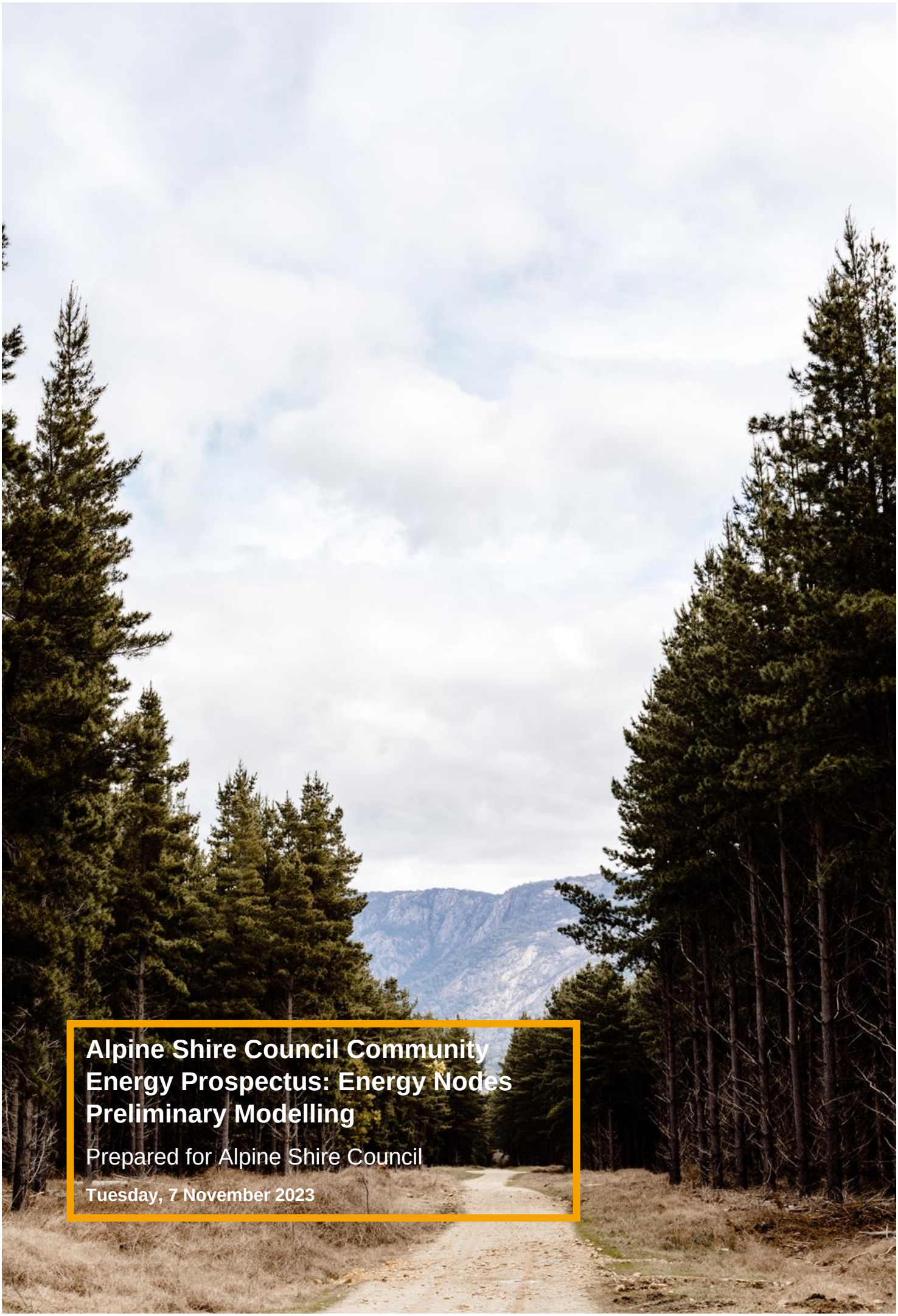

Alpine Shire Council Community Energy Prospectus: Energy Nodes Preliminary Modelling

Prepared for Alpine Shire Council

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1. Introduction

This report provides an overview of modelling of the five smaller sites included as a part of the development of a community energy and EV charging prospectus for Alpine Shire Council. Energy node sites include:

1. Mudgegonga Community Hall
2. Dederang Memorial Hall
3. Running Creek St Albans Hall
4. Harrietville Community Hall
5. Dinner Plain Community Centre

At these sites, there is less capacity for rooftop solar installation and smaller capacity electrical infrastructure, meaning they are well suited to solar and batteries comparable to or slightly larger than residential batteries. We term these systems 'energy nodes'.

