the town to be instead powered by renewables.

- **Reducing emissions and inequality**
  Manufacturing efficiency and economies of scale have driven down the cost of solar PV panels and battery storage technology and local distributed energy resources are expected to lead to lower energy prices and greater energy security[2]. Renewables can be a cost-effective alternative to traditional fossil-fuel-generated energy and it is thought that pooling community energy with a town battery or grid network may reduce prices and lessen financial pressure on households experiencing energy poverty.

- **A technological fix**
  Beechworth households and businesses have adopted rooftop PV with relish. This move to solar PV has shown significant increases in the two-way flows and voltage swing on the aging local grid, which was originally designed to accommodate one-way flows only. The future uncertainty about the grid exports of household and business rooftop power has fuelled suggestions that in the future, grid operators could limit household exports or even their ability to connect to systems.[3]

- **Power reliability is critical in times of emergency**
  Meter connected battery technology or a town-scale battery might lessen brown outs and ensure that Beechworth has power during times of bushfire emergency. Beechworth's municipality, Indigo Shire Council, is specified as a Designated Bushfire Prone Area. In 2009, the Black Saturday Beechworth-Mudgegonga fires were sparked by an electrical failure, after a tree fell onto a power line on Buckland Gap Road[4]. This fire caused the deaths of two people and 12 casualties; 38 houses were damaged or destroyed, and sheds, farming equipment and stock were destroyed. Overall, the fire burnt 33,577 hectares, including about 23,000 hectares of state park. The fire also cut the power supply to Beechworth Township – including the DSE offices and Incident Control Centre – where a generator had to be brought in at the height of the Black Saturday event.

- **Be a catalyst for renewable energy transition for towns throughout regional Australia**
  It's hoped that lessons learned from this project might encourage and assist other communities to take action on their own energy future. Beechworth is one of Australia's premier tourism destinations, the juxtaposition of new-age renewable technologies on historic buildings is sure to spark conversation and potentially attract energy-focused tourists.

[2] Goulburn and Ovens Murray Regional Partnerships 'Hume Region Renewable Energy Roadmap' August 2019 s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.vic-engage.files/9515/9002/7183/Roadmap-Hume.pdf
[3] PV Magazine, "PV exports in doubt as rooftop solar surges" July 2020 www.pv-magazine-australia.com/2020/07/17/pv-exports-in-doubt-as-rooftop-solar-surges/
[4] The 2009 Victorian Bushfires Royal Commission final report, "Volume 1: The Fires and Fire-Related Deaths," page 210, July 2010 http://royalcommission.vic.gov.au/Finaldocuments/volume-1/HR/VBRC_Vol1_Chapter14_HR.pdf

Project approach

A feasibility study is sought to provide detailed advice about the viability of each scenario. This includes cost/benefit analysis, project risk assessments and articulation of the scenarios in terms of the commercial reality, community concerns and environmental impacts along with advice regarding any additional opportunities, issues or risks that may arise during the course of the feasibility study.

TRB is seeking funding support to engage suitably qualified organisations or individuals to carry out this work. To this end, a two-part scope of works is proposed:

1. Feasibility investigations including community and stakeholder consultation
2. Feasibility study report that identifies the community's preferred way forward and any social, economic, technological and environmental case for this. This will include an action plan to guide TRB's next steps to progress the preferred scenario.

The above work will include the identification and detail of issues including:

