SHIRE OF DENMARK

Minutes

SHIRE OF DENMARK
SUSTAINABLE PROJECTS COMMITTEE

HELD IN THE COUNCIL CHAMBERS,
953 SOUTH COAST HIGHWAY, DENMARK
ON TUESDAY, 2 MAY 2023

Contents

Council Committee Meeting

02 May 2023

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1. DECLARATION OF OPENING/ANNOUNCEMENT OF VISITORS

10am – The Presiding person declared the meeting open.

2. RECORD OF ATTENDANCE/APOLOGIES/APPROVED LEAVE OF ABSENCE

MEMBERS:
Cr Jan Lewis (Presiding Person)
Cr Kingsley Gibson, Deputy Shire President
Cr Clare Campbell
Cr Donald Clarke

STAFF:
David King, Deputy Chief Executive Officer
Damian Schwarzbach, Manager Sustainable Projects
Laura Delbene, Sustainable Projects Officer

APOLOGIES:
Nil

ON LEAVE OF ABSENCE:
Nil

ABSENT:
Nil

VISITORS:
Mark McHenry, Biochar Projects
Louise Duxbury, Totally Renewable Denmark
Rhian Thomas, Totally Renewable Denmark

3. DECLARATIONS OF INTEREST

Nil

4. ANNOUNCEMENTS BY THE PERSON PRESIDING

Nil

5. CONFIRMATION OF MINUTES

The mover of any motion to confirm previous Minutes needs to have been at the meeting.

COMMITTEE RESOLUTION & OFFICER RECOMMENDATION	ITEM 5
MOVED: CR Clarke	SECONDED: Cr Campbell
That the minutes of the Sustainable Projects Committee Meeting held on the 07 March 2023, be confirmed as a true and correct record of the proceedings.	

6. PRESENTATIONS

6.1 BIOCHAR PROJECT

Mark McHenry provided the committee with an update on the Biochar Project. He presented an alternative to FOGO, which could be utilised at the source eliminating the need for bins and transport.

6.2 TOTALLY RENWABLE DENMARK

Louise Duxbury provided the committee with an update of the Totally Renewable Denmark Project (TRD).

- Request support from Council to support workshops.
- Request advocacy from Council to support community initiatives
- TRD will provide a summary from the April 29 workshop to the committee

Outcome

1. *Deputy CEO to contact Louise Duxbury to discuss.*

7. OFFICER REPORTS

7.1 TREATED WASTEWATER PROJECT UPDATE

File Ref:	PROJ.ENG.31.20/21
Applicant / Proponent:	Not Applicable
Subject Land / Locality:	Mclean Park
Disclosure of Officer Interest:	Nil
Date:	21 April 2023
Author:	Laura Delbene, Sustainable Projects
Authorising Officer:	David King, Deputy CEO
Attachments:	Nil

SUMMARY

1. The Shire of Denmark has entered into a recycled water supply agreement with Water Corporation. The agreement is for 15 years, supplying 140kL per day to irrigate the oval at Mclean Park. There is no recycled water supply charge to the Shire.

2. The Shire works for the project include works at Mclean Oval to be able to accept the treated wastewater and a pipeline connecting to the boundary of the wastewater treatment plant.

3. Water Corporation works includes necessary water treatments plant works and a pump station to provide pressure for delivery of the wastewater.

4. The Shire has installed a second 200kL tank and upgraded the irrigation system as part of the project. The project scope requires the Shire to establish a pipeline from Zimmerman Street to the tank at Mclean Park; this is in the draft budget for 2022/23.

5. The project aligns with the Shire's Sustainability Action Plan and delivers a positive outcome for our environment. Currently, all wastewater discharges to a creek that enters the Wilson Inlet adjacent to the Ricketts Reserve.

UPDATE

6. Officers met with the Water Corporation Regional Project Leader and Water Quality Advisor in February to further discuss the Water Quality Management Plan and Department of Health (DoH) requirements to ensure full approval will be achieved once the pipeline and pumping infrastructure is commissioned.

7. In addition to the valves, water monitoring meter and sampling tap that were noted as conditions of the in-principal approval, it was advised that installation of an overflow sump and fencing of the tank area may be a requirement of the DoH. Both these items were not originally included as conditions of in-principal approval. However, the Water Quality Advisor noted that several other wastewater re-use schemes in the region are now having to retrofit additional infrastructure to retain DoH approval, and as such it is unlikely the Shire will receive initial approval without these items being installed upfront.

8. The revised start date for Water Corporation works is 5 July 2023 and it remains the Water Corporations intention to have the treated water ready to use for the irrigation season this coming summer.

RISK

Risk	Risk based on history and with existing controls			Proposed Treatment/Control
	Likelihood	Consequence	Risk Rating	
Reputational: That Water Corporation does not complete its scope of works and the project remains incomplete	Moderate Substantiated, public embarrassment, moderate impact, moderate news profile 3	Unlikely The event could occur at some time 2	Moderate 6	Risk acceptable with adequate controls, managed by specific procedures and subject to semi-annual monitoring Accept Risk

NEXT STEPS

9. Provide quotes for additional items to finance to be considered in the budget review and continue to work with Water Corporation to progress the DoH application and Recycled Water Quality Management Plan.

7.2 POWER PROJECT UPDATE

File Ref:	PROJ.ENG.62.2021-2023
Applicant / Proponent:	N/A
Subject Land / Locality:	Various
Disclosure of Officer Interest:	Nil
Date:	26 April 2023
Author:	Laura Delbene, Sustainable Projects
Authorising Officer:	David King, Deputy CEO

Attachments: Nil

SUMMARY

2. The Shire of Denmark wishes to consume electrical energy with net-zero emissions. This can be achieved by installing additional behind-the-meter photovoltaic (PV) generation sufficient to achieve an annual net-zero energy balance and/or contract from external renewable generation.

3. The project's first stage is to reduce the organisations dependence on external generation by installing PV. A typical approach to PV installation is to match daytime use. However, this approach would limit the project's success in missing the opportunity of existing roof space and requiring reliance on external generation for a significant load requirement outside of effective PV generation times.

4. It is proposed to maximise the Shire's PV opportunity by managing the energy balancing of timing mismatches between self-generation and loads with local energy storage.

5. Future stages would look to incorporate non-contestable supplies by including enough behind-the-meter PV to be eligible to enter the Wholesale Energy Market (WEM).

6. The final stage would be to purchase any shortfall via external renewable generation.

UPDATE

7. Officers are currently awaiting more detailed project costs for both the Shire Administration Zone and Mclean Park Zone which comprise the following.

<u>Administration Zone – Total 64MWh</u>
Administration Building
CEO House

<u>McLean Park Zone – Total 76MWh</u>
Recreation Centre
McLean Oval

8. Data Logging at the individual sites has also been conducted, and once collated, will be provided to the consultant as they will provide a more accurate understanding of the power usage at both sites and used to further refine the design to be more cost effective.

9. The cost estimates will include estimates of all Western Power requirements to implement the project, future Photo Voltaic (PV) panel installation and details of any assumptions or refinements to the concept design which will be used to inform the business case.

RISK

10. A risk assessment has been undertaken per the Shire's Risk Management Governance Framework, and no risks have been identified in relation to the officer recommendation or the report whilst the project is in the feasibility stage.

NEXT STEPS

11. Officers will keep progressing with the development of the business case once the costings have been received and understood to determine a return on investment. This will be presented to the Committee for further consideration.

7.3 EV CHARGER PROJECT

File Ref:	PROJ.ENG.19.21/22
Applicant / Proponent:	N/A
Subject Land / Locality:	Various
Disclosure of Officer Interest:	Nil
Date:	26 April 2023
Author:	Laura Delbene, Sustainable Projects
Authorising Officer:	David King, Deputy CEO
Attachments:	Nil

SUMMARY

1. On 30 November 2020 the Western Australian State Government released the Electric Vehicle (EV) Strategy with initiatives aimed at preparing for the transition to low and zero-emission electric vehicles. This included the creation of an EV highway network throughout regional Western Australia to facilitate travel reaching north to Kununurra, through the southwest as far round as Eucla and east to Kalgoorlie. A progressive roll out will see the State's electric vehicle network fully operational by 2024, with 49 locations across Western Australia set to receive charging infrastructure. Denmark was not identified as a strategic location, falling between proposed charger installations in Albany and Walpole.

2. To meet the gap in the network the Shire has sought to install charging infrastructure in Denmark. Further details can be found in the progress section of the report.

RISK

3. A risk assessment has been undertaken per the Shire's Risk Management Governance Framework, and no risks have been identified in relation to the officer recommendation or the report whilst the project is in the feasibility stage for a DC charger.

PROGRESS

4. Installation of an Ocular IQ Dual 22k/W charger at Berridge park was completed in March and following Council adoption of the Tariff ($.044 per k/W + $1.00 per every 10 minutes after 3 hours), there has been more than 70 charging sessions and over 800k/W of power delivered since the unit was first commissioned. To date there have been no known reported issues with the EV Charger.

5. The power upgrade application to enable fast charging in town is still progressing with Western Power. A DC charger was originally earmarked for installation at Norm Thornton Park, however this will not be progressed as difficulties re-configuring the carpark to suit made the location an unviable choice. Alternatively, the CRC carpark was selected as it is closer to the transformer that requires an upgrade and requires minimal work to the carpark to support EV charging bays.

6. A second round of 'Charge Up' funding under Energy Policy WA will open in Q3 of this year which is targeted at DC charging. It is the Shire's intention to submit for grant funding to support the cost of the power upgrade and charger installation, however full details of the funding are not yet available.

7. **NEXT STEPS**

Ensure the Western Power upgrade application continues to progress so that the costs and supporting documentation is ready to submit as part of a grant application for DC charging in Q3 this year and consideration through the CBP and Annual Budget.

8. SUSTAINABLE BUILDING AUDIT REPORT

The Deputy CEO lead discussion on priorities from the report provided as Attachment 8. An amount will be allocated in the Corporate Business Plan considerations for 2023/24 under the title of "Emission Reduction Opportunities".

9. PRIORITISATION OF SUSTAINABLE ACTION PLAN PROJECT

Members reviewed and discussed the Sustainable Action Plan provided as Attachment 9.

Outcome

1. *Deputy CEO to resend CBP prioritisation list to committee members for rating.*
2. *Committee members to rank and submit to Shire Officers.*

10. TASK LIST

Members discussed the Task List – Attachment 10.

11. GENERAL BUSINESS

Nil

12. ADAPTATION WORKSHOP

Cr Clarke requested an Adaptation Workshop to be held for Council and to Review the Sustainability Strategy to align with the Strategic Community Plan.

13. NEXT MEETING

It is recommended that the next meeting of the Sustainable Projects Committee be held on Tuesday 4 July 2023 at the Shire of Denmark Council Chambers commencing at 2pm.

14. CLOSURE OF MEETING

11.58am – There being no further business to discuss, the Presiding Person closed the meeting.

South Coast Alliance Buildings

Built Environment Audit

South Coast Alliance Inc.

Job No:	1035142
Doc Ref:	1035142-RPT-SY-001
Revision:	B
Revision Date:	17 January 2023

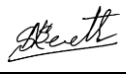
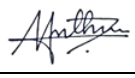
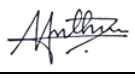
Vancouver Arts Centre, Albany, WA

Project title	South Coast Alliance Buildings	**Job Number**
Report title	Built Environment Audit	1035142

Document Revision History

Revision Ref	Issue Date	Purpose of issue / description of revision
—	07 December 2022	Issued for review
A	16 January 2023	Updated with client review comments
B	17 January 2023	Updated with client review comments

Document Validation (latest issue)

17/01/2023	17/01/2023	17/01/2023
X 	X 	X 
Principal author	Checked by	Verified by
Signed by: Nalin Nanayakkara	Signed by: Marianayagam, Mathuran	Signed by: Marianayagam, Mathuran

Executive Summary

This report outlines results from a Built Environment Audit conducted by Cundall for South Coast Alliance (SCA) for 10 typical buildings identified in the Shires of Jerramungup, Plantagenet, Denmark, and the City of Albany in WA.

This assessment has been conducted to facilitate the operational improvements to the facilities. The assessment included:

1. Review of the site and its operations
2. Analysis of the site energy and water consumption
3. Investigation of energy systems and current performances
4. Identification of multiple energy efficiency upgrade opportunities

Opportunities with promising paybacks have then been subject to more detailed investigations, including cost analyses and calculations of indicative payback periods.

Overall, the assessment has been able to identify a wide range of opportunities and initiatives which, if implemented, have the potential to provide reasonable and practical energy, water, and emission reductions.

Proposed energy and water reduction opportunities identified and analysed for the buildings are summarised below and more details are provided against the analysed building in the tables on next few pages.

1. Replace old and inefficient air conditioning systems with higher efficient systems
2. Replace all interior and exterior non-LED with LED lighting
3. Heat Pumps for hot water systems
4. Solar thermal heaters to feed hot water system
5. Skylights and solar tubes
6. Daylight and motion sensors for lighting
7. Solar photovoltaic (PV) system
8. Water efficient fixtures
9. Rainwater harvesting

The identified initiatives have been recommended based on broad assumptions. However, detailed analysis would need to be carried out if the initiatives are selected to be implemented.

Table 1.1: Proposed emissions reduction opportunities for Shire of Plantagenet

Ref.		Sounness Park		Saleyard	
Saving Potential					
	Proposed Initiative for Energy	**kWh**	**$**	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	500	170	1,200	400
EE2	Replace all interior non-LED with LED equivalent	2,000	650	1,000	350
EE3	Replace all exterior non-LED with LED equivalent	-	-	8,350	3,000
EE4	Heat Pump for hot water	15,800	2,400	-	-
EE5	Solar thermal system to feed hot water system	2,070	700	-	-
EE6	Daylight and motion sensor for lighting	-	-	230	80
EE7	Solar PV	50,400	16,700	50,400	17,900
EE8	Water heating reduction with efficient fixtures	1,700	550	-	-
	Proposed Initiative for Water	**kL**	**$**	**kL**	**$**
WE1	Efficient water fixtures	500	2,400	-	-
WE2	Rainwater harvesting	-	500	-	-
WE3	Water treatment and reuse	-	-	17,000	45,400
Cost of Implementation					
	Proposed Initiative for Energy	**Qty**	**$**	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	12	12,000	7	7,100
EE2	Replace all interior non-LED with LED equivalent	-	2,500	-	250
EE3	Replace all exterior non-LED with LED equivalent	-	-	-	10,600
EE4	Heat Pump for hot water	2	22,400	-	-
EE5	Solar thermal system to feed hot water system	3	15,000	-	-
EE6	Daylight and motion sensor for lighting	-	-	4	600
EE7	Solar PV	30kW	144,000	30kW	144,000
EE8	Water heating reduction with efficient fixtures				
	Proposed Initiative for Water		$		$
WE1	Efficient water fixtures	-	5,700	-	-
WE2	Rainwater harvesting	-	-	-	-
WE3	Water treatment and reuse	-	-	-	600,000

Table 1.2: Proposed emissions reduction opportunities for Shire of Jerramungup

Ref.		Jerramungup CRC		Shire Admin Jerramungup	
Saving Potential					
	Proposed Initiative for Energy	**kWh**	**$**	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	2,400	650	1,500	400
EE2	Replace all interior non-LED with LED equivalent	2,000	500	2,700	730
EE3	Replace all exterior non-LED with LED equivalent	400	110	120	30
EE4	Heat Pump for hot water	1,600	400	1,800	500
EE5	Daylight and motion sensor for lighting	300	80	550	150
EE6	Solar PV	15,100	4,100	8,400	5,350
	Proposed Initiative for Water	**kL**	**$**	**kL**	**$**
WE1	Efficient water fixtures	10	15	40	100
WE2	Rainwater harvesting	40	90	-	-
Cost of Implementation					
	Proposed Initiative for Energy	**Qty**	**$**	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	44	43,600	20	20,300
EE2	Replace all interior non-LED with LED equivalent	-	1,500	-	700
EE3	Replace all exterior non-LED with LED equivalent	-	200	-	60
EE4	Heat Pump for hot water	1	5,000	1	5,000
EE5	Daylight and motion sensor for lighting	4	600	5	750
EE6	Solar PV	10kW	20,000	15kW	48,200
	Proposed Initiative for Water		$		$
WE1	Efficient water fixtures	-	850	-	510
WE2	Rainwater harvesting	1	2,400	-	-

Table 1.3: Proposed emissions reduction opportunities for Shire of Denmark

Ref.		Shire Admin Denmark		McLean Oval		Denmark Depot	
Saving Potential							
	Proposed Initiative for Energy	**kWh**	**$**	**kWh**	**$**	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	7,200	2,300	2,100	550	2,180	570
EE2	Replace all interior non-LED with LED equivalent	120	40	1,700	450	1,100	300
EE3	Replace all exterior non-LED with LED equivalent	600	200	-	-	-	-
EE4	Heat Pump for hot water	4,400	1,400	3,800	1,000	2,700	700
EE5	Solar thermal system to feed hot water system	-	-	1,000	300	-	-
EE6	Daylight and motion sensor for lighting	700	200	1,500	400	450	100
EE7	Solar PV	-	-	25,200	6,700	16,800	4,400
EE8	Water heating reduction with efficient fixtures	-	-	500	150	300	70
	Proposed Initiative for Water	**kL**	**$**	**kL**	**$**	**kL**	**$**
WE1	Efficient water fixtures	470	1,290	140	400	140	375
WE2	Rainwater harvesting	350	950	350	1000	350	1000
Cost of Implementation							
	Proposed Initiative for Energy	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	25	25,400	30	29,500	14	13,800
EE2	Replace all interior non-LED with LED equivalent	-	100	-	4,000	-	700
EE3	Replace all exterior non-LED with LED equivalent	-	180	-	-	-	-
EE4	Heat Pump for hot water	2	9,900	2	22,400	2	9,900
EE5	Solar thermal system to feed hot water system	-	-	2	10,000	-	-
EE6	Daylight and motion sensor for lighting	10	1,500	4	600	8	1,200
EE7	Solar PV	-	-	15kW	72,000	10kW	48,000
EE8	Water heating reduction with efficient fixtures						
	Proposed Initiative for Water		$				
WE1	Efficient water fixtures	-	2,000	-	2,900	-	1,480
WE2	Rainwater harvesting	2	4,800	2	4,800	2	4,800

Table 1.4: Proposed emissions reduction opportunities for City of Albany

Ref.		Art Centre		Albany Depot		Albany Library	
Saving Potential							
	Proposed Initiative for Energy	**kWh**	**$**	**kWh**	**$**	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	-	-	1,600	400	-	-
EE2	Replace all interior non-LED with LED equivalent	3,700	975	7,500	1,800	-	-
EE3	Replace all exterior non-LED with LED equivalent	300	80	4,400	1,000	-	-
EE4	Heat Pump for hot water	800	200	1,800	400	6,500	1,700
EE5	Daylight and motion sensor for lighting	450	100	900	200	-	-
EE6	Solar PV	21,000	5,600	25,200	6,000	-	-
EE7	Water heating reduction with efficient fixtures	200	50	270	65	-	-
	Proposed Initiative for Water	**kL**	**$**	**kL**	**$**	**kL**	**$**
WE1	Efficient water fixtures	50	200	300	800	-	-
WE2	Rainwater harvesting	40	200	40	110	-	-
Cost of Implementation							
	Proposed Initiative for Energy	**Qty**	**$**	**Qty**	**$**	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	-	-	44	44,100	-	-
EE2	Replace all interior non-LED with LED equivalent	-	1,700	-	7,300	-	-
EE3	Replace all exterior non-LED with LED equivalent	-	100	-	1,000	-	-
EE4	Heat Pump for hot water	1	4,950	1	4,950	1	4,950
EE5	Daylight and motion sensor for lighting	8	1,200	12	1,800	-	-
EE6	Solar PV	25kW	60,000	15kW	72,000	-	-
EE7	Water heating reduction with efficient fixtures						
	Proposed Initiative for Water						
WE1	Efficient water fixtures	-	2,900	-	2,600	-	-
WE2	Rainwater harvesting	1	2,400	1	2,400	-	-

Contents

1.0 Introduction

1.1 Purpose

Cundall has been appointed to perform a 'built environment audit' across the portfolio of facilities for the South Coast Alliance (SCA). The objective of this audit is to understand the energy and water systems usage and determine potential improvement opportunities. The opportunities can then be assessed by a cost-benefit analysis and strategically chosen to reduce operational energy and water usage costs whilst additionally improving efficiency and environmental performance.

This report outlines available opportunities and strategies in reducing the overall energy together with cost estimate, where applicable.

1.2 Portfolio Description

SCA regional climate coordinator advised Cundall on the buildings selected for the assessment based on infrastructure owned and managed by SCA LGAs.

Below is a list of buildings that were included in the assessment.

1. Sounness Park - Mount Barker WA
2. Mount Barker Regional Sales Yard - Mount Barker WA
3. Community Resource Centre - Jerramungup WA
4. Shire Administration Building - Jerramungup WA
5. Shire Administration Building - Denmark WA
6. Recreation Centre and McLean Oval - Denmark WA
7. Depot at Zimmerman Road - Denmark WA
8. Vancouver Arts Centre - Albany WA
9. Depot at Mercer Road - Albany WA
10. Library and Visitor Centre - Albany WA

The desktop and physical audit were carried out for above list of buildings except for Depot at Zimmerman Road and Albany Library and Visitor Centre. Only desktop audits were carried out at Depot at Zimmerman Road and Albany Library and Visitor Centre.

1.3 Approach and Methodology

As per the scope of works, there are several stages in the built environment audit to provide a clear picture of the current state of the portfolio. The general stages are as follows:

1. Complete a Built Environment Desktop Audit for each of the 10 facilities.
2. Perform a physical audit of systems at 8 out of 10 facilities.
3. Summarise and present findings relevant to energy and water systems from the audits conducted.
4. Suggest improvement opportunities for operational costs and environmental performance.
5. Perform a high-level cost-benefit for each opportunity.

2.0 Electricity Tariff Analysis

The analysis and findings included in this report are based on electricity bills provided. This information has been used to calculate cost benefit and payback period for any energy efficiency initiatives. This also provides a comparison of electricity cost between various buildings, enabling the local councils to have better understanding and negotiating contract renewals with energy providers.

The following table shows the electricity volume charges as well as other charges. It is noted that when the consumption volume increases the effective tariff also increase.

Table 2-1: Electricity Tariffs

Building name	Tariff	Rate	Units
Sounness Park - Mount Barker	**Energy Charges**		
	Consumption (calculated from available bills)	33.74	c/kWh
	Calculated Charges		
	Consumption	33.10	c/kWh
Regional Saleyard - Mount Barker	**Energy Charges**		
	Consumption (calculated from available bills)	35.36	c/kWh
	Calculated Charges		
	Consumption	35.43	c/kWh
Community Resource Centre - Jerramungup	**Energy Charges**		
	Consumption	27.2174	c/kWh
	Network Charges		
	Supply Charge	174.9006	c/day
	Calculated Average Charges		
	Consumption	33.04	c/kWh
Shire Administration Building - Jerramungup	**Energy Charges**		
	Consumption	27.2174	c/kWh
	Green Power	3.5397	c/kWh
	Network Charges		
	Supply Charge	174.9006	c/day
	Calculated Charges		
	Consumption	35.47	c/kWh
Shire Administration Building - Denmark	**Energy Charges**		
	On Peak Consumption	48.5789	c/kWh
	Off Peak Consumption	14.5932	c/kWh
	Network Charges		
	Supply Charge	333.0391	c/day
	Calculated Charges		
	Consumption	30.43	c/kWh
Recreation Centre & McLean Oval - Denmark	**Energy Charges**		
	Consumption	26.5536	c/kWh
	Green Power	3.5397	c/kWh
	Network Charges		
	Supply Charge	170.6348	c/day

	Calculated Charges		
	Consumption	36.6	c/kWh
Depot at Zimmerman Road - Denmark	**Energy Charges**		
	Consumption	26.0969	c/kWh
	Green Power	3.1257	c/kWh
	Network Charges		
	Supply Charge	167.7	c/day
	Calculated Charges		
	Consumption	40	c/kWh
Vancouver Arts Centre - Albany	**Energy Charges**		
	Consumption	26.5536	c/kWh
	Network Charges		
	Supply Charge	170.6348	c/day
	Calculated Charges		
	Consumption	25.69	c/kWh
Depot at Mercer Road - Albany	**Energy Charges**		
	On Peak Consumption	6.17	c/kWh
	Off Peak Consumption	5.61	c/kWh
	Green Power	3	c/kWh
	Network Charges		
	Network Charges	1703.42	c/day
	Other Charges		
	Renewable Power	0.1864	c/MWh
	Large-scale renewable energy target price	29.29	c/MWh
	Small-scale technology certificate price	40	c/MWh
	Small-scale technology percentage	0.2726	c/MWh
	New transmission loss factor	1.0391	c/MWh
	New distribution loss factor	1.0474	c/MWh
	Calculated Charges		
	Consumption	24.38	c/kWh
Albany Library and Visitor Centre - Albany	**Energy Charges**		
	On Peak Consumption	6.194	c/kWh
	Off Peak Consumption	5.631	c/kWh
	Green Power	3	c/kWh
	Network Charges		
	Network Charges	2005.714	c/day
	Other Charges		
	Renewable Power	0.1864	c/MWh
	Large-scale renewable energy target price	29.29	c/MWh
	Small-scale technology certificate price	40	c/MWh
	Small-scale technology percentage	0.2726	c/MWh
	New transmission loss factor	1.0391	c/MWh
	New distribution loss factor	1.0474	c/MWh
	Calculated Charges		
	Consumption	26.24	c/kWh

Charges based upon the 01 July 2022 - 30 September 2022 billing period, these are subject to change.

3.0 Shire Of Plantagenet

3.1 Sounness Park - Mount Barker

3.1.1 Site Observations

3.1.1.1 Introduction

3.1.1.1.1. Overview

Sounness park in Shire of Plantagenet include change rooms building, club rooms building and consists of below functional areas.

- Offices
- Meeting room
- Function rooms
- Change rooms
- Kitchen and Bar
- Storage areas

3.1.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Electrical plans
- Mechanical plans

3.1.1.2 Operating Hours

Based on discussion with facility management there are no typical operation hours and on average change rooms are use 3 to 4 times a week and club rooms are used 4 days a week on average.

3.1.1.3 Heating Ventilation Air Conditioning (HVAC)

Meeting room, Office and Timekeeper room are served by dedicated reverse cycle standalone air conditioning units. Functional room is served by a ducted split air conditioning system while the kitchen is served by an Braemar evaporative cooling system.

Toilets, change rooms and kitchen areas are provided with exhaust system for ventilation purposes.

3.1.1.3.1. Air Conditioning Systems

Both Meeting room and Timekeeper rooms have split reverse cycle Daikin air conditioning units with 5kW of cooling capacity. Office room has another split reverse cycle Daikin air conditioning unit with 2kW cooling capacity serving the area.

Functional room is served with a larger ducted split reverse cycle Temperzone air conditioning with cooling capacity of 40.5kW.

Kitchen area is served by a side discharge ducted evaporative cooling system with a 1,440L/s air delivery rate. No heating is provided to the area.

3.1.1.3.2. Ventilation Systems

Change rooms building includes a ducted exhaust systems serving all areas that require exhaust ventilation.

Toilets, kitchen, and dish washing area in the club room building are served by separate exhaust systems.

3.1.1.4 Building Fabric

Based on review of architectural drawings and considering standard practice at the time of construction, the walls are double brick cavity and insulated stud walls while the roofs are steel frame with batts insulation under roof sheets and above ceiling.

3.1.1.5 Lighting & Control System

Lighting control is manual for most parts of the facility. Lighting in the change rooms and corridors are sensor controlled.

T5 fluorescent lighting and LED downlights are mostly used in facility. Exterior security lighting is LED with Solar PV and battery built into them.

Oval area is covered by 4 towers that consists of LED flood lights with 6 lights for each tower.

3.1.1.6 Water

The change rooms building consists of 15 shower cubicles in total. In addition, multiple water closets, urinals and wash basins are available. No records of WELS rating are available for water fixtures used at site.

Rainfall runoff (from Frost Park dams) are used to irrigate Sounness Park Ovals and gardens and no scheme water is used.

Two LP gas hot water units with ring main loops provides hot water to the two buildings without a storage system.

3.1.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid. Natural gas is being used primarily for domestic hot water and cooking.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

3.1.2.1 Periodic Breakdown

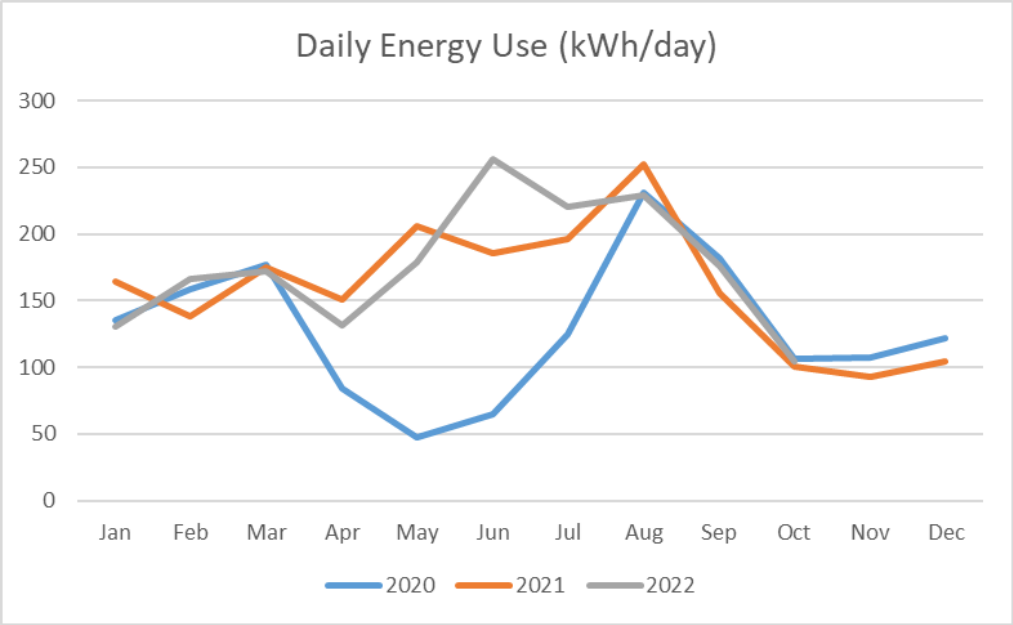


Figure 3.1.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 50 to 250 kWh as per above chart. In year 2020 electrical consumption has dropped significantly during the April to July. This may be related to the occupancy level in the COVID 19 affected year. Highest energy consuming months are in winter indicating the heating energy used, to be a significant contributor in facility energy consumption.

