

Annual Energy Review

FY 2019-2020



For more information contact
Shoalhaven Council at:

City Administration Centre

Bridge Road (PO Box 42)
Nowra NSW Australia 2541
P: (02) 4429 3214
F: (02) 4429 3170

council@shoalhaven.nsw.gov.au

www.shoalhaven.nsw.gov.au

Document Number: D20/507420

File: 56964E

Contents

1 Purpose	3
2 Introduction	3
3 Understanding Shoalhaven Council’s Electricity Supply	6
4 Electricity Consumption 2019/20	7
4.1 Trends by Group	10
5 Gas Consumption	11
6 Fleet Vehicle Fuel Consumption	12
7 Greenhouse Gas Emissions	13
8 Shoalhaven Council Energy Savings Initiatives 2019/20	14
9 Financial Implications	18
10 Recommendations	19



Above - A 31 kW solar PV system installed by Council at the Sussex Inlet Wastewater Treatment Plant.

Cover Page – A 95 kW solar PV system installed at the Vincentia Wastewater Treatment Plant in 2020.

Disclaimer

Every effort has been made to provide accurate and complete information. However, Shoalhaven City Council assumes no responsibility for any direct, indirect, incidental or consequential damages arising the use of information in this document.

Copyright Notice

No part of this publication may be reproduced in any form or stored in a database or retrieval system, or transmitted or distributed in any form by any means, electronic, mechanical photocopying, recording, or otherwise without written permission from Shoalhaven City Council. All rights reserved. Copyright © 2013, Shoalhaven City Council.

1 Purpose

At the Shoalhaven City Council Strategy & Assets Committee meeting on 12 November 2019, it was resolved that Council “Endorse the preparation of Annual Energy Review reports to track Council’s performance against energy and emission reduction targets established in Council’s Sustainable Energy Policy.” (HPERM Ref: D19/360041).

The purpose of this report is to present an annual analysis of Council’s energy consumption (by functional area), document energy savings measures recently implemented and identify potential cost-effective measures for future energy efficiency and renewable energy investment. This report will also track performance of Council towards achieving its energy and emissions reduction targets set out in Council’s adopted [Sustainable Energy Policy](#) (POL18/44).

2 Introduction

Energy in the form of electricity, gas and vehicle fuel, is an essential resource for the effective operation of Shoalhaven City Council. Most of Council’s current energy is derived from fossil fuels which are a costly and finite resource which also emit harmful greenhouse gases. From an economical and environmental perspective, it is critical that Council address its future energy needs and commence a strategic transition towards improved energy efficiency and use of more renewable energy. To guide this transition, an annual review of Council’s energy usage and energy efficiency measures will be conducted.

Shoalhaven Council is a member of the national Cities Power Partnership (CPP) program. Under the CPP, each member Council makes five action pledges in either renewable energy, energy efficiency, transport or working in partnership to tackle climate change. Progress on the pledges is reported back to the CPP every 6 months. Shoalhaven Council updated and refreshed its 5 pledges in mid-2020 to the following:

1. Use council resources to support the uptake of renewable energy
2. Facilitate large energy users’ collectively tendering and purchasing renewable energy at a low cost
3. Adopt best practice energy efficiency measures across all council buildings, and support community facilities to adopt these measures
4. Roll out energy efficient lighting across the municipality
5. Ensure Council fleet purchases meet strict greenhouse gas emissions requirements and support the uptake of electric vehicles

Despite the setbacks of the Black Summer bushfires, major flooding and the COVID-19 pandemic, Shoalhaven Council has been very active in its work across 2019/20 towards improved energy efficiency and the generation of renewable energy. Shoalhaven City Council was awarded overall winner in the ‘Towards Net-Zero Emissions’ category at the Local Government NSW 2020 Excellence in the Environment Awards. Shoalhaven City Council also

won the national Cities Power Partnership 2020 Climate Awards in the Energy Efficiency category, announced in October 2020.



Photos of Shoalhaven City Council's two sustainable energy awards received in 2020.

Sustainable Energy Policy

Shoalhaven City Council adopted a [Sustainable Energy Policy](#) (POL18/44) on 28 May 2019. The Policy aims to ensure access to affordable, reliable, sustainable and modern energy for both its operations and that of the wider Shoalhaven community. To achieve this, the following objectives and targets have been adopted:

- Aim to achieve net-zero greenhouse gas emissions by 2050 (consistent with the United Nations Paris Agreement ratified by the Commonwealth Government and the NSW Government's agreed targets). Interim targets to reduce emissions are 25% by 2025 and 50% by 2030, compared to 2015 levels.
- Seek opportunities to source or generate electricity supply for Council's operations from renewable energy sources, with an interim target of 25% renewables by 2023 and eventually 50% from renewable sources by 2030.
- Promote relevant initiatives to the community and businesses to increase the uptake of installed rooftop solar panels across the Shoalhaven LGA towards a target of 33% of dwellings by 2025.
- Upgrade all street lighting to energy saving LEDs by 2025.

Sustainable Energy Strategy 2020-2025

Shoalhaven Council will support its Sustainable Energy Policy by implementing its approved Sustainable Energy Strategy 2020-2025, that identifies priority initiatives to achieve the following objectives:

- **Cleaner Energy:** Transition to cleaner (lower emissions), more sustainable and more affordable energy sources.
- **Less Energy:** Reduce the energy requirement for Council by maximising energy efficiency in all aspects of Council's operations.

- **Measuring and Monitoring Energy:** Ensure systems, processes and expertise are in place to measure, monitor and manage energy consumption and renewable electricity generation effectively.
- **Demonstration of Leadership:** Council will ‘lead by doing’ to encourage the local community and businesses to also transition to a more resilient, reliable and renewable energy future.

The Sustainable Energy Strategy outlines a range of measures that Shoalhaven Council intends to implement to better manage its energy requirements over the next few years to 2025. The Strategy incorporates comprehensive baseline energy and emissions data, Council’s current corporate commitments, and identifies funding opportunities, such as Council’s internal Revolving Energy Fund.

Some of the most effective and feasible initiatives recommended in the Strategy include completing the upgrade of all Shoalhaven LGA residential street lights to energy savings LEDs; LED lighting upgrades at Council assets; installation of solar PV panels on Council assets for ‘behind the meter’ benefits; and entering into renewable Power Purchase Agreements for Council’s future electricity supply. It is envisaged that the Sustainable Energy Strategy will provide guidance and direction to Council to ensure access to affordable, reliable, sustainable and modern energy, for both its operations and that of the wider Shoalhaven community.

Revolving Energy Fund

Council commenced a Revolving Energy Fund (REFund) in 2019/20 to assist in funding energy efficiency and renewable energy projects. Savings made by the approved projects are reinvested back into the REFund to contribute towards future projects. The REFund provides a mechanism to support the implementation of Council’s sustainable energy projects. In 2019, Council resolved to ‘seed’ the REFund with \$230,000 to kick start the initiative. These funds were allocated in 2019/20 towards the following energy efficiency and renewable energy projects:

- Nowra Library 31 kW solar PV installation (*photo below*) and LED lighting upgrade
- Bomaderry Works Depot 31 kW solar PV installation
- LED lighting upgrades at various Shoalhaven Aquatic Centres

These projects have relatively short payback periods to ensure the REFund is replenished quickly for future project investment. The REFund is allocated and managed through an internal Council working group and will be reported back to Council annually.



3 Understanding Shoalhaven Council’s Electricity Supply

The supply of electricity to Council is delivered through three main agreements:

Supply Type	Site Consumption	Number of Sites	FY2020 Consumption (MWh)	FY2020 Total Electricity Spend
Small Sites	<100MWh per Year	~550	5,166	\$1.141M
Large Sites	>100MWh per year	44	25,800	\$3.962M
Streetlighting	Unmetered	Aggregated	5,325	\$912k*
TOTAL			36,290	\$6.015M

*Not including Street Light Use of System (SLUOS) charges (approx. \$1.2M)

Council’s electricity costs can be split into three main categories:

Category	Description	Typical Bill %
Energy Costs	Costs associated with electricity generation and reselling, usually contracted through a retailer such as Origin Energy or AGL.	39%
Network Costs	The costs associated with getting electricity from the generators to the customers (the poles and wires) through network operators such as Endeavour Energy	50%
Other	All the other costs associated with environmental, billing, regulator and metering charges.	11%

Figure 1 shows the typical bill breakdown for Shoalhaven Council’s Electricity Accounts. Only the energy costs are negotiable (contestable) through retailer agreements.

