GREATER SHEPPARTON

Energy Reduction Plan

Greater Shepparton City Council

Prepared by Moreland Energy Foundation

Date – 5 November 2015

1. Contents

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1. Executive summary

Greater Shepparton City Council has recognised the importance of a structured energy and GHG reduction program as part of its own corporate operations. As a community leader, Council has the opportunity to demonstrate a pathway to reducing energy consumption and associated greenhouse gas emissions, while securing financial benefits of this transition.

For the past decade Council has been committed to measuring and managing its energy use and GHG emissions and has taken steps to reduce them. Council has implemented actions, such as the flaring of methane from Cosgrove landfill and the replacement of street lights with low energy technology, which will reduce emissions and cost to the community as well as demonstrating leadership.

This five-year corporate Energy Reduction Plan has a dual focus on greenhouse gas (GHG) emission reduction and financial savings. It plots an ambitious but realistic path to significant cuts in Council's energy consumption and greenhouse gas emissions between now and 2020, and will set the organisation up to make additional cuts beyond this.

The plan identifies five key drivers or activity areas for Council's energy consumption, opportunities to reduce energy consumption and associated greenhouse gas emissions across these areas, target setting and an action plan to drive implementation.

The table below provides a breakdown of targets specific to each energy consumption driver, noting water pumping and treatment is excluded from the target setting process due to its variability in energy consumption (from factors external to Council such as climatic conditions).

Target area	Target	Potential energy reduction from projected BAU	Estimated capital cost
Capital Works	40% lower energy use than reference building for all new build projects.	5.8%	TBD
Energy Efficiency	Implement at least 50% of retrofit actions identified in energy audits with simple payback period of 7 year or less.	4.1%	$120,000
Operations and Maintenance	Budget allocation for 0.5 FTE role to specialise in energy management, to drive systematic improvement in facilities management.	2.3%	$55,000
Renewable Energy	250kW of new installed generation capacity by 2020. This will equate to approximately 8.5% of total electricity use in 2014.	8.5%	$450,000
Total target		20.7%	

Table 1 - Breakdown of activity area target

The quantification of these opportunities will deliver a **20% reduction** in Council GHG emissions.

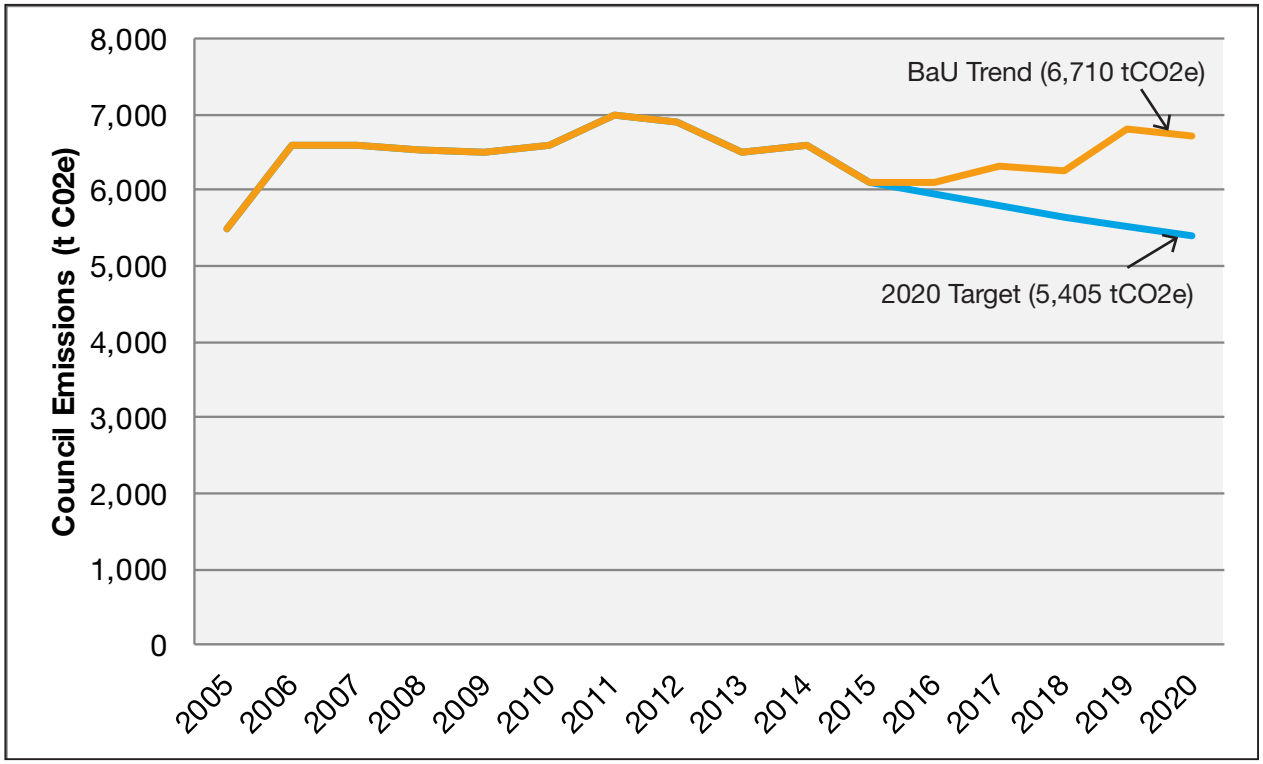


Figure 1 - Total corporate emissions from energy projection to 2020, demonstrates BaU trend and the proposed target.

Context

1.1. Why develop an Energy Reduction Plan?

Energy use is a significant direct expense to Council, costing the organisation in the order of $1.45 million annually. But just as importantly, non-renewable energy consumed through Council's operations has an environmental, economic and social cost as a source of greenhouse gas emissions. As a result of these two drivers, Council has recognised the importance of developing a strategic approach to reducing its energy consumption and use of non-renewable energy, culminating in the development of this Energy Reduction Plan.

While Council's greenhouse gas emissions profile includes a number of key sources including waste and transport, the focus of the Energy Reduction Plan is stationary energy – electricity and gas consumption – and the emissions associated with this sector.

Direct financial savings and reducing greenhouse gas emissions associated with energy will be critical to Council's future operation in a number of ways:

- Demonstrate leadership in reducing greenhouse gas emissions associated with Council's operations in line with the reductions required globally to mitigate climate change
- Protect Council against current and future rises in the cost of energy through establishing significant and ongoing reductions in energy consumption and improvements in energy efficiency
- Protect Council against the potential cost impost of future carbon pricing.