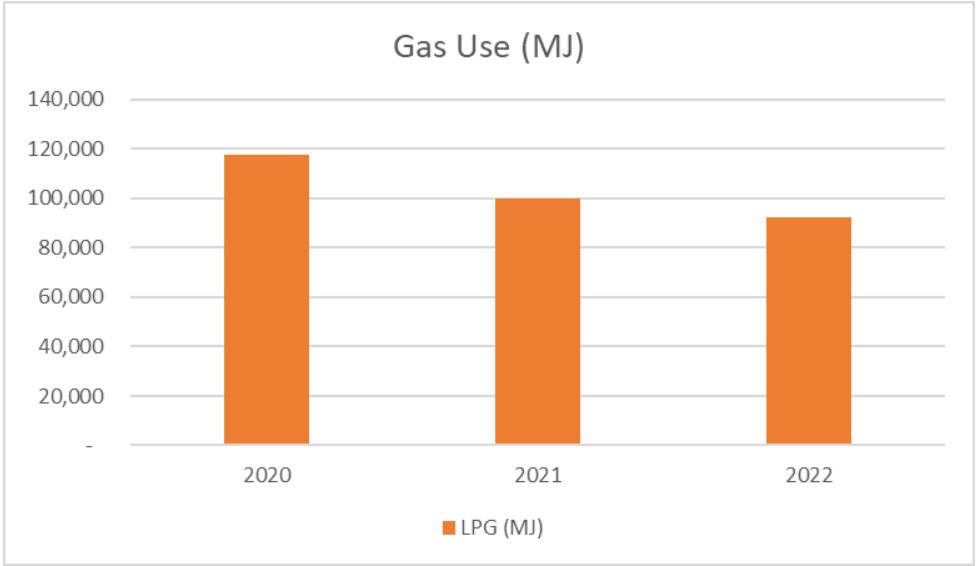


Figure 3.1.2 Annual natural gas consumption over several years

Gas energy use has gradually dropped from 2020 to 2022. Average reduction of 11% over a every year.

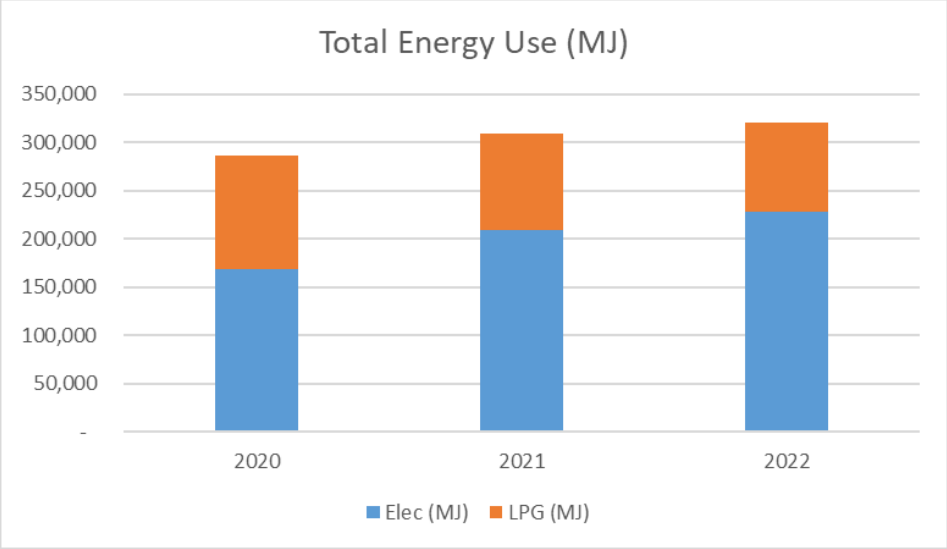


Figure 3.1.3 Total Energy use over several years

Total Energy usage of the site has increased over the three years around 12%. From year 2021 to 2022 energy increment of 3.6% is recorded year over year. The gas consumption has reduced, and electrical energy has increased over the years.

3.1.2.2 End User break Down

Cundall have reviewed the Sounness Park energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for calendar year 2022.

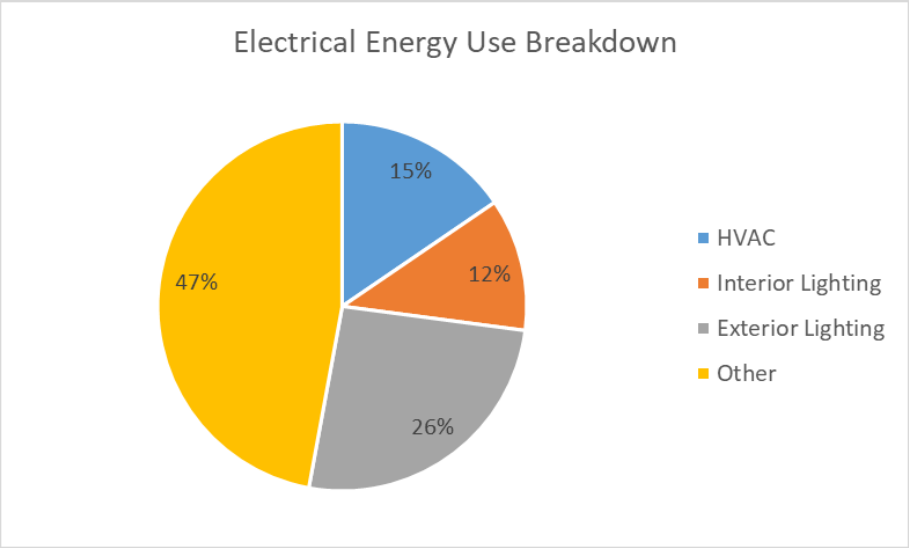


Figure 3.1.4 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Exterior lighting energy use accounts for 26% of building energy consumption while Heating Ventilation and Air Conditioning (HVAC) accounts for 15%. Other unmetered loads include freezers, Fridge, etc which accounts for the 47% of the building energy consumption.

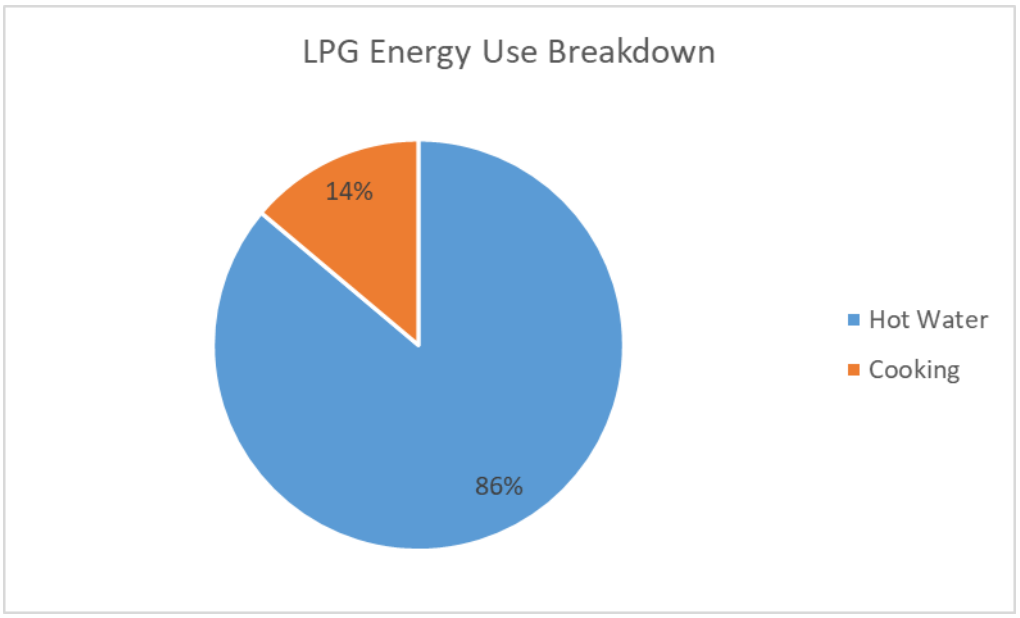


Figure 3.1.5 LPG Energy Use Breakdown

Based on the gas energy use breakdown, hot water use accounts for 86% of building energy consumption which is the biggest contribution for onsite gas consumption.

3.1.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

3.1.3.1 Periodic Breakdown

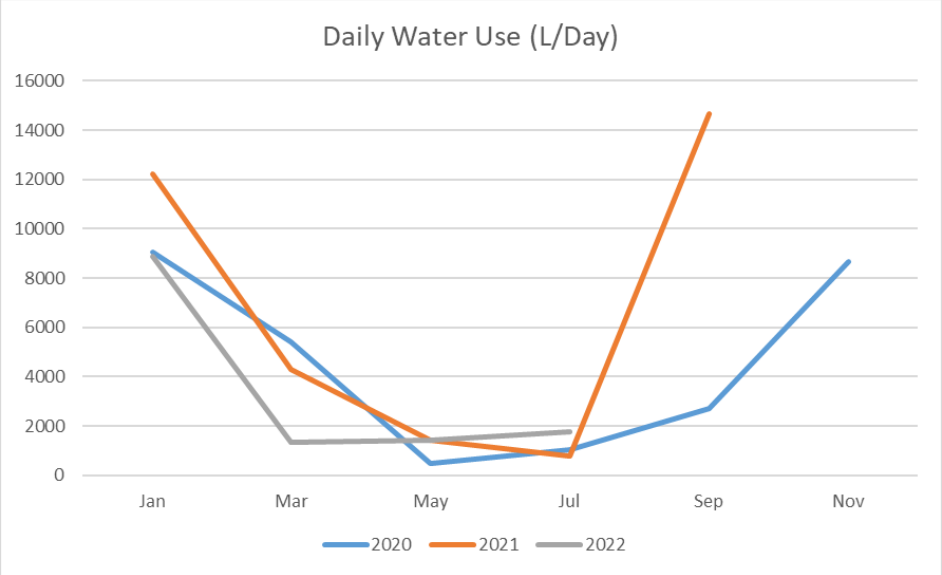


Figure 3.2.6 Daily water consumption for various years

Daily water consumption varies between 500L to 14,500L as per above chart. Highest water consuming months are in spring to summer.

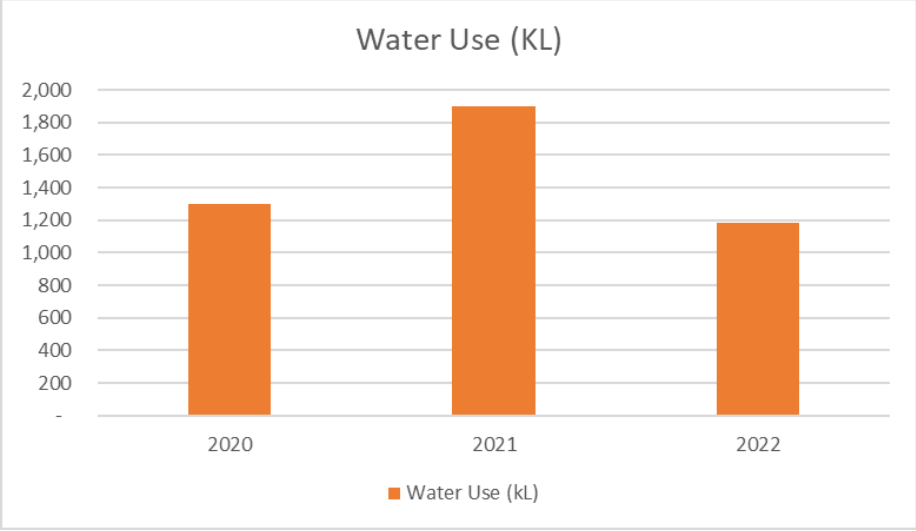


Figure 3.1.7 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is an increase in water consumption of 31% from year 2020 to 2021.

3.1.3.2 End User break Down

Cundall have reviewed the Sounness Park water use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

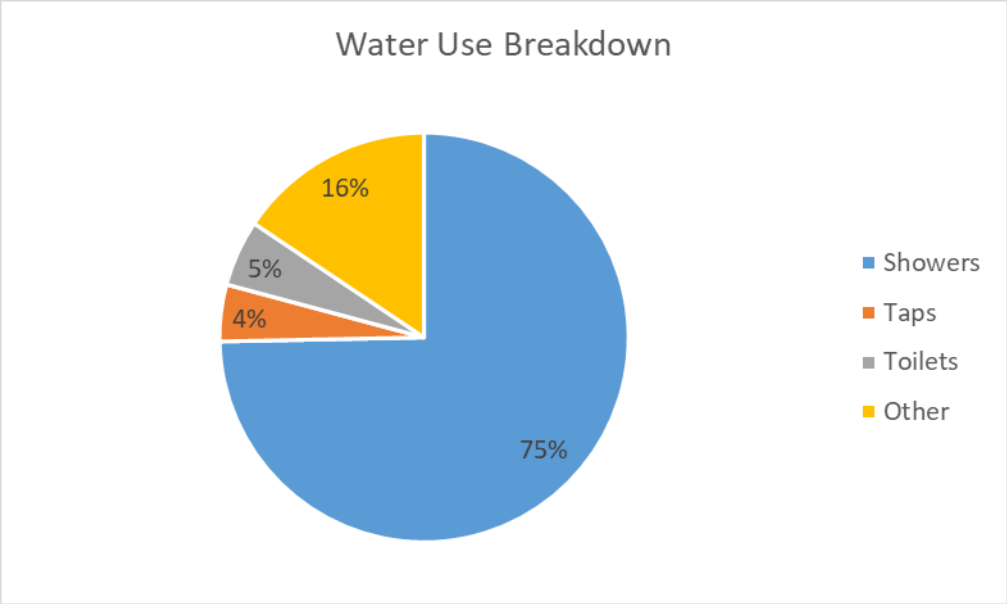


Figure 3.1.8 Water Use Breakdown

Based on the water use breakdown, showers accounts for 75% of building water consumption while other unmetered water use accounts for the 16% of the total building water consumption.

3.1.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Existing air condition systems are close to 10 years old. Rated efficiency of wall mounted split units is below typical units available at present.
- A combination of T5 fluorescent and LED lighting was noted in the current lighting system.
- Tower lighting in the oval has been updated to LED.
- Two separate hot water systems are available for the two building with ring main and heaters are all gas heaters at present.
- Occupancy sensors are available in for transient area lighting.

Proposed:

- Replace existing wall mounted split units with higher efficient system or consider a small VRF system combining units where possible.
- Replace T5 lighting with efficient LED lighting.
- Replace existing gas heated hot water units with heat pump units and adequate storage to meet peak demand.
- Install solar thermal heaters (3nos of 350L units at minimum) and provide feedwater to hot water system through solar thermal system.
- Install a 30kW Solar PV system with battery backup.
- Replace existing showers with 3-star WELS 7.5L per minute showers and taps with 5-star WELS taps.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system with storage.
- Roofs have the load bearing capacity for solar thermal heaters and solar PV.
- Based on the calculation only 30kW PV system with battery is necessary to meet the electricity usage demand.
- For DHW demand it has been proposed that solar thermal system coupled with heat pumps. This is to ensure relatively less efficient solar thermal system during winter is supplemented by the heat pumps.
- It should be also noted that building has amble roof space that can accommodate both PV and solar thermal system.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades is $202,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 50,300kWh of electrical energy and 79,000MJ of LPG energy per annum.
- It is expected the water efficiency measures will save 524kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrade is around 9 years.

Table 3-1: Proposed emissions reduction opportunities

Ref.		Sounness Park	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	500	170
EE2	Replace all interior non-LED with LED equivalent	2,000	650
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	15,800	2,400
EE5	Solar thermal system to feed hot water system	2,070	700
EE6	Daylight and motion sensor for lighting	-	-
EE7	Solar PV	50,400	16,700
EE8	Water heating reduction with efficient fixtures	1,700	550
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	500	2,400
WE2	Rainwater harvesting	-	500
WE3	Water treatment and reuse	-	-
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	12	12,000
EE2	Replace all interior non-LED with LED equivalent	-	2,500
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	2	22,400
EE5	Solar thermal system to feed hot water system	3	15,000
EE6	Daylight and motion sensor for lighting	-	-
EE7	Solar PV	30kW	144,000
EE8	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		$
WE1	Efficient water fixtures	-	5,700
WE2	Rainwater harvesting	-	-
WE3	Water treatment and reuse	-	-

3.1.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

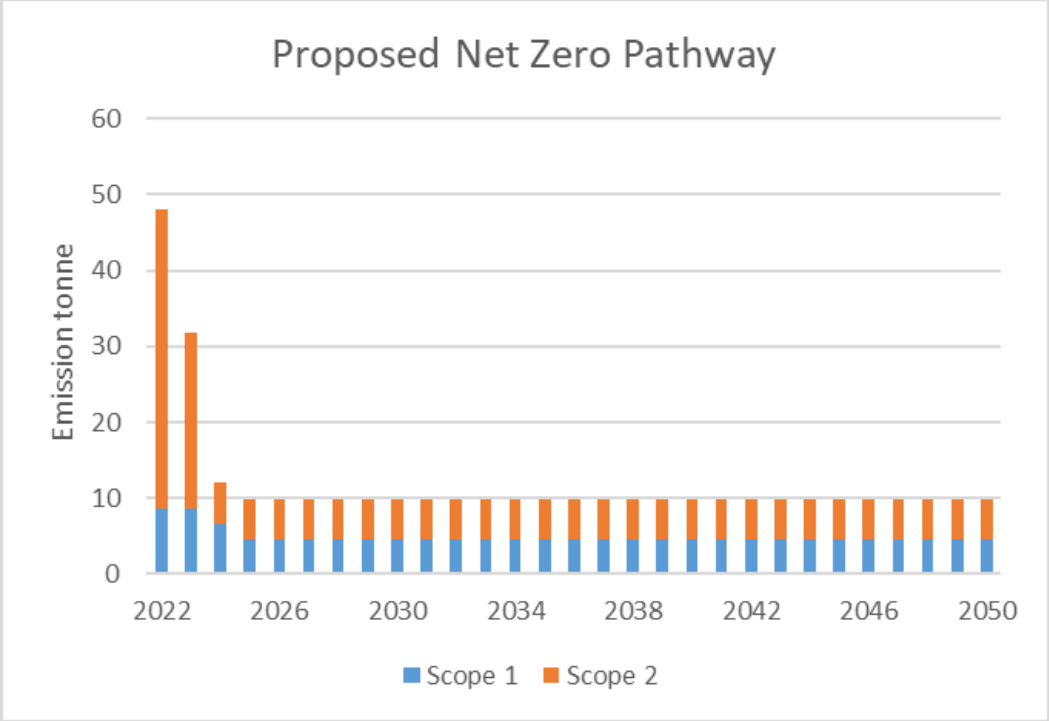


Figure 3.1.9 Proposed Net Zero Pathway for Sounness Park

3.2 Regional Saleyard - Mount Barker

3.2.1 Site Observations

3.2.1.1 Introduction

3.2.1.1.1. Overview

Mount Barker Regional Saleyard include an Office building and Cattle yard buildings and consists of below functional areas.

- Offices
- Canteen
- Amenities
- Sales pens
- Buyer pens
- Dispatch area

3.2.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Electrical plans

3.2.1.1.3. Operating Hours

Based on discussion with facility management typical operation hours are 8AM to 4PM, 3 days a week while operation can extend to 24 hours a day in summer period from November to February.

Office building typically operate Monday to Friday 8AM to 4PM based on discussions at site.

3.2.1.2 Heating Ventilation Air Conditioning (HVAC)

Canteen and a facility office room are served by dedicated reverse cycle standalone Daikin air conditioning units. Rest of the office spaces are served by a Daikin ducted split air conditioning system while.

Toilets and kitchen areas are provided with exhaust system for ventilation purposes.

3.2.1.2.1. Air Conditioning Systems

Both Canteen and facility office rooms have split reverse cycle Daikin air conditioning units with 8.5kW and 2.5kW of cooling capacity respectively. Rest of the Office room has another ducted reverse cycle split Daikin air conditioning unit with 7.1kW cooling capacity serving the area.

3.2.1.2.2. Ventilation Systems

Toilets and kitchen area in the office building are served by separate exhaust systems.

3.2.1.3 Building Fabric

Based on review of architectural drawings and considering standard practice at the time of construction, the walls are insulated timber stud walls while the roofs are timber frame Colorbond sheet with batts insulation under roof sheets.

3.2.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility. Lighting in the toilets is sensor controlled.

T8 fluorescent lighting with magnetic ballast and compact fluorescent (CFL) are mostly used in facility. T8 fluorescent are currently being replaced with LED tubes whenever replacements are required.

Exterior security lighting is mostly LED with 8 more metal halide flood lights left to be replaced with LED.

Dispatch area lighting is LED while Sales Pen area lighting is still T8. These are operated as required with timer control for lighting.

3.2.1.5 Water

The facility consists of 2 shower cubicles in total. In addition, multiple water closets, urinals and wash basins are available. No records of WELS rating are available for water fixtures used at site.

One Propane gas hot water unit provides hot water to the buildings without a storage system.

3 nos. of 250kL rainwater harvesting tanks combined with municipal water and 2 nos. of 250kL washdown tanks are present at site. Major contribution for water end use at site is from washdown and washdown water is used for irrigation of paddocks. Next largest end use of water is truck wash.

3.2.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid. The gas supply to the site is via gas bottles and no consumption data has received for the assessment.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

3.2.2.1 Periodic Breakdown

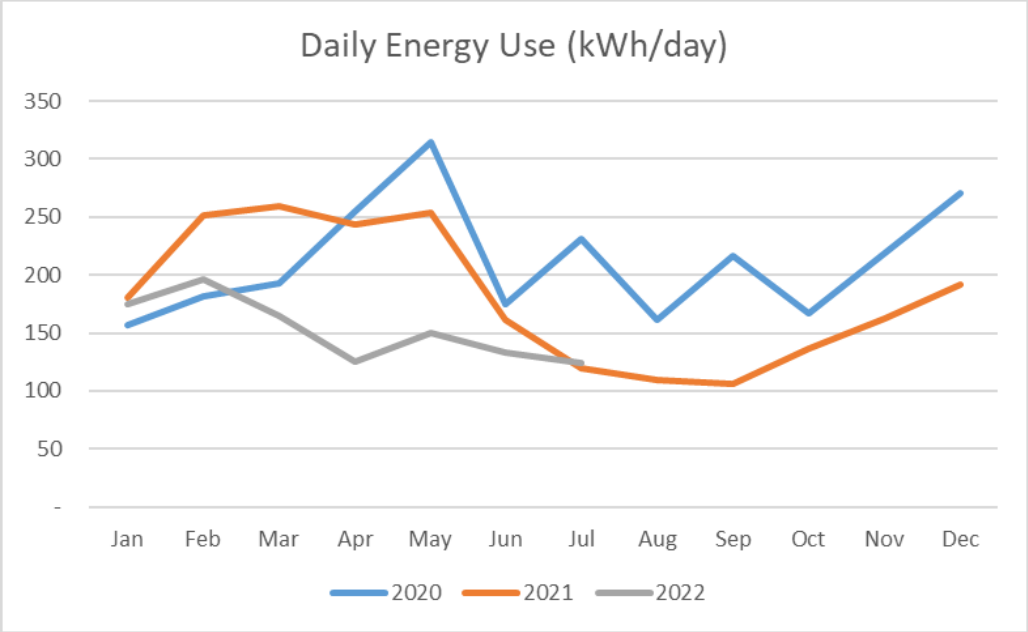


Figure 3.2.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 100 to 300 kWh as per above chart. Highest energy consuming months are in March-April and November to December. The external lighting is a significant contributor in facility energy consumption.

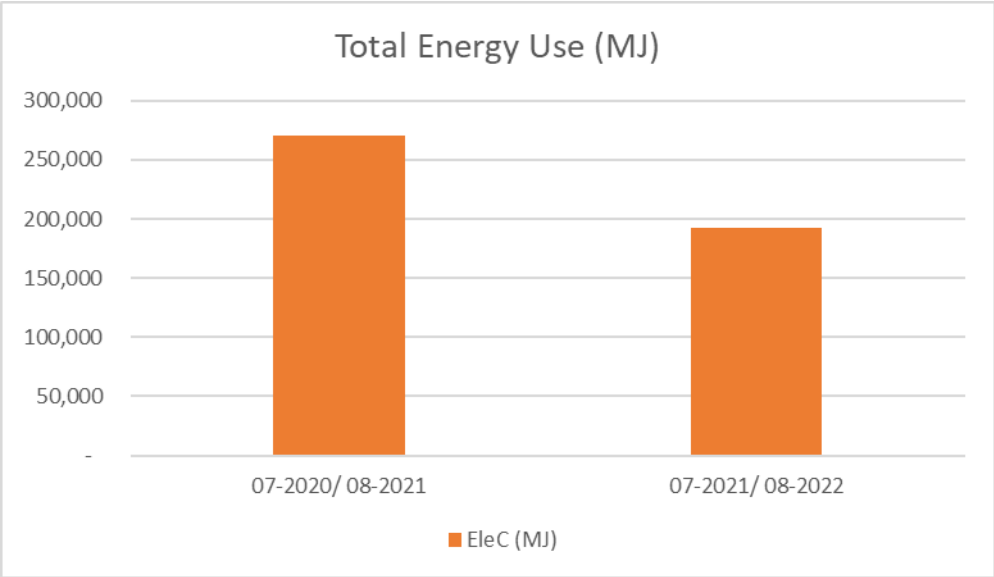


Figure 3.2.2 Total Energy use over several years

Energy usage of the site has decreased year on year around 28% From year 2021 to 2022.

3.2.2.2 End User break Down

Cundall have reviewed the Saleyard energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

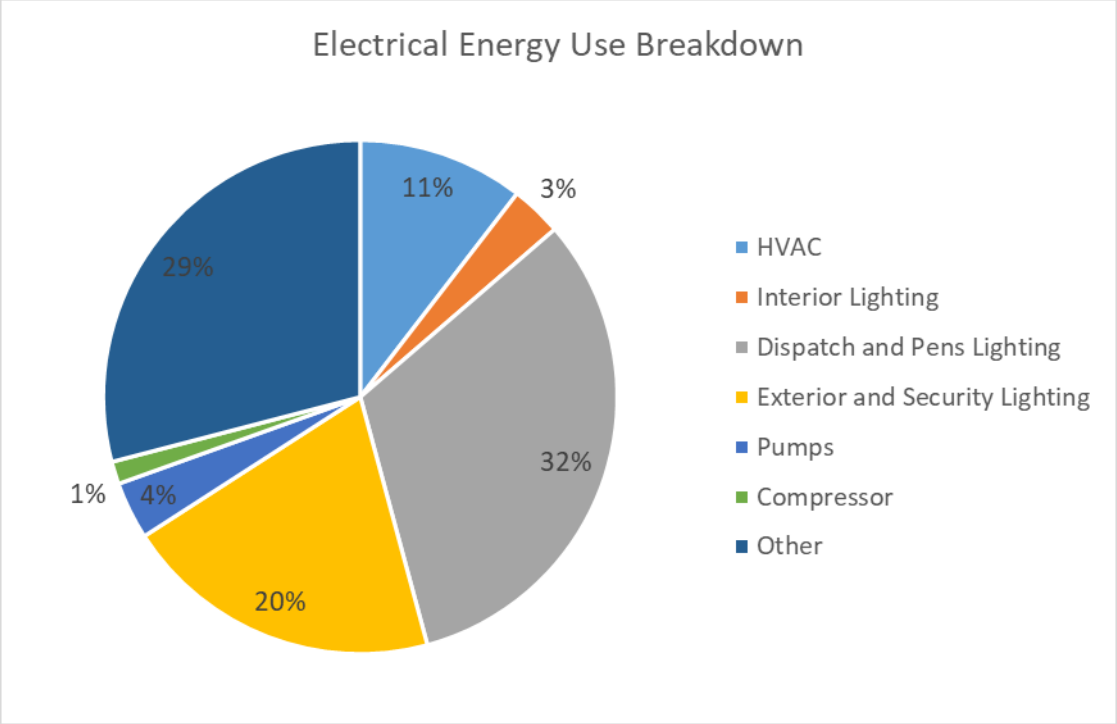


Figure 3.2.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, lighting energy use in total accounts for 55% of site energy consumption while Heating Ventilation and Air Conditioning (HVAC) accounts for 11% of energy consumption.

3.2.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply and through rainwater harvesting.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

3.2.3.1 Periodic Breakdown

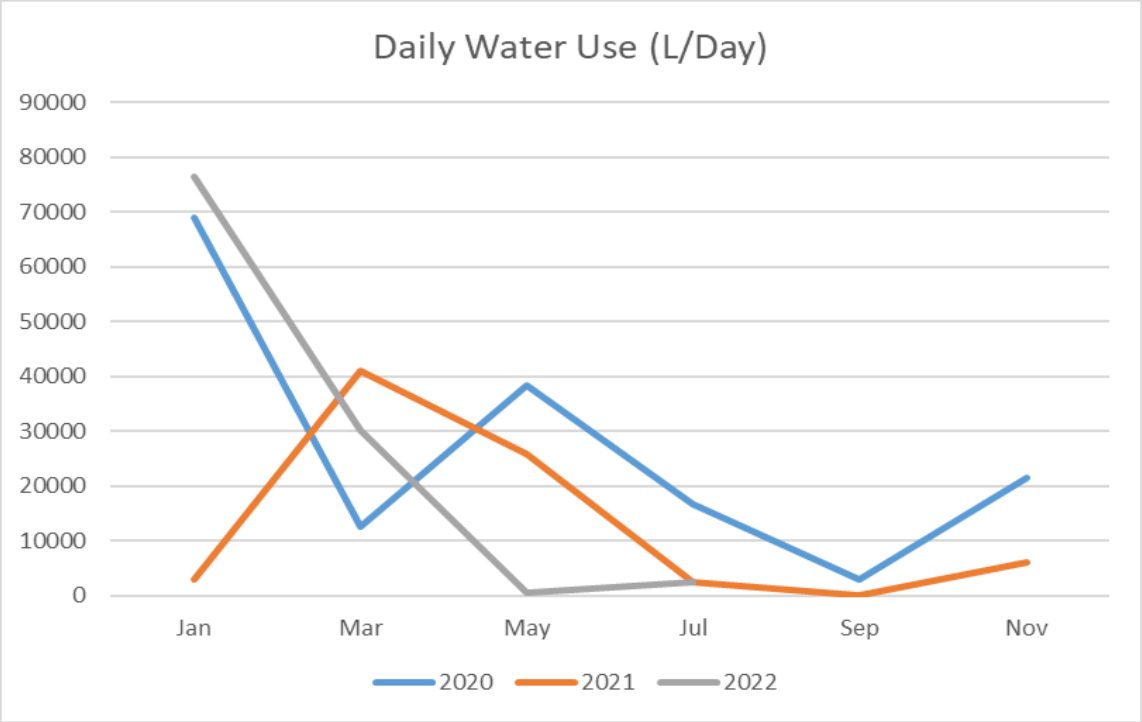


Figure 3.2.4 Daily water consumption for various years

Daily water consumption (From municipal water supply) between 550L to 76,500L as per above chart. Higher water consumption in months of spring to summer.