Key considerations		Possible considerations
Wider energy market context		
1	Including relevant renewable energy market forecast and trends, e.g. emerging technologies, energy use trends, integration of multiple technologies	• Incentives for renewable energy uptake • Economic viability of community-based energy • Policy settings
The Beechworth context		
2	Analysis of Beechworth's electricity supply and network performance, including current energy supply and use - local generation, consumption, and seasonal impacts	• How much power must be generated and is there enough solar irradiance (sun) for Beechworth to generate this power? • The final system needs to provide secure and stable power when needed – consider Beechworth's usage patterns. Are there times when the town's power fluctuates? What is the daytime peak, and the town's differences in power needs on weekdays versus weekends? • What is the current and projected take-up of solar PV in Beechworth and the 3747 post code? (This is expected to require an analysis of aerial photographs, to establish current PV take up and a town survey to capture details of households and businesses looking to install PV in the short to medium-term) • Estimation of public (government-owned) rooftops in Beechworth that could be harnessed for this project (Indigo Shire Council may already hold some of this data)
3	Technical considerations specific to Beechworth and the 3747 post code, e.g. tariffs, mini-grids, grid-connection	• Are the scenarios technically feasible for Beechworth and / or the 3747 post code? • Are the scenarios 'emergency proof' – how will they be affected by, or assist in, times of bushfire? • Can the needs of residents with medical conditions that require reliable power supply be met? • What are the specific considerations of the Beechworth Health Service? • What are the tangible benefits (if any) for low-income residents?

Key considerations		Possible considerations
4	Economic considerations specific to Beechworth and the 3747 post code	• To be of value, the meter-connected battery technology or a town-scale battery must be able to reduce power costs for customers when compared with the current approach. Are these technologies economically viable for Beechworth and/or the 3747 post code? • What are the potential economic savings for local customers versus what they currently or are projected to pay? • How many households have a low income or are experiencing cost of living stress (assisting these households to manage their future energy costs may be a driver for future funding for this project)? • Direct and indirect job creation
5	The environment	• Environmental impacts and emissions
6	Social considerations specific to Beechworth and the 3747 post code	• Issues of potential concern for the community • Recommendation as to whether the town is able to 'island' itself, and the scenarios when this may be desirable. Is this the right thing to do? Is the town in the correct location to island and is doing so disruptive to other communities, businesses or households further down the line? • Viability - do all residents have to sign up or is there a minimum number of residents required to make each option viable?
7	Basic concept models for meter-connected battery technologies or a town-scale battery, including cost/benefit analysis	• Rough costings per scenario • Timeframes • Any obvious constraints • 'What's in it for me' answers for community
8	Community engagement to determine the preferred scenario	Ultimately, this has to be a community-based decision. Is either scenario technically, economically or socially desirable to the Beechworth community?
Deliverable: Feasibility study including an action plan		
9	Indicate whether the community's preferred scenario is feasible. Provide advice of any additional opportunities, issues or risks the consultant becomes aware of that need to be considered, even if they are outside the project specification Recommend an investment approach for the community's preferred scenario, including finance options - e.g. grants, community investment, and a timeline	To be considered for Beechworth and/or the 3747 post code: • Risks • Technical feasibility • Economic viability and benefits • Environmental benefits • Regulatory approvals, safety considerations and heritage controls • Government approvals • Regional benefits or affects • Anticipated capital investment and likely return on investment • Ownership and governance: could this town battery be wholly owned by residents, or could the community be a co-investor with a commercial energy firm or with the local council? Legal and governance arrangements for this approach. • Social benefits and implications - how will benefits be shared with the community?
10	Development of a Recommended Action Plan	To support the next step: to implement the community's preferred scenario

It is not expected that the consultant undertakes any specialist studies such as geotechnical survey, flora / fauna assessments, etc. Rather as an outcome of this task, it is anticipated that they will include recommendations where such studies may be required.

Outputs

1. Feasibility study including an action plan for the preferred scenario
2. Through the community consultation, Beechworth residents gain an improved energy literacy and awareness of renewables and community energy projects
3. TRB builds its capacity and energy literacy to ensure local agency to continue the project forward

Budget

It is anticipated that up to $150,000 will be required to engage the suitably qualified organisations or individuals to undertake the task of examining the scenarios and identifying all of the relevant issues. This includes costs for community and stakeholder consultation. A minimum of three quotes will be sought.

Key risks

1	Neither meter-connected battery technology or a town-scale battery is deemed feasible compared with the current approach	The potential for these outcomes is acknowledged. Regardless, the secondary outcomes are beneficial to the Beechworth community: • By going ahead with the project, Beechworth residents will gain an improved energy literacy and awareness of renewables and community energy projects through the project's community consultation • TRB will be able to build its capacity and energy literacy, to ensure local agency to continue the project forward
2	The community rejects the premise of the project and opts to maintain the status quo	
3	The community shows a preference for an alternative approach	

As the project progresses, a risk matrix shall be progressively compiled and reviewed. This will include strategies and mitigations to address risks to the project.