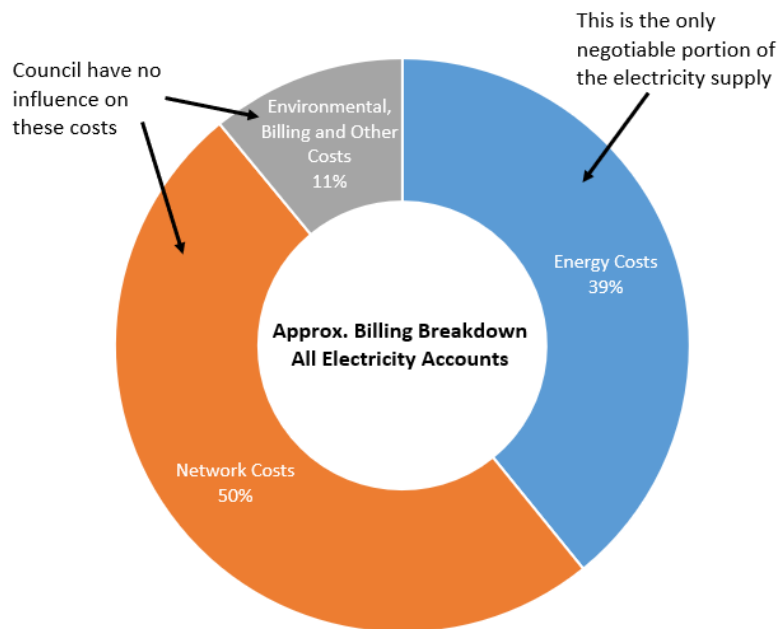


Figure 1. Shoalhaven City Council’s typical electricity bill breakdown

4 Electricity Consumption 2019/20

In 2019/20, Shoalhaven City Council consumed 36,290 MWh of electricity across its three supply types: Large Sites, Small Sites and Street Lighting, with a total electricity spend of just over \$6M (excluding the \$1.2M for the Street Light Use of System or SLUOS). Just over half of Shoalhaven Council’s electricity was consumed by Shoalhaven Water’s water (30%) and sewerage (27%) operations (Figure 2). In terms of the overall cost, wastewater processing (~\$1.9M) was more costly than water supply (~\$1.4M), with water supply pumps typically operating during ‘Off Peak’ periods when electricity pricing is cheaper (Figure 3).

The next largest consumer of electricity in terms of cost was street lighting across the Shoalhaven LGA. Although the majority of Shoalhaven’s street lights are owned and operated by Endeavour Energy, Council pays for the power that the lights consume (around \$900K/pa, Fig. 3). A Street Light Use of System (SLUOS) charge of approx. \$1.2M per year is also paid by Council to Endeavour Energy, but this comprises costs mainly arising from the operation, maintenance and capital costs of the street lighting network, rather than electricity consumption.

Council’s Aquatic Centres and Holiday Haven tourist parks then follow in terms of annual electricity costs with approximately \$529K and \$499K, respectively, noting that these were down considerably compared to the previous year (i.e. \$668K and \$599K respectively), due to bushfire and COVID-19 disruptions to normal operating conditions. These are then followed by community facilities and civic buildings making up \$323K and \$282K of electricity costs, respectively (Fig. 3). The annual electricity cost breakdown for all of Shoalhaven Council’s Large Sites (>100MWh/pa) for 2019/20 are shown in Figure 4.

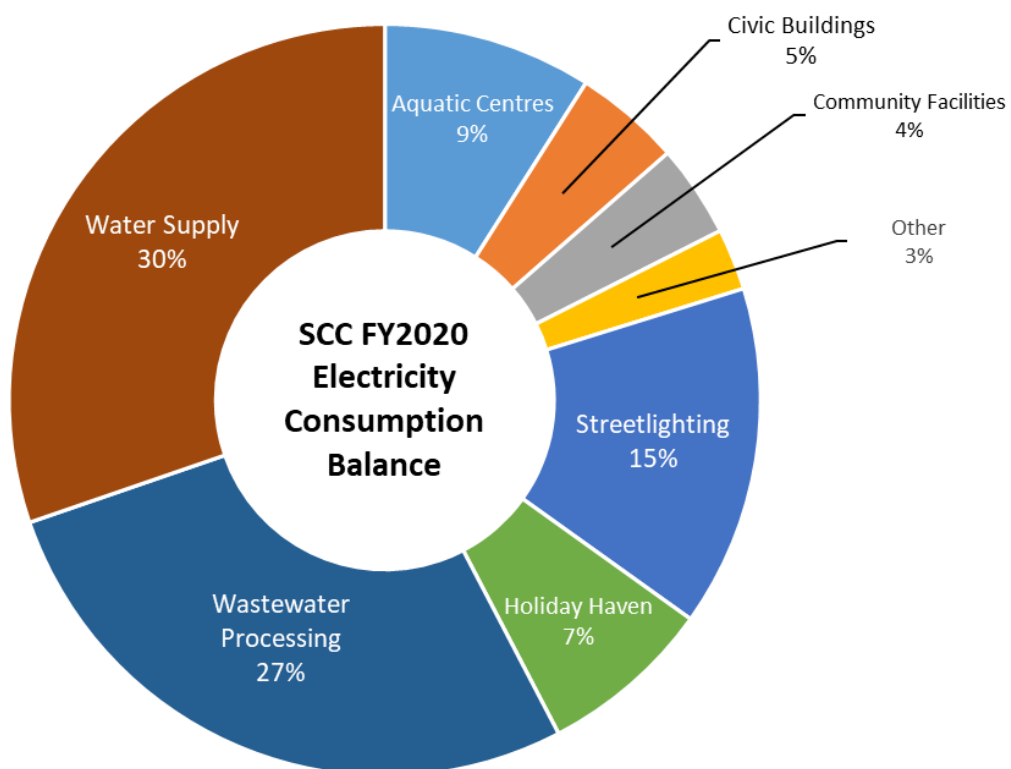


Figure 2. Shoalhaven City Council’s 2019-2020 electricity consumption % by functional areas

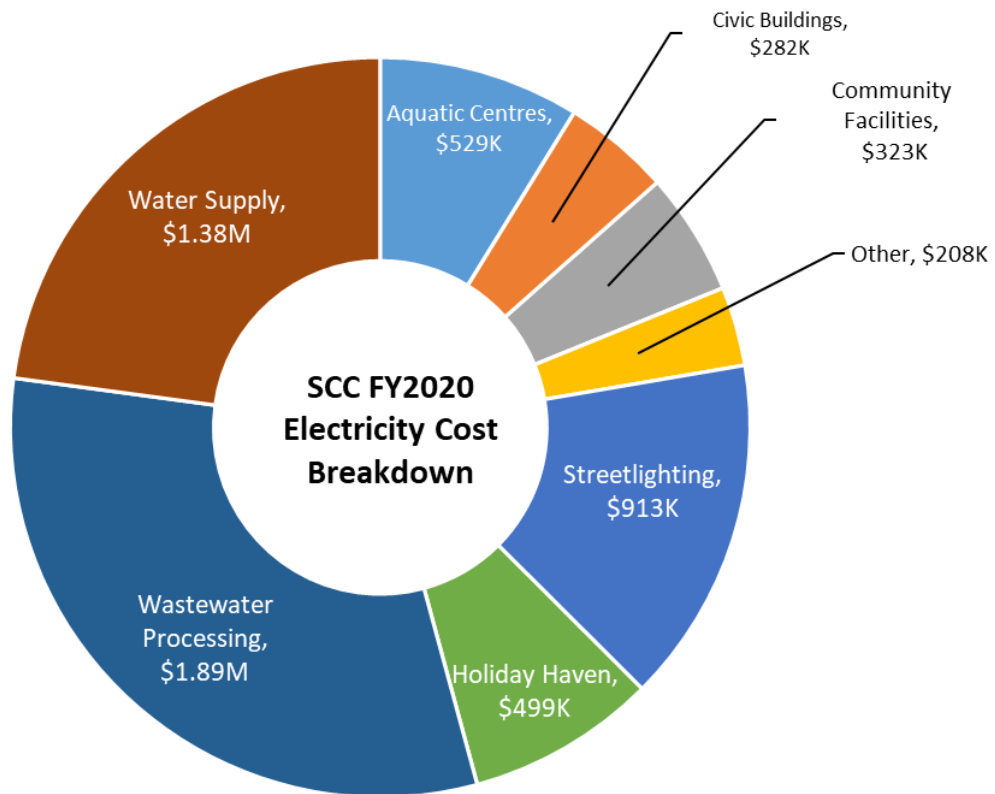


Figure 3. Shoalhaven City Council's 2019-2020 electricity costs by functional areas.