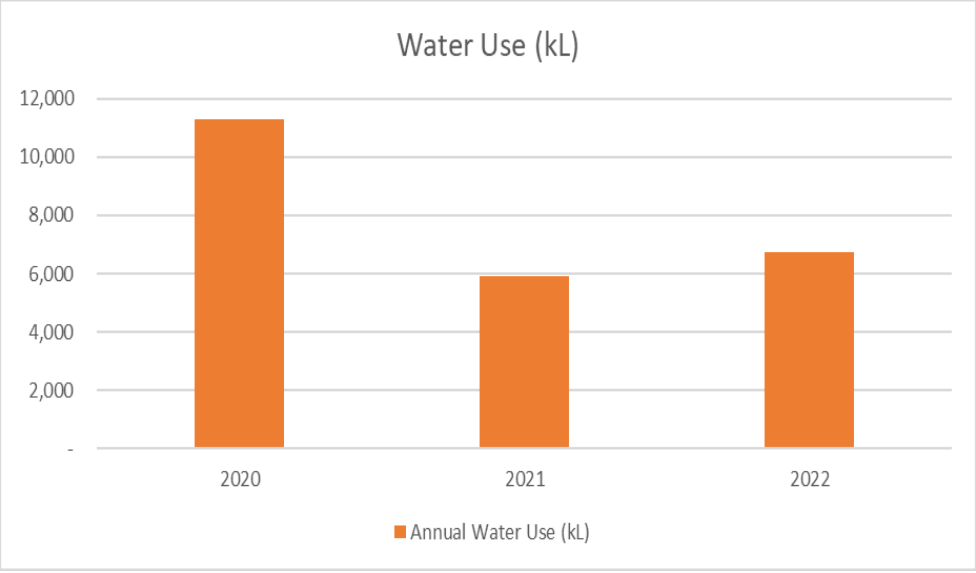


Figure 3.2.5 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is a decrease in water consumption of 47% from year 2020 to 2021.

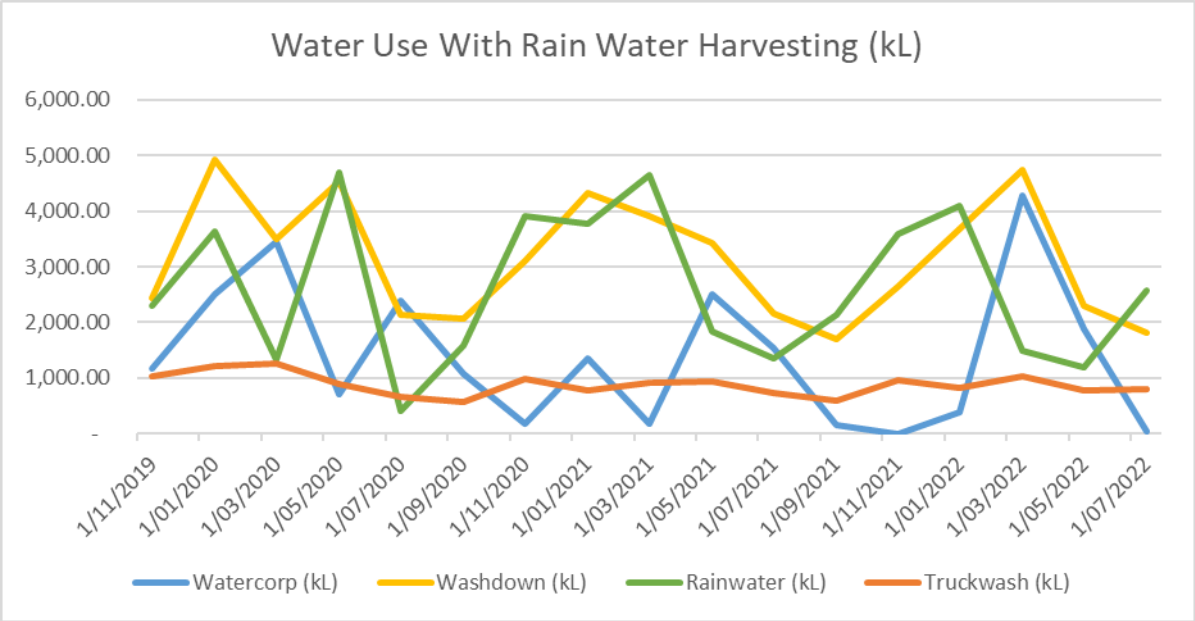


Figure 3.2.6 Annual water consumption including rainwater over several years

The site is consisting of 750kL rainwater storage capacity and collected water is used for truck wash and washdowns.

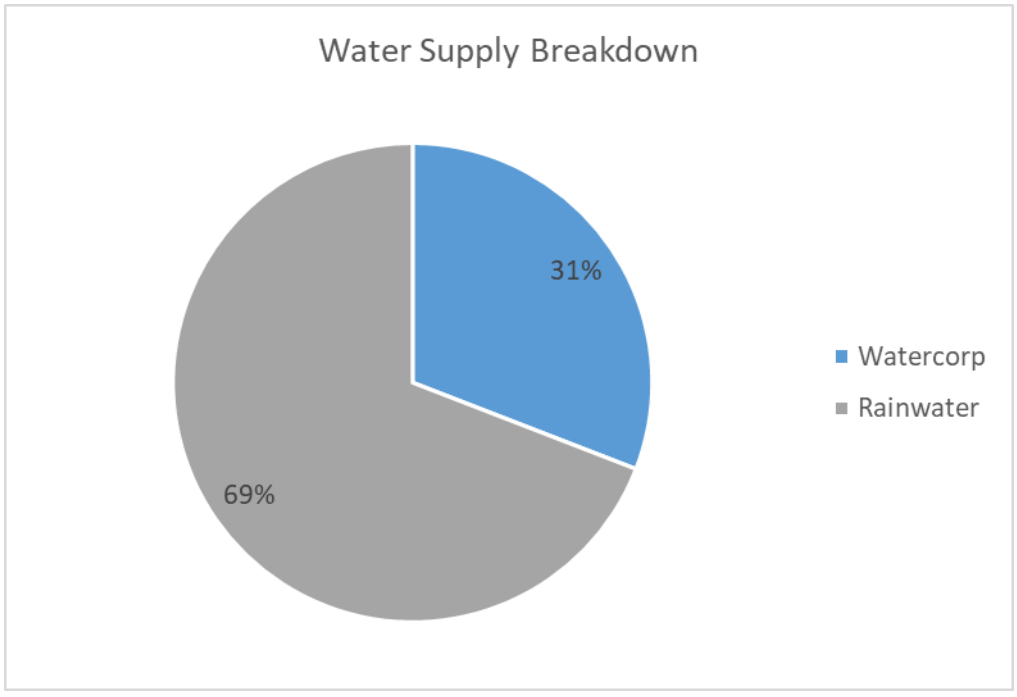


Figure 3.2.7 Annual water Supply

The rainwater harvesting is supplying 69% of onsite water consumption for the year 2022 with estimated consumption values for November and December months.

3.2.3.2 End User break Down

Cundall have reviewed the Mount Barker Saleyard water use based on data provided and onsite observations. Following water use breakdown charts are based on data collected and onsite observations for year 2022.

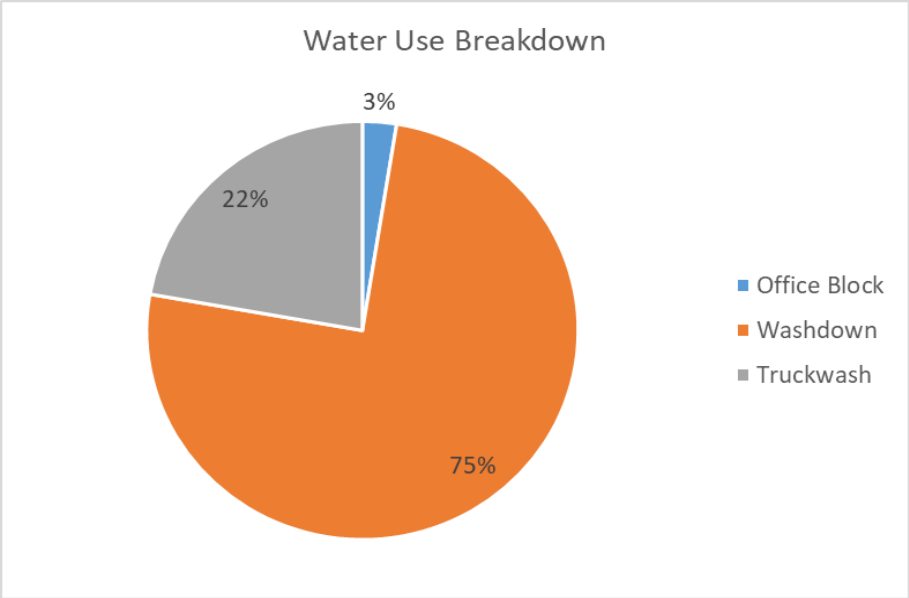


Figure 3.2.8 Water Use Breakdown

Based on the water use breakdown, washdowns accounts for 75% of site water consumption while truck wash accounts for the 22% of the total site water consumption.

3.2.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Existing air condition systems are over 10 years old based on site observations. Rated efficiency of ducted split units is below typical units available at present.
- A combination of T8 fluorescent, CFL and LED lighting was noted in the current interior lighting system.
- Security tower lighting is a combination of LED and metal halide (or similar). Dispatch area lighting is upgraded to LED while sales pen lighting is still T8 fluorescent.
- Adequate daylight levels are available for most of the office areas and the central corridor based on site observations.
- 3 no's of 250kL rainwater harvesting tanks and 2 no's of 250kL washdown tanks are available at site. Based on the catchment roof areas of the site additional rainwater harvesting tanks would be of no further benefit to the site.
- Investigation is underway to look at the possibility of treating washdown water for reuse.

Proposed:

- Replace existing ducted split units with higher efficient system.
- Replace T8 and CFL lighting with efficient LED lighting.
- Use daylight sensor control for interior lighting with adequate daylight levels.
- Install a 30kW Solar PV system with battery backup.
- Installation of a treatment plant for washdown water and reuse treated water.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Roofs have the load bearing capacity for solar PV.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades is $763,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 61,200kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 17,000kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrades are around 11 years.

Table 3-2: Proposed emissions reduction opportunities

Ref.		Saleyard	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	1,200	400
EE2	Replace all interior non-LED with LED equivalent	1,000	350
EE3	Replace all exterior non-LED with LED equivalent	8,350	3,000
EE4	Heat Pump for hot water	-	-
EE5	Solar thermal system to feed hot water system	-	-
EE6	Daylight and motion sensor for lighting	230	80
EE7	Solar PV	50,400	17,900
EE8	Water heating reduction with efficient fixtures	-	-
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	-	-
WE2	Rainwater harvesting	-	-
WE3	Water treatment and reuse	17,000	45,400
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	7	7,100
EE2	Replace all interior non-LED with LED equivalent	-	250
EE3	Replace all exterior non-LED with LED equivalent	-	10,600
EE4	Heat Pump for hot water	-	-
EE5	Solar thermal system to feed hot water system	-	-
EE6	Daylight and motion sensor for lighting	4	600
EE7	Solar PV	30kW	144,000
EE8	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		$
WE1	Efficient water fixtures	-	-
WE2	Rainwater harvesting	-	-
WE3	Water treatment and reuse	-	600,000

3.2.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

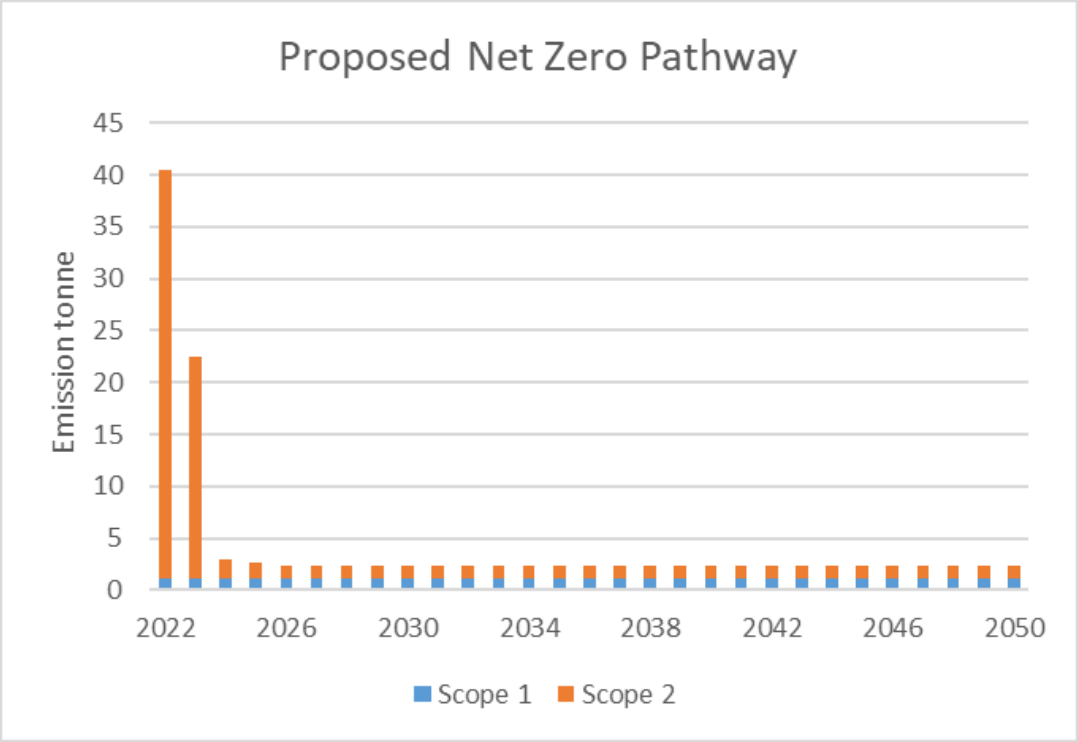


Figure 3.2.9 Proposed Net Zero Pathway for Saleyard

4.0 Shire Of Jerramungup

4.1 Community Resource Centre – Jerramungup

4.1.1 Site Observations

4.1.1.1 Introduction

4.1.1.1.1. Overview

Jerramungup Community Resource Centre include multifunctional spaces and consists of below functional areas.

- Offices
- Meeting room
- Conference rooms
- Public library
- Visitor centre
- Kitchen
- Storage areas

4.1.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans

4.1.1.1.3. Operating Hours

Based on discussion with facility management, typical operation hours are 8AM to 5PM Tuesday to Friday. Training courses are also conducted at the facility averaging at 10 hours a month.

4.1.1.2 Heating Ventilation Air Conditioning (HVAC)

Public library, visitor centre and community centre office served by a ducted reverse cycle Fujitsu air conditioning system. Conference room is served by Fujitsu ceiling caste multi-split air conditioning system while FBG (Tenant) office areas are served by a ducted reverse cycle Fujitsu air conditioning system. Meeting room is served by a reverse cycle Mitsubishi split air conditioning unit.

Toilets and kitchen areas are provided with exhaust system for ventilation purposes.

4.1.1.2.1. Air Conditioning Systems

Public library, visitor centre and community centre offices are served by a ducted reverse cycle Fujitsu air conditioning units with 26.4kW of cooling capacity. Conference room has a multi-split reverse cycle Fujitsu air conditioning unit with 8.6kW cooling capacity serving the area.

FBG offices are also served by an 8.6kW cooling capacity ducted reverse cycle Fujitsu air conditioning unit.

Meeting room is served by a split Mitsubishi air conditioning unit with a cooling capacity of 5kW.

4.1.1.2.2. Ventilation Systems

Toilets and kitchen areas are served by separate exhaust systems.

4.1.1.3 Building Fabric

Architectural drawings provided does not indicate the type of constructions. Based on site observations the walls are double brick cavity while the roofs are timer frame with Colorbond sheeting.

4.1.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility.

T8 fluorescent lighting, CFL, LED panels and downlights are mostly used in facility. Exterior security lighting is also CFL.

4.1.1.5 Water

There are multiple water closets, urinals, and wash basins available. No records of WELS rating are available for water fixtures used at site.

Electric storage hot water unit provides hot water to the buildings.

4.1.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid and a leased PV system. There is no gas usage on the site.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

4.1.2.1 Periodic Breakdown

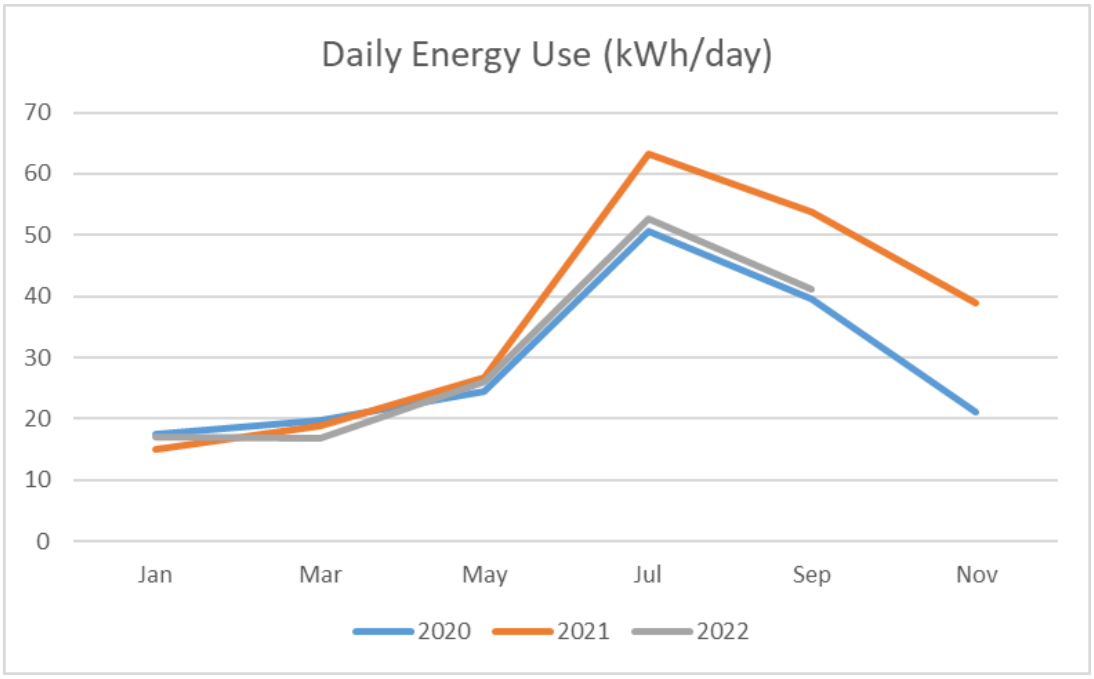


Figure 4.1.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 15 to 65 kWh as per above chart. Highest energy consuming months are in winter indicating the heating energy to be a significant contributor in facility energy consumption.

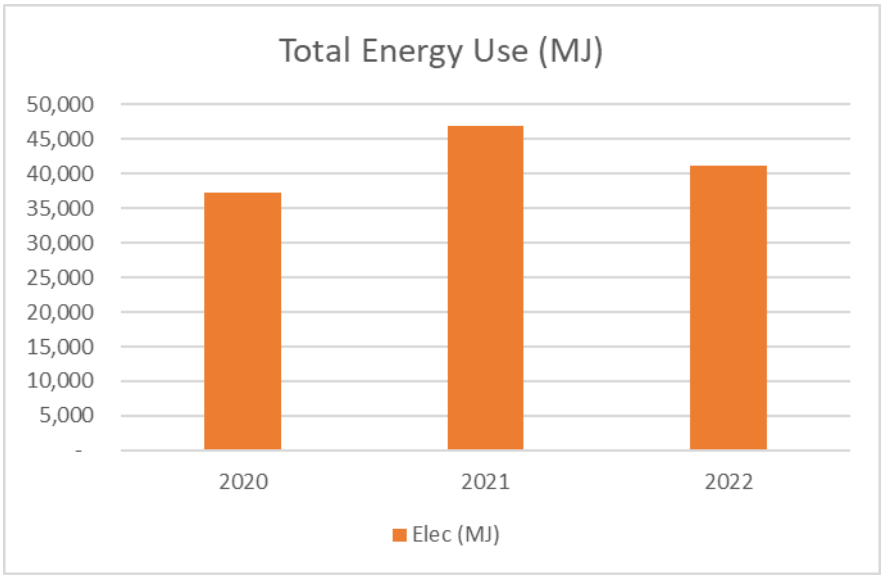


Figure 4.1.2 Total Energy use over several years

The energy consumption is low in year 2020 may be due to low occupancy levels. There is a reduction in energy usage year on year around 12% From year 2021 to 2022.

4.1.2.2 End User Break Down

Cundall have reviewed the Shire administration building in Jerramungup energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

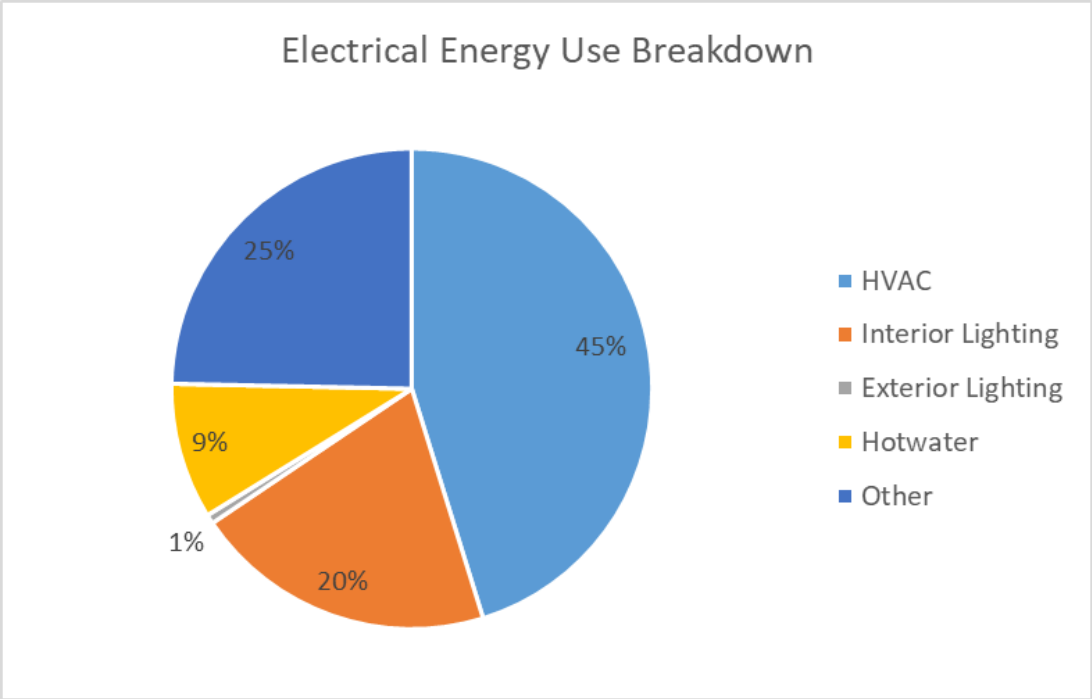


Figure 4.1.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 45% of site energy consumption which is the highest, while Interior lighting energy use accounts for 20%.

4.1.3 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Some of the existing air condition systems are over 15 years old and reaching the end of life. Rated efficiency of these units is below typical units available at present.
- A combination of T8 fluorescent, CFL and LED lighting was noted in the current lighting system.
- Electric storage hot water unit provides hot water to the building.
- Occupancy/motion sensors are available for exterior lighting.
- Adequate daylight levels are available for most of the office areas based on site observations.

Proposed:

- Replace existing split units with higher efficient system or consider a VRF system combining units where possible.
- Replace T8 and CFL lighting with efficient LED lighting.
- Replace existing electric storage hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Install a 10kW Solar PV system to meet part of the electrical demand.
- Replace existing taps with 5-star WELS taps.
- Install a rainwater harvesting system with a minimum capacity of 4kL and use harvested rainwater when available.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.
- Roofs have the load bearing capacity for solar PV.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades is $74,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 21,800kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 47kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrades are around 12 years.

Table 4-1: Proposed emissions reduction opportunities

Ref.		Jerramungup CRC	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	2,400	650
EE2	Replace all interior non-LED with LED equivalent	2,000	500
EE3	Replace all exterior non-LED with LED equivalent	400	110
EE4	Heat Pump for hot water	1,600	400
EE5	Daylight and motion sensor for lighting	300	80
EE6	Solar PV	15,100	4,100
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	10	15
WE2	Rainwater harvesting	40	90
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	44	43,600
EE2	Replace all interior non-LED with LED equivalent	-	1,500
EE3	Replace all exterior non-LED with LED equivalent	-	200
EE4	Heat Pump for hot water	1	5,000
EE5	Daylight and motion sensor for lighting	4	600
EE6	Solar PV	10kW	20,000
	Proposed Initiative for Water		$
WE1	Efficient water fixtures	-	850
WE2	Rainwater harvesting	1	2,400

4.1.4 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

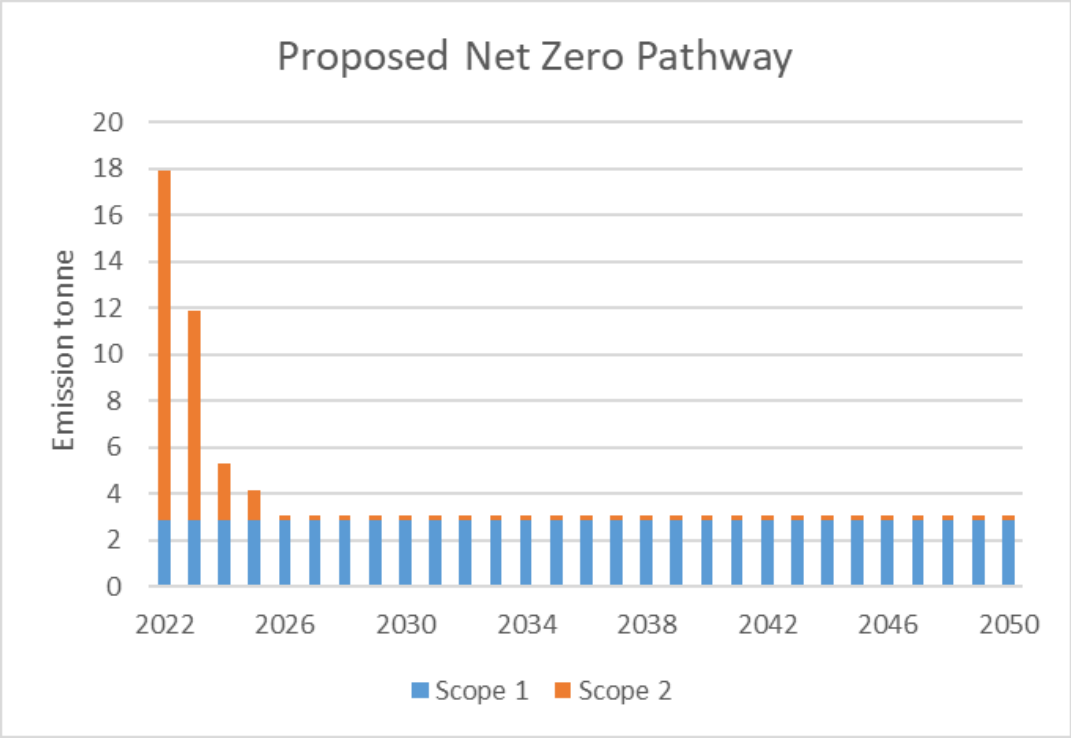


Figure 4.1.4 Proposed Net Zero Pathway for CRC

4.2 Shire Administration Building – Jerramungup

4.2.1 Site Observations

4.2.1.1 Introduction

4.2.1.1.1. Overview

Jerramungup Shire Administration building include multifunctional spaces and consists of below functional areas.

- Offices
- Meeting room
- Council chamber
- Kitchen
- Storage areas

4.2.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Electrical plans

4.2.1.1.3. Operating Hours

Based on discussion with facility management, typical operation hours are 8.30AM to 4PM Monday to Friday.

4.2.1.2 Heating Ventilation Air Conditioning (HVAC)

All airconditioned areas are served by reverse cycle split air condition units. Original construction of the building included an evaporative cooling system which is no longer operated.

Toilets and kitchen areas are provided with exhaust system for ventilation purposes.

4.2.1.2.1. Air Conditioning Systems

Office areas, meeting rooms and council chambers are served by revers cycle air conditioning split systems. 2 nos. of Fujitsu systems with 3.5kW cooling capacity and 5.4kW cooling capacity were noted during the site visit. Further, Mitsubishi systems with 3.5kW, 8kW and 9.2kW cooling capacities were also noted at site.

4.2.1.2.2. Ventilation Systems

Toilets and kitchen areas are served by separate exhaust systems.

4.2.1.3 Building Fabric

Based on review of architectural drawings and considering standard practice at the time of construction, the walls are brick veneer while the roofs are steel framed Colorbond sheet with batts insulation under roof sheets.

4.2.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility. T8 and T5 fluorescent lighting, CFL and LED downlights are mostly used in facility.

Exterior security lighting is sensor controlled.

4.2.1.5 Solar Photovoltaic (PV) System

Based on site observations, there is a 10kWp Solar PV system installed covering part of the north facing roof area which has been installed in 2015 with a lease arrangement. Lease has formally ended in 2020 and current lease payments are much lower than the amounts in the lease period. Based on current payments the lease is of very high financial disadvantage to the Shire.

4.2.1.6 Water

There are multiple water closets, urinals, and wash basins available. No records of WELS rating are available for water fixtures used at site.

Electric storage hot water unit provides hot water to the buildings.

4.2.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid and a leased PV system. There is no gas usage on the site.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

4.2.2.1 Periodic Breakdown

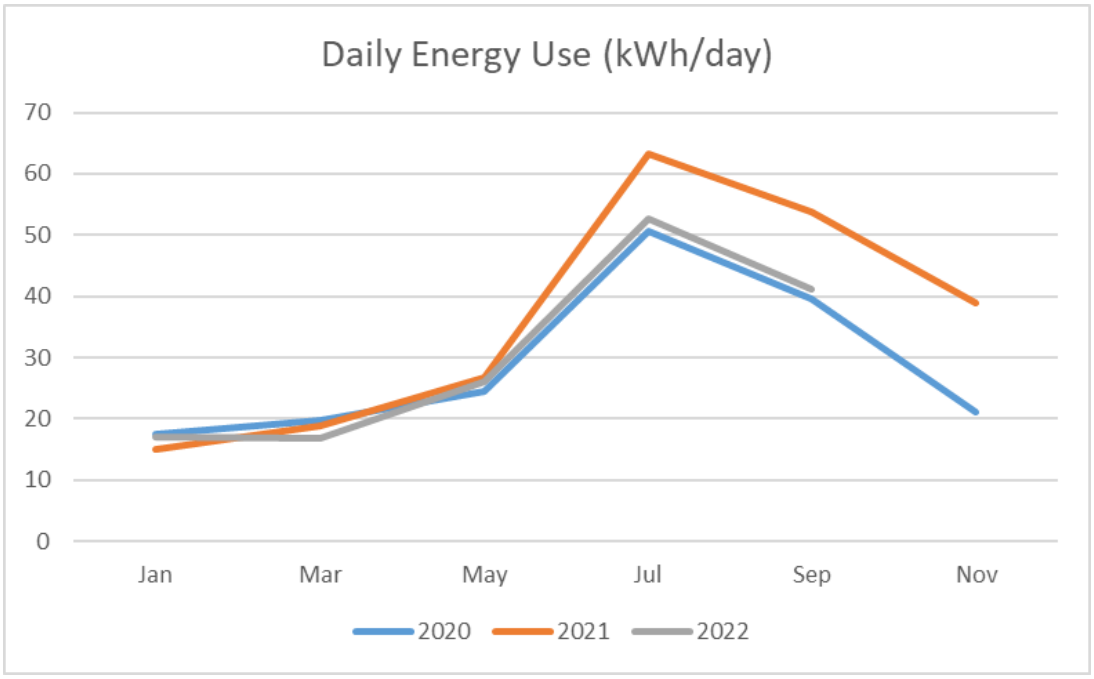


Figure 4.2.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 15 to 65 kWh as per above chart. Highest energy consuming months are in winter indicating the heating energy to be a significant contributor in facility energy consumption.