Council has varying levels of influence over emissions from energy consumption in the municipality (see Figure 2 below). The focus of the Energy Reduction Plan is on corporate energy consumption and emissions, however it is recognised that Council's efforts within this sphere of direct control can in turn influence municipal emissions beyond its control.

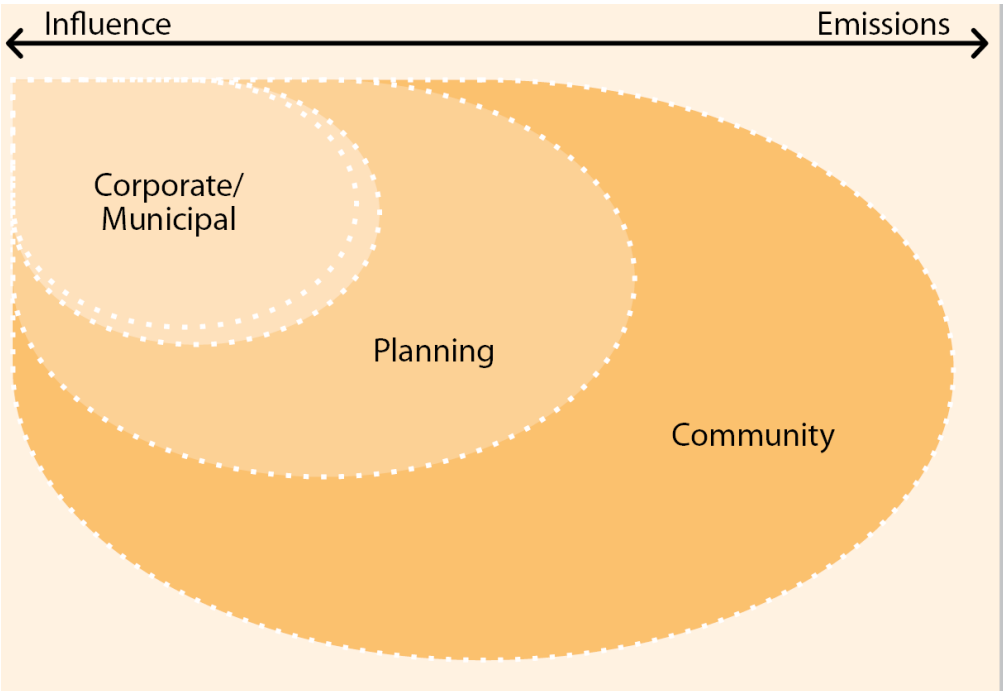


Figure 2 Council's proportion of municipal emissions

To realise the benefits noted above the Energy Reduction Plan does the following:

» Establishes a clear understanding of Council's current energy use profile and the projected changes to this profile

» Identifies what is specifically driving energy use within Council's operations

» Identifies the most significant and achievable opportunities to reduce Council's consumption of energy between now and 2020

» Establishes clear targets that balance pragmatism and ambition

» Defines a plan to implement the identified opportunities and achieve the stated energy reduction targets

The overarching process that has been undertaken in developing the Energy Reduction Plan is outlined in Figure 3 below.

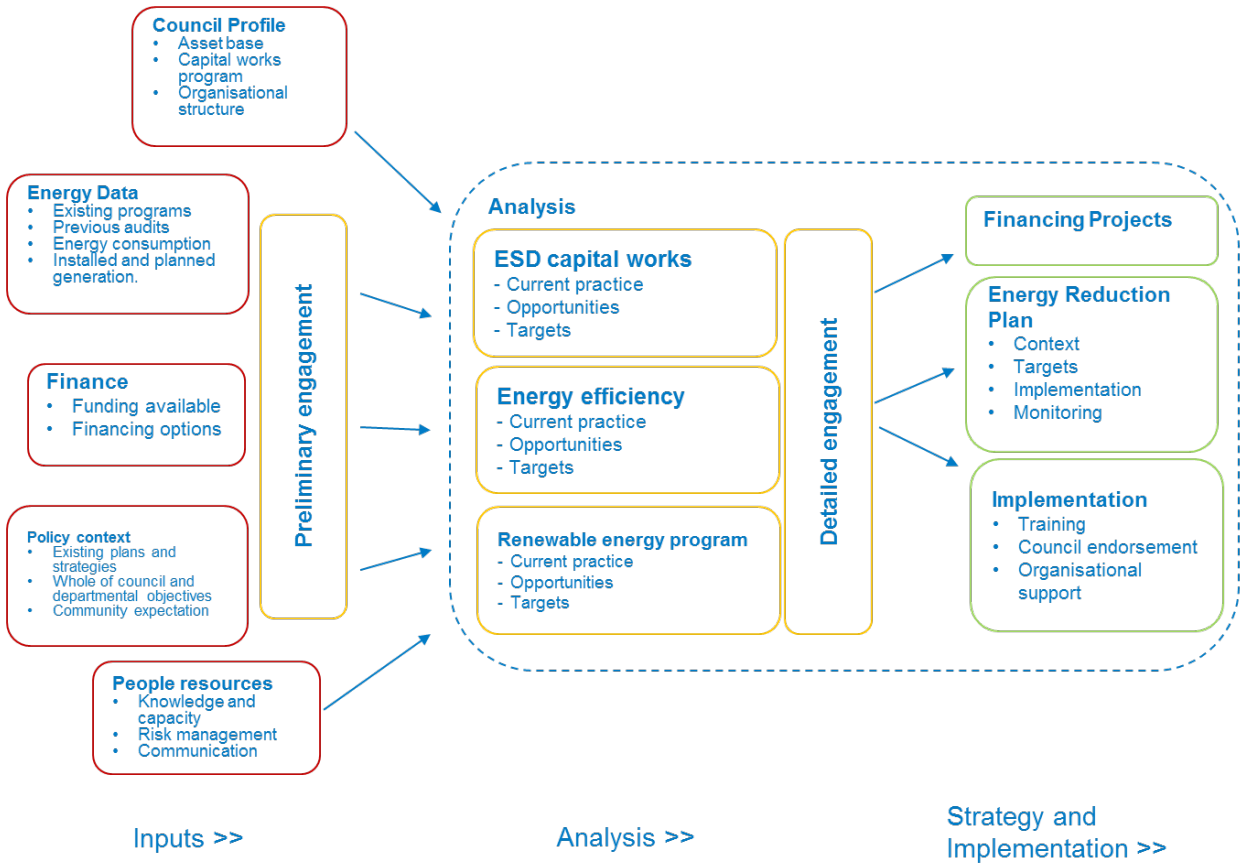


Figure 3 - Energy Reduction Plan project process

1.2. Profile: Greater Shepparton City Council

The municipality

Greater Shepparton is the fourth largest urban centre in Victoria, covering 2,422 square kilometres. The population of the municipality is projected to be 64,775 in 2016 and growing at around 2% per annum[1].