A major upgrade and modernisation of both the Nowra (shown below) and Bomaderry wastewater treatment plants was completed in late 2019. The upgrades included advanced treatment (including filtration and two-stage disinfection) to meet current environmental and water recycling guidelines. The treatment capacity for both plants was increased and linked via distribution pipelines to the REMS, ensuring that up to 90% of the output can be beneficially reused. Electricity consumption for Shoalhaven Council increased considerably in 2019/20 due to these plant upgrades.



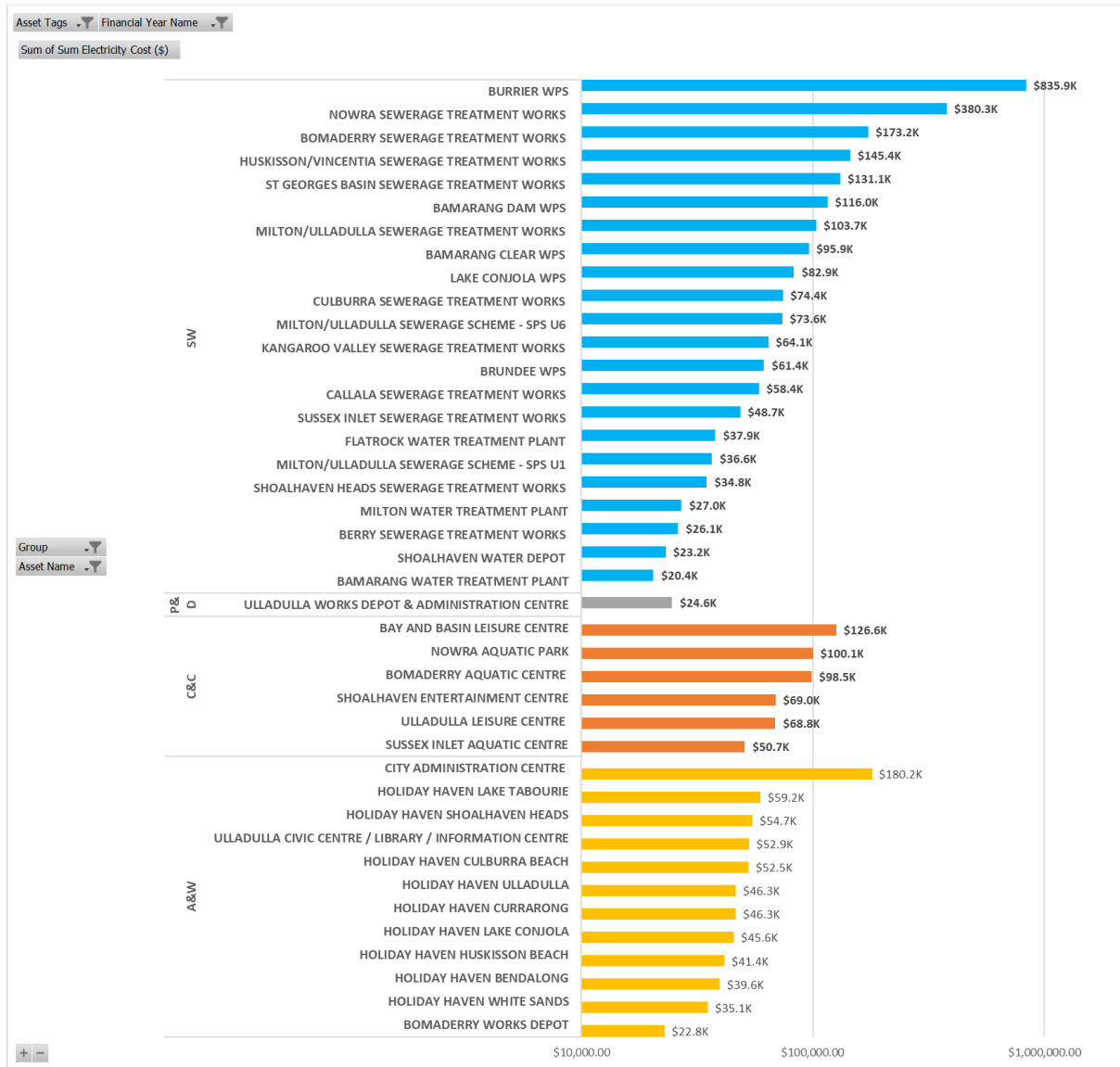


Figure 4. Shoalhaven City Council's 2019-2020 electricity spend by Council Groups (note log scale).



A 31 kW solar PV system installed on the rooftop of the Automotive Workshop at Shoalhaven Council's Bomaderry Works Depot in mid-2020

4.1 Trends by Group

Shoalhaven Council’s total electricity consumption (in kWh) has shown an upward trend over the past 7 years (Figures 5 & 6). New wastewater treatment plants at Nowra and Bomaderry have contributed significantly to a large percentage increase in electricity consumption in the wastewater processing category in the past year. The impacts of the NSW-wide COVID-19 lockdown in early 2020 caused a reduction in electricity consumption at Aquatic Centres and Holiday Haven facilities across the Shoalhaven LGA.

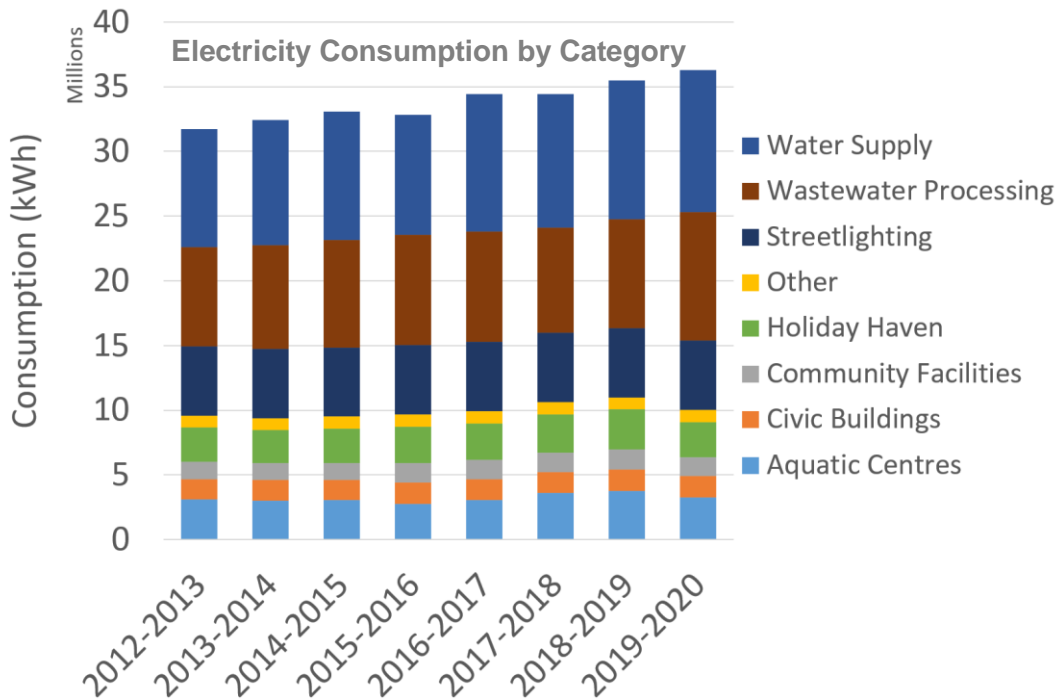


Figure 5. Shoalhaven City Council’s annual trend in electricity consumption by group category