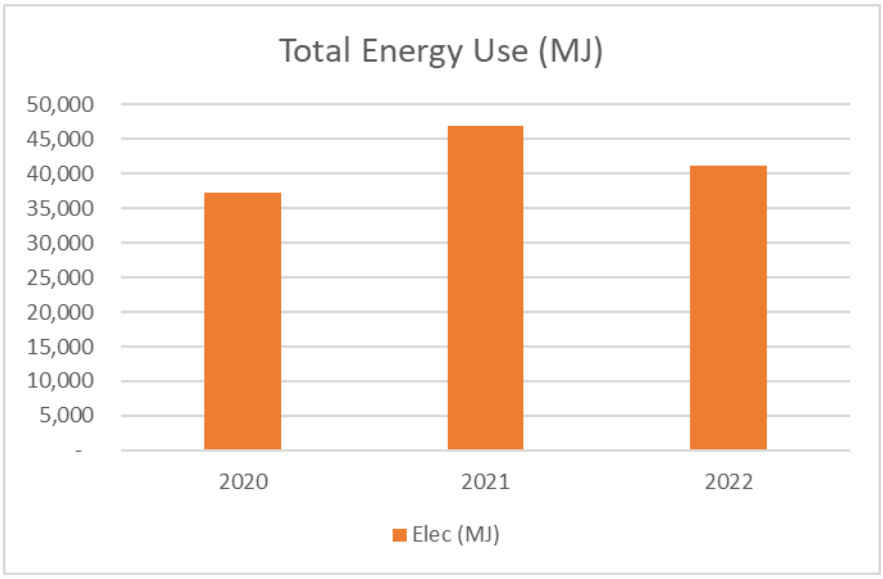


Figure 4.2.2 Total Energy use over several years

The energy consumption is low in year 2020 may be due to low occupancy levels. There is a reduction in energy usage year on year around 12% From year 2021 to 2022.

4.2.2.2 End User Break Down

Cundall have reviewed the Shire administration building in Jerramungup energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

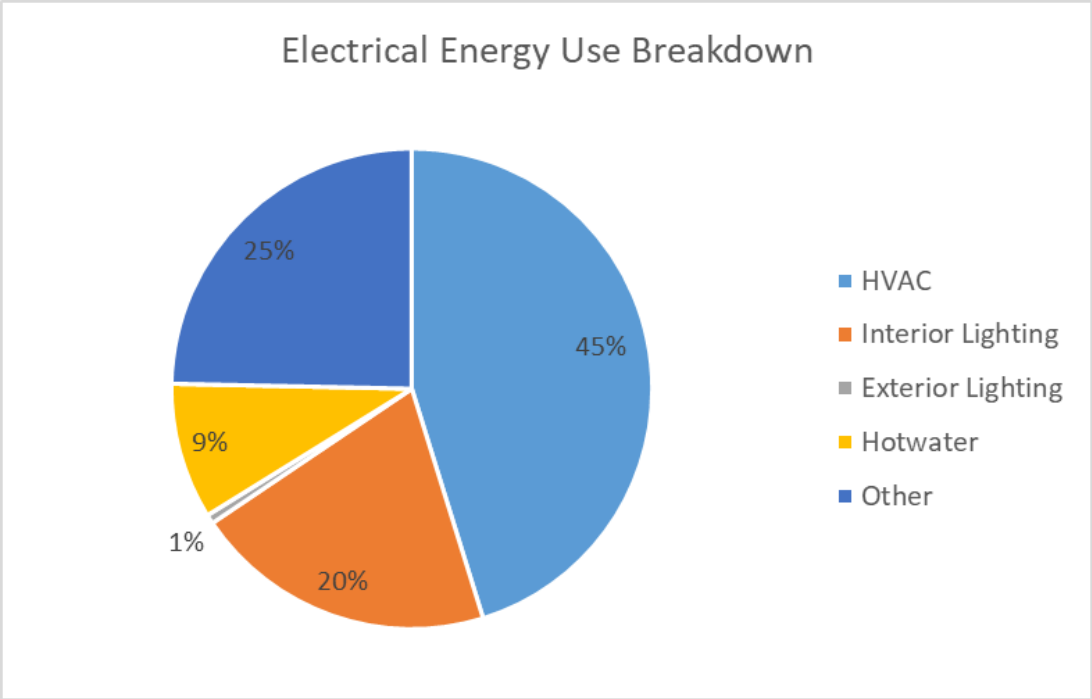


Figure 4.2.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 45% of site energy consumption which is the highest, while Interior lighting energy use accounts for 20%.

4.2.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

4.2.3.1 Periodic Breakdown

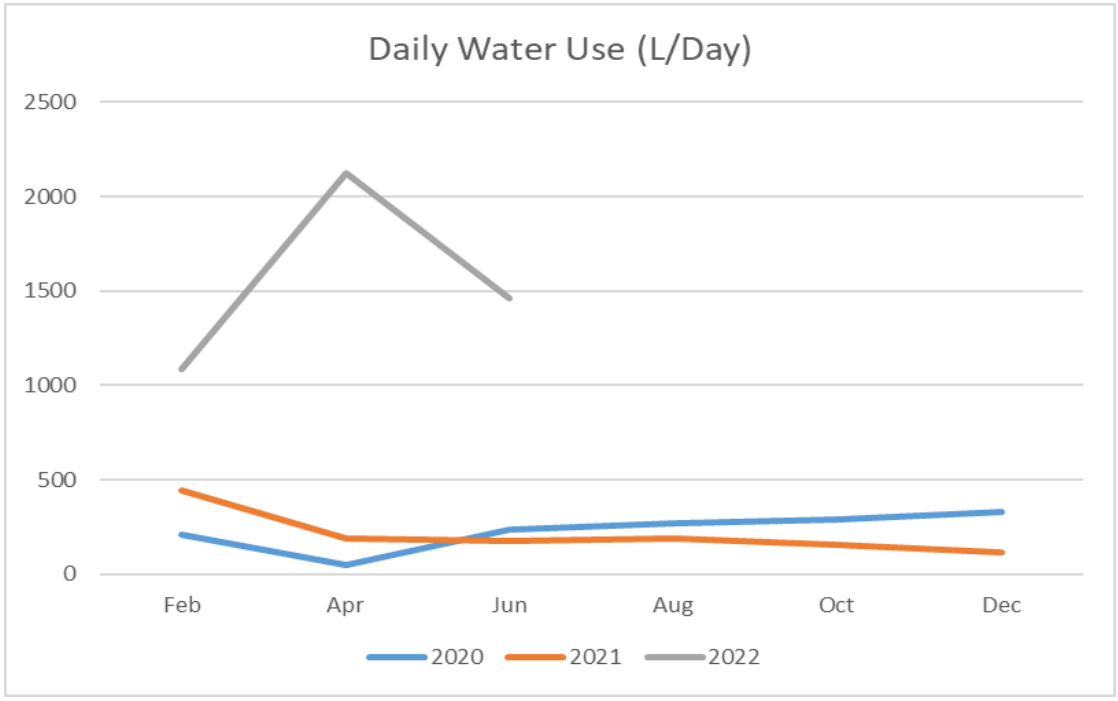


Figure 4.2.4 Daily water consumption for various years

Daily water consumption varies between 50L to 2000L as per above chart. Water consumption has considerably increased in the year 2022 according to the available data.

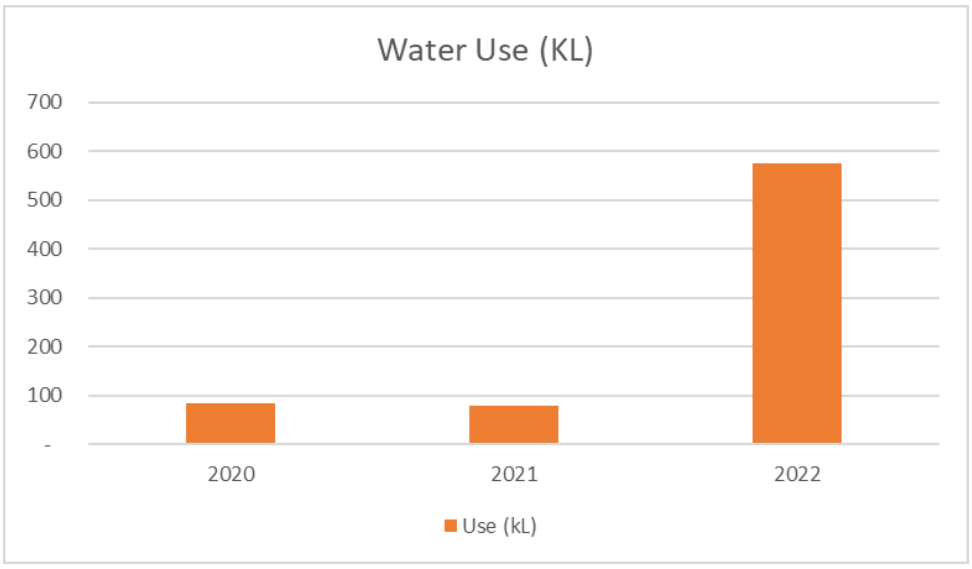


Figure 4.2.5 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is an expected increase in water consumption of 600% from year 2021 to 2022.

4.2.3.2 End User break Down

Cundall have reviewed the administration building Jerramungup water use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

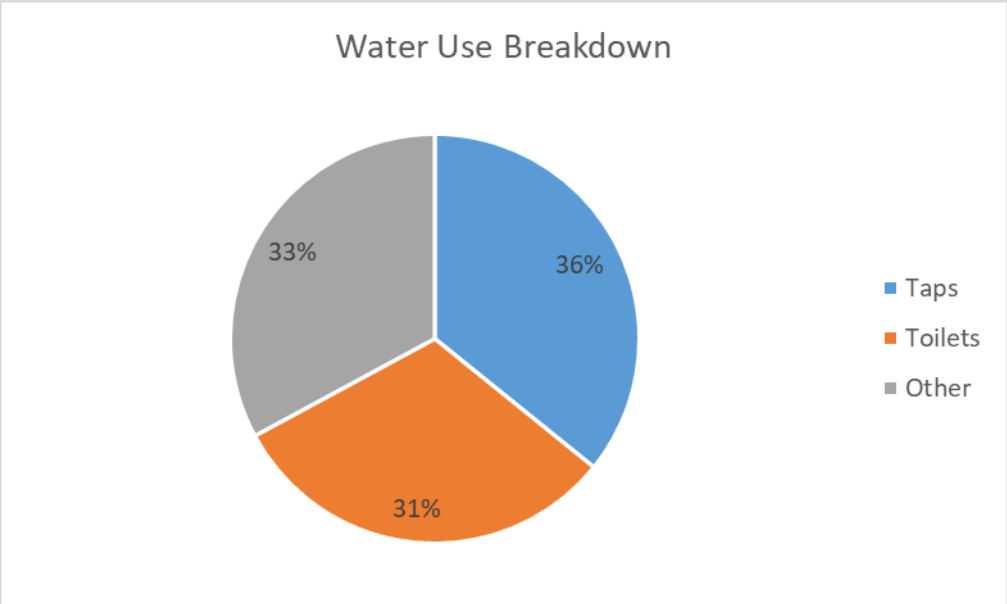


Figure 4.2.6 Water Use Breakdown

Based on the water use breakdown, taps accounts for 36% of building water consumption while other unmetered water use accounts for the 33% of the total building water consumption.

4.2.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Some of the existing air condition systems are over 10 years old. Rated efficiency of these units is below typical units available at present.
- A combination of T8 fluorescent, T5 fluorescent, CFL and LED lighting was noted in the current lighting system.
- Electric storage hot water unit provides hot water to the building.
- Occupancy/motion sensors are available for exterior lighting.
- Adequate daylight levels are available for some of the office areas based on site observations.
- 10kW Solar PV system is available which has been leased to the Shire by a third-party organisation.

Proposed:

- Replace existing split units with higher efficient system or consider a VRF system combining units where possible.
- Replace T8, T5 and CFL lighting with efficient LED lighting.
- Replace existing electric storage hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Install a 15kW Solar PV system and battery backup for at least 5kW and remove the existing leased solar PV system.
- Replace existing taps with 5-star WELS taps.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.
- Roof has the load bearing capacity for solar PV.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades is $76,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 15,100kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 36kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrades are around 10 years.

Table 4-2: Proposed emissions reduction opportunities

Ref.		Jerramungup Admin	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	1,500	400
EE2	Replace all interior non-LED with LED equivalent	2,700	730
EE3	Replace all exterior non-LED with LED equivalent	120	30
EE4	Heat Pump for hot water	1,800	500
EE5	Daylight and motion sensor for lighting	550	150
EE6	Solar PV	8,400	5,350
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	40	100
WE2	Rainwater harvesting	-	-
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	20	20,300
EE2	Replace all interior non-LED with LED equivalent	-	700
EE3	Replace all exterior non-LED with LED equivalent	-	60
EE4	Heat Pump for hot water	1	5,000
EE5	Daylight and motion sensor for lighting	5	750
EE6	Solar PV	15kW	48,200
	Proposed Initiative for Water		$
WE1	Efficient water fixtures	-	510
WE2	Rainwater harvesting	-	-

4.2.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

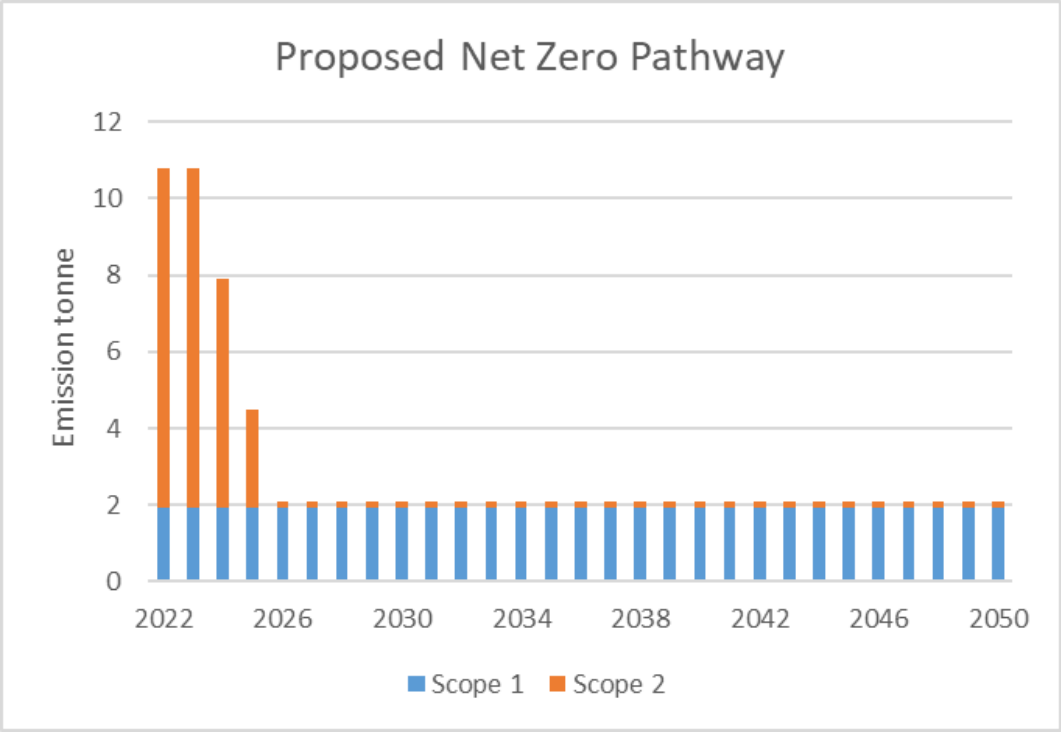


Figure 4.2.7 Proposed Net Zero Pathway for Jerramungup Shire Administration

5.0 Shire Of Denmark

5.1 Shire Administration Building – Denmark

5.1.1 Site Observations

5.1.1.1 Introduction

5.1.1.1.1. Overview

Shire administration building of Denmark include multifunctional spaces and consists of below functional areas.

- Offices
- Meeting rooms
- Council chambers
- Committee room
- Kitchen
- Storage areas

5.1.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Electrical plans

5.1.1.1.3. Operating Hours

Based on discussion with facility management, typical operation hours are 7AM to 6PM Monday to Friday.

5.1.1.2 Heating Ventilation Air Conditioning (HVAC)

Airconditioned areas are served by mix of reverse cycle split air condition units and a ducted reverse cycle split unit.

Toilets and kitchen areas are provided with exhaust system for ventilation purposes.

5.1.1.2.1. Air Conditioning Systems

Part of the office areas are served by a ducted revers cycle air conditioning Fujitsu split systems with a total cooling capacity of 25.4kW. Other office areas, meeting room and council chambers are served by Fujitsu and Panasonic reverse cycle split units of various capacities with a total cooling capacity of approximately 46kW.

5.1.1.2.2. Ventilation Systems

Toilets and kitchen areas are served by separate exhaust systems.

5.1.1.3 Building Fabric

Based on review of architectural drawings and considering standard practice at the time of construction, the walls are double brick cavity and brick veneer while the roofs are steel framed Colorbond sheet with batts insulation under roof sheets.

5.1.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility. CFL and LED downlights are mostly used in facility.

Skylights are used in some parts of the building while most of the spaces have adequate daylight levels to keep artificial lighting use to a minimum. No sensor control systems are available to maximise the use of daylight.

5.1.1.5 Solar Photovoltaic (PV) System

Based on site observations, there is a 26kWp Solar PV system installed in 2013 with a battery bank and inverter system.

5.1.1.6 Water

There are multiple water closets, urinals, and wash basins available. No records of WELS rating are available for water fixtures used at site.

Electric storage hot water units and instantaneous heaters provides hot water to the buildings.

Rainwater harvesting tank was noted at site and the harvested rainwater is used for drinking and in coffee machine.

5.1.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid and battery backed solar PV.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

5.1.2.1 Periodic Breakdown

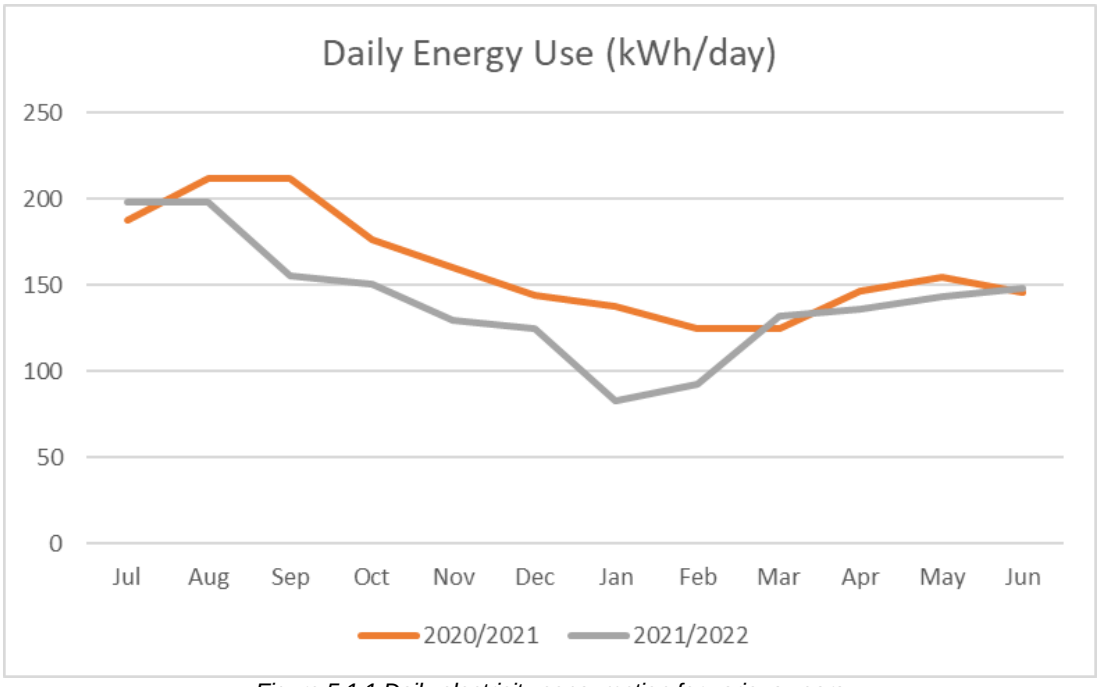


Figure 5.1.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 80 to 200 kWh as per above chart. Highest energy consuming months are in winter indicating the heating energy to be a significant contributor in facility energy consumption and less solar generation.

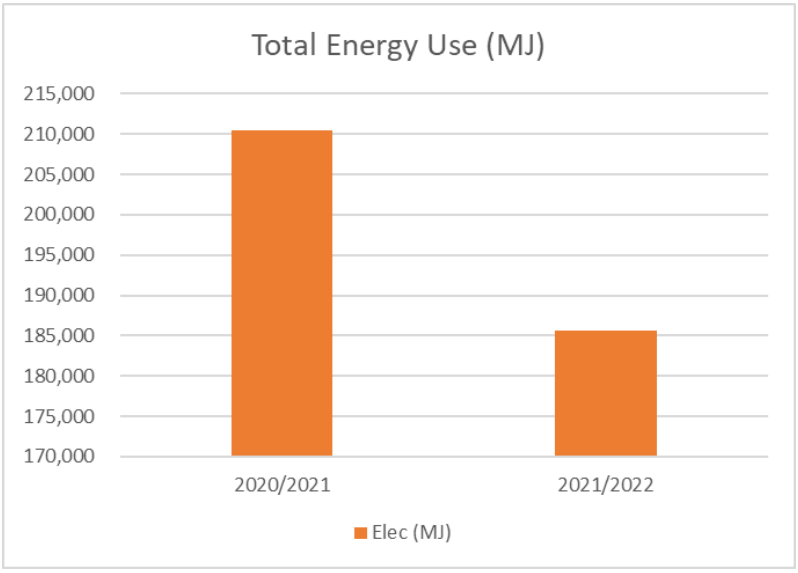


Figure 5.1.2 Total Energy use over several years

Energy usage of the site has decreased year on year around 12% From year 2020 to 2022.

5.1.2.2 End User break Down

Cundall have reviewed the Shire administration building of Denmark energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

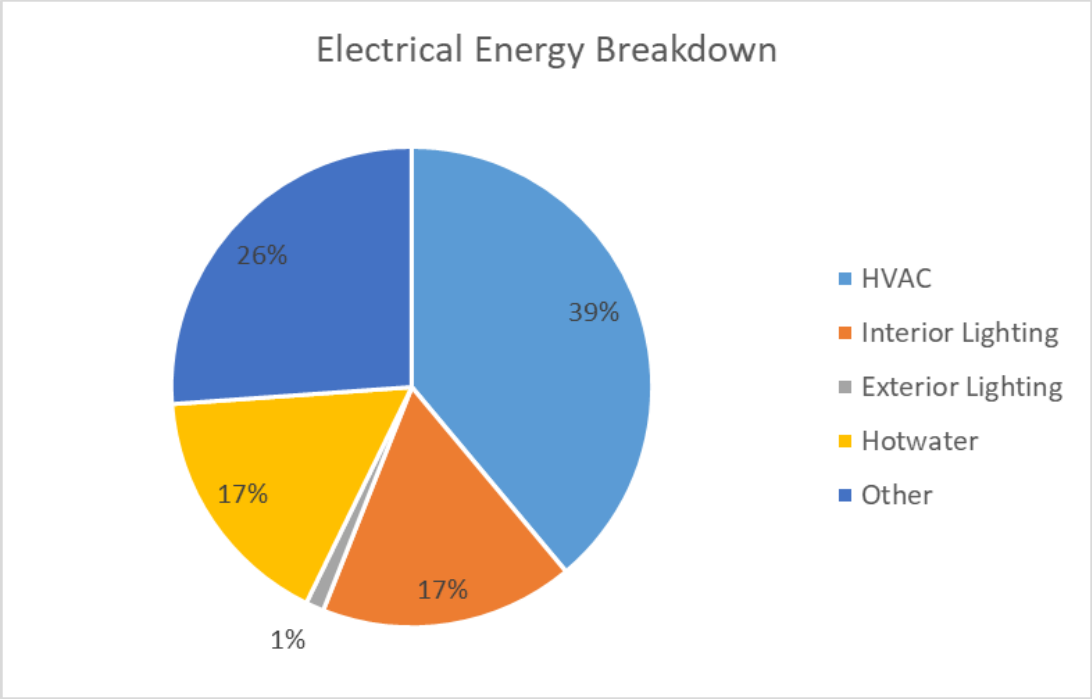


Figure 5.1.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 39% of site energy consumption which is the highest, while Interior lighting and hot water generation energy use accounts for 17% each.

5.1.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

5.1.3.1 Periodic Breakdown

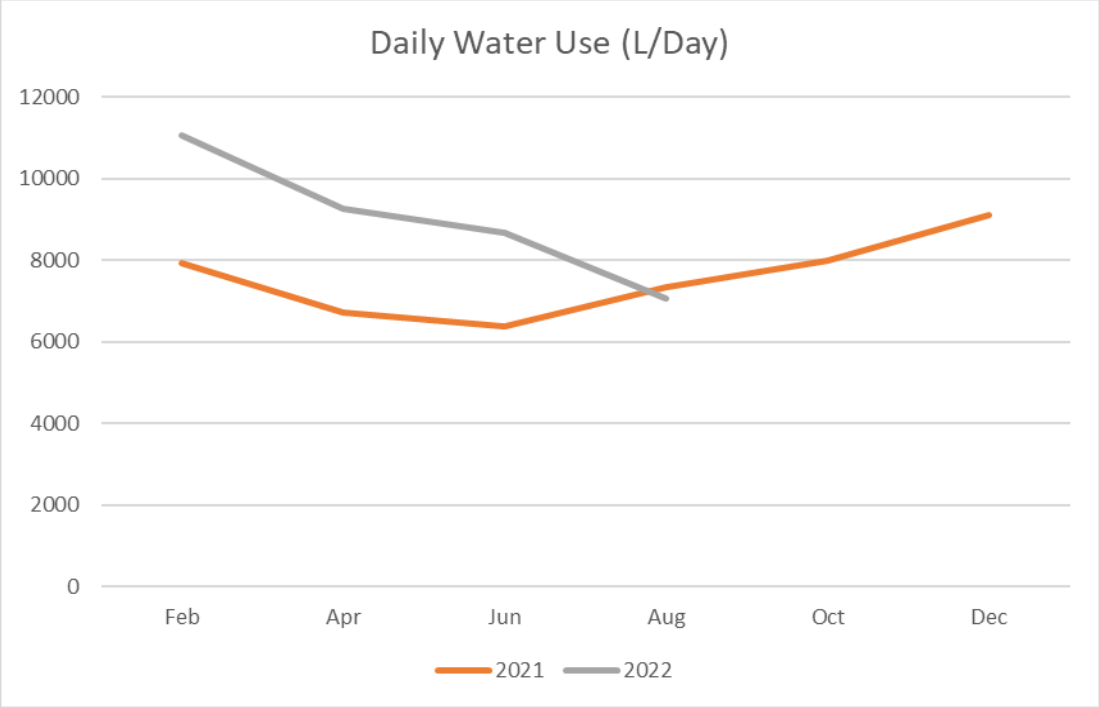


Figure 5.1.4 Daily water consumption for various years

Daily water consumption varies between 6,300L to 11,000L as per above chart. Higher water consumption in months of spring to summer.

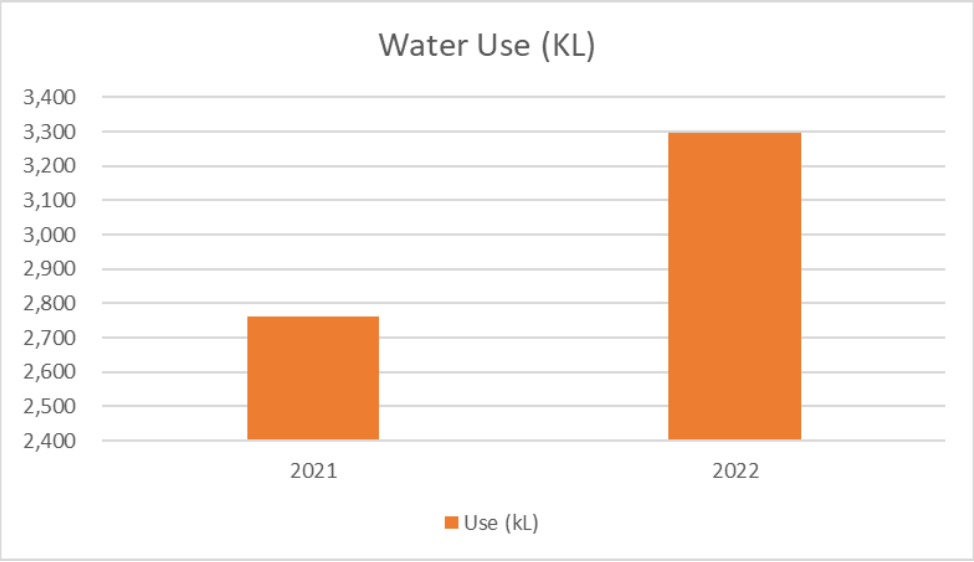


Figure 5.1.5 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is an expected increase in water consumption of 19% from year 2021 to 2022.

5.1.3.2 End User break Down

Cundall have reviewed the Shire administration building of Denmark water use based on data provided and onsite observations. Following water use breakdown charts are based on data collected and onsite observations for year 2022.

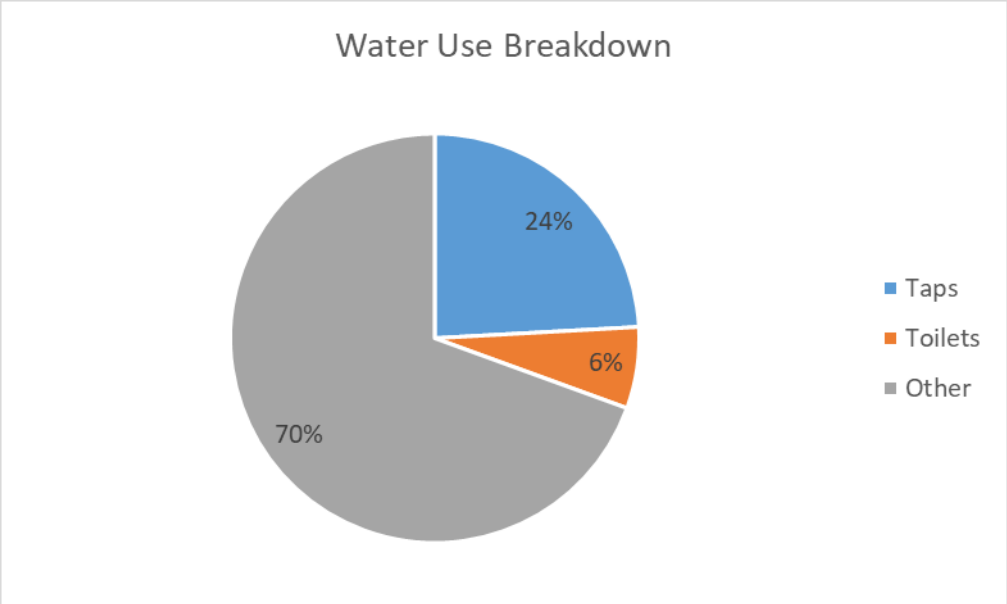


Figure 5.1.6 Water Use Breakdown

Based on the water use breakdown, taps accounts for 36% of building water consumption while other unmetered water use accounts for the 70% of the total building water consumption.