Shepparton township is located at the confluence of the Goulburn and Broken Rivers and at the intersection of the Goulburn Valley and Midland Highways.

The region is a major fruit and vegetable processing centre, with two large canneries. There are also large dairy processing facilities located in and around Shepparton, which provide products for both local consumption and export. Irrigation is critical to agricultural production.

Council's operations

Council is responsible for various core functions and services to the community that are highly relevant to any efforts to reduce energy consumption. These include:

» Operating facilities such as the council offices, town hall, swimming pools, depots and neighbourhood houses,

» Operating key infrastructure such as streetlights and water pumping infrastructure

» Service delivery includes infrastructure maintenance and works, and community outreach.

1.3. Policy Context

Greater Shepparton Council Plan 2013-2017

The *Greater Shepparton Council Plan 2013-2017* highlights the importance of Council's leadership role in relation to energy reduction. Under *Section 2 - Enhancing the environment* the following strategies are employed:

» Investigate the opportunities that are available to Council to enable Council to support renewable energy options

» Continue to reduce Council's Greenhouse Emissions.

Greater Shepparton 2030 Strategy

The *Greater Shepparton 2030 Strategy* also outlines the importance of greenhouse gas emission reduction. Objective 4 of the Environment section of the report states:

» To reduce greenhouse gas emissions by local actions, in the interests of current and future generations.

Greater Shepparton Environmental Sustainability Strategy

This strategy was adopted by Council in July 2014 and provides important strategic context and direction for the Energy Reduction Plan. The strategy seeks to incorporate environmental sustainability considerations into all Council decision-making processes and operations. The Energy Reduction Plan reflects this commitment and provides a greater degree of detail on implementation actions relating to energy efficiency and renewable energy.

Specific references within the strategy that are relevant to the corporate Energy Reduction Plan include:

» Objective 3.1 Reduce Council's greenhouse gas emissions and the financial costs of Council's energy use. Outcomes:

- Greenhouse gas emissions from Council priority facilities and plant are reduced.
- The number of Council owned or managed buildings/facilities using renewable energy sources is increased.
- The number of climate change adaption measures implemented at Council priority facilities is increased.

1 Source: Victoria in Future 2014 - Population and Household Projections to 2051

- Whole of life costs are incorporated in project planning (including Sustainability and Environment checklists, Integrated Project Management (IPM), InterPlan etc.).
- **Action: Develop and implement an energy management plan to reduce Councils greenhouse gas emissions and financial costs of Council's Energy use.**

» Objective 3.3 Encourage and attract innovative renewable and alternative energy industries/ businesses development within our municipality. Outcome:

- Innovative renewable or alternative energy industries or businesses move to, or establish their operations in Greater Shepparton.
- **Action: Include the development of alternative, sustainable sources of energy generation within our municipality in the new Economic Development Action Plan.**

Procurement

Council has an adopted procurement strategy; the G*SCC Procurement Policy* that allows for a 10% cost premium where an item demonstrates sustainability credentials. To date this has in practice been restricted to the purchase of consumables, however there is potential to extend application of this policy to other types of procurement.

Council has also developed a *Sustainable Decision Making Policy* which highlights the need for procurement decisions to focus on limiting waste and reducing consumption overall:

The *Efficient use of resources* section states:

» Council is committed to adopting and facilitating the efficient use of resources and encouraging sustainable consumption and production.

2. Current energy and emissions profile

2.1. Overview

Drivers

Energy consumption within Council's facilities and operations, and associated greenhouse gas emissions, is driven by five key factors:

Capital Works Projects – new assets of all types, predominantly buildings. Sustainable building design is critical as the lifetime of Council assets are long and decisions made during the design process can leave a significant positive or negative legacy for energy use (both associated costs and environmental impacts). The building design dictates the efficiency of the thermal envelope, Heating Ventilation and Air Conditioning (HVAC) and other key plant including lighting layout design and technologies.

Energy Efficiency – the operational energy efficiency of buildings and other Council facilities and assets. This is influenced by various factors including the legacy of Capital Works and Operations and Maintenance decisions, as well as normal wear and tear. Standalone projects to improve energy efficiency may be identified through periodic energy audits.

Operations and Maintenance – the day-to-day management and tuning of buildings and other facilities. This influences whether critical building systems, such as HVAC and lighting, are operating as efficiently as possible. This could be influenced by the effective use of Building Management Systems (BMS), other monitoring and evaluation protocols, and occupant behaviour.

Renewable and Low Carbon Energy Generation – on-site generation of energy through solar PV and cogeneration facilities. At present there is relatively little energy generated through PV on Council facilities, and given the cogeneration plant at Aquamoves has just been commissioned, no strong understanding of the performance of this installation yet. This noted, future uptake of renewable energy projects would have a significant influence on Council energy costs and greenhouse gas emissions.

Water Pumping and Treatment – operation of pumping and treatment facilities associated with irrigation water and domestic water. This has been noted as a major component of Council's overall energy usage profile, however also represents an area of energy usage that is very challenging to significantly influence due to variations in energy use based on climatic conditions and water demand.

Achievements to date

Council has taken steps to reduce energy consumption across all five of these areas over the last decade, leading to reductions in energy consumption growth.

Energy consumption driver	Actions taken to date
Capital Works	There is already a positive culture within Council that pursues improved energy efficiency outcomes in individual projects, with contractors that can demonstrate good sustainability awareness and integration into projects being preferred where possible. There is already an informal practice in place to bring representatives of the maintenance team into meetings when deciding on features and functions of new capital works programs. This is an excellent position to build from, with this existing culture being complemented and enhanced through more formal targets and procedures for sustainability integration in capital works projects.
Energy Efficiency Projects	Shepparton has had some limited success in undertaking energy efficiency actions arising from audit statements to date. These have largely comprised around low cost interventions, focusing on behaviour change and operational opportunities (with some work undertaken in optimisation of building management systems). Notable large scale activities include the transition currently underway with street lighting, and the recent installation of a cogeneration system and improved HVAC space conditioning system at Aquamoves. However, based on the audit data, work remains to be undertaken in implementing larger energy efficiency projects, and modifying procurement processes to ensure systematic transition to higher efficiency.
Operations and Maintenance	Currently operations and maintenance (O&M) activities are undertaken across several departments and areas within Council. This structure presents advantages and disadvantages. The close integration of O&M into other activities allow for better consultation, however it presents a challenge for creating a consistent approach to O&M for energy reduction planning. A consolidation of these functions is being pursued.