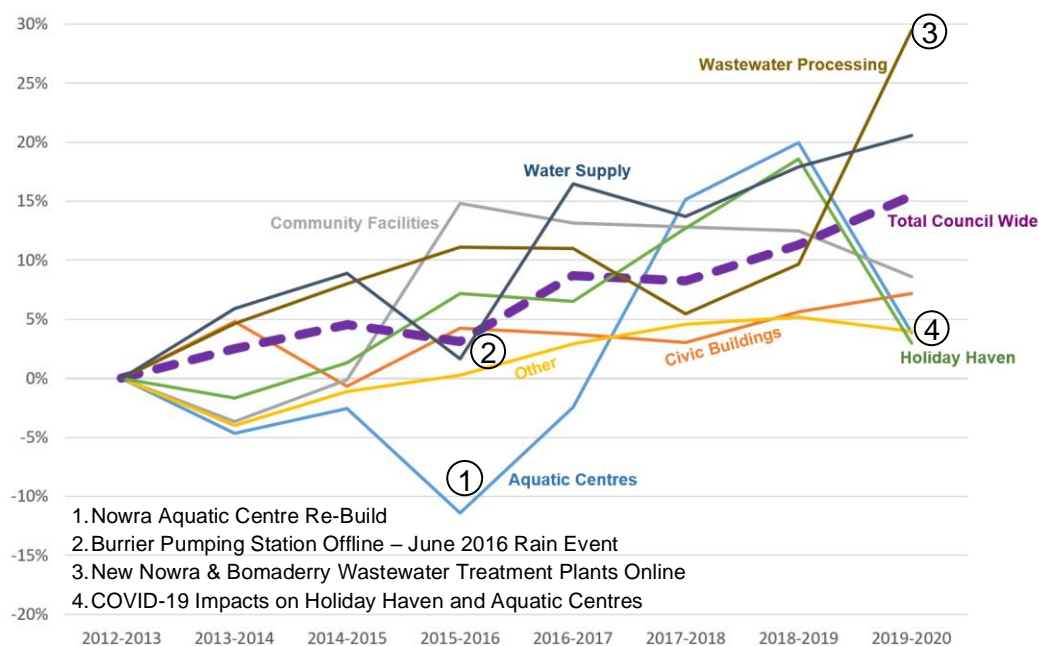


Figure 6. Shoalhaven City Council’s annual percentage change in electricity consumption by group category from 2012-2013

5 Gas Consumption

Shoalhaven Council consumes both natural (mains) gas and LPG (bottled gas) at a number of its assets. Natural gas supply is limited to the Nowra and Bomaderry areas due to the gas pipeline coverage. The main Council assets that utilise natural gas include the Nowra Administration Centre, Shoalhaven Entertainment Centre and both the Bomaderry and Nowra Aquatic Centres. Sites that consume LPG bottled gas include the Holiday Haven tourist parks, other Aquatic Centres and the Shoalhaven Crematorium. Consumption of both natural gas and LPG tends to vary from year to year (Figure 7). The price of bottled LPG gas has increased considerably in recent years, so it makes economic and environmental sense to switch appliances from gas powered to electricity at the end of their working life, where possible. Electrical appliances can also be powered by renewable energy and this reduces their greenhouse gas emissions compared to gas combustion.

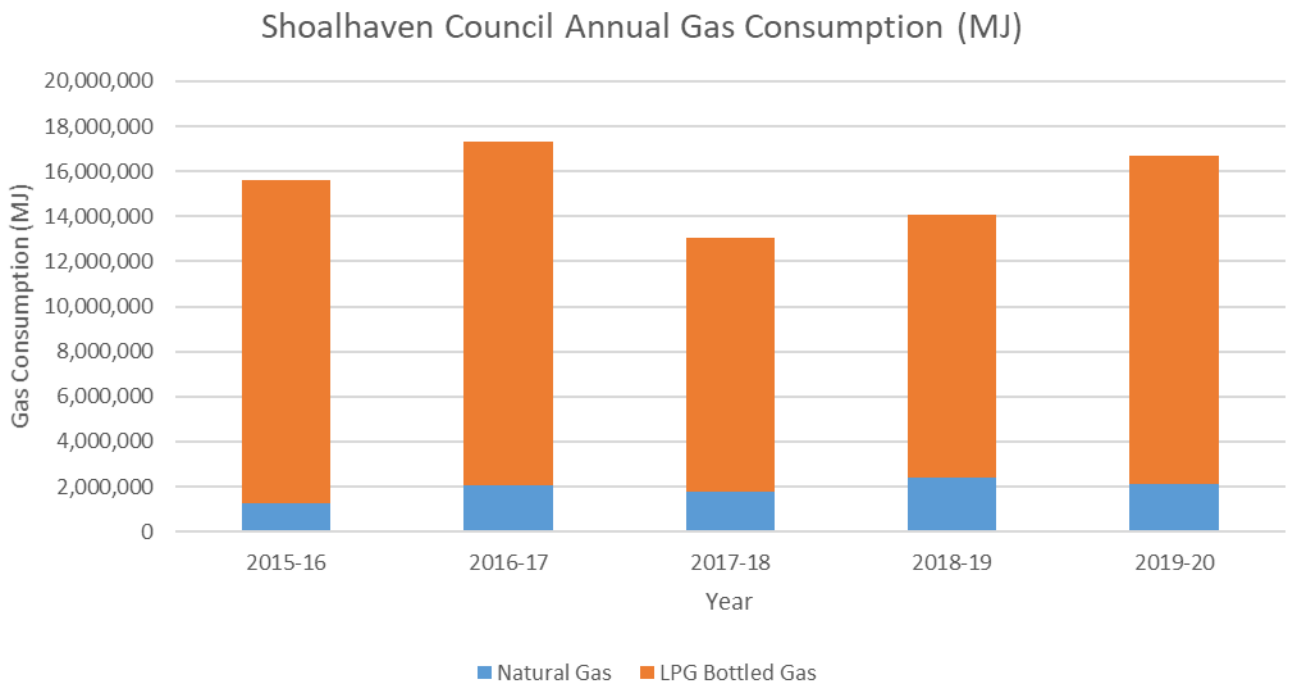


Figure 7. Shoalhaven City Council's annual gas (natural and LPG) consumption.

6 Fleet Vehicle Fuel Consumption

Shoalhaven Council’s fleet vehicle fuel consumption decreased substantially in 2019/20, compared to 2018/19 (Figure 8). Much of this decline was due to the COVID-19 pandemic restricting work and private driving distances. In June 2019, Council took delivery of three Hyundai Kona fully Electric Vehicles (EVs) as part of a 2-year trial. The Kona EVs have had vinyl sign wraps attached to them to help promote the uptake of EVs across the region (Figure 9).