5.1.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Some of the existing air condition systems are over 15 years old and reaching the end of life. Rated efficiency of these units is below typical units available at present.
- Most interior lighting is LED with few CFL still present. These have been upgraded over the past few years.
- Electric storage and instantaneous hot water unit provides hot water to the building.
- Adequate daylight levels are available for some of the office areas and common corridors based on site observations.

Proposed:

- Replace existing split units with higher efficient system.
- Replace existing electric storage and instantaneous hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Replace existing taps with 5-star WELS taps.
- Install a rainwater harvesting system with a minimum capacity of 8kL and use harvested rainwater when available.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades is $44,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 13,000kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 821kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrades are around 7 years.

Table 5-1: Proposed emissions reduction opportunities

Ref.		Denmark Admin	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	7,200	2,300
EE2	Replace all interior non-LED with LED equivalent	120	40
EE3	Replace all exterior non-LED with LED equivalent	600	200
EE4	Heat Pump for hot water	4,400	1,400
EE5	Solar thermal system to feed hot water system	-	-
EE6	Daylight and motion sensor for lighting	700	200
EE7	Solar PV	-	-
EE8	Water heating reduction with efficient fixtures	-	-
Cost of Implementation			
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	470	1,290
WE2	Rainwater harvesting	350	950
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	25	25,400
EE2	Replace all interior non-LED with LED equivalent	-	100
EE3	Replace all exterior non-LED with LED equivalent	-	180
EE4	Heat Pump for hot water	2	9,900
EE5	Solar thermal system to feed hot water system	-	-
EE6	Daylight and motion sensor for lighting	10	1,500
EE7	Solar PV	-	-
EE8	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		$
WE1	Efficient water fixtures	-	2,000
WE2	Rainwater harvesting	2	4,800

5.1.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

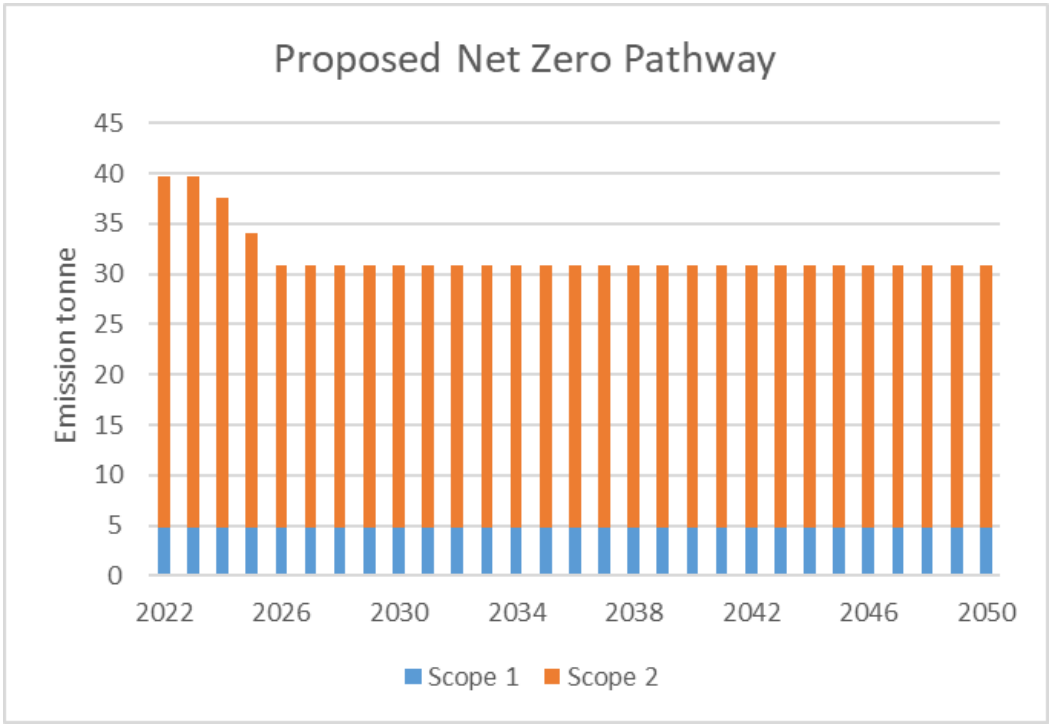


Figure 5.1.7 Proposed Net Zero Pathway for Denmark Shire Administration

5.2 Shire of Denmark Recreation Centre & McLean Oval

5.2.1 Site Observations

5.2.1.1 Introduction

5.2.1.1.1. Overview

Shire of Denmark Recreation Centre is multi-functional building and consists of below functional areas.

- Creche
- Offices
- Meeting Room
- Function Rooms
- Change Rooms
- Gym
- Under roof playing area

Mclean oval area contains a toilet and a small storage area as one block of building.

5.2.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Electrical plans

5.2.1.1.3. Operating Hours

Based on discussion with facility management operational hours are as follows.

- 8:00AM to 7:30PM From Monday - Friday

5.2.1.2 Heating Ventilation Air Conditioning (HVAC)

Gym, office, and meeting room are served by dedicated reverse cycle standalone Mitsubishi air conditioning units. Creche has only heating provided by wall mount ARLEC electric heater.

Function room consists with ceiling fans and playing area is provided with exhaust fans for ventilation.

5.2.1.2.1. Air Conditioning Systems

Gym has two split reverse cycle Mitsubishi air conditioning units each with 8.5kW of cooling capacity. Meeting room has another split reverse cycle Mitsubishi air conditioning unit with 8.5kW cooling capacity serving the area.

Office area is served with a smaller split reverse cycle Mitsubishi air conditioning with cooling capacity of 2.9kW.

Two Electric wall mounted ARLEC heating units each with a capacity of 2kW serve Creche. No cooling is provided to the area.

5.2.1.2.2. Ventilation Systems

the function room area is served by ceiling fans with a total of 8 fans installed in the area for air movement and comfort.

Under roof playing area consists of 4 exhaust fans mounted in the roof for air movement.

5.2.1.3 Building Fabric

Based on review of architectural drawings and considering standard practice at the time of construction, the wall are a combination of double brick cavity and steel framed walls while roof is steel framed with Colorbond sheeting and insulation under the roofing sheets.

5.2.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility. Lighting in the change rooms is sensor controlled. Lighting remains on throughout operational hours for most areas.

T8 fluorescent lighting with magnetic ballast is mostly used in facility with some compact fluorescent lighting (CFL) and LED lighting being introduced as replacement for existing lighting when they are non-functional.

Gym and playing area lighting is LED where LED high bay lights are used in the playing area.

McLean Oval is covered by 4 towers that consists of LED flood lights with 12 lights for two towers and 8 lights for others. There are different modes available to turn on the lights in the ground depending on its use.

5.2.1.5 Water

The recreation centre change rooms are consisting of 7 shower cubicles in total. In addition, multiple toilets, Aqua drop urinals and wash basins are available. The fixtures and tap ware used are not mentioned with any WELS ratings.

Two electric hot water units with a capacity of 3.6kW and 4.8kW provides hot water to the facility. The combined hot water storage capacity is 730L.

5.2.2 Energy Consumption Overview

The electricity for the sites is being supplied by the grid.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

5.2.2.1 Periodic Breakdown (Recreation Centre)

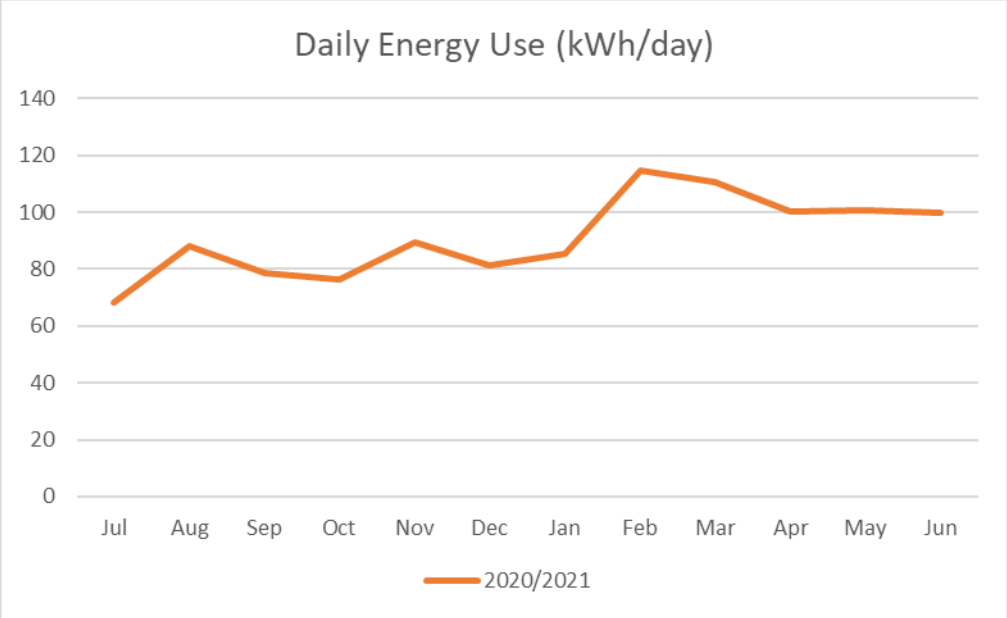


Figure 5.2.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 70 to 115 kWh as per above chart. The electrical consumption has increased over time and peaked consumption in month of February 115kWh.

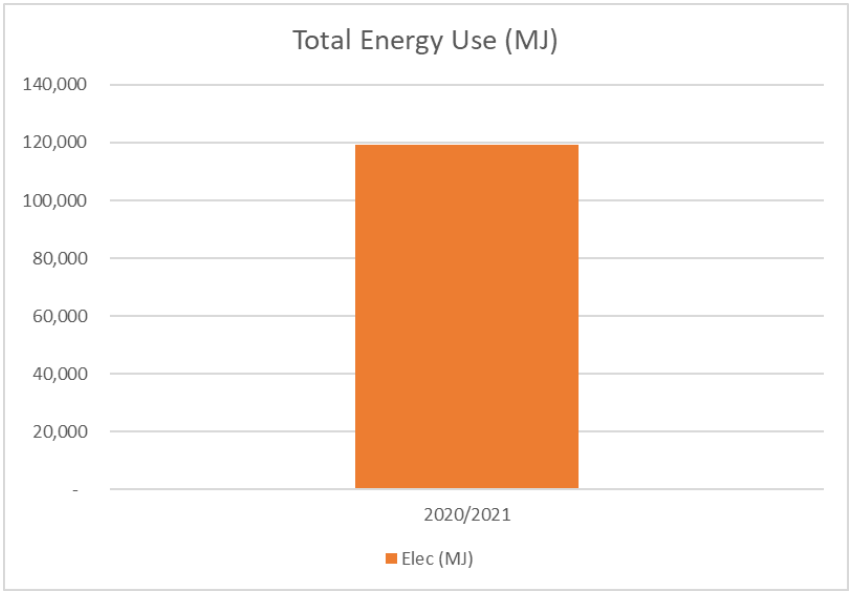


Figure 5.2.2 Total Energy use over several years

Total electrical energy usage of the site for year 2020/2021 is around 119,000MJ.

5.2.2.2 Periodic Breakdown (McLean Park)

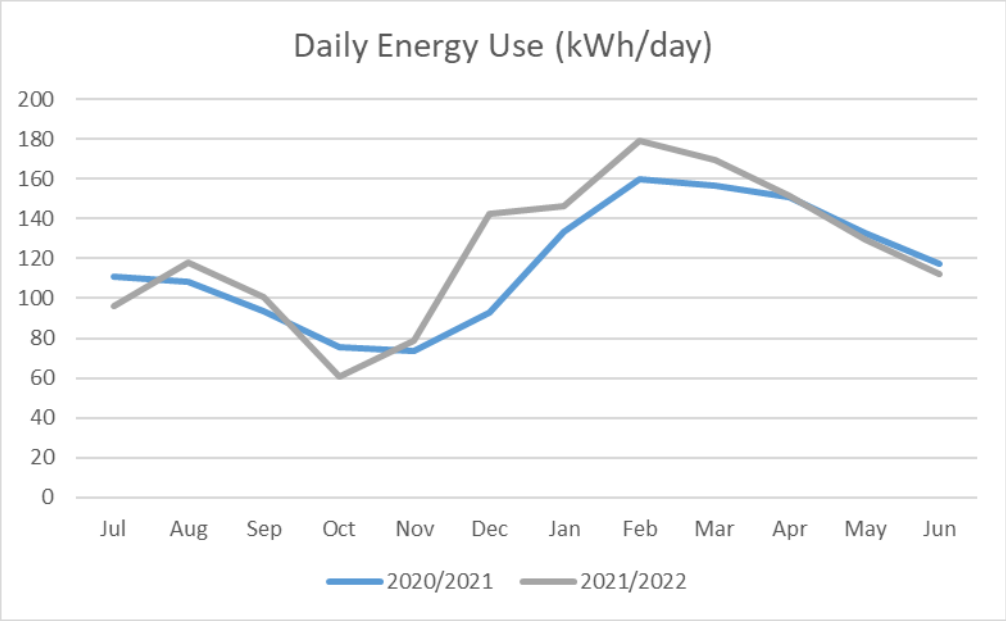


Figure 5.2.3 Daily electricity consumption for various years

Daily electrical energy consumption varies between 60 to 180 kWh as per above chart. The peak electrical consumption in month of January/February 180kWh.

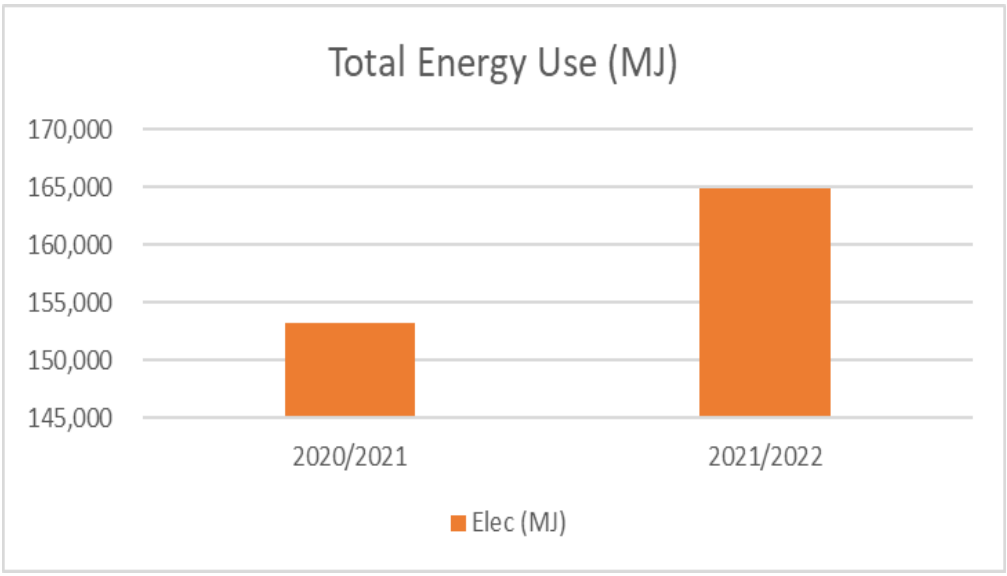


Figure 5.2.4 Total Energy use over several years

Total electrical energy usage of the site has increased by 7.6% from year 2020/2021 to 2021/2022. The low consumption in year 2020/2021 may be due to low occupancy.

5.2.2.3 End User break Down (Recreation Centre)

Cundall have reviewed the Denmark Recreation Centre energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

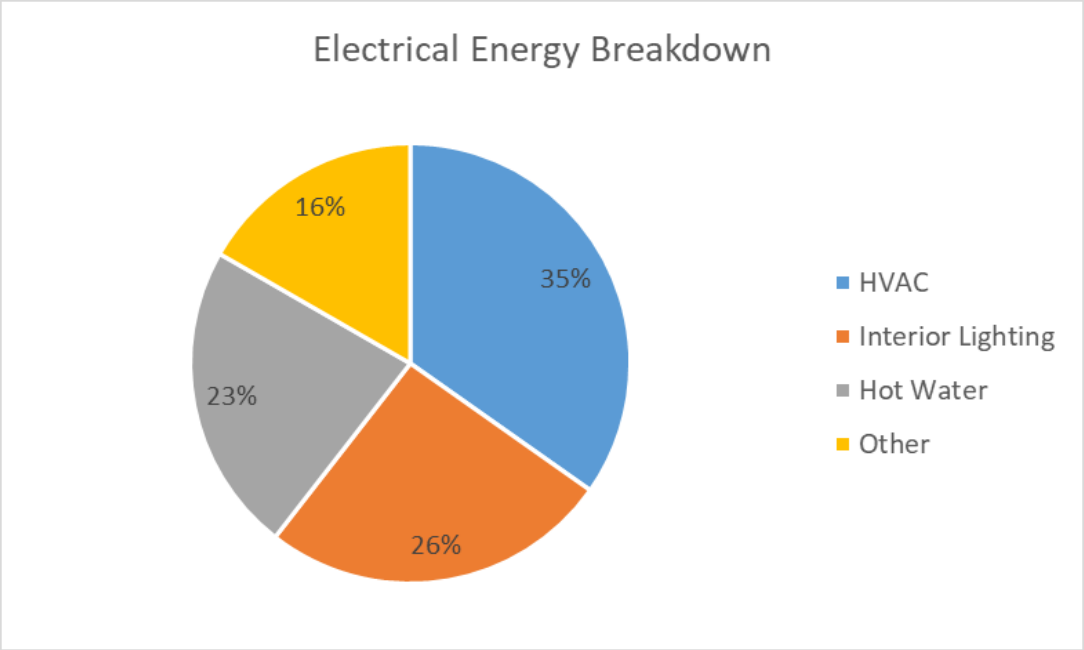


Figure 5.2.5 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 35% of site energy consumption which is the highest, while Interior lighting energy use accounts for 26% and closely followed by hot water generation energy consumption at 23%.

5.2.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

5.2.3.1 Periodic Breakdown

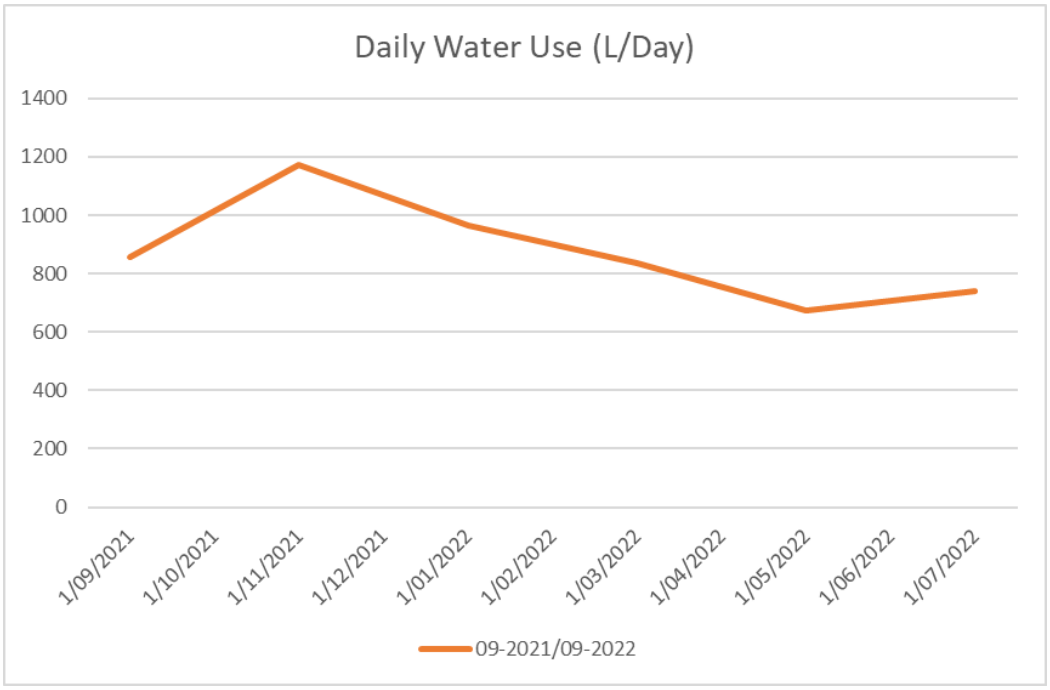


Figure 5.2.6 Daily water consumption for various years

Daily water consumption varies between 650L to 1,200L as per above chart. Higher water consumption in months of October.

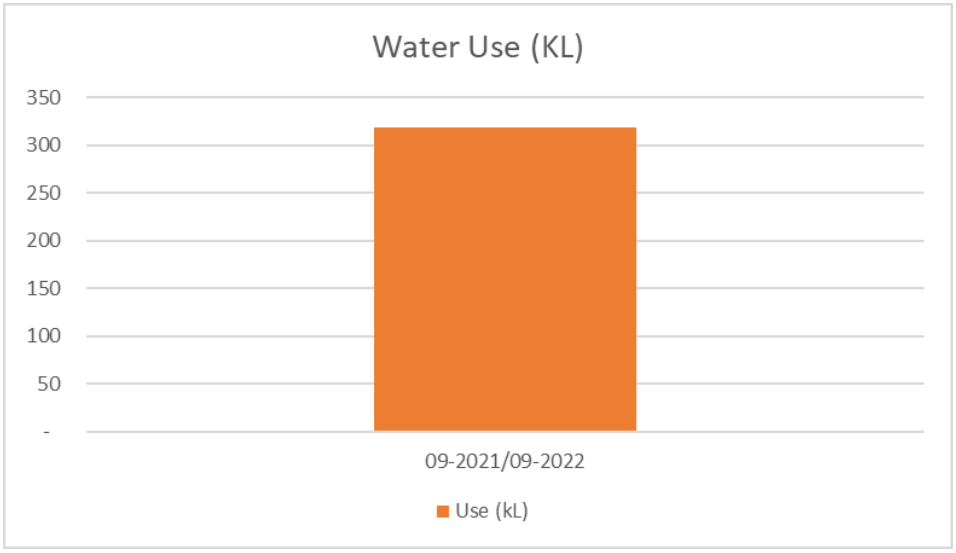


Figure 5.2.7 Annual water consumption over several years

Total of 318kL of water was used for the facility during the period of 09-2021 to 09-2022.

5.2.3.2 End User break Down

Cundall have reviewed the recreation centre Denmark water use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

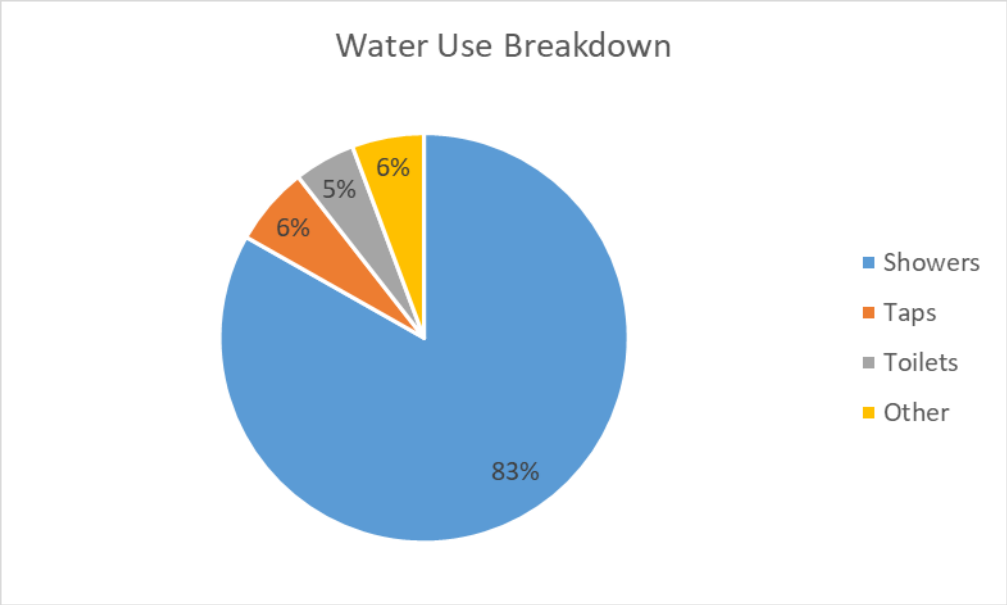


Figure 5.2.8 Water Use Breakdown

Based on the water use breakdown, showers accounts for 83% of building water consumption.

5.2.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Some of the existing air condition systems are over 10 years old. Rated efficiency of these units is below typical units available at present.
- Electric heating system is available for the crèche area.
- A combination of T8 fluorescent, CFL and LED lighting was noted in the current lighting system.
- Electric storage hot water units provide hot water to the building.
- Adequate daylight levels are available for underroof playing area based on site observations.

Proposed:

- Replace existing split units with higher efficient system or consider a VRF system combining units where possible.
- Replace electric heating systems with reverse cycle air conditioning system.
- Replace T8 and CFL lighting with efficient LED lighting.
- Replace existing electric storage hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Install a 15kW Solar PV system and battery backup.
- Replace existing showers with 3-star WELS 7.5L per minute showers and taps with 5-star WELS taps.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.
- Roof has the load bearing capacity for solar PV.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades are $146,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 35,800kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 137kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrade is around 13 years.

Table 5-2: Proposed emissions reduction opportunities

Ref.		McLean Oval	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	2,100	550
EE2	Replace all interior non-LED with LED equivalent	1,700	450
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	3,800	1,000
EE5	Solar thermal system to feed hot water system	1,000	300
EE6	Daylight and motion sensor for lighting	1,500	400
EE7	Solar PV	25,200	6,700
EE8	Water heating reduction with efficient fixtures	500	150
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	140	400
WE2	Rainwater harvesting	350	1000
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	30	29,500
EE2	Replace all interior non-LED with LED equivalent	-	4,000
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	2	22,400
EE5	Solar thermal system to feed hot water system	2	10,000
EE6	Daylight and motion sensor for lighting	4	600
EE7	Solar PV	15kW	72,000
EE8	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		
WE1	Efficient water fixtures	-	2,900
WE2	Rainwater harvesting	2	4,800

5.2.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

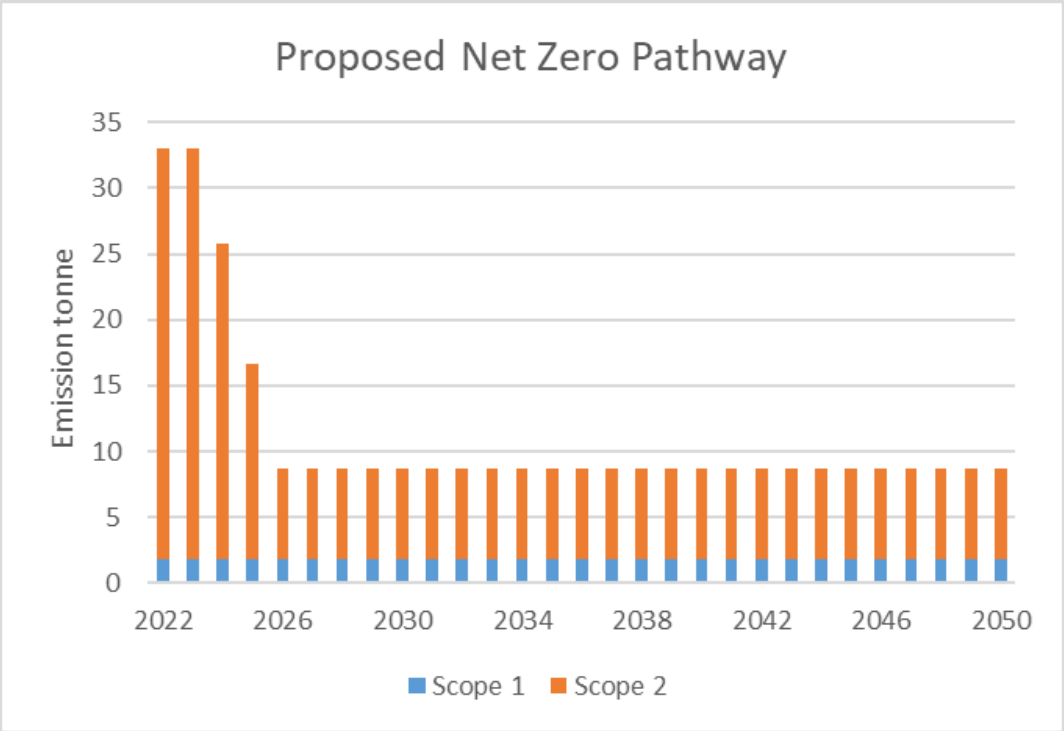


Figure 5.2.9 Proposed Net Zero Pathway for Denmark Rec Centre

5.3 Shire of Denmark Depot building

5.3.1 Site Observations

5.3.1.1 Introduction

5.3.1.1.1. Overview

Denmark depot is consisting of multiple buildings and workshops. The list of main buildings is below.

- Office
- Crib
- workshop
- machinery
- Kennels
- Nursery

5.3.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data

5.3.1.1.3. Operating Hours

Based on discussion with facility management operational hours are as follows.

- 7:30AM to 4:30PM From Monday - Friday

5.3.1.2 Heating Ventilation Air Conditioning (HVAC)

Multiple areas in office and crib room served by dedicated reverse cycle standalone Fujitsu air conditioning units of similar cooling capacity.

All other areas are naturally ventilated.

5.3.1.2.1. Air Conditioning Systems

There are four reverse cycle Fujitsu air conditioning units with a cooling capacity of 2.6kW serves multiple areas of the office.

There is one off TECO wall mounted air conditioner serving the crib room with a cooling capacity of 3.4kW.

5.3.1.3 Building Fabric

Based on observation made at site, the wall are a combination of double brick cavity and steel framed walls while roof is steel framed with Colorbond sheeting and insulation under the roofing sheets.

5.3.1.4 Lighting & Control System

Lighting control is manual in the facility. Lighting remains on throughout operational hours for most areas.

T8 fluorescent lighting with magnetic ballast is mostly used in facility with some LED lighting being introduced as replacement for existing lighting when they are non-functional.

Workshops contain mixture of LED and Metal-Halide high bay lights. Out of 8 high bay lights 6 are LED and 2 are Metal-Halide.

5.3.1.5 Water

The depot building consists of office kitchen area, shower cubicles and multiple toilets with wash basins. The fixtures and tap ware used are not mentioned with any WELS ratings.