Stakeholders

In addition to the community, local stakeholders will be identified and engaged through the project including TRB, Indigo Shire Council and local community retailer, Indigo Power. This may also include Ausnet Services (network provider) and Mondo Power. Other potential local delivery partners and a broad range of local, regional and national stakeholders may also be engaged.

Capacity to deliver

TRB is an incorporated association and has the Indigo Shire Council's backing to administer this project. TRB's team has a broad range of expertise in renewable energy, project and campaign delivery, financial management, strategic and operational planning, and community engagement experience. Together, they can provide appropriate guidance to the consultant and will have oversight of the grant.

Supporting documents

1. Community battery examples
2. TRB Strategic Plan 2020 - 2023

Imagine if Beechworth households and businesses could bank their excess solar energy ...well, similar approaches are happening across Australia.

	Project	*Type*	*Community*	*Proponent*	*Learn more*
1	The Solar and Storage Trial at Alkimos Beach Residential Development project involves developing, deploying, and testing the commercial feasibility of a new energy retail model. It will combine community scale battery storage, high penetration rooftop solar PV and energy management within a new residential development at Alkimos Beach, WA. A centralised battery will provide customers with the benefits and incentives of standalone storage without requiring on-site installation and maintenance. Half of the project's $7M cost was contributed by ARENA. This project will: • design, manufacture and install a fully contained lithium ion energy storage system of approximately 250kW peak / 1.1MWh; • install an Energy Smart Home Package in at least 100 homes; and • develop and test at least three new electricity retail products.	Battery and solar mix	Alkimos Beach, Perth, WA	Lendlease Communities (Alkimos) Pty Ltd, Synergy, Development WA	arena.gov.au/projects/solar-and-storage-trial-at-alkimos-beach-residential-development/
2	The Shire of Augusta-Margaret River is undertaking a five-year trial of community battery storage in Margaret River using a 464 kWh Tesla battery. Western Power will operate the battery.	Community-scale battery	Margaret River, WA	Western Power	www.energymagazine.com.au/margaret-river-trials-unique-community-battery/
3	Marble Bar has historically had among the highest energy costs in regional WA. Following Horizon Power's introduction of a hybrid microgrid, 60% of the town's power requirements are now supplied by a 300kW solar plant. The system consists of the solar array, four 320kW diesel generators, and a 500kW flywheel stabilisation system and has significantly reduced the town's operating costs. These technologies have considerably improved power supply reliability: power outages have reduced from an average of approximately 38 minutes per year to fewer than eight minutes per year.	Hybrid microgrid with solar	Marble Bar, Nullagine, WA	Horizon Power	horizonpower.com.au/our-community/news-events/news/powering-marble-bar-and-nullagine-with-energy-from-the-sun/

4	Western Power partnered with Synergy to install community-scale batteries utilising Tesla technology: • Meadow Springs, Mandurah: A first trial launched in October 2018 with a 105kW (420kWh) battery • Falcon, Mandurah: An extension of the Meadow Springs trial with a 116kW (464kWh) battery • Ellenbrook: A PowerBank 2 trial launched in February 2020 with a 116kW (464kWh) battery The PowerBank community battery is an Australian-first trial to integrate bulk solar battery storage into the existing grid that also provides customers with a retail storage option. Western Power owns and maintains the battery, meaning customers don't have to outlay the costs of purchasing a behind-the-meter battery. The first PowerBank trial was in Meadow Springs, near Mandurah, WA. The trial involved 44 residents who were able to virtually store their excess energy in the PowerBank community battery and draw the energy back out for use when needed. The residents saved an average of $228 each and had a collective saving of $11,000 across the trial. Across the three battery projects, up to 192 households will have access to between 6-8kWh of virtual storage in the PowerBank. At the cost of $1 to $2 per day, participants can store their excess solar energy in the battery and draw it back out when needed. In the first year of the Meadow Springs trial, 95% of customers saved money on their power bills.	Community-scale battery	Meadow Springs, WA Falcon, WA Ellenbrook, WA	Western Power in partnership with state-owned retailer Synergy	westernpower.com.au
5	Eigg, in the United Kingdom, is not connected to the mainland electricity supply. After decades of diesel generators, Eigg Electric provided 24-hour power for the first time in February 2008. A standalone mini-grid powered by hydro, wind and solar PV, providing electricity to the residents of the Isle of Eigg. Three hydroelectric generators produce electricity from running water. The biggest hydro above at Laig on the west side of the island is 100kW, with	Minigrid with hydro, solar and wind	Isle of Eigg, United Kingdom	Eigg Electric	isleofeigg.org/eigg-electric/