The generation and storage capacity of energy nodes is more closely aligned to the on-site load than 'community power plants', which are oversized relative to site load. This being the case, the energy node facilities are designed to operate to supply on site load on a day-to-day basis and during an emergency power outage. Further revenue could be earned if the batteries participated in a virtual power plant (VPP), whether providing grid support ('FCAS') or exporting energy into the National Electricity Market. A scenario was modelled where the battery was optimised to participate in the wholesale energy market, providing an indicative 'ceiling' of the potential revenue from having the sites participate in a virtual power plant.

2. Method

To model the energy and cash flow effects of installing solar and batteries at energy nodes, we used the modelling program 'Gridcog'. We used interval data for the sites and overlaid solar and battery systems of different sizes. While we have provided design briefs covering the installation of EV chargers, revenues associated with EV chargers were not modelled for lack of suitable data and the potentially extreme seasonality/intermittency if revenues are primarily driven by tourist demand.

2.1 Scenarios

Scenario Number	*Scenario Name*	*Description*	*Battery Mode*
1	Baseline	Existing energy usage (and generation where applicable) and standard retail tariff	-
2	Proposed systems	As per baseline scenario, with proposed solar & battery systems overlaid and no change to retail tariff	Self-consumption (charge from solar generation surplus to load, discharge to load to prevent grid imports)
3	Proposed systems, wholesale energy market participation	As per 'proposed systems' but site is on a wholesale-exposed retail contract and battery operates to maximise revenue. This is modelled to provide a 'ceiling' on the potential earnings from participating in a virtual power plant.	Co-optimised (battery operates with 'perfect foresight' to maximise revenue by either supplying the site load or exporting to the market)

2.2 Assumed Rates

The models incorporate several value streams:

1. Retail tariffs and feed-in tariffs
2. Wholesale energy prices
3. Network charges
4. Small-scale and large-scale renewable energy certificate charges
5. Victorian energy efficiency certificate charges
6. Operational expenses

Retail tariffs were modelled with indicative 'unbundled' rates, meaning that different assumptions were used for each of the individual cost components that comprise a retail tariff (energy costs, network costs, market fees, environmental fees, retailer costs). Network charges were modelled using FY23/24 rates and were assumed not to change. The energy cost component of the retail tariffs are tabulated below.

Item	*Rate Type*	*Electricity Rate*	*Future rates*
Energy imports Peak (8am-8pm AEST Monday to Friday)	c/kWh	12.5 c/kWh	Unchanged
Energy imports off-peak (all other times)	c/kWh	9.5 c/kWh	Unchanged
Energy exports	c/kWh	5 c/kWh	10% linear decline each financial year starting 2024-07-01

2.3 Meter Data

2.3.1 Mudgegonga Community Hall

From the meter data obtained for the Mudgegonga Community Hall, it is apparent that the existing rooftop solar was commissioned in late 2021, but the meter was not reconfigured to record the export channel until September 2022. This presented us with the choice of either capturing more recent evening/overnight usage but failing to capture solar feed-in or using accurate older usage and modelling the solar. We chose to use the data from 1 December 2020 to 1 December 2021, prior to the solar system being active, and modelled the existing solar system. While the meter data suggested the usage of the hall throughout CY2020 was very low (likely due to COVID restrictions), the data from December onwards showed that the hall was being used.

2.3.2 Running Creek St Albans Community Hall

Accurate meter data was obtained for Running Creek St Albans Community Hall for 1 Jan 2019 to 26 May 2023. The most recent twelve months of data was used for modelling.