Two electric hot water units with a capacity of 2.4kW and 3.6kW provides hot water to the facility. The combined hot water storage capacity is 75L.

There are other activities on site with major water consumptions like wash downs, irrigation, and fire truck fillings.

5.3.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

5.3.2.1 Periodic Breakdown

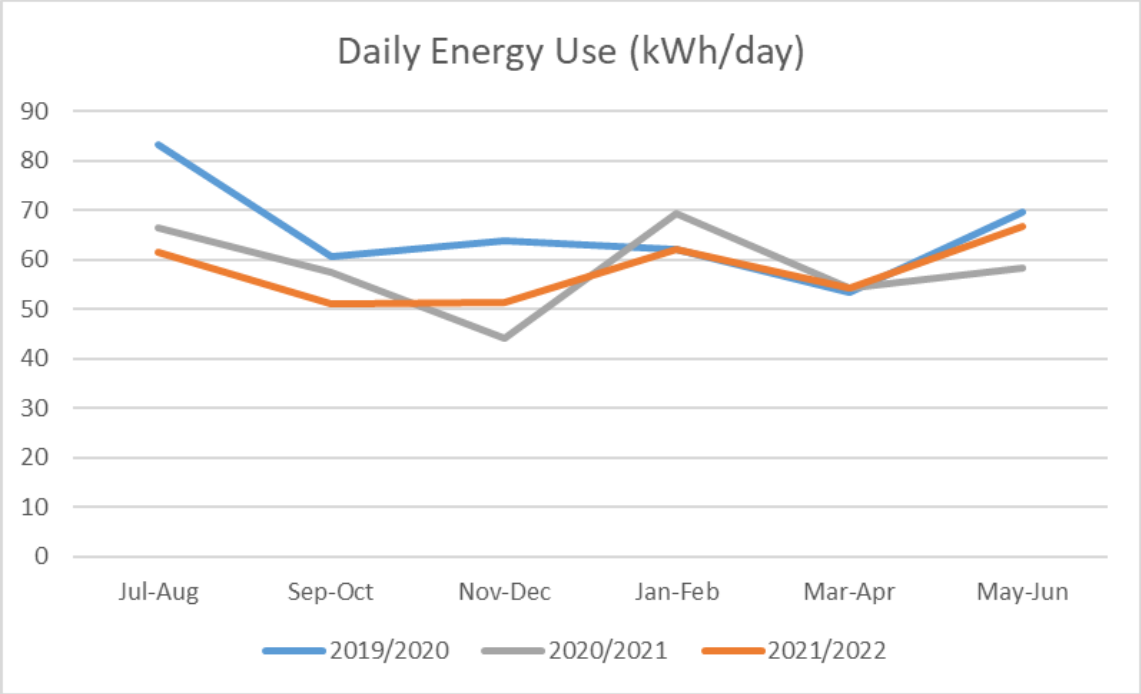


Figure 5.3.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 45 to 85 kWh as per above chart. Highest energy consuming months are in winter indicating the heating energy to be a significant contributor in facility energy consumption.

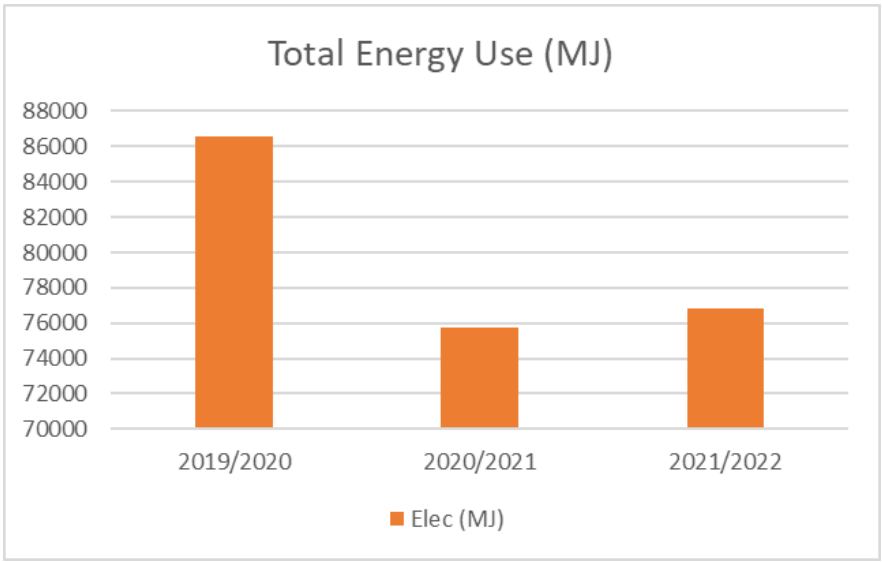


Figure 5.3.2 Total Energy use over several years

The energy consumption is low in year 2020 may be due to low occupancy levels and slight increment of 1.4% from year 2020/2021 to 2021/2022.

5.3.2.2 End User Break Down

Cundall have reviewed the Denmark Depot energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2021/2022.

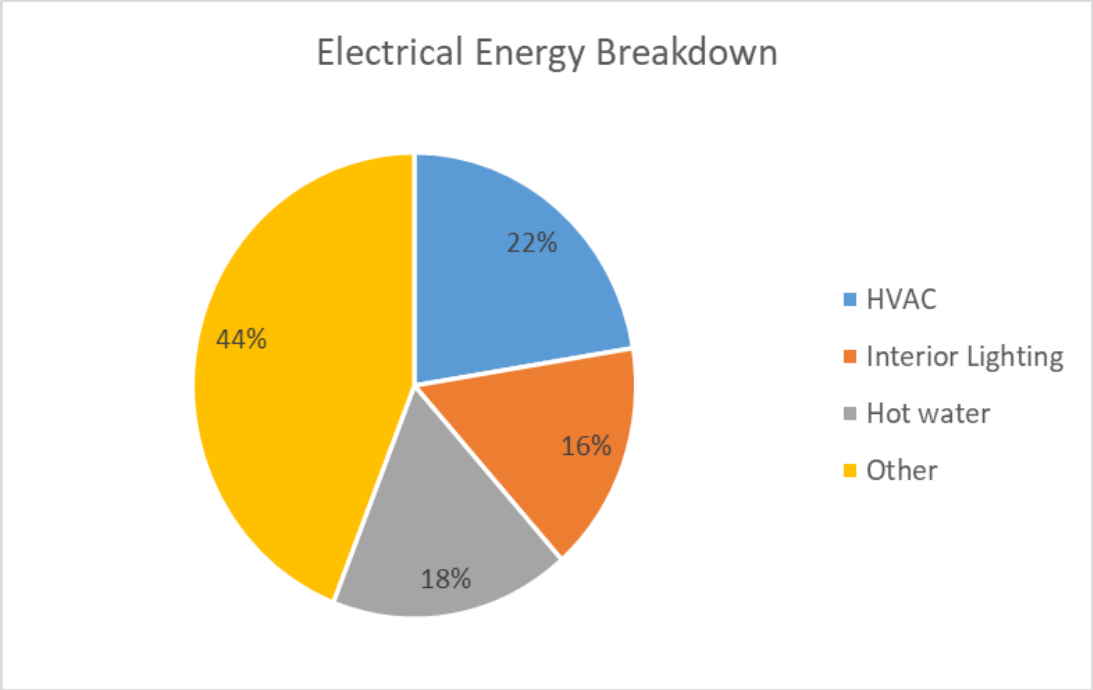


Figure 5.3.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 22% of site energy consumption and other unmetered loads accounts for 44% of the energy consumption which is the highest. This includes the power consumed in workshops for machinery operations, freezers, Fridge etc.

5.3.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

5.3.3.1 Periodic Breakdown

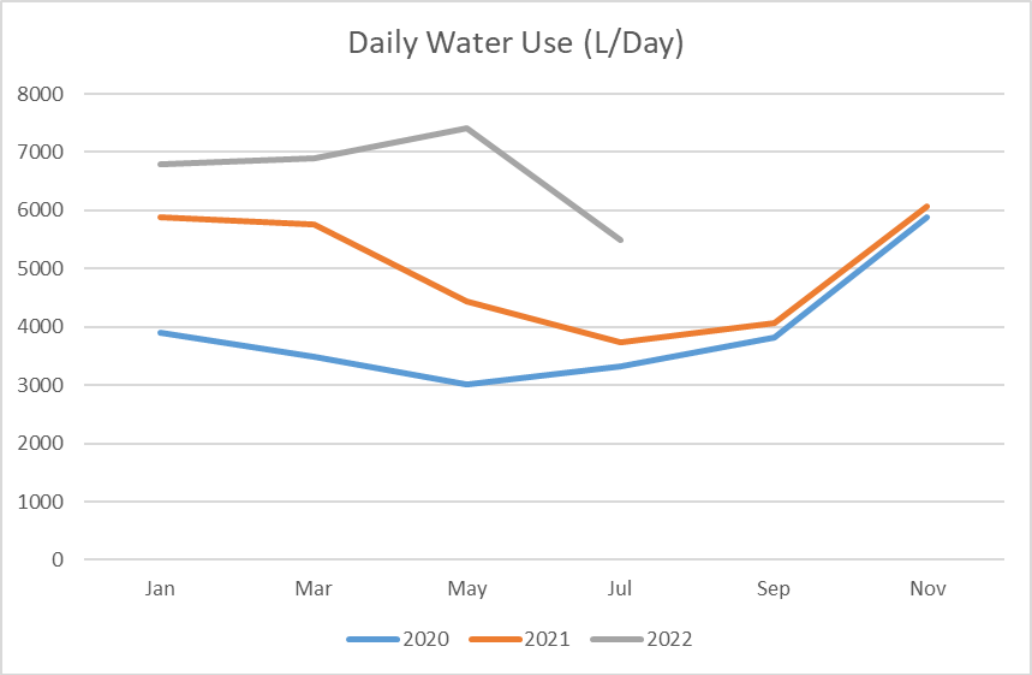


Figure 5.3.4 Daily water consumption for various years

Daily water consumption varies between 3,000L to 7,400L as per above chart. Higher water consumption in months of summer.

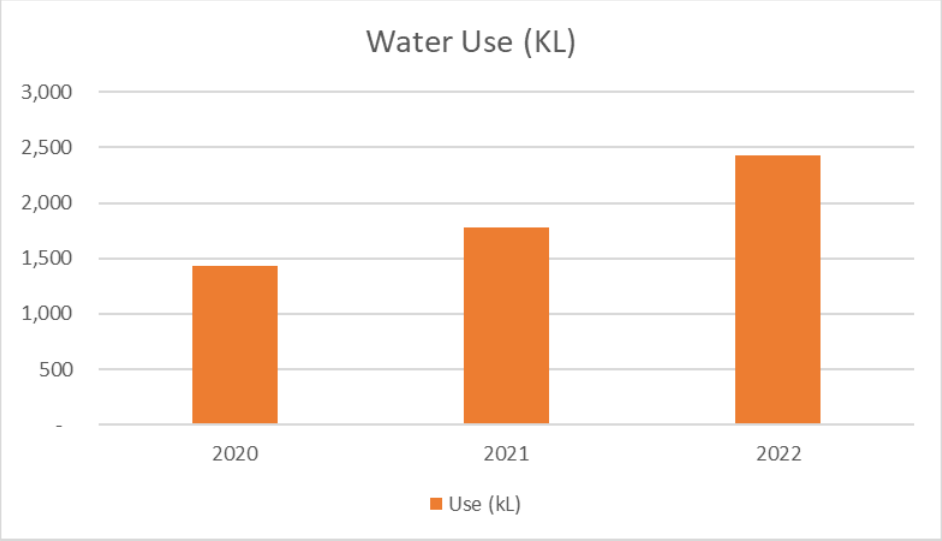


Figure 5.3.5 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is an increase in water consumption year over year from 2020 and it is expected be around 36% year over year increment from 2021 to 2022.

5.3.3.2 End User break Down

Cundall have reviewed the Depot Denmark water use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

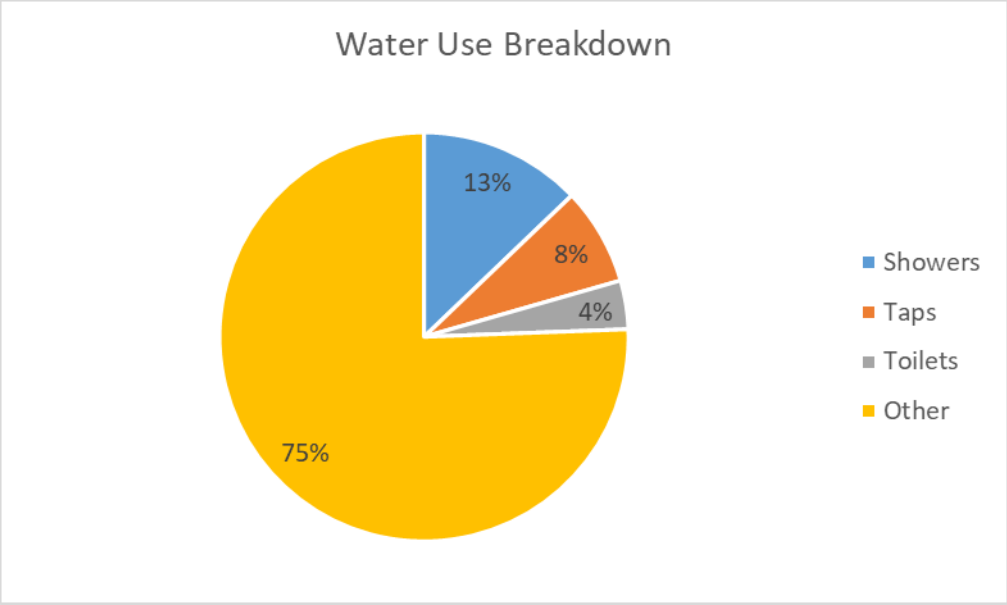


Figure 5.3.6 Water Use Breakdown

Based on the water use breakdown, showers accounts for 13% of building water consumption while other unmetered water use accounts for the 75% of the total building water consumption.

5.3.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Some of the existing air condition systems are over 15 years old. Rated efficiency of these units is below typical units available at present.
- A combination of T8 fluorescent, high bay metal halide (or similar) and LED lighting was noted in the current lighting system.
- Electric storage hot water units provide hot water to the building.
- Adequate daylight levels are available for some of the underroof working areas based on site observations.

Proposed:

- Replace existing split units with higher efficient system or consider a VRF system combining units where possible.
- Replace electric heating systems with reverse cycle air conditioning system.
- Replace T8 and high bay lighting with efficient LED lighting.
- Replace existing electric storage hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Install a 10kW Solar PV system and battery backup.
- Replace existing showers with 3-star WELS 7.5L per minute showers and taps with 5-star WELS taps.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.
- Roof has the load bearing capacity for solar PV.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades are $79,900.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 23,000kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 140kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrade is around 11 years.

Table 5-3: Proposed emissions reduction opportunities

Ref.		Denmark Depot	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	2,180	570
EE2	Replace all interior non-LED with LED equivalent	1,100	300
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	2,700	700
EE5	Solar thermal system to feed hot water system	-	-
EE6	Daylight and motion sensor for lighting	450	100
EE7	Solar PV	16,800	4,400
EE8	Water heating reduction with efficient fixtures	300	70
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	140	375
WE2	Rainwater harvesting	350	1000
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	14	13,800
EE2	Replace all interior non-LED with LED equivalent	-	700
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	2	9,900
EE5	Solar thermal system to feed hot water system	-	-
EE6	Daylight and motion sensor for lighting	8	1,200
EE7	Solar PV	10kW	48,000
EE8	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		
WE1	Efficient water fixtures	-	1,480
WE2	Rainwater harvesting	2	4,800

5.3.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

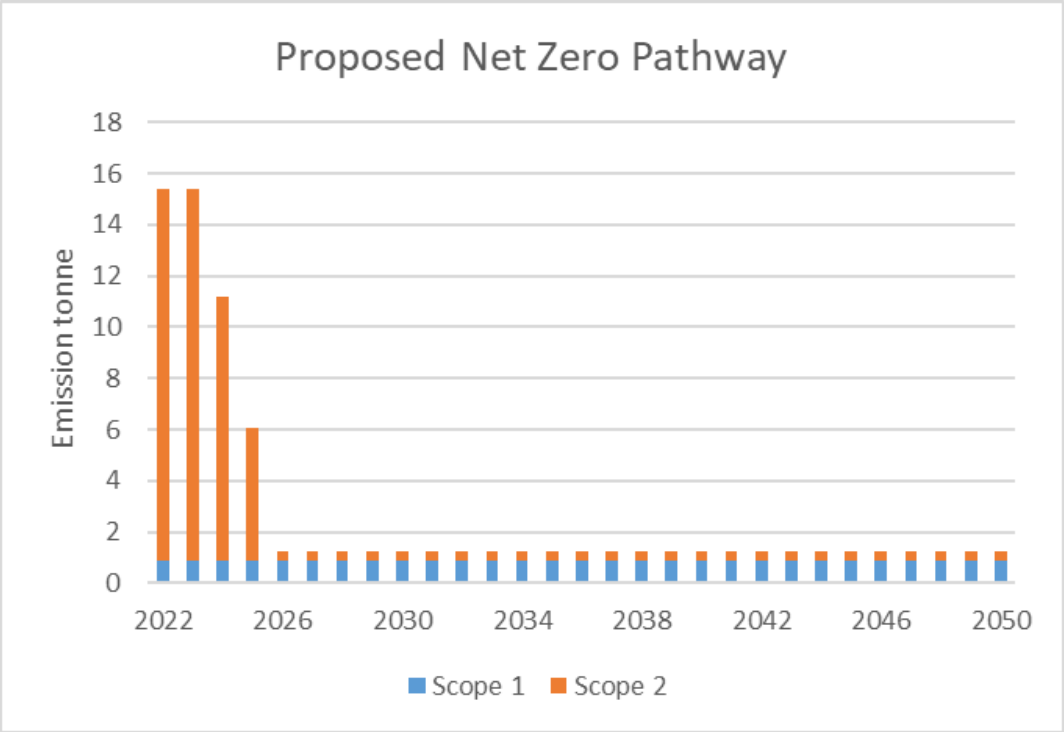


Figure 5.3.7 Proposed Net Zero Pathway for Denmark Depot

6.0 City Of Albany

6.1 Vancouver Arts Centre – Albany

6.1.1 Site Observations

6.1.1.1 Introduction

6.1.1.1.1. Overview

Vancouver Arts Centre includes multiple buildings and multifunctional spaces and consists of below functional areas.

- Offices
- Workshops and studios
- Galleries
- Kitchen
- Meeting rooms
- Artist accommodation rooms

6.1.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Mechanical plans

6.1.1.1.3. Operating Hours

Based on discussion with facility management, typical operation hours are 8AM to 5PM Monday to Friday for the office.

Studios are operation 24x7 and to be used as required.

6.1.1.2 Heating Ventilation Air Conditioning (HVAC)

All airconditioned areas are served by reverse cycle split air condition units. There is a combination of ducted, wall mounted split and ceiling cassette units serving indoor conditioned spaces.

Toilets and kitchen areas are provided with exhaust system for ventilation purposes.

6.1.1.2.1. Air Conditioning Systems

Gallery area, performance studio and gallery annex areas are served by Daikin ducted air conditioning systems with a total capacity of 45kW. Ceiling cassette units are serving part of gallery annex, library, meeting room, admin, office, and studios with a total cooling capacity of 20kW. Wall split units are serving gather, studio, and general-purpose area with a total cooling capacity of 14kW.

6.1.1.2.2. Ventilation Systems

Toilets and kitchen areas are served by separate exhaust systems.

6.1.1.3 Building Fabric

Based on observation made at site, the walls are a combination of limestone, double brick cavity and steel framed walls while roof is timber framed with wood shingles for the main building and Colorbond sheeting for annex buildings.

6.1.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility with sensor control lighting for toilets and service areas. T8 fluorescent lighting, CFL and LED tubes and downlights are mostly used in facility.

6.1.1.5 Water

There are multiple showers, water closets, urinals, and wash basins available. No records of WELS rating are available for water fixtures used at site. There is only one shower used on a regular basis.

Gas hot water unit provides hot water to the buildings.

6.1.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid. There is a gas supply to the site with gas being primarily used for hot water and cooking.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

6.1.2.1 Periodic Breakdown

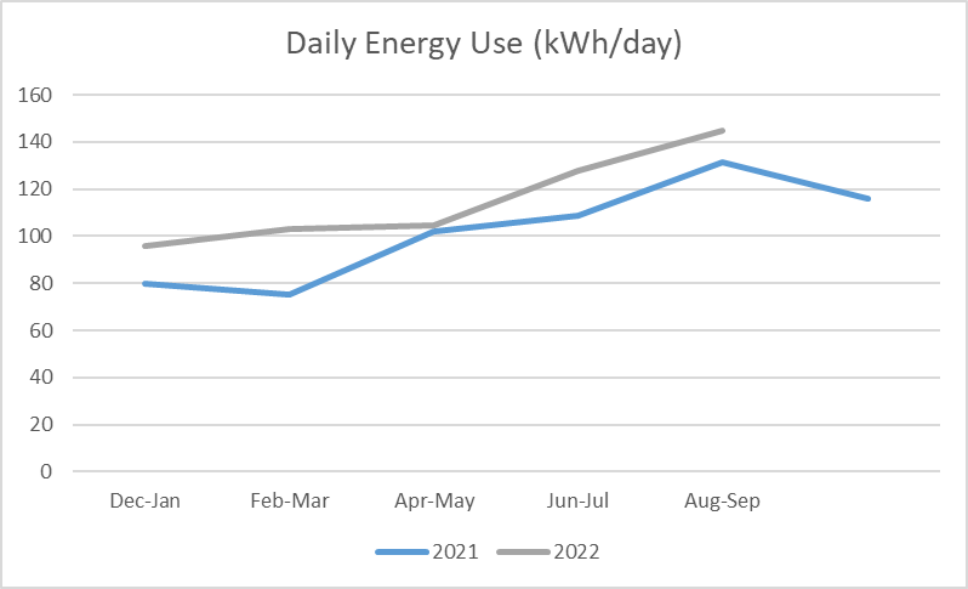


Figure 6.1.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 75 to 145 kWh as per above chart. Highest energy consuming months are in winter indicating the heating energy used, to be a significant contributor in facility energy consumption.

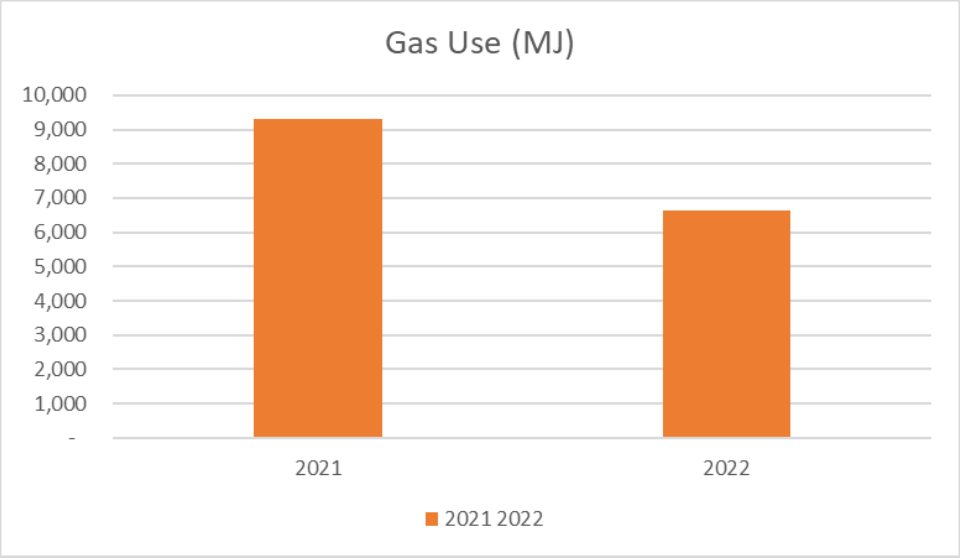


Figure 6.1.2 Annual natural gas consumption over several years

Gas energy use has gradually dropped from 2021 to 2022. Average reduction of 29% year over year.

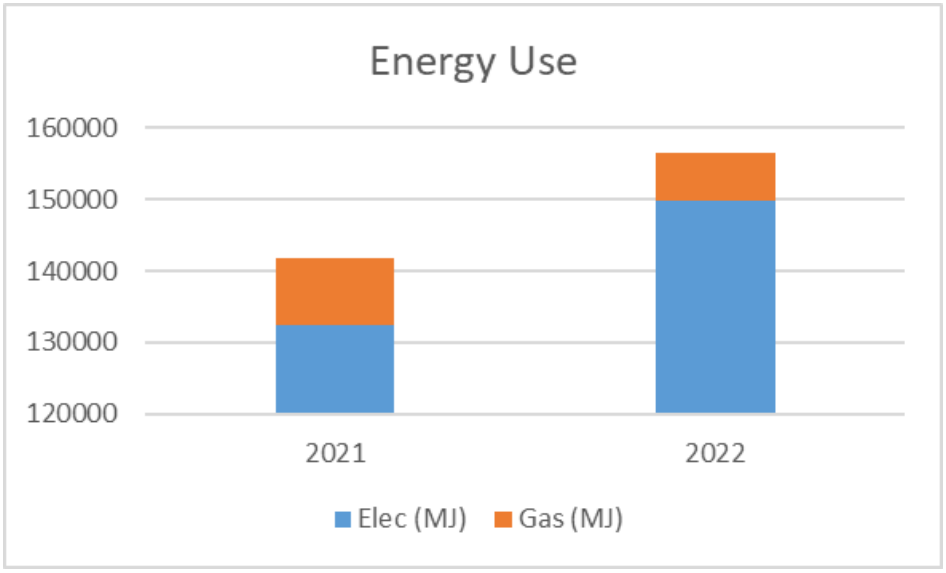


Figure 6.1.3 Total Energy use over several years

Total Energy usage of the site has increased around 10% From year 2021 to 2022. The gas consumption has reduced, and electrical energy has increased year over year.

6.1.2.2 End User break Down

Cundall have reviewed the Vancouver Arts Centre Energy Use based on data provided and onsite observations. Following energy breakdown charts are based on data collected and onsite observations for year 2022.

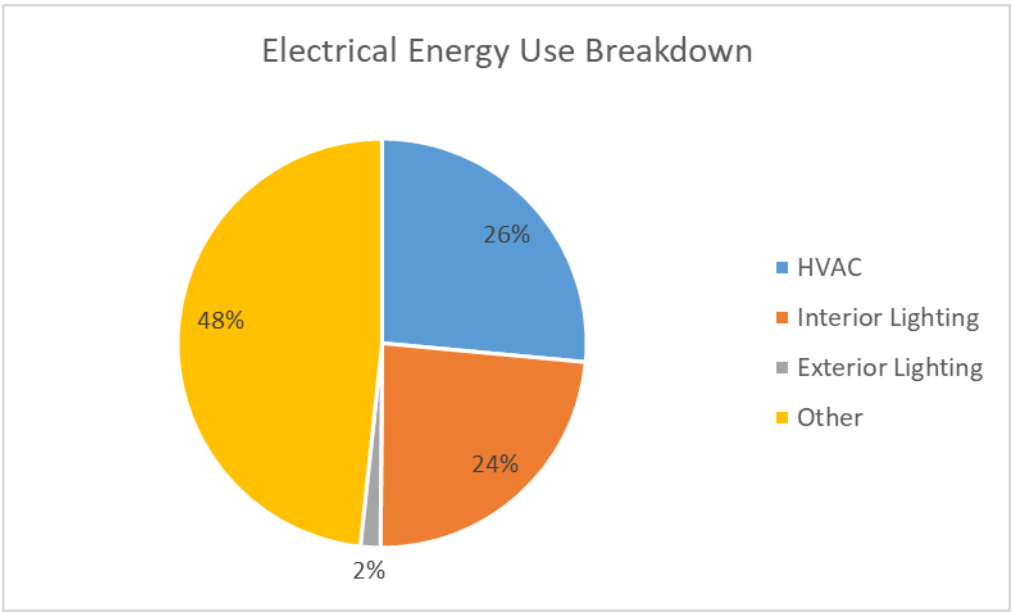


Figure 6.1.4 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) energy use accounts for 26% of building energy consumption while Interior lighting accounts for 24%. Other unmetered loads accounts for the 48% of the building energy consumption.

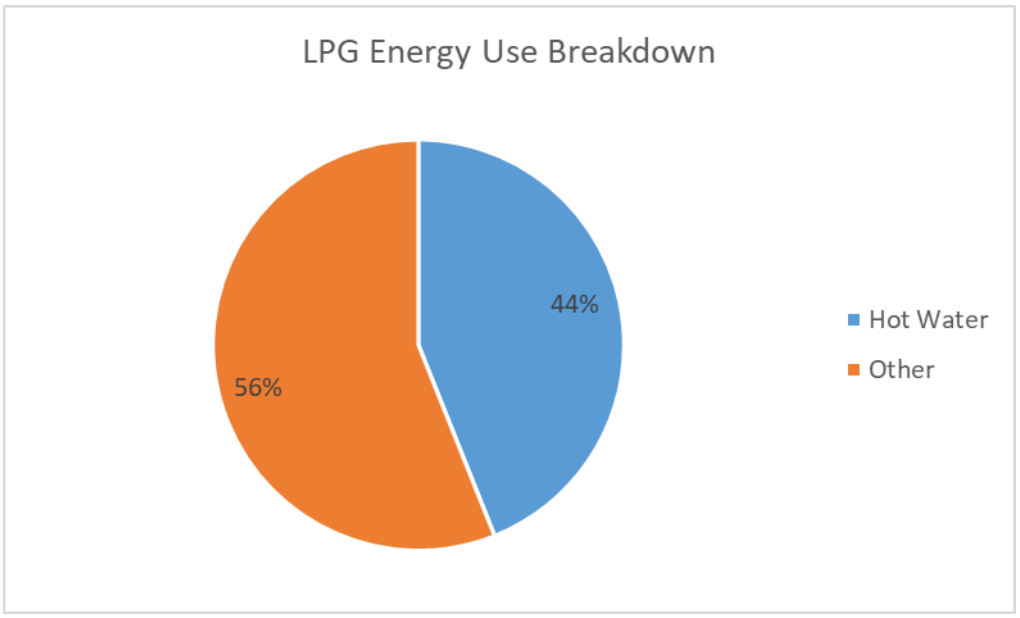


Figure 6.1.5 LPG Energy Use Breakdown

Based on the gas energy use breakdown, hot water use accounts for 44% of building energy consumption and other unmetered loads include single gas heater as well.