Energy consumption driver	Actions taken to date
Renewable Energy Generation	**GreenPower** GreenPower is a government managed scheme which allows energy consumers to purchase a certified renewable energy product from their energy retailer, which ensures that the same amount of energy is generated and purchased from a renewable energy generator. Council has in place agreements for 10% of electricity consumed at a number of key sites to be GreenPower, resulting in an overall proportion of around 8% of total Council electricity usage. This has an annual cost of approximately $30,500 and in 2014 reduced greenhouse gas emissions by 610 tonnes. At approximately $38 per tonne of greenhouse gas abatement, this represents a relatively high cost means to reduce emissions. **Solar PV** A number of relatively small solar PV systems have been installed at Council facilities. These have been less than 5 kW in capacity, and have generally not been monitored or evaluated for performance or value to Council. Anecdotal evidence suggests that a number of these systems are broken and have not been repaired. As a result of this lack of information and the incidence of breakdown, PV has not yet demonstrated value to Council as a means to reduce energy consumption, costs and greenhouse gas emissions. Despite this experience to date, there is wide support for a large adoption of solar PV energy generation in Council. Shepparton has excellent solar resource and the community is already a strong adopter of solar (currently with approximately 15% of houses having a PV system, as compared to 12% for the state average). There is not currently a systematic process for considering solar adoption for the Council, with systems being considered on a case-by-case basis for capital works projects. **Cogeneration plant at Aquamoves** A cogeneration system was recently installed at Shepparton's Aquamoves leisure centre. It is anticipated that this will have a substantial impact on the energy consumption profiles for the Council, with gas consumption likely to increase substantially while a drop in electricity consumption is expected. Due to the specific circumstances required for effective adoption of cogeneration, most significantly a large stable heating load, it is considered unlikely that this technology will be relevant to other Council facilities. For this reason it is recommended that the focus of future renewable and low carbon energy projects be solar PV.
Water Pumping and Treatment	The team responsible for Council's water assets has made significant progress in considering the energy consumption implications of current and future pumping and treatment facilities, however given the strong relationship of energy use to climatic conditions it is unclear as to the exact effect of these actions.

Transport

Energy usage and emissions relating to transport are not within the scope of this study. However it should be noted that transport resources at Council are undergoing substantial changes as the fleet is moved towards hybrid vehicles. This move is driven by a desire to systematically reduce emissions associated with transport. The intention is to transition a large part of the fleet to electric vehicles (EVs) in the next few years to further improve the ability of Council to reduce transport-related emissions.

Although this Energy Reduction Plan is focused on stationary energy consumption, due to this move towards the consumption of electricity in the vehicular fleet it is relevant to consider what role this might play on electricity-based emissions.

2.2. Energy and emissions profiles

Overall Council has a profile that is quite typical for local government. The majority of stationary energy emissions are generated by a small number of key buildings, and electricity is by far the biggest emissions source by energy type.

Figure 4 below shows Council's emissions breakdown by stationary energy type.

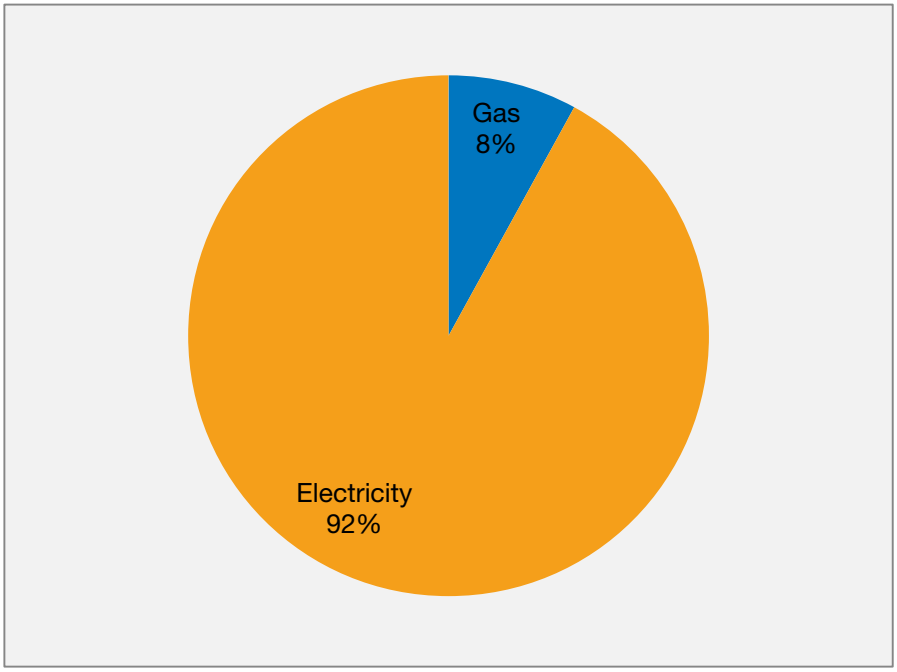


Figure 4 - Emissions by stationary energy type

2.3. Overview – Electricity

GSCC has been tracking its energy consumption and emissions in detail since 2004, with reporting extending back to 1999.

Figure 5 below shows Council's total electricity consumption since 2005 and highlights a general downward trend since a peak in consumption in 2010 (noting that 2015 is a projected result).