	two smaller 5-6kW hydros on the east side, four small 6kW wind turbines below a 50kW Photovoltaic array producing electricity from the sun. Although the capacity of the scheme is around 184kW, not all renewable resources produce their maximum output all the time or at the same time. Renewable sources have provided around 95% of electricity since the scheme was first switched on in 2008. The remaining 5% is generated by two 64kW diesel generators to provide back up when renewable resources are low or during maintenance. Owned by Eigg Electric, a subsidiary of the Eigg Development Trust, of which local people are members.				
6	Horizon Power is installing off-grid renewable systems for remote farms in Esperance, delivering safer, more cost efficient and reliable power. 13 Standalone Power Systems are being constructed for 14 fringe-of-grid properties (one system will service two properties) that are currently serviced by 54 kilometres of ageing powerlines. These are standalone power systems that consist of solar and battery technology and include a back-up diesel generator in case more power is needed. The systems will be remotely monitored and fully maintained by Horizon Power. Customers will not have to pay extra for the systems. They will pay the same tariff that currently applies for electricity from the overhead network. By late 2020, the systems will be fully operational and the aging powerline infrastructure decommissioned.	Standalone power systems: solar, battery, back-up diesel generation	East of Esperance, WA	Horizon power	horizonpower.com.au/our-community/news-events/news/esperance-micro-power-systems-works-set-to-commence/
7	Horizon Power chose Carnarvon for a substantial microgrid trial as it already had a high penetration of household solar panels, providing 1.3MW of generating capacity relative to a daily power load of about 5MW. The high penetration of rooftop PV panels had implications for network management, prompting Horizon to institute a moratorium on new rooftop solar panels and initiate distributed energy resources and microgrid management trials.	Solar microgrid	Carnarvon, WA	Horizon Power	horizonpower.com.au/carnarvonder/

	Horizon Power's vertical integration and control over the Carnarvon system's generation, distribution and retail functions enabled a high degree of visibility and control over the trials and removed any constraints that may have arisen through traditional disaggregated contractual arrangements for power station operations. Horizon Power's direct relationship with customers also enabled direct community and consumer engagement for trial participation and rollout.				
8	The Onslow project by WA's regional utility Horizon Power is Australia's largest microgrid. It involves a 1MWh /500 kilowatt-hour battery system installed alongside a 1MWh solar farm at a substation, working alongside an existing gas and diesel-fired generator. The equipment, partly funded by US energy major Chevron, supports a self-supporting local grid that supplies a 900-person remote coastal township, gas plant workers and a salt mine. While relatively small, the battery is significant as part of the total 8MW system and can contribute around 12.5% of generation, depending on demand from the town.	Microgrid	Onslow, WA	Horizon Power with Chevron	www.afr.com/companies/energy/remote-towns-provide-blueprint-for-battery-use-lg-chem-20190930-p52w8a
9	The small town of Perenjori in WA averaged about 11 outages each year, totalling 30 hours. To solve this, a microgrid backed up by a 1MWh large battery was installed on the outskirts of town. This has been designed to instantaneously provide a minimum of two hours back-up power if the line goes down. An automated SMS notification system provides warning to the township of impending shortages.	Microgrid and battery	Perenjori, WA	Western Power in partnership with Balance Utility Solutions	westernpower.com.au/community/news-opinion/powering-up-the-end-of-the-line/
10	Kalbarri, a remote town on the WA coast, had always had trouble maintaining a reliable power supply. The town's electricity comes from a 140km feeder line from Geraldton. In late 2019, a 5MW battery building that is 25 meters long, five meters wide and weighs 60t was installed. This battery is central to a microgrid to provide energy to the town. The battery can supply a minimum of 2MWh during a network outage, and 5MW at peak capacity. Additional supply comes from residential rooftop solar installations and a local wind farm.	Microgrid, town-scale battery	Kalbarri, WA	Western Power	westernpower.com.au/our-energy-evolution/projects-and-trials/kalbarri-microgrid/