6.1.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

6.1.3.1 Periodic Breakdown

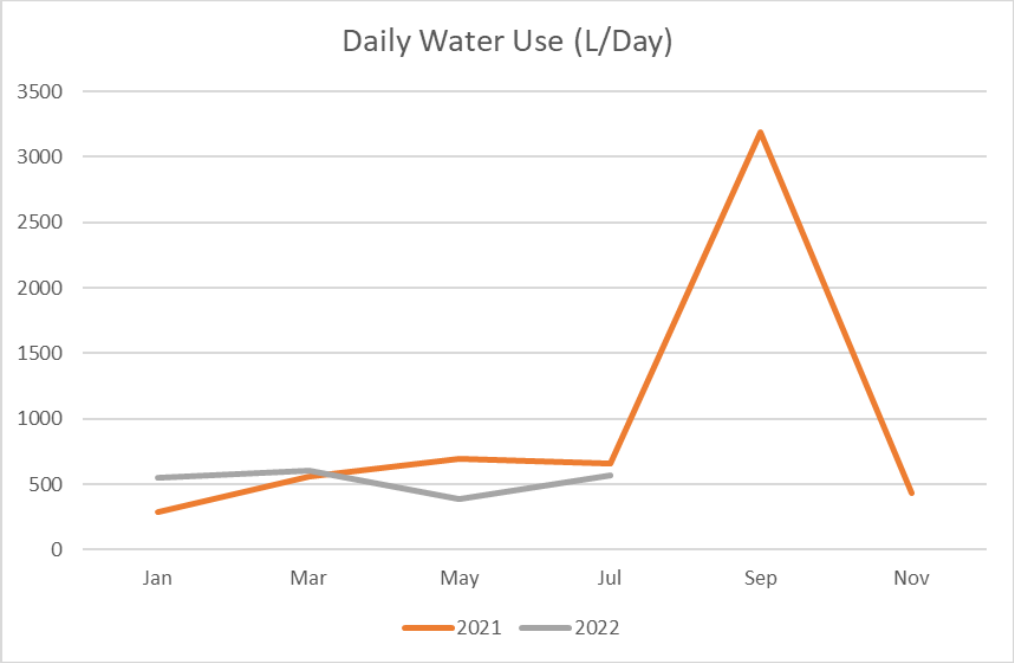


Figure 6.1.6 Daily water consumption for various years

Daily water consumption varies between 275L to 700L as per above chart. There is one anomaly in the month of September in 2021.

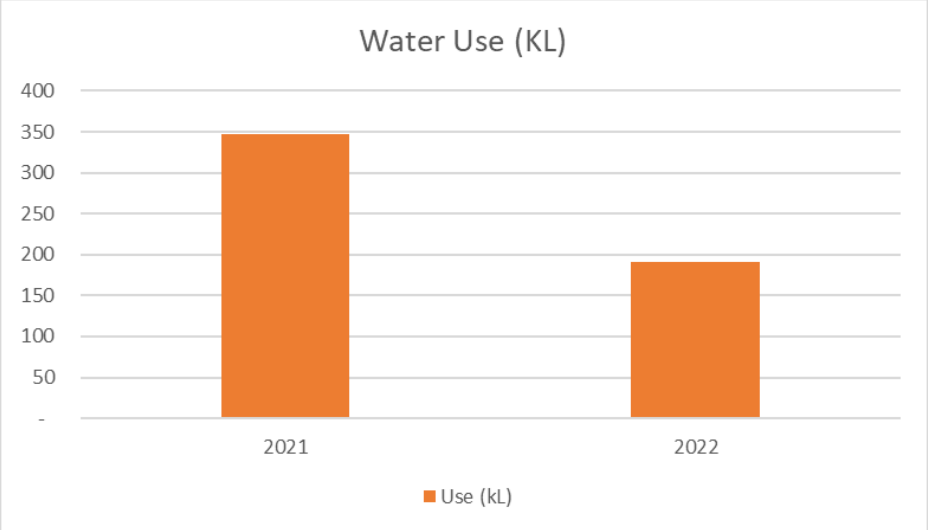


Figure 6.1.7 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is a decrease in water consumption year over year from 2021 to 2022.

6.1.3.2 End User break Down

Cundall have reviewed the Vancouver Art Centre water use based on data provided and onsite observations. Following water use breakdown charts are based on data collected and onsite observations for year 2022.

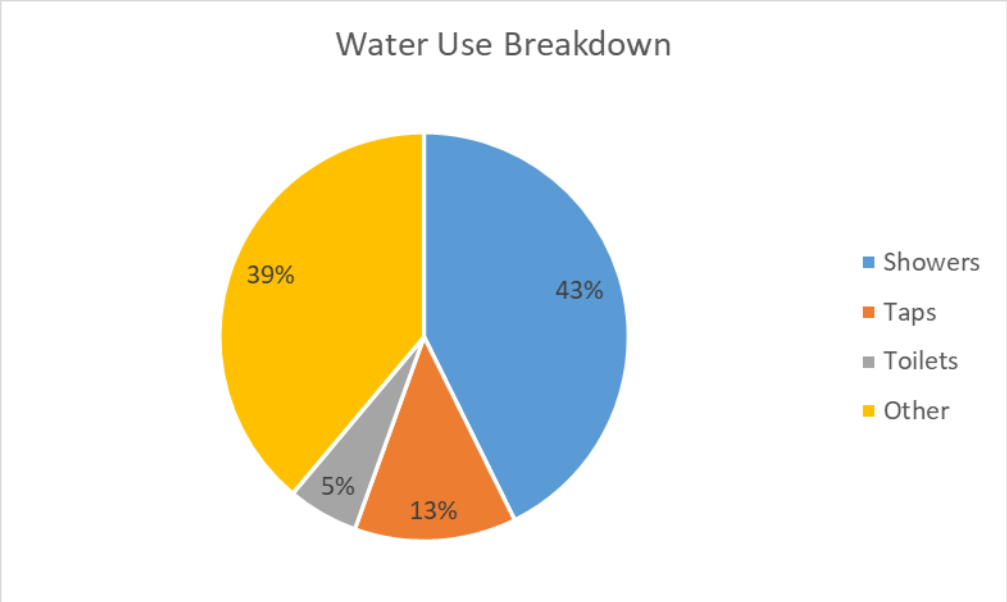


Figure 6.1.8 Water Use Breakdown

Based on the water use breakdown, showers accounts for 43% of building water consumption while other unmetered water use accounts for the 39% of the total building water consumption.

6.1.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- A combination of T8 fluorescent, CFL and LED lighting was noted in the current lighting system.
- Gas instantaneous hot water unit provides hot water to the building.
- Adequate daylight levels are available for some of the areas based on site observations.

Proposed:

- Replace T8 and CFL lighting with efficient LED lighting.
- Replace existing gas hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Install a 12.2kW Solar PV system with battery backup.
- Replace existing showers with 3-star WELS 7.5L per minute showers and taps with 5-star WELS taps.
- Install a rainwater harvesting system with a minimum capacity of 4kL and use harvested rainwater when available.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.
- Roofs have the load bearing capacity for solar PV.
- During the discussion with the local council team, it has been confirmed that the roof of this building consists of wood shingle tiles therefore unsuitable for installation of large solar PV system, as this would damage the tiles and impede the heritage aspect. It has also been confirmed that a previous report suggests that 12.2kW system could be fitted to buildings with metal roof facing the road.
- Water from rainwater harvesting system is proposed for irrigation purposes only.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades are $73,300.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 24,700kWh of electrical energy and 2,900MJ of gas energy per annum.
- It is expected the water efficiency measures will save 91kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrade is around 10 years.

Table 6-1: Proposed emissions reduction opportunities

Ref.		Art Centre	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	-	-
EE2	Replace all interior non-LED with LED equivalent	3,700	975
EE3	Replace all exterior non-LED with LED equivalent	300	80
EE4	Heat Pump for hot water	800	200
EE5	Daylight and motion sensor for lighting	450	100
EE6	Solar PV	21,000	5,600
EE7	Water heating reduction with efficient fixtures	200	50
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	50	200
WE2	Rainwater harvesting	40	200
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	-	-
EE2	Replace all interior non-LED with LED equivalent	-	1,700
EE3	Replace all exterior non-LED with LED equivalent	-	100
EE4	Heat Pump for hot water	1	4,950
EE5	Daylight and motion sensor for lighting	8	1,200
EE6	Solar PV	25kW	60,000
EE7	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		
WE1	Efficient water fixtures	-	2,900
WE2	Rainwater harvesting	1	2,400

6.1.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets. The Scope 2 emissions are not included since 100% renewable energy is purchased through power purchase agreement.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

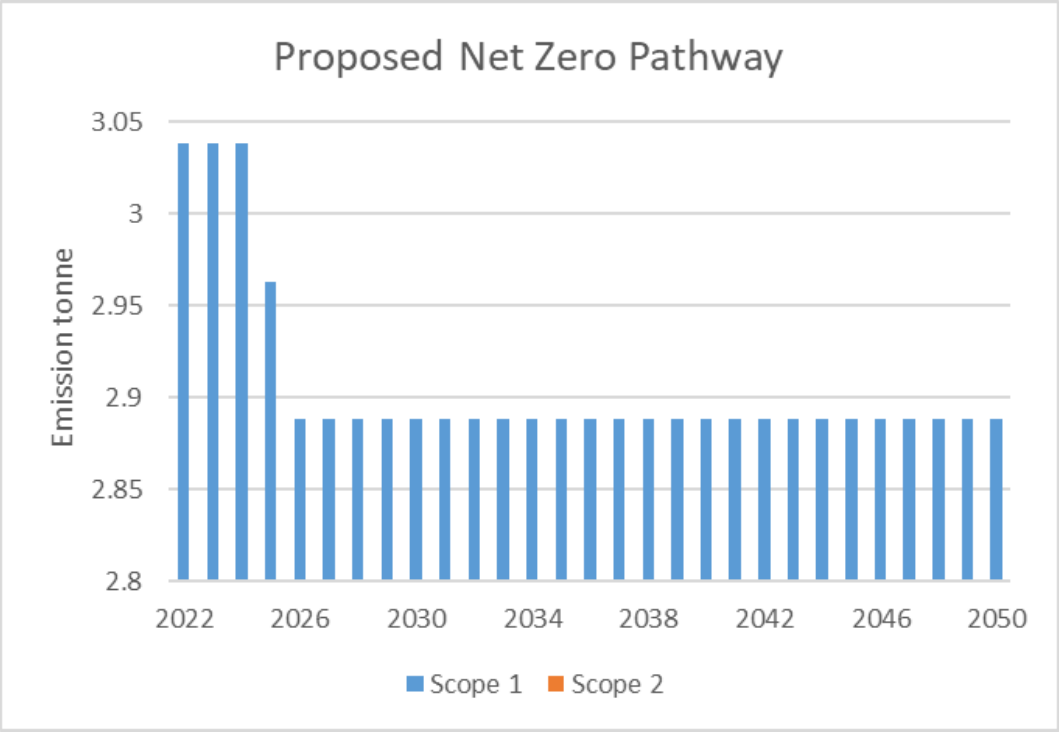


Figure 6.1.9 Proposed Net Zero Pathway for Vancouver Arts Centre

6.2 Depot at Mercer Road Albany

6.2.1 Site Observations

6.2.1.1 Introduction

6.2.1.1.1. Overview

The Mercer Rd Depot consists of multiple buildings and workshops, as listed below:

- Administration Building
- Engineering Offices and assets
- Training Room
- Mechanical Workshop
- Carpenters Workshop
- Signs and works shed
- Seedling
- Multiple sheds

6.2.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans

6.2.1.1.3. Operating Hours

Based on discussion with facility management operational hours are as follows.

- 7:30AM to 4:30PM From Monday – Friday
- Workshops - 6:30AM to 4:30PM From Monday – Friday
- Reserves Area - 6:30AM to 3:30PM From Monday – Friday (during Summer Months)

6.2.1.2 Heating Ventilation Air Conditioning (HVAC)

Multiple areas in offices and training room served by dedicated reverse cycle air conditioning units.

The air conditioning units are of various brands and different cooling capacities. All other areas are naturally ventilated.

6.2.1.2.1. Air Conditioning Systems

The administration building is served by Mitsubishi reverse cycle air conditioner with a cooling capacity of 15kW which is the largest unit on site. Other office areas are served with Daikin, Fujitsu, Kelvinator branded split units where cooling capacities are varying between 2kW-4kW.

6.2.1.3 Building Fabric

Based on observation made at site, the walls are a combination of double brick cavity and steel framed walls while roof is steel framed with Colorbond sheeting.

6.2.1.4 Lighting & Control System

Lighting control is manual in the facility. Lighting remains on throughout operational hours for most areas.

T8 fluorescent lighting with magnetic ballast is mostly used in facility with some compact fluorescent lighting (CFL) and LED lighting being introduced as replacement for existing lighting when they are non-functional.

Workshops and sheds contain mixture of T8 fluorescent lighting with magnetic ballast and Metal-Halide high bay lights. There are 14 Metal-Halide and 35 dual T8 fluorescent lighting across the workshops and sheds.

External lighting is provided with 6 flood lights in the facility. Out of 6 flood lights 2 are LED and other 4 are sodium flood lights.

6.2.1.5 Power Purchase Agreement

It has been confirmed that this building has entered into a power purchase agreement with 100% renewable energy from 1 April 2022. Hence all electricity consumption on site since this date will have zero emissions. However, our analysis has also investigated reducing site energy intensity (kWh/m^2).

6.2.1.6 Water

The depot building consists of office kitchen area, shower cubicles, multiple toilets with wash basins and Aqua drop urinals. The fixtures and tap ware used are not labelled with any WELS ratings.

Electric hot water unit with a capacity of 3.6kW provides hot water to the facility and hot water storage capacity is 250L.

There are other activities on site with major water consumptions like wash downs, city wide irrigation from trucks and firefighting which is not metered separately.

6.2.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid and 20kWp solar PV generation installed on the depot administration building.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

6.2.2.1 Periodic Breakdown

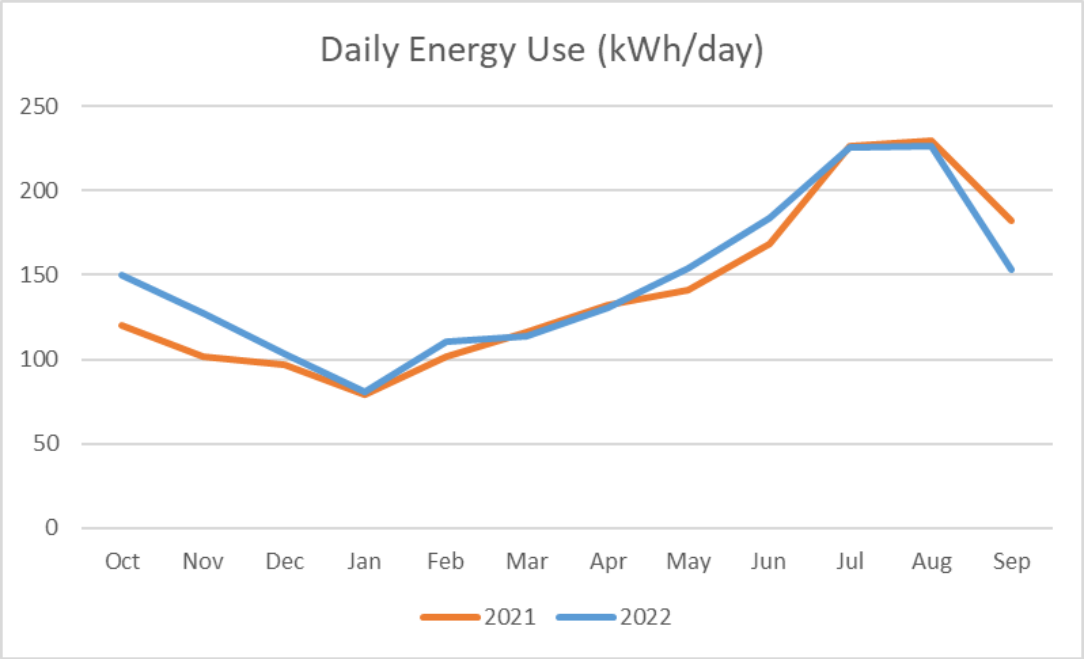


Figure 6.2.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 80 to 230 kWh as per above chart. Highest energy consuming months are in winter indicating the heating energy to be a significant contributor in facility energy consumption.

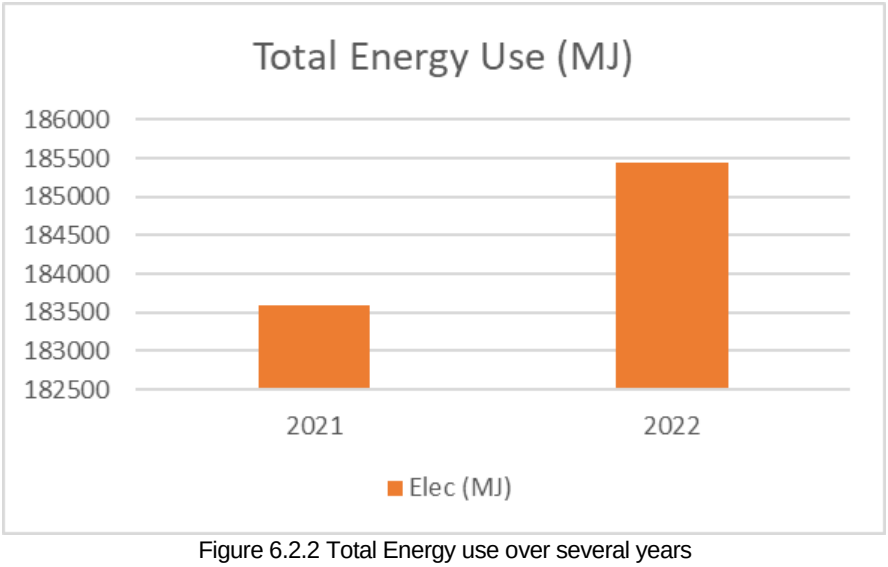


Figure 6.2.2 Total Energy use over several years

The energy consumption is low in year 2021 may be due to low occupancy levels and slight increment of 1% from year 2020/2021 to 2021/2022.

6.2.2.2 End User Break Down

Cundall have reviewed the Albany Depot energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2021/2022.

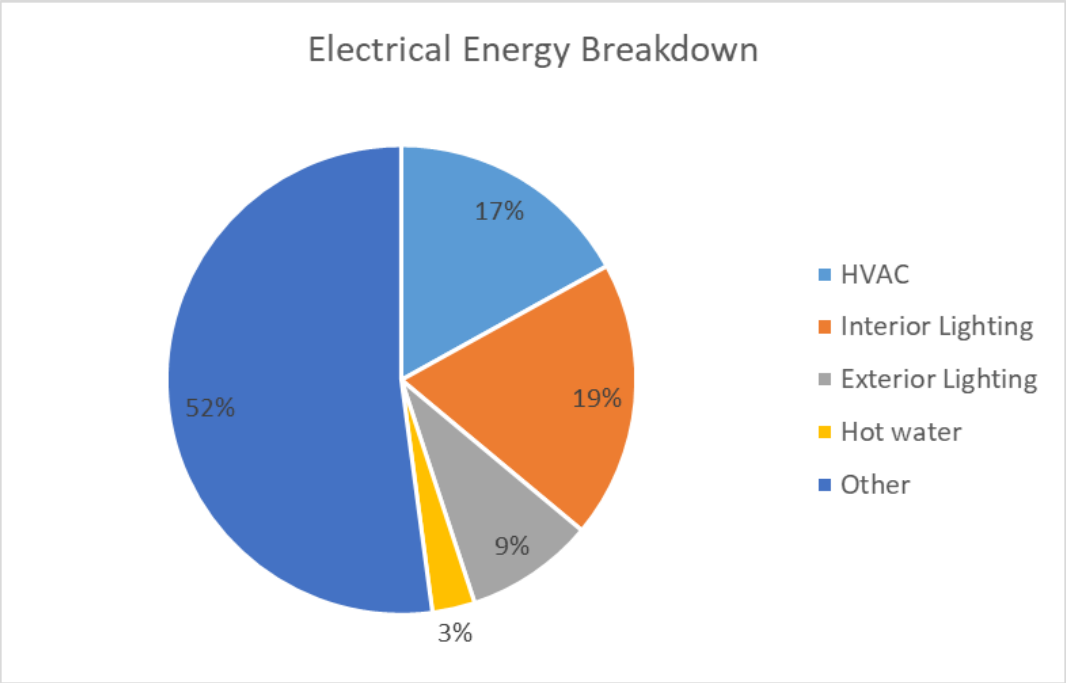


Figure 6.2.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 17% of site energy consumption, Interior lighting accounts for 19% of energy consumption and other unmetered loads accounts for 52% of the energy consumption which is the highest. This includes the power consumed in workshops for machinery operations, freezers, Fridge etc.

6.2.3 Water Consumption Overview

The water for the site is being supplied by the municipal water supply.

Monthly water consumptions from water bills are available for the review. The following analysis is based on the available data.

6.2.3.1 Periodic Breakdown

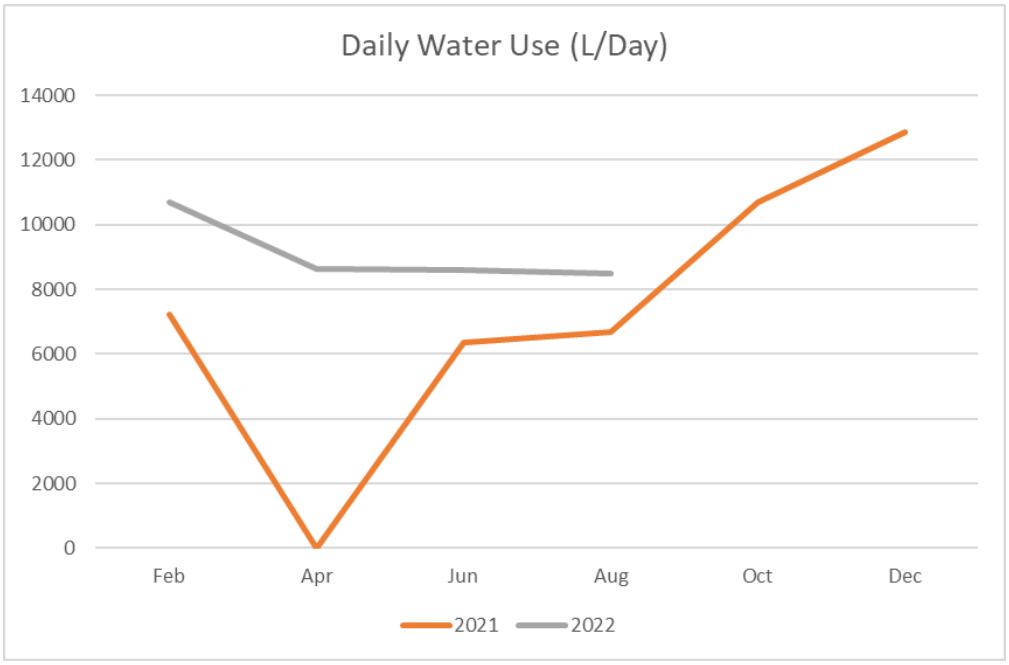


Figure 6.2.4 Daily water consumption for various years

Daily water consumption varies between 6,300L to 12,900L as per above chart. Higher water consumption in months of summer.

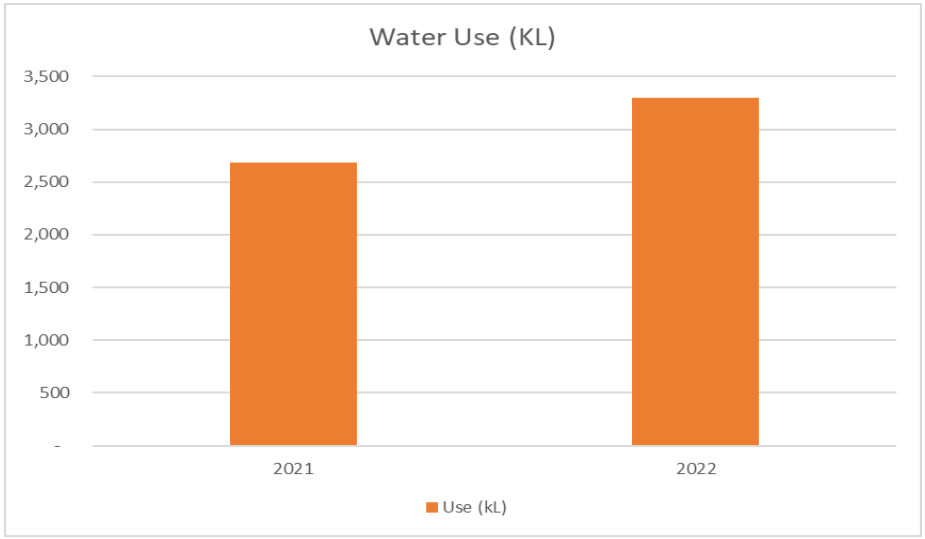


Figure 6.2.5 Annual water consumption over several years

The total water consumption for the year 2022 is calculated extrapolating the current recorded consumption. There is an increase of 23% in water consumption year over year from 2021 to 2022.

6.2.3.2 End User break Down

Cundall have reviewed the Albany Depot water use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2022.

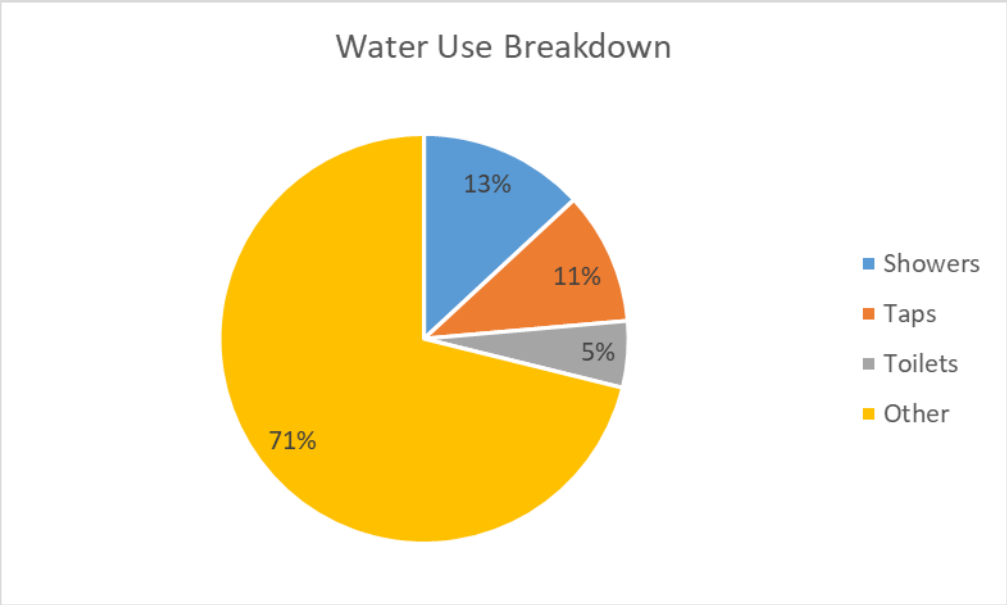


Figure 6.2.6 Water Use Breakdown

Based on the water use breakdown, showers accounts for 43% of building water consumption while other unmetered water use accounts for the 39% of the total building water consumption

6.2.4 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Some of the existing air condition systems are over 15 years old and reaching the end of life. Rated efficiency of these units is below typical units available at present.
- A combination of T8 fluorescent, CFL and LED lighting was noted in the current lighting system.
- Electric storage hot water unit provides hot water to the building.
- Adequate daylight levels are available for most of the undercover working areas based on site observations.

Proposed:

- Replace existing old split units with higher efficient system or consider a VRF system combining units where possible.
- Replace T8 and CFL lighting with efficient LED lighting.
- Replace existing electric storage hot water unit with a heat pump storage unit.
- Use daylight sensor control for interior lighting for areas with adequate daylight levels.
- Install a 15kW Solar PV system (in addition to the existing 20kW) with battery backup.
- Replace existing showers with 3-star WELS 7.5L per minute showers and taps with 5-star WELS taps.
- Install a rainwater harvesting system with a minimum capacity of 4kL and use harvested rainwater when available.

Assumptions:

- Efficient LED lighting can meet illumination requirements for each space.
- Adequate space availability for installation of heat pump system.
- Roofs have the load bearing capacity for solar PV.
- Water from rainwater harvesting system is proposed to be used for washing and seedling purposes only.

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades are $136,100.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 40,500kWh of electrical energy per annum.
- It is expected the water efficiency measures will save 340kL of water per annum.

Payback:

- Considering the above, the payback period of this upgrade is around 12 years.

Table 6-2: Proposed emissions reduction opportunities

Ref.		Albany Depot	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	1,600	400
EE2	Replace all interior non-LED with LED equivalent	7,500	1,800
EE3	Replace all exterior non-LED with LED equivalent	4,400	1,000
EE4	Heat Pump for hot water	1,800	400
EE5	Daylight and motion sensor for lighting	900	200
EE6	Solar PV	25,200	6,000
EE7	Water heating reduction with efficient fixtures	270	65
	Proposed Initiative for Water	**kL**	**$**
WE1	Efficient water fixtures	300	800
WE2	Rainwater harvesting	40	110
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	44	44,100
EE2	Replace all interior non-LED with LED equivalent	-	7,300
EE3	Replace all exterior non-LED with LED equivalent	-	1,000
EE4	Heat Pump for hot water	1	4,950
EE5	Daylight and motion sensor for lighting	12	1,800
EE6	Solar PV	15kW	72,000
EE7	Water heating reduction with efficient fixtures		
	Proposed Initiative for Water		
WE1	Efficient water fixtures	-	2,600
WE2	Rainwater harvesting	1	2,400

6.2.5 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in Appendix A for reference.

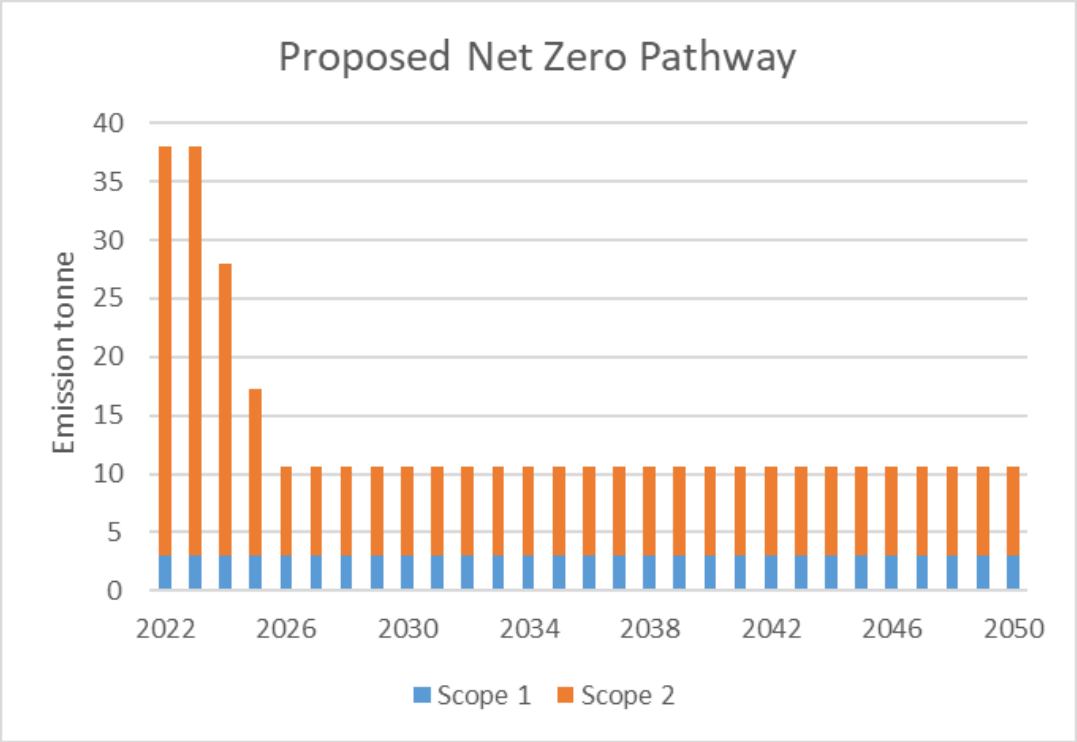


Figure 6.2.7 Proposed Net Zero Pathway for Depot Albany

6.3 Albany Library and Visitor Centre

6.3.1 Site Observations

6.3.1.1 Introduction

6.3.1.1.1. Overview

Albany library and visitor centre include multifunctional spaces and consists of below functional areas.