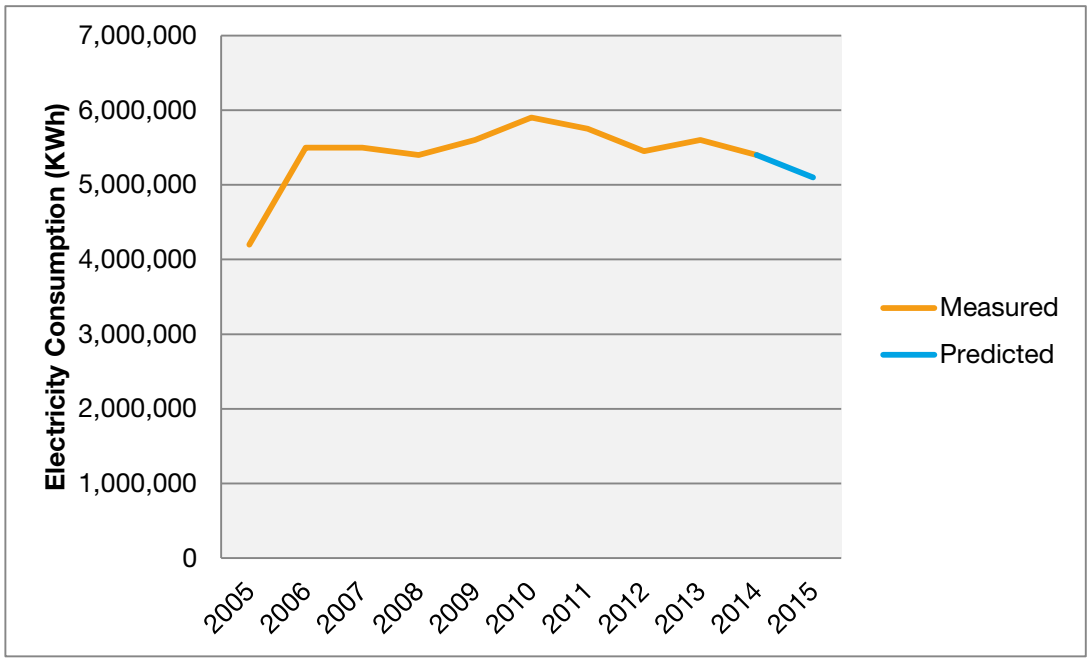


Figure 5 - Total electricity consumption for Council

Exploring electricity consumption across the overarching categories reveals a general downward trend in consumption since roughly 2009 (see Figure 6). This downward trend is consistent with broader energy consumption trends Victoria wide and coincides with a reduction in energy use at one of the key Council facilities (the Welsford St office / Eastbank complex). Please note the 'Other' catergory incorporates sites such as aged and disability services, building maintenance, smaller leisure facilities and tourism.

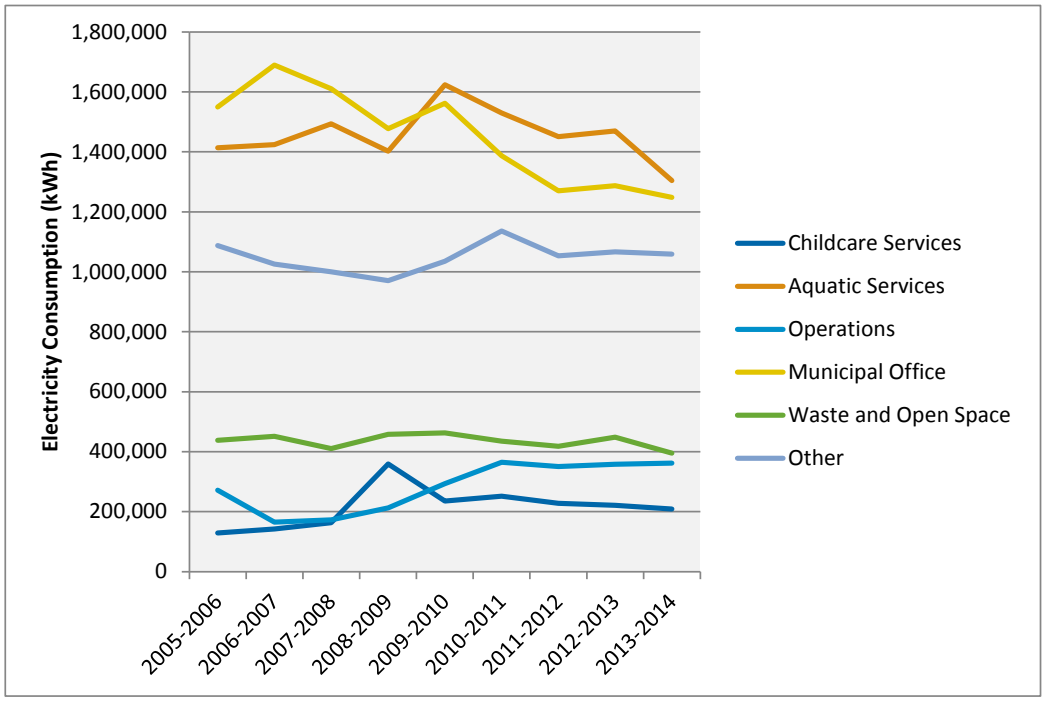


Figure 6 - Electricity consumption in principle divisions

When taking a look at the breakdown of electricity consumption and identifying key sites, it is clear that there are two substantial sites that are worth considering in detail: the Council offices on Welsford Street and Aquamoves, which consume 27% and 25% of total electricity consumption respectively.