11	In the Victorian town of Yackandandah, the community is building three microgrid networks. Totally Renewable Yackandandah (TRY) is a 100% volunteer run community group formed in 2014, with the audacious goal of powering this small Victorian town with 100% renewable energy and achieving energy sovereignty by 2022. The long-term goal is that the energy generated by solar panels and stored in home batteries can be shared between neighbours, even those without their own panels. TRY has gone on to win more than $500k in Victorian government grants and several awards for its achievements, which include installing three microgrids (networks of houses that can share, buy and sell power directly into the main grid), increasing uptake of solar systems from 20% to 55%. In late 2018, TRY helped form Indigo Power, a community-owned energy company that pumps half its profits back into building new community assets. Assets such as a 'virtual powerplant' – ten community buildings fitted with solar systems, three of which have batteries, including the Country Fire Authority so it can maintain power in times of emergency. In 2020 they hope to unveil one of Australia's first community-owned 136-kWh lithium batteries.	Microgrids and solar	Yackandandah VIC	Totally Renewable Yackandandah with Mondo Power and Ausnet	totallyrenewableyack.org.au/
12	Enova is a community enterprise owned by more than 1,600 local shareholders. It is Australia's first community-owned energy retailer. Launched in 2016 in Byron Bay in NSW, the group hosted 30 community events to raise $4m from 1,100 local residents. This energy group uses microgrids and solar gardens (centrally-located grids-connected solar PV array where solar gardeners receive a credit on their electricity bill for the solar generation of the panels). Half of Enova's profits (after tax and reinvestment) go back into community renewable energy projects, education and energy efficiency services. In partnership with Enosi Australia and the University of Newcastle, and with the support of Essential Energy, they are working on a shared community battery project. The project will involve a shared 2MWh battery for solar storage	Mix	Byron Bay, NSW	Enova Community Energy in partnership with Essential Energy	enovaenergy.com.au/

	and peer-to-peer trading. The battery will be about as big as a shipping container, and it will look a bit like a shipping container too. Close to half of all the energy sourced by Enova is generated by local solar users driven by the retailer's relatively high feed-in tariff, which rewards users for pushing power back into the grid. About 40% of all energy is generated from behind the meter, that is through solar rooftop installations.				
13	A new, more efficient power station is being constructed in Esperance. This will reduce the carbon footprint of power supply to Esperance by almost half compared to the existing power supply arrangements. This includes a battery energy storage system to improve the efficiency of the power station by responding to variabilities in power transmission. This will also help reduce the likelihood of power fluctuations. As part of this project, a new renewables hub will be constructed, bringing together solar and wind power to generate up to 46% of Esperance's electricity. Wind turbines will continue to be an important part of Esperance's energy mix with the construction of two new state-of-the-art 4.3MW wind turbines. A new 4MW solar farm comprising of more than 10,000 solar panels is being constructed. During the day the solar farm is capturing the energy from the sun, and after dark is when the wind farm is most active. Combined, these two energy sources will enable electricity to be generated by renewables on a 24/7 basis.	Mix of solar and wind	Esperance, WA	Horizon Power	horizonpower.com.au/our-community/projects/esperance-power-project/
14	In May 2020, a hybrid renewable-energy generation and storage system was approved for Lockhart, in the Riverina district of NSW. Comprising a 10MW solar farm, 25MWh battery and a biodigester — the methane from which will run a 400kW generator providing 24-hour power — the system will reliably power the town of 1,000 residents, reducing energy costs and attracting new industry. Lockhart Shire Council has been keen on the project from the outset, and successfully lobbied local Federal MP for $1M in funding under the Community Development Grants Programme, which was allocated in April 2019 to	Mix of biodigester, solar and battery	Lockhart, NSW	Better Energy Technology and Essential Energy	www.pv-magazine-australia.com/2020/05/18/historic-nsw-town-leaps-into-a-clean-energy-future/