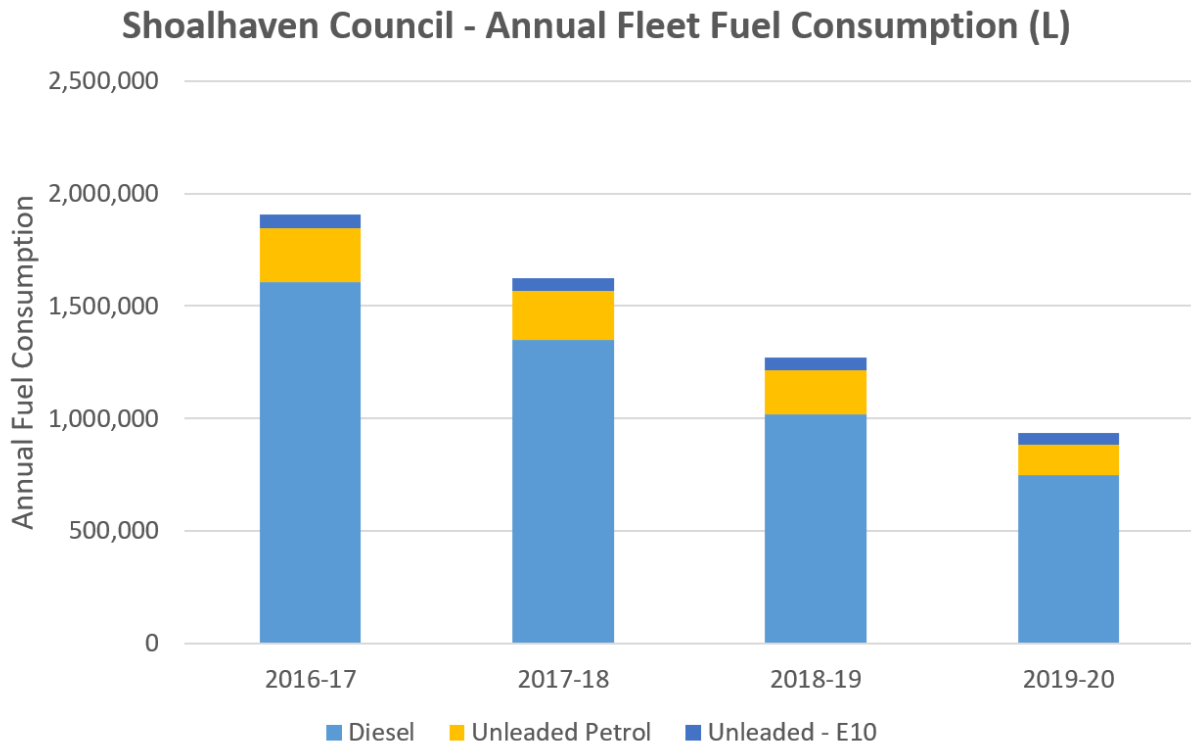


Figure 8. Shoalhaven City Council’s annual fleet vehicle fuel consumption.



Figure 9. One of three Shoalhaven City Council fully electric Hyundai Kona fleet cars.

7 Greenhouse Gas Emissions

Shoalhaven City Council’s operations emitted a total of 68,440 tonnes of greenhouse gases (carbon dioxide equivalents or CO₂-e) in 2019/20 (Scope 1, 2 & 3 emissions). Council’s **purchased electricity** contributed to almost half (48%) of Council’s total annual corporate greenhouse gas emissions (Figure 10, showing Scope 1, 2 and 3 total emissions). Despite having 328 kW of installed solar panels on Council assets in 2019, this renewable energy represents less than 4% of Council’s electricity needs. An additional 324 kW of solar PV has been commissioned on 8 Council assets **since July 2020**, generating an additional 460 MWh per annum. The remainder of Council’s electricity is generated from coal or gas-fired power stations which results in greenhouse gas emissions due to the combustion of these non-renewable fossil fuels. Methane and nitrous oxide emissions from Council’s wastewater treatment plants are the second highest source of greenhouse gas emissions at 30%. Methane emissions from the Council-operated landfill at West Nowra generated the third largest amount of equivalent greenhouse gas emissions at around 16% (despite continually flaring off the gas for emissions reduction). Fleet transport fuels (diesel, petrol etc.) and gas for stationary energy (both natural gas and LPG) make up the remaining 6% of Council’s corporate carbon emissions profile.

Figure 11 shows Council’s corporate greenhouse gas emissions for the 2015 baseline year, 2019/20 FY and emissions targets for 2025, 2030 and 2050. The initial actual decline in emissions from 2015 to 2019/20 was mainly due to a reduction in legacy methane emissions from West Nowra landfill from 19,072 to 11,796 tonnes of CO₂-e, with some savings in transport fleet fuels as well. All other sources of Council’s carbon emissions have either been steady or increased over this same period.

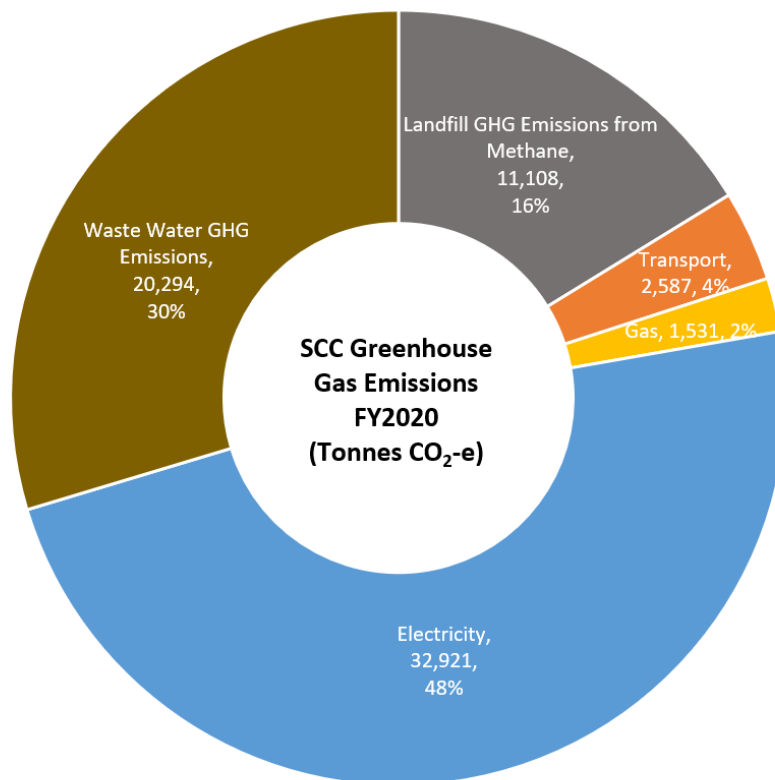


Figure 10. Shoalhaven City Council’s corporate greenhouse gas emissions profile for 2019/20.