- Visitor centre
- Function room
- Library
- Office
- Meeting room
- Kids area
- Kitchen

6.3.1.1.2. Documentation Received

The following information was provided, reviewed, and used to inform the assessment:

- Historical monthly energy consumption
- Utility meter interval data
- Architectural floor plans
- Mechanical plans

6.3.1.1.3. Operating Hours

Based on discussion with facility management, typical operation hours as follows.

- Monday to Wednesday and Friday – 9:00AM to 5:30PM
- Thursday - 9:00AM to 8:00PM
- Saturday - 9:00AM to 1:00PM

Typical operation hours for visitor centre are as follows.

- Monday to Friday – 10:00AM to 4:00PM
- Saturday and Sunday - 10:00AM to 2:00PM

6.3.1.2 Heating Ventilation Air Conditioning (HVAC)

All airconditioned areas are served by reverse cycle split air condition units and a ducted reverse cycle split unit.

Toilets and kitchen areas are provided with exhaust system for ventilation purposes.

6.3.1.2.1. Air Conditioning Systems

Part of the library is served by a ducted split revers cycle air conditioning Commair systems with a total cooling capacity of 22kW. All other areas are served by Daikin reverse cycle split units of various capacities with a total cooling capacity of approximately 136kW.

6.3.1.2.2. Ventilation Systems

Toilets and kitchen areas are served by separate exhaust systems.

6.3.1.3 Building Fabric

Based on observation made at site, the walls are a combination of concrete and steel framed walls while roof is steel framed with Colorbond sheeting.

6.3.1.4 Lighting & Control System

Lighting control is manual for most parts of the facility with occupancy/motion sensor override. LED lighting is mostly used in facility.

6.3.1.5 Solar Photovoltaic (PV) System

Based on site observations, there is a 31kWp Solar PV system installed at site.

6.3.1.6 Power Purchase Agreement

It has been confirmed that this building has entered into a power purchase agreement with 100% renewable energy from 1 April 2022. Hence all electricity consumption on site since this date will have zero emissions. However, our analysis has also investigated reducing site energy intensity (kWh/m^2).

6.3.1.7 Water

There are multiple showers, water closets, urinals, and wash basins available. No records of WELS rating are available for water fixtures used at site.

Electric storage hot water units and instantaneous heaters provides hot water to the buildings.

6.3.2 Energy Consumption Overview

The electricity for the site is being supplied by the grid and solar PV generation.

Monthly energy consumptions from energy bills are available for the review. Half hourly interval data was also made available. The following analysis are based on the available data.

6.3.2.1 Periodic Breakdown

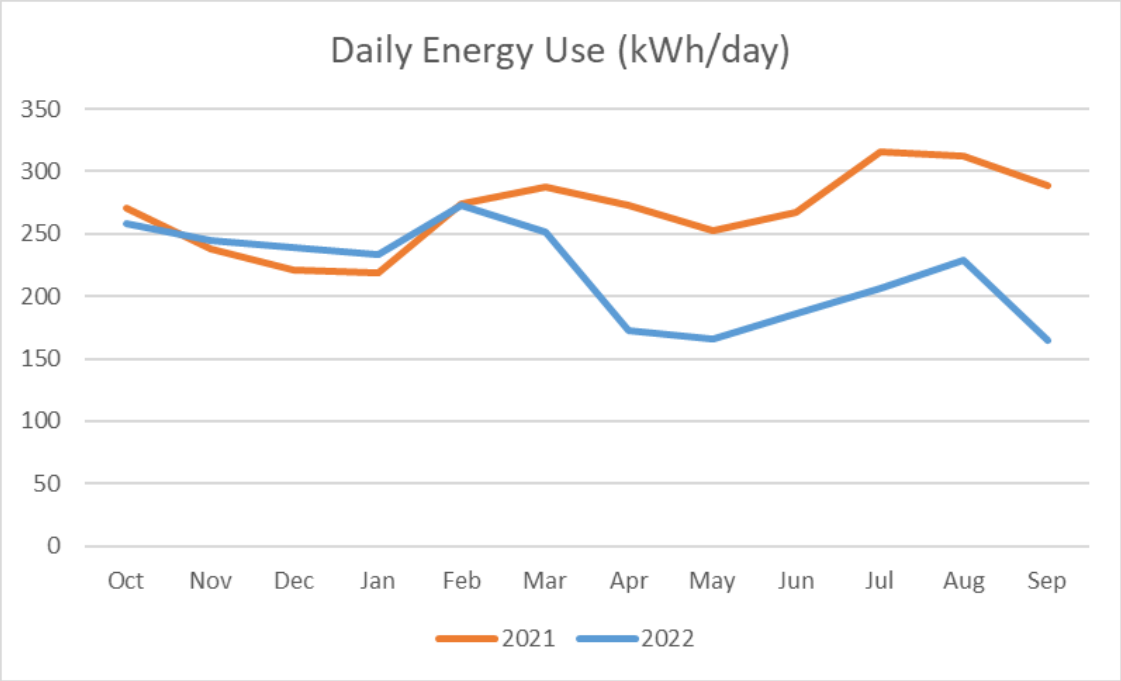


Figure 6.3.1 Daily electricity consumption for various years

Daily electrical energy consumption varies between 160 to 310 kWh as per above chart. The energy consumption in the winter months is reduced in the year 2021/2022 compared to the year 2020/2021.

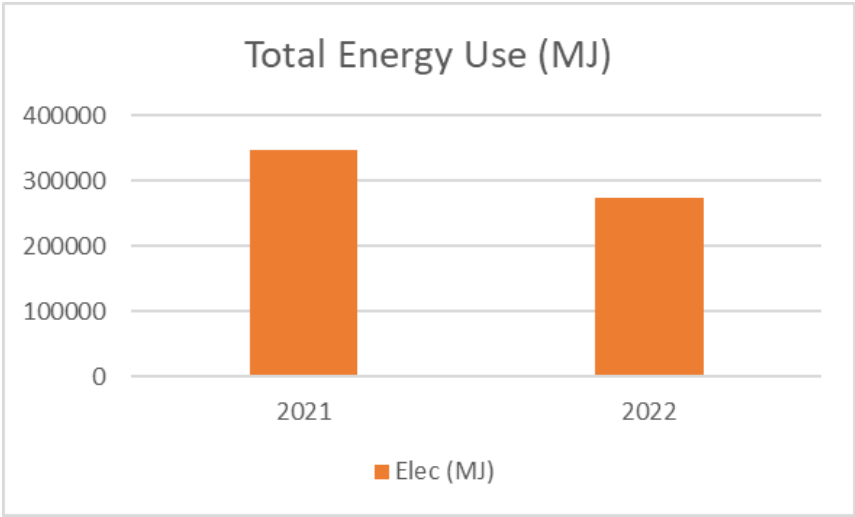


Figure 6.3.2 Total Energy use over several years

The energy consumption has reduced 21% year over year from year 2020/2021 to 2021/2022.

6.3.2.2 End User Break Down

Cundall have reviewed the Albany Library and Visitor Centre energy use based on data provided and onsite observations. Based on available data following energy breakdown charts are generated for year 2021/2022.

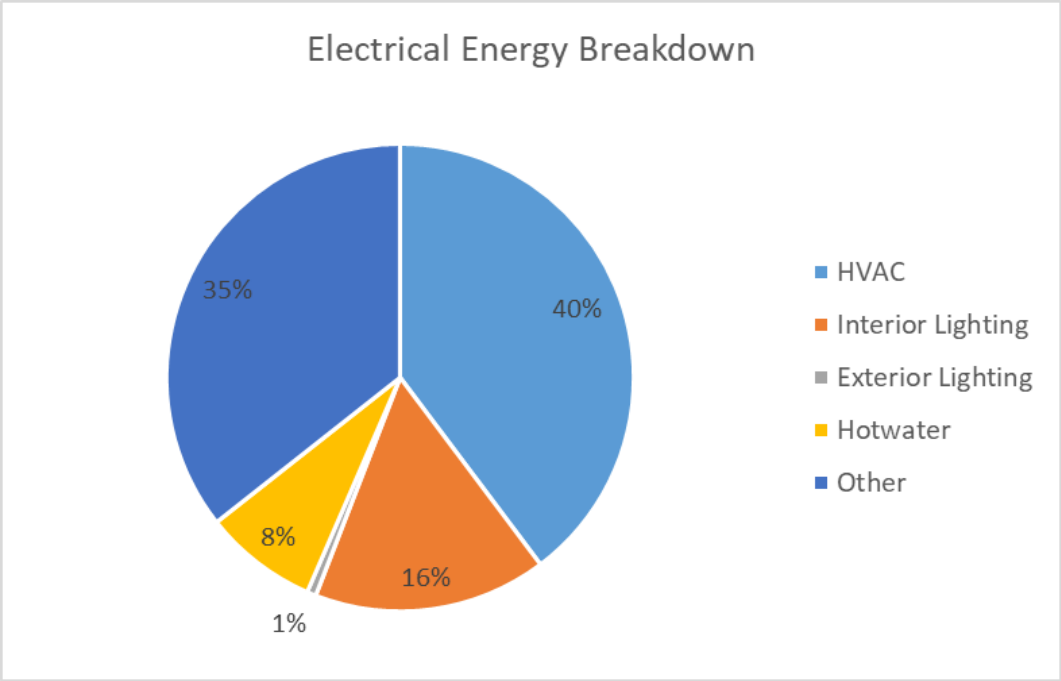


Figure 6.3.3 Electrical Energy Use Breakdown

Based on the electrical energy use breakdown, Heating Ventilation and Air Conditioning (HVAC) accounts for 40% of site energy consumption which is the highest, Interior lighting accounts for 16% of energy consumption and other unmetered loads accounts for 35% of the energy consumption.

6.3.3 Emission Reduction Opportunities – Energy & Water

Existing systems:

- Most interior lighting is LED. These have been upgraded over the past few years.
- Electric storage hot water unit provides hot water to the building.

Proposed:

- Replace existing electric storage hot water unit with a heat pump storage unit.

Assumptions:

- Adequate space availability for installation of heat pump system.
- Since the building have a power purchase agreement with 100% renewable energy on site PV system is not proposed (30kW Solar PV system with battery backup, in addition to existing 30kW).

Capital Cost:

- Estimated capital cost (excluding labour) for upgrades are $5,000.

Estimated Energy and Water Savings:

- It is expected these energy efficiency measure will save 6,500kWh of electrical energy per annum.

Payback:

- Considering the above, the payback period of this upgrade is around 3 years.

Table 6-3: Proposed emissions reduction opportunities

Ref.		Albany Library	
Saving Potential			
	Proposed Initiative for Energy	**kWh**	**$**
EE1	Replace existing AC with higher efficiency system	-	-
EE2	Replace all interior non-LED with LED equivalent	-	-
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	6,500	1,700
EE5	Daylight and motion sensor for lighting	-	-
EE6	Solar PV	-	-
EE7	Water heating reduction with efficient fixtures	-	-
Cost of Implementation			
	Proposed Initiative for Energy	**Qty**	**$**
EE1	Replace existing AC with higher efficiency system	-	-
EE2	Replace all interior non-LED with LED equivalent	-	-
EE3	Replace all exterior non-LED with LED equivalent	-	-
EE4	Heat Pump for hot water	1	4,950
EE5	Daylight and motion sensor for lighting	-	-
EE6	Solar PV	-	-
EE7	Water heating reduction with efficient fixtures		

6.3.4 Proposed Net Zero Pathway

Below figure shows the proposed initiatives having impact on the building emissions. This approach can be used to develop a more robust net zero pathway for each of the assets. The Scope 2 emissions are not included since 100% renewable energy is purchased through power purchase agreement.

Please note that Scope 3 emissions such as water, waste, travel, etc. are not included in the proposed pathway below and it needs to be tackled to reach a Net Zero target for the facilities.

Additional details on carbon offsets are provided in appendix A for reference.

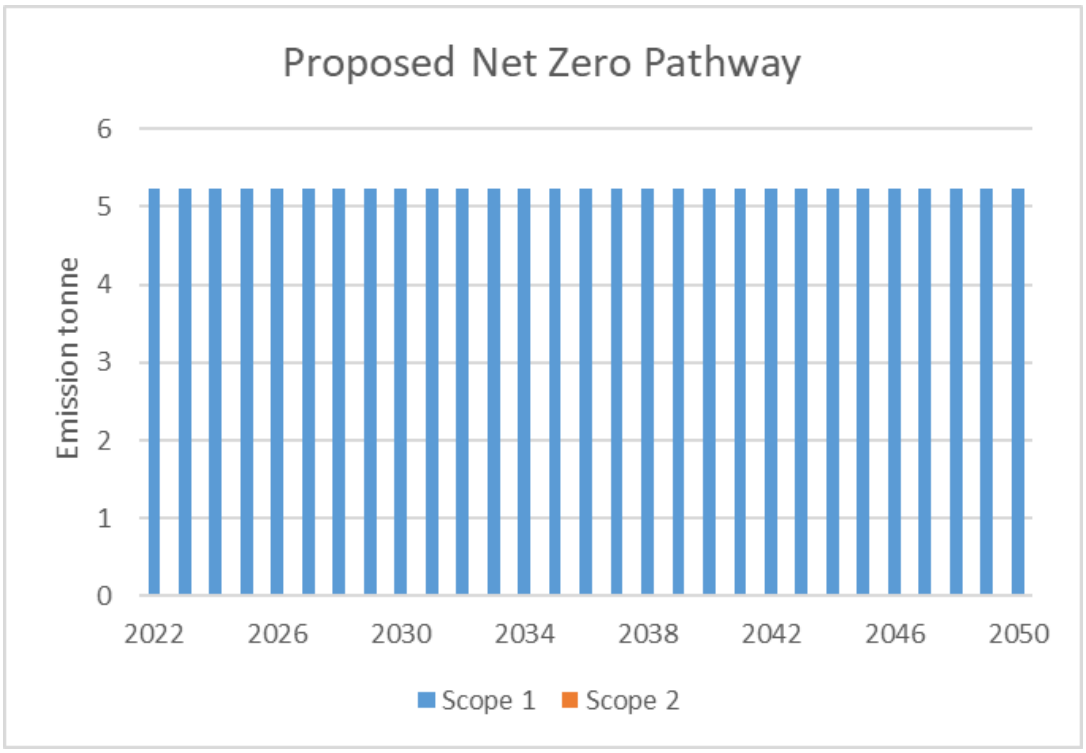


Figure 6.3.4 Proposed Net Zero Pathway for Library and Visitor Centre

7.0 Conclusion

This assessment has been conducted to facilitate the operational improvements to ten buildings identified in Shires of Jerramungup, Plantagenet, Denmark, and the City of Albany as part of South Coast Alliance (SCA) built environment audit. The assessment included:

1. Review of the site and its operations
2. Analysis of the site energy and water consumption
3. Investigation of energy systems and current performances
4. Identification of multiple energy efficiency upgrade opportunities. Opportunities with promising paybacks have then been subject to more detailed investigations, including cost analyses and calculations of indicative payback periods

Overall, the assessment has been able to identify a wide range of opportunities and initiatives which, if implemented, have the potential to provide reasonable and practical energy, water, and emission reductions. These initiatives have been summarised in a table in the executive summary section of this report.

In addition to the proposed initiatives, it is also recommended that a consistent and low tariff agreement with electricity utility provider is reached for whole portfolio of assets for each council.

It is also recommended the councils purchase 100% of their electricity sourced from renewable energy providers such as wind farms at Albany, as part of WALGA's joined purchase energy initiative. It is noted that such power purchase agreement with 100% renewable energy has been already in place for few of the facilities.

Appendix A: Carbon Offsets Information

Types of Offsets

There are several types of offsets available for purchase. The two main categories are:

Nature based offsets, such as

- Avoiding deforestation
- Reforestation and afforestation
- Soil and wetland management
- Savanah management
- Coastal carbon sequestration (blue carbon)

Technology based offsets, such as:

- Renewable energy technologies, such as solar PV, wind farms, biogas, hydro power, and others
- Energy efficiency measures
- Low-tech items in developing countries such as improved cooking stoves
- Methane collection and combustion or use as energy source

Co-benefits

As well as providing the required carbon emissions reduction set out by the carbon offset, all offset projects also have other co-benefits. Essentially, the purchase of the offset has direct positive outcomes (social, environmental, and economic) associated with an offset project that are additional to the emissions avoided or the carbon stored. They are benefits which are not automatically priced into the value of an offset.

Co-benefits for offsets can be:

- Empowerment and employment for minorities,
- Support for women and girls,
- Reduced pollution and improved health,
- Poverty reduction, climate adaptation,
- Preserving cultural knowledge,
- Preservation of animals and native species or benefits to local plant and flora,
- others

All credible projects advise on their co-benefits in their information papers and online documentation. Co-benefits are often aligned with the Sustainable Development Goals and can help a purchaser like Programmed to invest into projects who align with their own sustainability vision and objectives in addition to the carbon neutral claim.

Eligible offset schemes

Climate Active has defined a set of eligibility requirements for offset units that align with the framework for Australian Carbon Credit Units (ACCUS). To be accepted by Climate Active, offsets need to be: Additional, permanent, measurable, transparent, address leakage, independent audited and publicly registered.

The following offsets are eligible under the current Climate Active Carbon Neutral Standard:

- **Australian Carbon Credit Units (ACCUs)** - Issued by the Australian Clean Energy Regulator, have a reputation for high quality assurance standards and credibility. Most local Australian projects issue ACCUs only.

- **Certified Emission Reductions (CERs) and Removal Units (RMUs)** – International verification standard offset, these are currently renegotiated and can sometimes have issues with eligibility.

- **Verified Emissions Reductions (VERs)** issued by the Gold Standard - Have a reputation for the highest quality assurance standards and credibility, some of these credits can be tracked against the Sustainable Development Goals.

- **Verified Carbon Units (VCUs)** - Good offset units with good credibility (slightly lower than Gold Standard VERs and ACCUs), tend to be less costly than Gold Standard VERs and ACCUs.

The offset vintage year must be later than 2012.

Offset costs

Offsets are traded via carbon markets and prices therefore vary subject to demand and supply. With the renegotiation of the Paris Agreement, a number of voluntary schemes being introduced and the implementation of new markets and trading schemes worldwide, it is expected that the demand for offset units will rapidly increase until 2050. Because supply is limited due to limited land area and a current lack of technologies to absorb all emissions, it is projected that offset costs will increase in the coming years. To illustrate that, ACCUs have seen a price increase of around 40% over the last year.

Offset costs currently range between $1 and $70, depending on the location and type of the project. It, however, would not be recommend going below the $5 mark for offset units as the credibility and eligibility of the units can be questionable for very low-price projects and impose a risk to the purchaser's reputation when certifying carbon neutral.

ACCUs currently range at $40 - $60 per unit.

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CBP or OP	Number	Pillar	Item	Action	Directive	Responsibility	Resourcing Required	Measure of Success	Ref	Average
OP	8 & 9	Sustainable Materials & Products & Zero Waste	SM3 & ZW9	"Get rid of the disposable coffee cup" Project	*Shire of Denmark Sustainability Strategy (2021-2031)*	Sustainable Projects	New	Develop and Distribute the resource pack to Local businesses.	Complete	5
OP	9	Zero waste	ZW12	Recycling bins in the CBD trial	*Shire of Denmark Sustainability Strategy (2021-2031)*	Sustainable Projects	New	2 x trial recycling bins in operation in the CBD	In progress	4.75
OP	7	Sustainable Travel & Transport	ST3	Reduce the carbon footprint for the fleet of corporate vehicles; including consideration of Council fleet vehicles to be electrical or hybrid.	*Shire of Denmark Sustainability Strategy (2021-2031)*	Technical Services - Engineering	New	Carbon footprint of Council fleet vehicles reduced by a minimum of 50 per cent by 2030.	7.1 Ongoing - Arena fuels program funding	4.5
OP	8	Sustainable Materials & Products	SM2	Direct industry and public on where to access information on sourcing and selecting sustainable building materials.	*Shire of Denmark Sustainability Strategy (2021-2031)*	Sustainable Development - Building	New	Links provided on Shire website to sources of information on sustainable building materials.	8.3 Complete	4
OP	6	Local & Sustainable Food	SF5	Partner with the Chamber of Commerce and State government in supporting investigation into sustainable farming products (i.e. viability of a local food processing plant and local or mobile abattoir).	*WA Health Meat Inspection Branding and Processing Regulations (1950)*	Sustainable Projects	New	Engagement with key partners in responding to requests to support industry on case-by-case basis.	6.2 Ongoing works from partnering organisations	3.75
OP	10	Zero Carbon Energy	ZC1	Audit Greenhouse Gas Emissions for Shire activities and investigate purchase of software to record and audit data annually for Shire operations.	*Shire of Denmark Sustainability Strategy (2021-2031)*	Sustainability	New	Develop baseline data for carbon emissions and audit trends over time.	10.2 Officers working with Azzility and through Regional Climate Alliance to deliver this project	3.75
OP	9	Zero Waste	ZW8	Support local builders to reduce waste via recycling and reusing commercial and industrial waste as repurposed materials; including investigating licencing requirements to recycle waste from building contractors.	*Great Southern Group of Councils Regional Waste Strategic Plan (2014-2018)*	Waste & Reserves	New	Reduced commercial and industrial waste.	9.4	3.5
OP	10	Zero Carbon Energy	ZC6	Provide information to community and general public regarding battery and storage options for new residential properties - broader comment	*Shire of Denmark Sustainability Strategy (2021-2031)*	Sustainable Projects	New	Information made readily available to public on alternative energy options.	10.3	3.5
OP	5	Sustainable Water	SW5	Install water bottle refill facilities at strategic locations across the Shire.	*Shire of Denmark Sustainable Events Policy P100516*	Sustainable Projects & Technical Services - Assets	New	Installation of water refill facilities to enable compliance with Sustainable Events Policy at Shire events.	5.1	3.25
OP	7	Sustainable Travel & Transport	ST4	Investigate and trial cultural change programs that will see reduced reliance on fossil fuel transport by staff.	*Shire of Denmark Sustainability Strategy (2021-2031)*	Governance - Human Resources	New	Programs implemented to reduce fossil fuel usage by Shire staff.	7.4	3.25
OP	4	Land & Nature	LN2	Investigate options to develop an objective environmental impact measuring tool to guide decision making for procurement.	*Shire of Denmark Environment Policy P100503* *Shire of Denmark Purchasing Policy P040220 (5) Sustainable Procurement*	Sustainable Projects	New	Redesign evaluation matrix for procurement to include, as far as is practicable, objective environmental considerations.	4.1	3
OP	5	Sustainable Water	SW3	Investigate fire-resistant options for installation of durable water tanks on Shire buildings and administration building plumbed to building to be used on grey water system (toilets and washing).	*Shire of Denmark Water Efficiency Action Plan (2017-2022)*	Technical Services - Assets	New	Increased number of water tanks and pumps installed on Shire buildings and plumbed into the toilets and greywater system.	5.1	3

OP	6	Local & Sustainable Food	SF7	Support delivery of education on sustainable food production (i.e. regenerative farming).	*Shire of Denmark Sustainability Strategy (2021-2031)*	Governance - Economic Development	New	Delivery of education on sustainable food production practices.	6.4	3
OP	9	Zero Waste	ZW7	Investigate funding opportunities to divert waste water from the inlet to the Golf Course and Denmark Agricultural College.	*Shire of Denmark Water Efficiency Action Plan (2017-2022)*	Sustainable Projects	New	Identification of potential funding sources for waste water reuse to irrigate key community assets.	9.2	2.75
OP	9	Zero Waste	ZW11	Investigate best practice sustainable fish cleaning, composting and offal disposal stations for installation at key Shire sites.	*Shire of Denmark Sustainability Strategy (2021-2031)*	Community Services - Ranger Services	New	Investigations undertaken on feasibility of installing fish cleaning, composting and offal disposal stations at relevant Shire sites.	9.3	2.75
OP	7	Sustainable Travel & Transport	ST8	Support community initiatives for communal travel options (i.e. community shuttle bus to Greens Pool).	*Shire of Denmark Sustainability Strategy (2021-2031)*	Governance - Economic Development	New	Communal travel options investigated.	7.4	2.5

Sustainable Projects Committee - TASK LIST

The actions below have been determined at Committee Meetings - updated for the Agenda 02 August 2022

Item No	Meeting Date	ITEM	Action	Responsible Officer	Status	Date Completed
1	3 May 2022	Seedling Production / Tree Nursery (WICC)	Officers to look into the nursery proposal and bring back information to the committee.	David King	Preliminary site chosen. Shire officers working with WICC on funding opportunities	
2	3 May 2022	FOGO Costs to ratepayers	Officers to update the costings to ratepayers for FOGO and present to the Committee.	David King	Committee Recommendation to Council - June OCM	21-Jun-22
3	3 May 2022	Greenwaste mulching costs	Officers to look at costings for processing of the green waste to reduce or eliminate the need to burn the green waste not burning.	David King	in progress	
4	3 May 2022	Power Projects	Officers to provide members with further information including details of the project scale and anticipated costings.	David King	Standing Agenda item to keep Committee updated	2/08/2022
5	3 May 2022	LED steet lighting status	Officers to include on the agenda for the June 22 meeting.	David King	Added to CBP Project List	9/08/2022
6	7 June 2022	COMMITTEE RECOMMENDATION - INITIATE FOGO	That Council request the Chief Executive Officer: 1.INITIATE a FOGO service in the 2023/24 financial year. 2.MAKES provision in 2022/23 budget for the associated costs.	David King	Included in June 2022 OCM Agenda	21 June 2022
7	7 June 2022	COMMITTEE RECOMMENDATION - REVIEW kerbside collection fees	That Council request the Chief Executive Officer, REVIEW the kerbside collection Fees and Charges to ensure they are more cost reflective.	David King	Included in June 2022 OCM Agenda	21-Jun-22
8	7 June 2022	CHARTER INCLUDING TERMS OF REFERENCE	Outcome: Officers to: 1.Provide a summary of the Sustainability Strategy to include: •List of small operational projects, to be distributed to the Committee in order to prioritise before next meeting •List of Corporate Business Plan Projects, as they relate to the Strategy; and •Summary of completed actions. 2.Revise the Charter and circulate a draft to members for discussion at the next Sustainable Projects Committee meeting.	Damian Schwarzbach	Completed	2/08/2022
9	7 June 2022	MEETING FREQUENCY	It was noted that this could be amended in the draft charter to be considered by members at the next meeting.	Damian Schwarzbach	Completed	
10	7 June 2022	PRESENTATION - PLASTIC RED	Officers to invite Karen Anderson, Plastic Reduction Denmark, to present at the next meeting.	David King	MEETING INVITATION SENT TO KAREN ANDERSON 15/06/2022	15 June 2022

Sustainable Projects Committee - TASK LIST

The actions below have been determined at Committee Meetings - updated for the Agenda 02 August 2022

Item No	Meeting Date	ITEM	Action	Responsible Officer	Status	Date Completed
11	9 August 2022	"Get rid of the disposable coffee cup" Project	1. Liaise with Karen, Cressida and Denmark Chamber of Commerce to develop a resource pack for Local businesses for reducing the reliance on disposable coffee cups. 2. Distribute the resource pack to local businesses. 3. Develop a media release promoting the resource pack	Damian Schwarzbach	Shire Officers have contacted (in-person) the 19 agreed vendors and supplied information in partnership with the Boomerang Alliance. The Shire will make up 8 x coffee cup hampers, with an associated flyer leaflet utilising the information provided by Plastic Reduction Denmark incorporating mug library information and reference to the WA Plan for Plastics and the Shire's Sustainability Strategy Zero Waste sustainability objective. Boomerang Alliance will promote the mug library when visiting cafes. The Shire will promote the mug library and plan for plastics Boomerang Alliance visit through a media release post-visit as well as upload relevant information to Shire website. The Shire is prepared to provide funds (up to between $500-$1000 per café – dependent upon numbers) for grant proposals facilitated and organised by Boomerang Alliance if aligned with Shire's Sustainability Strategy Zero Waste/Sustainable Materials objectives. (These projects will be organised and coordinated by Boomerang Alliance with funding facilitated by the Shire).	10 November 2022

Sustainable Projects Committee - TASK LIST

The actions below have been determined at Committee Meetings - updated for the Agenda 02 August 2022

Item No	Meeting Date	ITEM	Action	Responsible Officer	Status	Date Completed
12	9 August 2022	Sustainability Strategy Action Plar	Provide to the Committee an *annual review* of the Sustainability Strategy Action Plan by March each year (Next one to be March 2023). This will aid the Committee with budget deliberations for the next financial year.	Damian Schwarzbach	The SPC have requested a review of the SAP to be delivered in Feb/March – to enable the SPC to inform Council on upcoming annual budget deliberations. Officers plan to complete the annual review of the S.A.P. at the end of each financial year to align with end of year financial reporting. The annual review requires at least a month or two of review through Managers and their staff, which if due in February, would require input from Managers and staff over the Christmas and summer holiday period which is not ideal. Tthe SPC will be kept abreast of all the sustainability projects occurring throughout the year through the bi-monthly SPC meetings; so they will already be well-informed as to the ongoing progress and status of sustainable projects being undertaken and planned for operationally by the Shire. Officers recommend, to keep annual reporting of the S.A.P. to be consistent with end of year financial reporting; which can then also be utilised for annual reporting to Council which occurs in and around September.	1 November 2022
13	9 August 2022	Sustainability Strategy Action Plar	After the Committee minutes are presented at the Ordinary Council meeting in September, develop a media release and inform the Sustainability Strategy Working Group members of the progress to date.	Damian Schwarzbach	Once presented to Council - media release with Communications Officer	Completed December 2022
14	9 August 2022	FOGO - composting	Officers to Investigate alternate opportunities for composting e.g. Private operators	Damian Schwarzbach	In report	1 November 2022
15	9 August 2022	Recycling bins in the CBD trial	2 x trial recycling bins in operation in the CBD	Damian Schwarzbach	Part of the new Cleanaway agreement to include extra service. Cleanaway will not pick up due to being at capacity. Require quotes for bin stands.	
16	9 August 2022	Subscriptions	Provide the current list of Sustainable subscriptions for the Shire including cost, resourcing requirements and outcomes.	Damian Schwarzbach	Attached	1 November 2022
17	9 August 2022	Energy	Provide the latest energy consumption data from the subscribed Azzility platform.	Damian Schwarzbach	Attached	1 November 2022