	progress design of the system. At the time, the town's Mayor projected the cost of the development to be around $30M. The next step is to secure financial close and grid-connection agreement with Essential Energy, after which construction expected to begin in the second half of 2020. Better Energy Technology is in discussion with an energy-intensive business to locate its operations in Lockhart and become the beneficiary of behind-the-meter supply of energy from the biodigester working in tandem with a methane-powered generator to reliably power its continuous operations. Excess generation from the solar farm will be stored in the 25MWh battery.				
15	In 2018, a partnership between RMIT researchers, Moreland Energy Foundation, renewable energy services business, Ovida, and solar retailer Allume Energy won a $980,000 grant from the Victorian government towards a trial of microgrids for multi-tenanted buildings. The $2M Ovida Community Energy Hub project is a combination of shared solar PV, battery storage and microgrid technology installed at three separate buildings in Melbourne's Northern suburbs for ten years. At the time, the Victorian government expected the hub to benefit about 650 customers, generate 5000kWh of solar energy and support 11,000kWh of energy storage.	Mix of shared solar PV, battery storage and microgrid technology	Preston, Melbourne, VIC	RMIT, Moreland Energy Foundation, Allume Energy, Jemena	www.thefifthestate.com.au/energy-lead/local-government-energy-lead/victoria-announces-first-microgrid-consortium/
16	Licola is a very small town in the Shire of Wellington, 254km east of Melbourne. In the 2016 Census, there were 11 people in Licola. This town is the only town in Victoria not on mains grid power. It generates its own electricity, pumps and treats its own water and handles its own waste management. Electricity was becoming increasingly expensive for the tiny town as Licola relied entirely on diesel-based generation. Between fuel and generator maintenance costs, $135,000 a year was being spent on power. A decision was made to slash electricity costs and emissions using solar energy. 600 solar panels have been installed across Licola and two large shipping containers hold batteries (total capacity unknown) and associated systems.	Mix of solar and battery	Licola, VIC		www.solarquotes.com.au/blog/licola-off-grid-solar-mb1315/

17	A privately-owned and operated SPS on Thevenard Island, just offshore from Onslow, is remotely monitored and controlled from Perth. The system consists of 320kW of solar panels, four 110kVA diesel generators and a 614kWh lithium-ion battery.	Mix of solar and battery	Mackerel Islands, WA	Privately owned	www.carnegiece.com/project/mackerel-islands-stand-alone-power-station/
18	Sandfire Resources is a Western Australian company which has added a large 10.6MW solar power system to its DeGrussa copper-gold mine near Meekatharra (900km north-east of Perth). The mine had previously relied on a 19MW diesel-fired power station. The innovative $40M solar project was successfully commissioned in June 2016 and comprises 34,080 solar PV panels that track the sun to increase efficiency. The PV panels are connected to a 6MW lithium-ion battery storage facility and supply around 20% of the mine's annual power requirements. This will cut fuel use by 5 million litres a year and cut 15% of its carbon dioxide emissions.	Solar and battery	Meekatharra, WA	Sandfire's DeGrussa Mine PV project	www.sandfire.com.au/operations/degrussa/solar-power-project.html
19	Western Power trialled six Standalone Power Systems (SPS) in the Ravensthorpe region in 2009 to address regional reliability issues during periods of peak demand, with frequent outages being experienced. The batteries installed in the trial allowed enough storage to provide two days' supply of electricity, after which a diesel generator started. After the first 12 months, the trial was rated a success by customers with: • 92% of their electricity generated by solar panels; • an average of 65 hours of power outages avoided; and • high customer satisfaction with the new system. The Ravensthorpe SPS withstood a major storm in January 2017 and the SPS customers experienced better reliability than those connected to the 'traditional' network. The town of Ravensthorpe now has the ability to be switched off from the feeder line and operate as an islanded microgrid, supplied by local diesel generation to avoid outages during peak demand periods. Additionally, with further enhancements, the microgrid can provide improved reliability service to the town through automatic islanding and resynchronising to the grid.	Standalone Power Systems	Ravensthorpe, Lake King, West Lake, Ongerup, WA	Western Power	westernpower.com.au/energy-solutions/projects-and-trials/stand-alone-power-system- trial-stage-1/ westernpower.com.au/community/news-opinion/sps-the-regional-game-changer/