2.3.3 Dederang Memorial Hall

Due to a miscommunication the interval data was obtained for the Dederang Recreation Reserve, rather than the Memorial Hall. We assumed that the Memorial Hall's usage would be similar to that of the Running Creek St Albans Hall and used its meter data as a surrogate. As a result, the baseline energy imports and expense are identical to those of the Running Creek St Albans Community Hall.

2.3.4 Dinner Plain Community Centre

We were unable to obtain meter data for the Dinner Plain Community Centre. We were able to determine however that the Community Centre (based on the meter number) draws 70 kWh per day, around 25 MWh per year. This is around five times more than the Running

Creek St Albans Hall. We believe that the potential bill savings from solar and battery storage at the Dinner Plain Community Centre are likely to be material, noting that such an installation in an alpine environment is more complicated than a typical installation. A ground mount solar PV system is recommended for this site to allow for easy removal of snow, and to avoid shading that would impact solar PV panels installed on the building roof.

2.3.5 Harrietville Community Hall

Harrietville Community Hall has rooftop solar and a battery installed, along with a diesel genset. The site is well-suited to hosting a public EV charger. There is no recommended change to the generation and storage facilities at the site. For this reason, detailed modelling was not carried out for the site. EV charging revenues were not modelled due to the difficulty in predicting usage, particularly as this would be expected to be driven by tourists with strong seasonality.

3. Energy Nodes Summary

Site	***Scenario***	***Solar (kW)***	***Battery storage (kWh)***	***EV Charger***	***Year one grid imports (MWh)***	***Year one grid exports (MWh)***	***Year one energy expense ($)***	***Change relative to baseline ($)***
Mudgegonga Community Hall	Baseline	5 kW	-	-	1 MWh	8.6 MWh	($59)	-
	Proposed systems	16.6 kW	20 kWh	7 kW	0 MWh	22.3 MWh	($782)	$723
	Wholesale exposed	16.6 kW	20 kWh	7 kW	1.2 MWh	22.4 MWh	($1,358)	$1,299
Dederang Memorial Hall[1]	Baseline	-	-	-	5.4 MWh	-	$1,628	-
	Proposed systems	10 kW	20 kWh	-	0.8 MWh	9.1 MWh	$1	$1,627
	Wholesale exposed	10 kW	20 kWh	-	2.9 MWh	10.4 MWh	($748)	$2,376
Running Creek St Albans Community Hall	Baseline	-	-	-	5.4 MWh	-	$1,628	-
	Proposed systems	12 kW	12 kW	-	0.8 MWh	11.5 MWh	($118)	$1,726
	Wholesale exposed	12 kW	12 kW	-	2.7 MWh	12.6 MWh	($822)	$2,450
Dinner Plain[2]	Baseline	-	-	-	~25 MWh		~$10,120	
	Proposed	13 kW	40 kWh	25 kW			~$5,687.5	~$4,432.56
Harrietville Hall[3]	Baseline	10 kW	16 kWh	-				
	Proposed	10 kW	16 kWh	25 kW				

[1] Note that as per s2.3.3 the meter data for Running Creek St Albans Hall was used as a surrogate for Dederang Memorial Hall.
[2] There was no meter data available for modelling the Dinner Plain site. Estimates are based on import information available to Indigo Power on the national electricity database.
[3] No detailed modelling carried out for the site as there are no recommended changes to generation and storage facilities at this site.

4. Discussion

Energy node sites should be selected based on the value each community site would provide a community during an emergency, the cost to install and the day-to-day bill savings.

Bill savings are likely greatest at Dinner Plain Community Centre, which is the largest user of electricity on a day-to-day basis. Bill savings for Running Creek St Albans Community Hall and Dederang Memorial Hall are more significant than at Mudgegonga Community Hall because Mudgegonga already has rooftop solar installed. Harrietville Community Hall is an already well-established energy node and does not require any further generation and storage.

Smaller batteries have more rapid payback periods and are more commercial, though larger batteries provide greater resilience.

Participation in the wholesale energy market increases expected earnings, however this comes with associated risk. We expect that retail tariffs and virtual power plant offerings will continue to evolve and that offers will be available which commercialise behind-the-meter batteries while shielding the customer from risk.

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