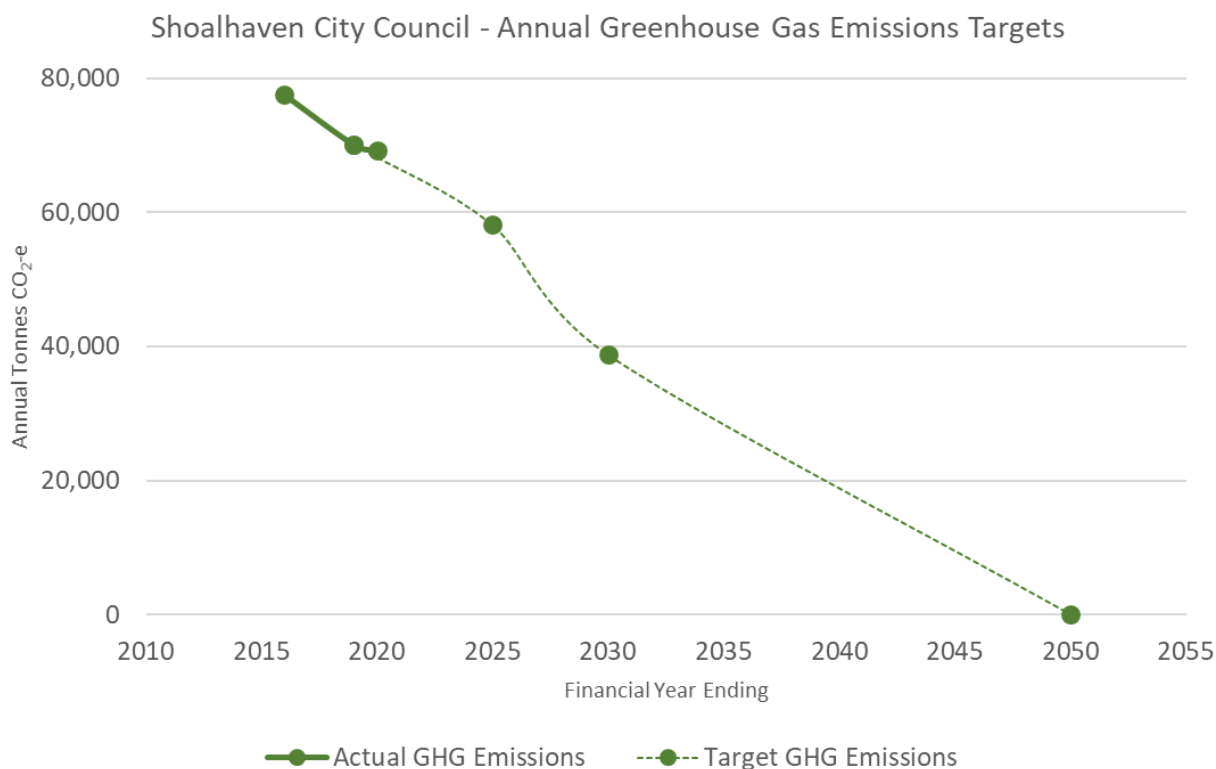


Figure 11. Shoalhaven City Council's corporate greenhouse gas emissions targets and tracking.

8 Shoalhaven Council Energy Savings Initiatives 2019/20

Implementation of Council's Sustainable Energy Policy and Sustainable Energy Strategy has commenced with numerous energy projects underway in the past 12 months, including:

- Installation of 405 kW of additional solar PV on 9 Council-owned assets including:
 - o Vincentia/Huskisson Wastewater Treatment Plant (WWTP) = 96 kW
 - o Sussex Inlet WWTP = 31 kW
 - o Shoalhaven Indoor Sports Centre = 60 kW
 - o Nowra Library = 31 kW
 - o Bomaderry Works Depot = 31 kW
 - o Flat Rock Water Treatment Plant = 31 kW
 - o Ulladulla WWTP = 23 kW
 - o Shoalhaven Heads WWTP = 21 kW
 - o Shoalhaven Entertainment Centre = 81 kW

Solar PV systems previously installed around April/May 2019 at Berry WWTP and Bamarang WTP are now demonstrating significant actual financial savings (Figures 12 and 13).

- Continuation of three (3) fully electric Hyundai Kona cars in Council's fleet as part of a trial of EVs and charging infrastructure;
- Creation of an internal Revolving Energy Fund (REFund) with seed funding of \$230,000 to finance energy efficiency and renewable energy projects into the future. The REFund has enabled LED lighting upgrades to take place at the Nowra Library and a number of Aquatic Centres, as well as some solar PV installs on Council buildings;
- Replacement of 4,231 residential street lights with energy savings LED lamps in 2020. This project was part-funded by the NSW Department of Planning, Industry and Environment (DPIE), allowing Council to achieve a feasible payback period of 5 years for its \$1.2M investment. The accelerated lighting upgrade will save around \$230,000 per year in energy costs and save 1,369 tonnes of CO₂-e per year (including Scope 2 and 3 emissions). Once upgraded, around 55% of Council's street lights will be LEDs;
- Upgrades of HVAC systems at Shoalhaven Regional Gallery and Nowra Admin Centre for improved energy efficiency;
- Partnering with a range of stakeholders, including Repower Shoalhaven (a local community renewable energy group), on the Social Access Solar Garden. This project is now being further progressed by Repower Shoalhaven to establish a 4 MW community-owned solar farm in the Shoalhaven on Council-owned land;
- Shoalhaven City Council revised and adopted new CPP pledges in 2020 after predominantly completing all its original 2017 pledges;
- Council continues to employ two sustainable energy contractors to provide expertise and management of energy-related matters such as policies, strategies, project management, energy supply, monitoring and reporting. Shoalhaven Council's new organisational structure acknowledges the value of staff capacity and capability in this field, by creating a new functional area for energy management and sustainability under City Services;
- Membership in the national Cities Power Partnership (CPP) program (around 140 member Councils in total) to implement five climate change pledges made by Council;
- Membership in the NSW Government's Sustainability Advantage Program and working towards a Sustainability Policy and Strategy;
- Shoalhaven Council submitted a written submission into the NSW Legislative Assembly Parliamentary Committee Inquiry into sustainability of energy supply and resources in NSW. Council then presented verbal evidence at the inquiry in mid-2020;
- Shoalhaven Council's Energy Management Coordinator presented a speech in Parliament House in Canberra for the Smart Energy Summit in February 2020.

These projects contribute towards the achievement of energy and emissions targets stated in Council's adopted Sustainable Energy Policy. Figures 14 & 15 show the tracking towards these targets to help gauge progress on Council's energy performance and achievement of its goals. Figure 16 shows the tracking of the solarisation of dwellings (residents and businesses) in the Shoalhaven LGA and the community solar energy penetration target of 33% by 2025.

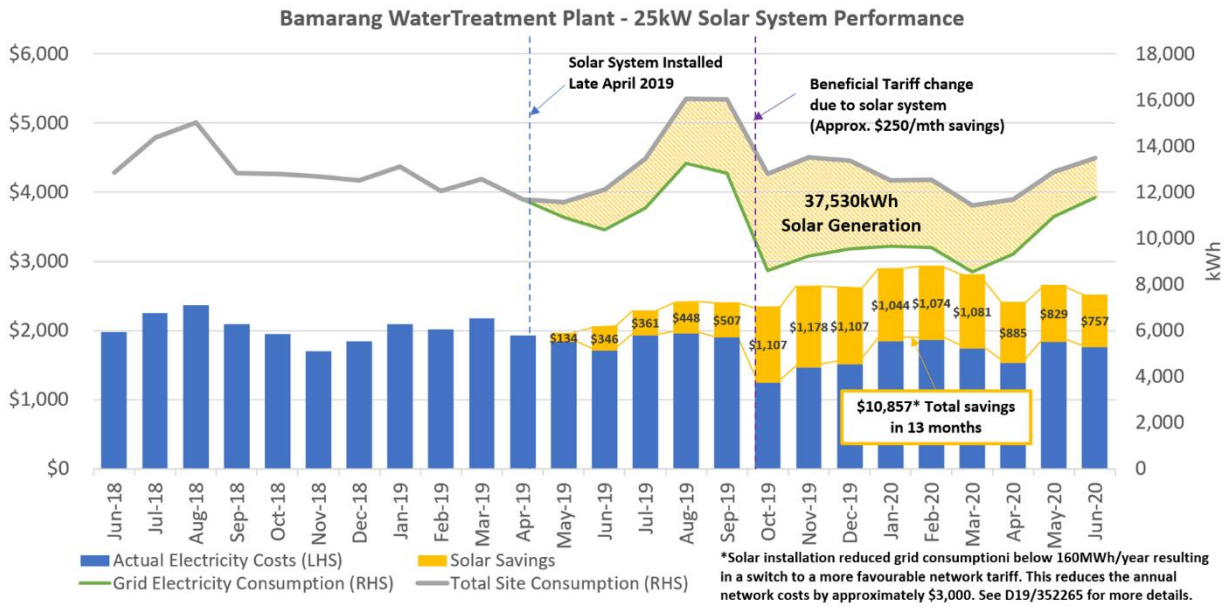


Figure 12. Bamarang Water Treatment Plant solar PV performance to date.