20	In April 2018, Alinta installed WA's largest lithium-ion battery at its Newman power station in the Pilbara. The asset is designed to improve the performance of Alinta's islanded high voltage network in the area and is also the largest battery to be developed for an industrial application. The project comprises 100 individual batteries each capable of powering a typical home for 90 days. The 30MW/11.4MWh Kokam battery supports the 178MW open-cycle gas turbines by emulating a 30MW gas turbine and providing spinning reserve. It also delivers other services such as frequency control, voltage regulation and reduces peak demand, demonstrating battery technology's capacity to provide grid support services, in addition to performing an energy storage function. The $45M project has an expected payback period of 4.5 years.	Town scale battery	Newman, WA	Alinta Energy and South Korean company Kokam	www.alintaenergy.com.au/about-us/news/alinta-energy-switches-on-big-pilbara-battery reneweconomy.com.au/alinta-sees-sub-5-year-payback-for-unsubsidised-big-battery-at-newman-78605/
21	The Dunsborough Community Energy Project is Australia's first privately-funded Virtual Power Plant (VPP) proposal. It aims to be a community built, owned and managed facility with the goal of reducing the town's household energy costs and moving toward a 90% renewable energy target. The VPP consists of the solar panels on 1,000 households and Redback inverter/battery systems. Houses are connected by advanced aggregation and control software developed in Australia. The VPP will provide 6.5MW of solar power at peak output and 9.6GWh of energy a year. The project cost of $12.5M was provided by investment company SUSI Partners with VPP participants paying $36.50 per week over ten years for their home systems. At the end of this period the assets are fully owned by DCEP, who will then substantially reduce the lease payments. In 2018, one hundred households signed up to the project.	Mix of solar and battery storage systems	Dunsborough, WA	Plico Energy (Dunsborough Community Energy Project) with SUSI Partners	www.dunsboroughcommunityenergyproject.com.au/
22	Residents in Geraldton have formed a locally-based energy cooperative: Tersum Energy. Tersum had identified an opportunity to defer significant transmission system upgrades through providing a local generation alternative. For five years they had been planning to install a 35MW gas-fired power station on a 200 hectare site at Narngulu, an outer suburb of Geraldton. Tersum now proposes to install a large battery and a predominately solar mixed-energy park with approximately 10MW of gas.	Virtual power plant (solar and battery mix)	Geraldton, WA	Tersum Energy	www.tersumenergy.com