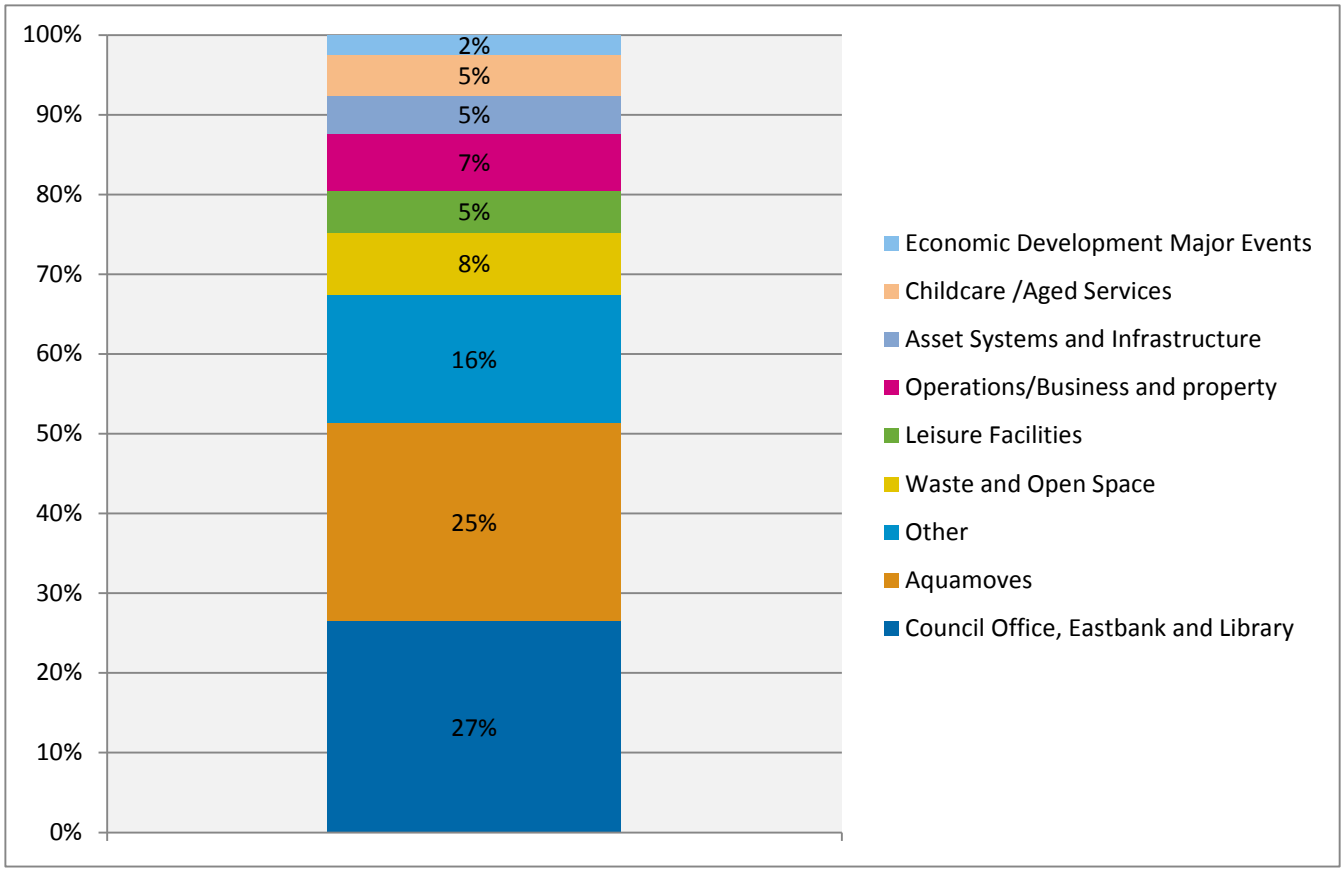


Figure 7 - Electricity breakdown for 2015

This data, derived from Planet Footprint, shows the relative priority for the buildings within the capital assets for the Council. Looking at this breakdown can assist with understanding where actions would be best targeted to lower total energy consumption. For instance, a 20% reduction in electricity use in all childcare and aged-care facilities would result in Council consumption reducing by 1% (approximately $12,000), whereas a matching reduction in the Council office would see total consumption reduce by over 5% (approximately $60,000).

The energy consumption associated with water management is very significant to the overall energy consumption profile of Council. In a previous analysis that looked at Shepparton's carbon reduction targets between 1999 and 2010, of the large increase that was recorded approximately 90% of that increase was due to additional electricity use with pumping and water handling. The diagram below indicates some of the variation that energy use in water management undergoes, showing scaled consumption on three main pumps over the last 10 years.

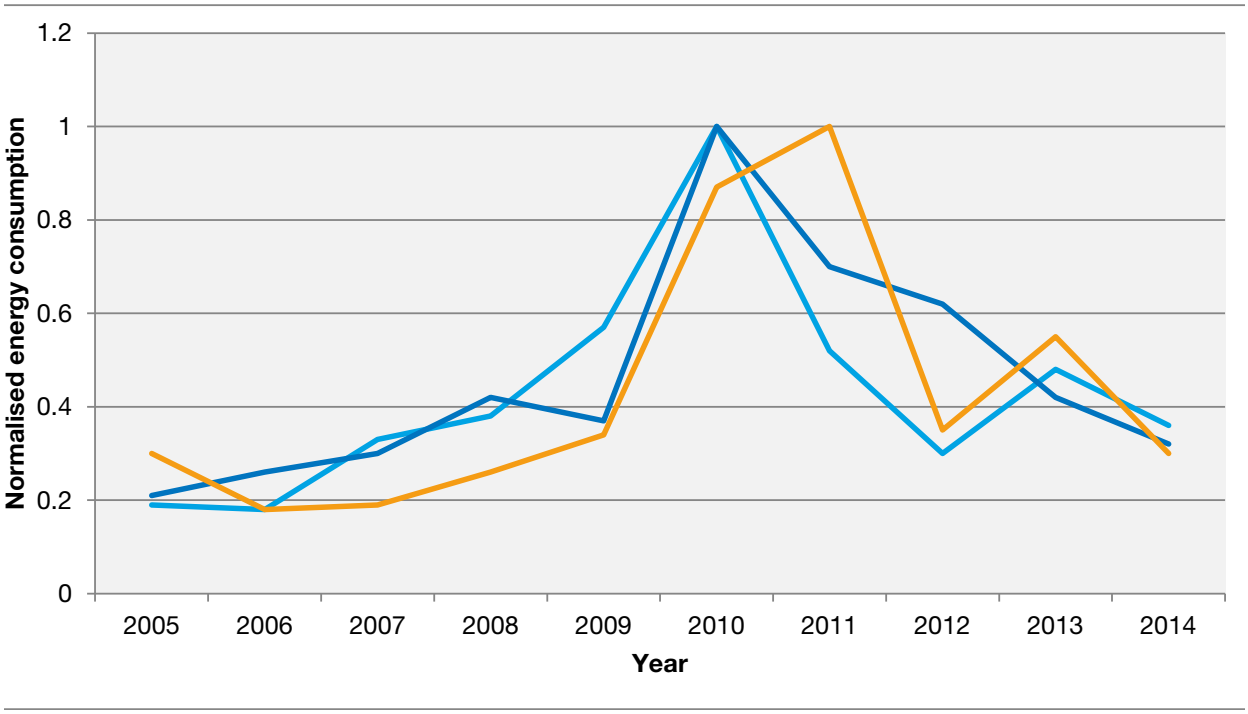


Figure 8: Normalised energy consumption associated with water pumping (annual consumption data for three representative pumping stations. Data is normalised by maximum annual consumption to facilitate comparison across different datasets).

This large variation is substantial, overall between 1999 and 2010 (which coincides with the highest point of water consumption on the available records) there was over a 2,700% increase in electricity consumption associated with water use. It is clear that this increased usage was due to very different weather conditions (such as flood and drought years), however it does make it challenging to produce reasonable targets for emissions reductions. As a result energy use associated with water has been excluded from the overall Energy Reduction Target proposed within this Plan.