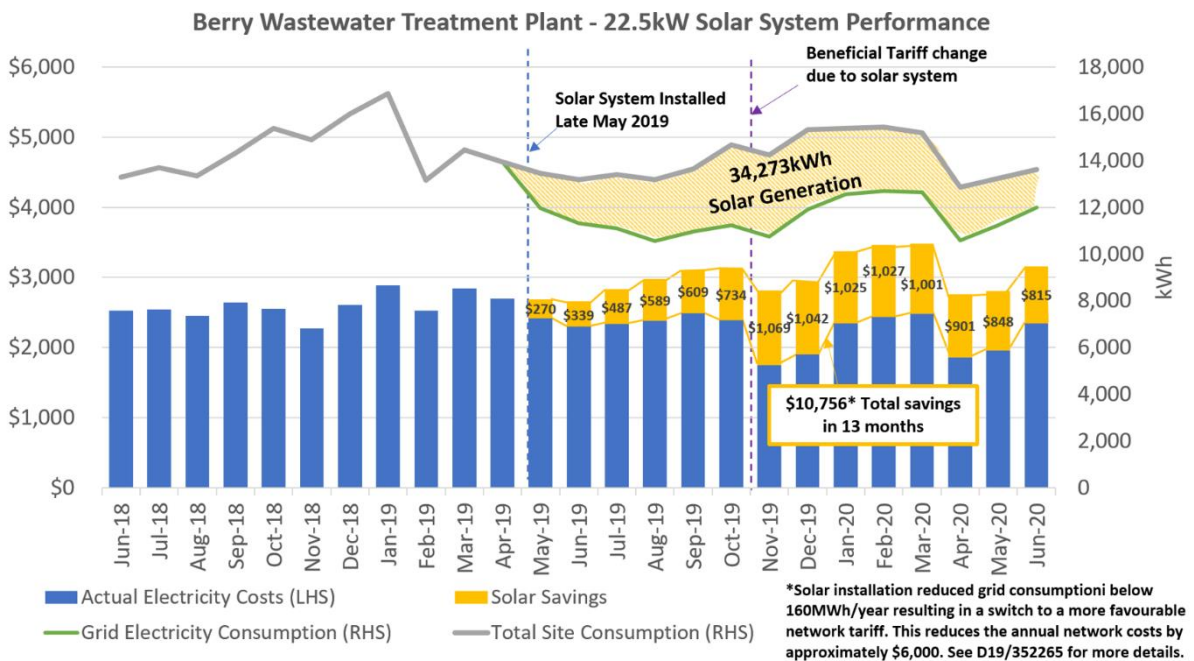


Figure 13. Berry Wastewater Treatment Plant solar PV performance to date.

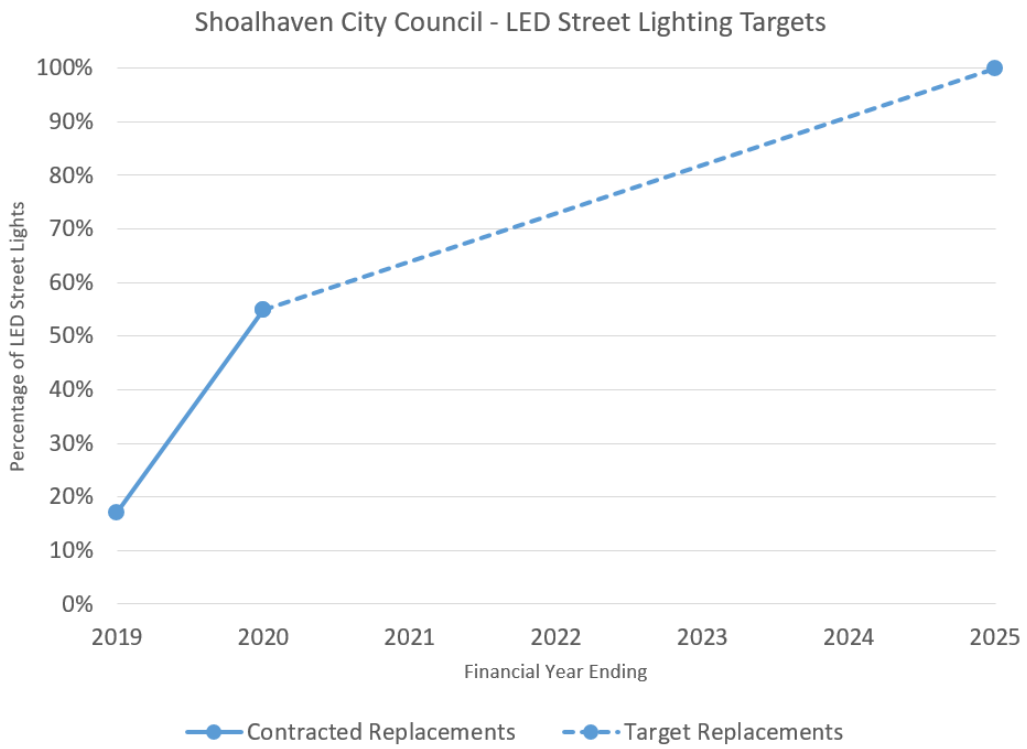


Figure 14. Shoalhaven City Council's street lighting replacement tracking with energy savings LEDs.



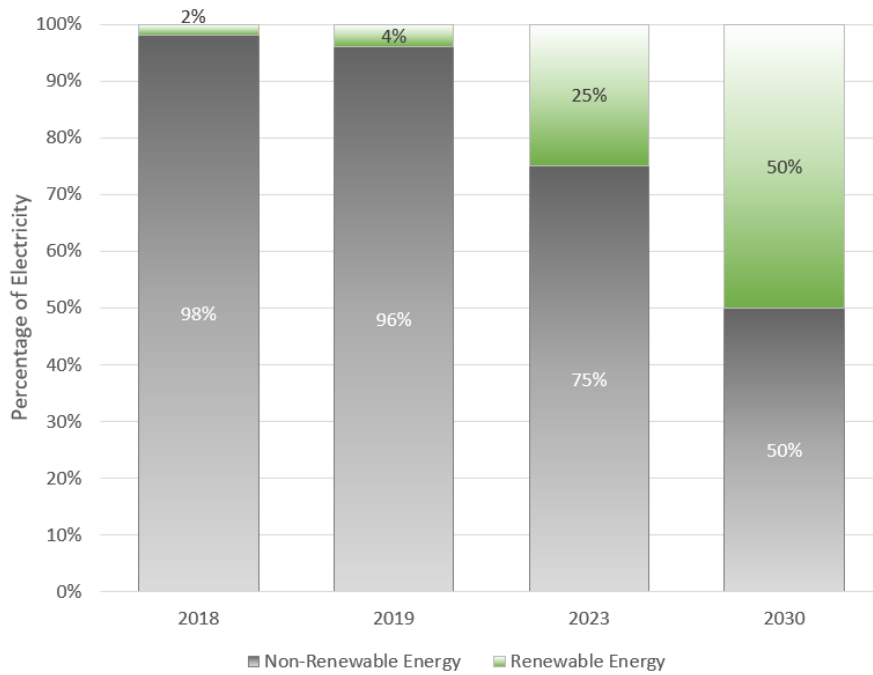


Figure 15. Shoalhaven City Council's percentage of renewable energy consumed – 2018 and 2019 is actual, 2023 & 2030 are targets.

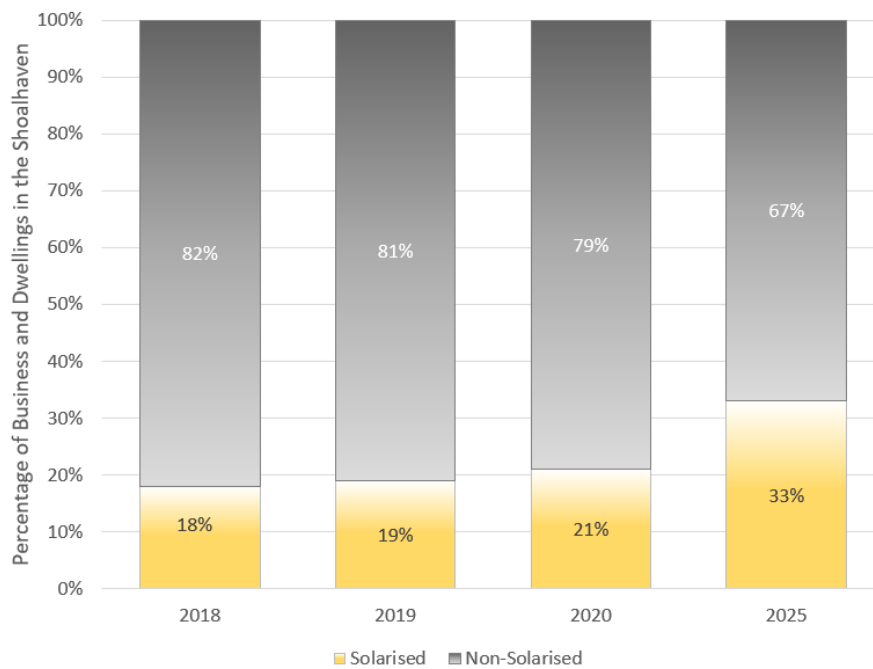


Figure 16. Shoalhaven LGA solar PV installations on dwellings – 2018, 2019 & 2020 are actual, 2025 is a target.