	Tersum has been in discussions with Western Power regarding access to connect its project to the grid and has been working with the local community to develop Geraldton Community Energy, a community-owned retailer. This project will cost approximately $60M and provide 100 jobs.				
23	In May 2018, the WA Government announced that it would commit $500k to develop a proposal for a virtual power plant trial (VPP) in Kalgoorlie-Boulder. The project comprises a distributed solar and battery system centrally controlled by a software platform. The rooftop PV and battery assets will be installed at a household-scale but will present to the power system operator and network operator as a dispatchable unit. The WA Department of Primary Industries and Regional Development states that the software enables an operator to control the collective energy from the batteries as if it were from a single generator. Central control distinguishes this project from normal household PV and battery assets which operate autonomously behind the meter, independent of any form of central orchestration by a network or system operator. Installing the panels on rooftops is a potential alternative to the construction of a large-scale solar farm on a large plot of land.	Virtual power plant (solar and battery mix)	Kalgoorlie, WA		thewest.com.au/news/kalgoorlie-miner/virtual-power-plant-trial-for-kalgoorlie-boulder-ng-b88852368z
24	Hornsdale Power Reserve is a grid-connected energy storage system co-located with the Hornsdale Wind Farm in the mid north region of SA. At 100MW/129MWh, the Hornsdale Power Reserve is promoted as the largest lithium-ion battery in the world. Construction cost was $89M. In its first two years of operation, the project saved South Australia consumers over $150M. The 50MW/ 64.5MWh expansion, currently under construction, will further showcase the complete benefits that grid-scale batteries can provide to the National Electricity Market and Australian consumers.	Battery – Statewide example	Hornsdale, SA	Neoen, together with the South Australian Government, the Australian Renewable Energy Agency and the Clean Energy Finance Corporation. Supported by Tesla	hornsdalepowerreserve.com.au/

Totally Renewable BEECHWORTH 3747

Strategic Plan 2020 - 2023

A community energy initiative.

Our **vision** is for Beechworth and the 3747 region to be powered by 100% renewable energy by 2030

Our **role** is to promote and support the uptake of renewable energy and energy efficiency to benefit the natural environment and the social and economic wellbeing of the Beechworth community

Our drivers

- **Decarbonise** energy supply to reduce greenhouse gas emissions and mitigate climate change
- **Decentralise** and localise energy supply to maximise renewable energy generation, and increase reliability and affordability of supply
- **Democratise** energy supply through community inclusion and ownership
- **Demonstrate** that clean energy technologies work and a low carbon future is possible

How we'll do this

- **Assess** opportunity, benefits and risks
- **Inform** our community of technical, economic and social solutions
- **Enable** the community to take evidence-based action and participate in collaborative projects
- **Advocate** for energy measures and policies that benefit the community
- **Learn and leverage** from the knowledge and experience of others

Action areas

- Report progress towards our 100% renewable energy target
- Increase community owned renewable energy generation, storage and use
- Facilitate the transition to electric vehicles
- Support community owned energy retailers
- Advocate for energy policy and distribution system changes to support renewable energy generation and use
- Support the Indigo Shire Council to achieve its zero-carbon emission target
- Keep our community informed and seek feedback and support from the community

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Strategic Plan 2020 - 2023

Targets

Action areas	2023 targets
Report progress towards our 100% renewable energy target	• Publish a report on the current status of renewable energy in Beechworth and what needs to happen to achieve our 2030 100% renewable energy target
Increase community owned renewable energy generation, storage and use	• Facilitate opportunities for households and businesses to participate in at least one bulk buy offer per year • Establish a financing mechanism for the installation of solar panels/renewable energy • Develop a feasibility study and implementation plan for community owned energy storage (battery), potentially with a dedicated photovoltaic array, or to store aggregated excess household solar energy and raise a minimum of $300,000 for installation • Facilitate establishment of a mini-grid that aggregates (virtual) power supply
Facilitate the transition to electric vehicles	• Advocate for the installation of at least three public electric vehicle charging stations in Beechworth • Ensure that Beechworth residents and businesses have access to information to enable consideration of an electric vehicle as the next new car purchase
Support community owned energy retailers	• Promote the Indigo Power electricity retail offer with the aim of 1,000 households and business joining the Beechworth Hub • Collaborate with Indigo Power on the investment in at least one renewable energy installation in Beechworth
Advocate for energy policy and distribution system changes to support renewable energy generation and use	• Actively participate in projects to support the development of policy and/or distribution system changes that support growth in distributed and renewable energy
Support the Indigo Shire Council to achieve its zero-carbon emission target	• Provide input to the development and delivery of the Indigo Shire carbon neutral plan and ensure consideration of renewable energy powered street lighting, use of assets for renewable energy generation and minimal use of carbon off-sets
Keep our community informed and seek feedback and support from the community	• Distribute newsletters to our mailing list • Provide an update on progress in delivery of the strategy at annual general meetings • Expand membership to 300 and mailing list to 1,000