2.4. Overview - Gas

The gas data that is available is not as easily interrogated as the electricity data, as the recorded data fluctuates substantially. However, it is clear that there is relatively little gas consumption across the organisation with the exception of the Aquamoves facility. Further discussion with facility managers will help develop a clearer picture of gas data and the opportunities presented over the life of the plan.

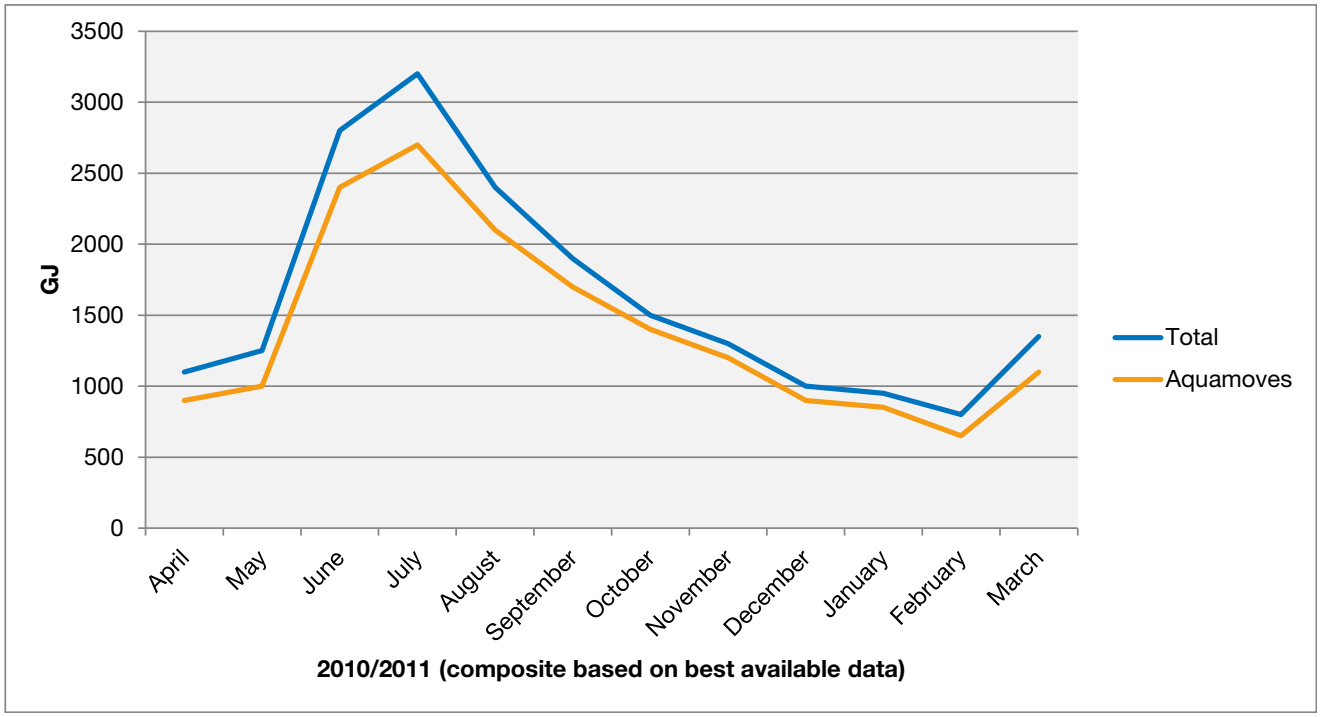


Figure 9 - Gas consumption, showing Aquamoves and remainder of Council

As can be seen, the amount of gas consumption at the Aquamoves site dominates the total gas consumption for Council. This is expected to become even more pronounced now that the cogeneration plant at the site is operational.

2.5. Combined energy consumption and total emissions

When Council is considering the most appropriate steps to take in reducing energy consumption, it is valuable to consider where the most significant benefits or changes can be made. Looking at the combination of stationary energy consumption across the Council reveals that by far the majority of total emissions can be attributable to electricity consumption, as can be seen in Figure 10.

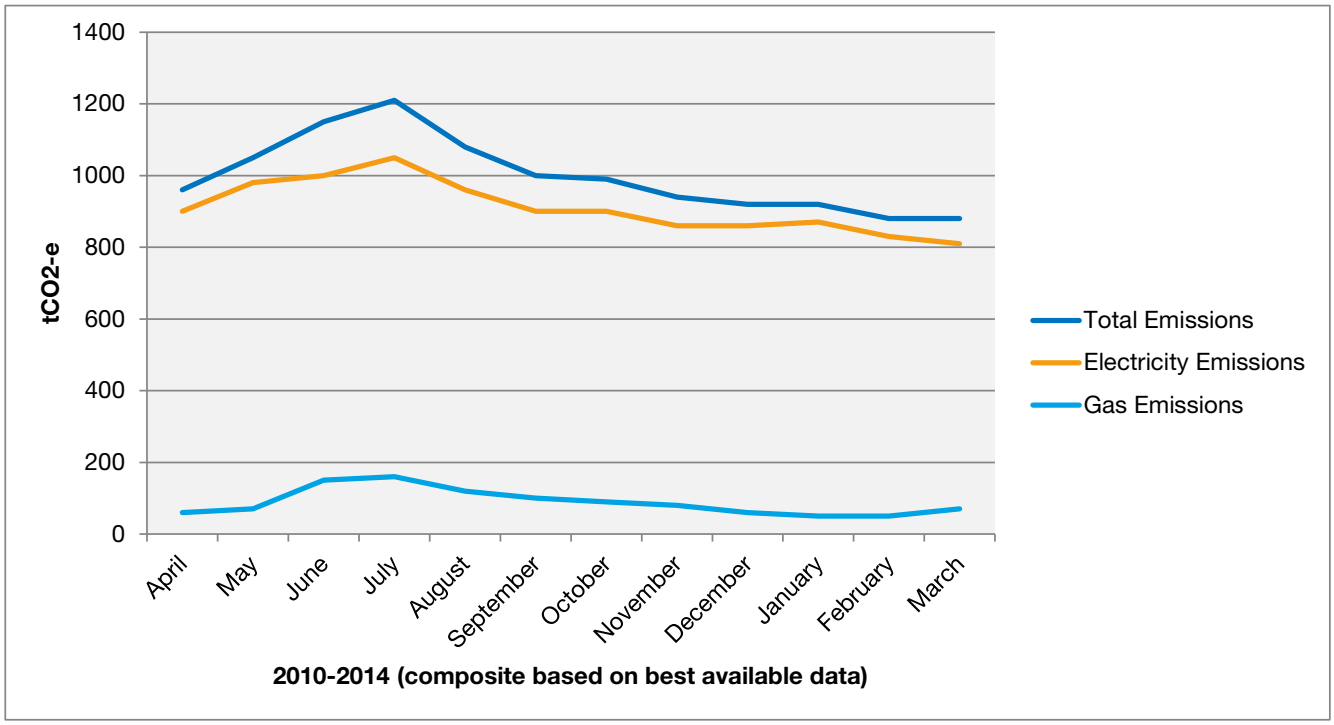


Figure 10 - Emissions by consumption type for Council

2.6. What does the data indicate?

The data presented across Sections 3.1 to 3.5 suggests that Council is already making inroads into reducing corporate energy consumption and associated emissions, a trend which has been observed since approximately 2009/2010.