9 Financial Implications

The proposed energy savings initiatives outlined in Council's Sustainable Energy Strategy will incur a capital cost to implement, however, they also result in cost savings and are therefore a good investment for Council. Even with the option of borrowing low interest funds from TCorp factored in, some of these recommended energy savings initiatives still have a favourable payback period, especially since the new energy contracts come into effect from 1 Jan 2020. Shoalhaven Council now pays an additional 21% (approx. \$1.4M extra in total) for electricity

across its Large/Small Sites and street lighting in 2020, compared to 2019. These higher electricity prices continue into 2021 and 2022 (Figure 17). Higher electricity charges will mean that payback periods for energy efficiency and renewable energy projects will become much more favourable.

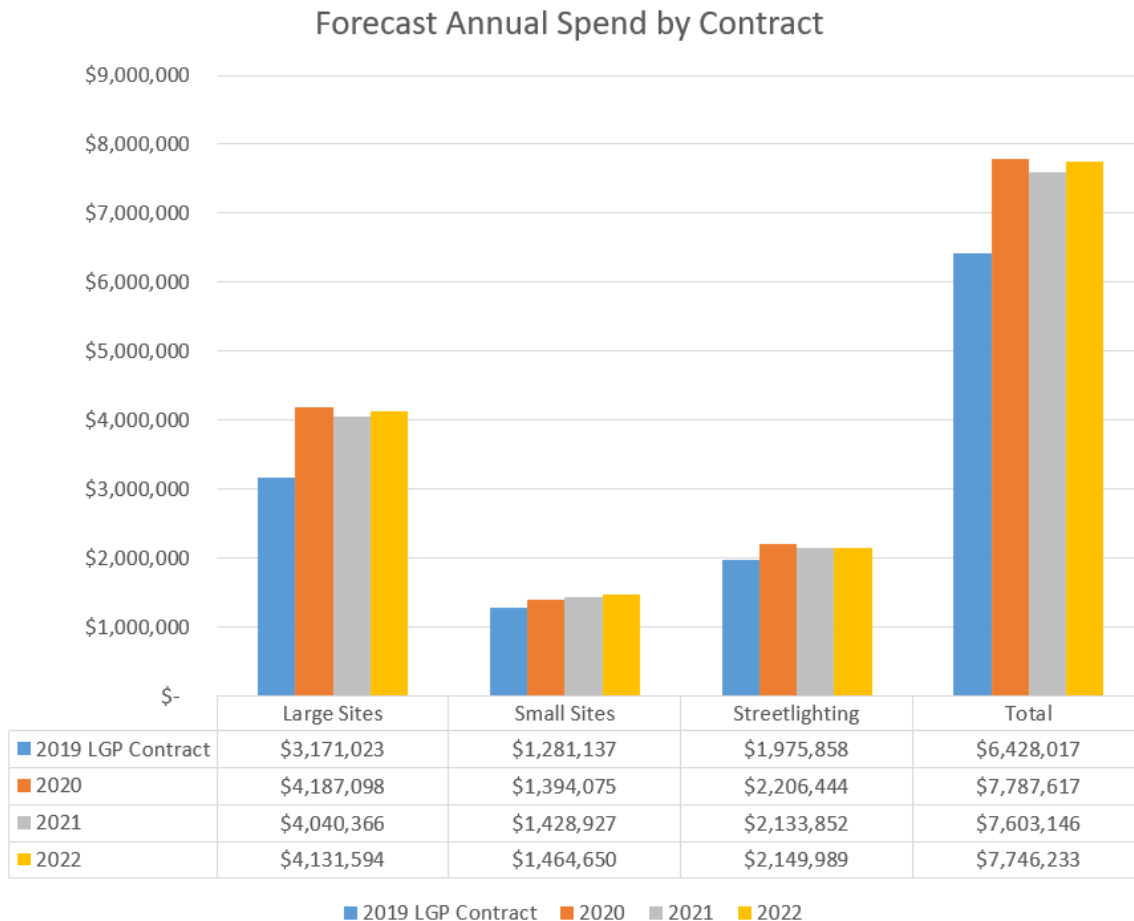


Figure 17. Shoalhaven City Council’s 2019-2022 forecast electricity costs by contract.

Notes and Assumptions for Figure 17:

- This analysis only refers to the retail supply of electricity and does not include any unforeseen impacts of network, billing, environmental, regulator or metering charges.
- The analysis does include a forecast reduction in street lighting due to the LED bulk lamp replacement currently underway (55% of total street lights to be replaced with LEDs by Dec 2020).
- Includes a 2.5% annual forecast increase in consumption and also an estimated 2.5% annual forecast increase in network charges.
- Small Sites pricing beyond July 2021 (current 776 contract) based on 2020 rates.
- Streetlighting figures include Street Lighting Use Of Service (SLUOS) charges (approx. \$1.2M/pa)

10 Recommendations

Upgrades and improvements took place in 2020 to air-conditioning systems at both the Nowra Admin Centre and the Shoalhaven Regional Gallery. Heating, ventilation and air-conditioning, or HVAC as it is known, consumes by far the greatest amount of electricity in large buildings. Replacement of aged HVAC systems with more modern units that have better energy efficiency, performance ratings and controls, will be necessary to achieve significant energy savings for Council. Nowra Library has 4 package air-conditioner units in operation with power

ratings from 45 to 65 kilowatts each. The Library has received some additional capital budget in 2020/21 to upgrade their aged HVAC system. With solar PV and LED lights also installed in 2020, the Nowra Library will be one of Council's most energy efficient buildings in 2021. Good maintenance and operation of HVAC systems at Council assets is also critical to ensure they remain as energy efficient as possible.

Further upgrades of building lighting to more energy efficient LED lights is also a good investment for Council. LED lighting has a much longer lamp life than conventional lighting, so this also reduces costly maintenance requirements. LED lights also use much less electricity to operate and are currently eligible for NSW Government energy savings certificates (rebates), but only until 2025 when the NSW Energy Savings Scheme closes. LED lighting upgrades to civic and public buildings with long operating hours incur the best rebates under the Scheme. The Nowra Admin Centre and the Ulladulla Civic Centre/Library are two obvious assets where energy efficient LED lighting replacements would be economically feasible and supported by strong business cases.

New solar PV installations are being planned in 2020/21 for four Shoalhaven wastewater treatment plants, namely Nowra (100 kW); Bomaderry (50 kW), Culburra (50 kW) and Callala (30 kW). Many of the Shoalhaven showgrounds will also be receiving solar PV installations and storage batteries under the NSW Government's Showgrounds Stimulus funding. The new Shoalhaven Indoor Sports Stadium had a 60 kW solar PV system installed on its rooftop in late 2020 to offset some of its daytime power needs. Additional solar PV may be warranted on the rooftop of the Ulladulla Civic Centre complex which houses Council administration, library and Tourist Information. There is a small 6 kW solar PV system already on the roof but this only generates a small portion of the Centre's daytime power needs and could be augmented with a larger solar array.

Shoalhaven Council is well-positioned to continue its efforts in reducing energy usage and emissions by implementing the approved Sustainable Energy Strategy 2020-2025. The Strategy outlines the priority initiatives that offer the most cost-effective outcomes for Council to achieve its energy and emissions targets adopted in the Sustainable Energy Policy.