This indicates that the actions that have already been implemented are showing results. This places Council in an excellent position to set ambitious, but achievable targets for emissions reductions as there is already a demonstrated trajectory.

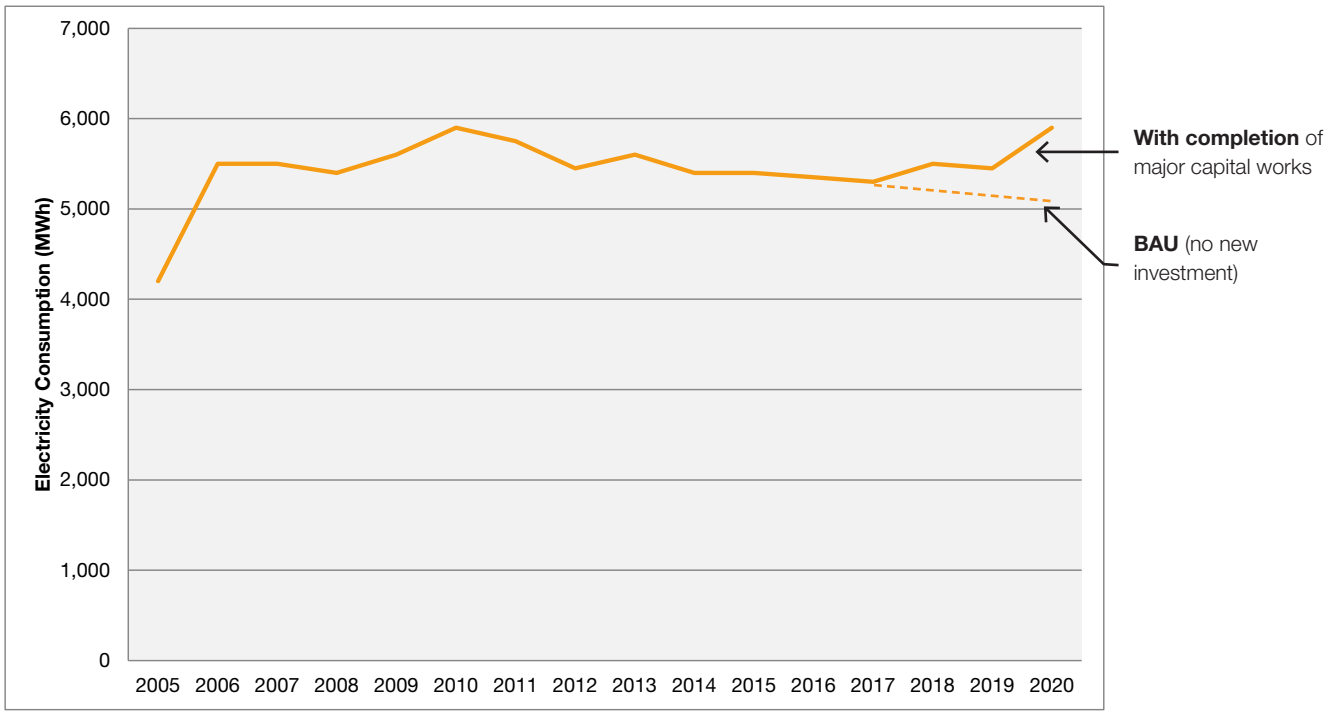


Figure 11: Total council electricity consumption

It is expected that in general there would be a small decrease for Council energy consumption over the next five years. However, due to the commissioning of several facilities within the next 5 years overall consumption under BaU will be expected to stay relatively level or rise slightly.

3. Energy and emission reduction strategies

3.1. Overview

To respond to the drivers of energy consumption outlined in Section 3, it is important to consider the practical strategies that can influence and respond to these drivers and ensure that these are the focus of the Energy Reduction Plan's implementation.

Through the program of workshops, interview and other activities which underpin this Energy Reduction Plan, it was recognised that strategies to reduce energy and emissions fall into two broad categories:

Process, procedure and behaviour change – amendments to the way Council operates, staff roles and procedures that will result in systemic improvements to energy and greenhouse gas emissions management.

Specific projects or investments – specific, targeted interventions that will result in clear and quantifiable reductions in energy consumption and greenhouse gas emissions.

The drivers of energy consumption outlined in Section 3 have been used to provide a consistent organising structure for the opportunities available to Council in systematically reducing energy and emissions. This section will outline the key opportunities identified as appropriate to GSCC and provide an indication of the scale of impact each can provide.

3.2. Capital works

New capital works projects will inevitably lead to an increase in Council's energy consumption. Any new building or facility (or expansion of existing) will require energy and this will be in addition to Council's existing requirements. As a result, for Council to achieve overall reductions in energy consumption across its portfolio of assets, it is critically important that new facilities are energy efficient and generate their own renewable energy wherever possible.

Process

Significant potential exists to improve the integration of sustainability and energy considerations into the capital works project process. An amended process was developed through consultation with Council staff, which is typified by the following key steps:

1. Pre-feasibility check for new projects - avoids new project ideas without a strong chance of success investing a lot of redundant effort.
2. Early engagement with key stakeholders about possible project (Sustainability and Environment team, Operations and Maintenance team).
3. Formal Council assessment process (i.e. will this project be budgeted in the current year). An important opportunity for further sustainability input.
4. Concept design/project definition/costed design
5. Tender (including performance requirements relating to sustainability strategy)
6. DD and construction (verification via independent ESD assessment)
7. Commissioning and handover
8. Operations - monitoring process.

This process is presented in Figure 12 below.

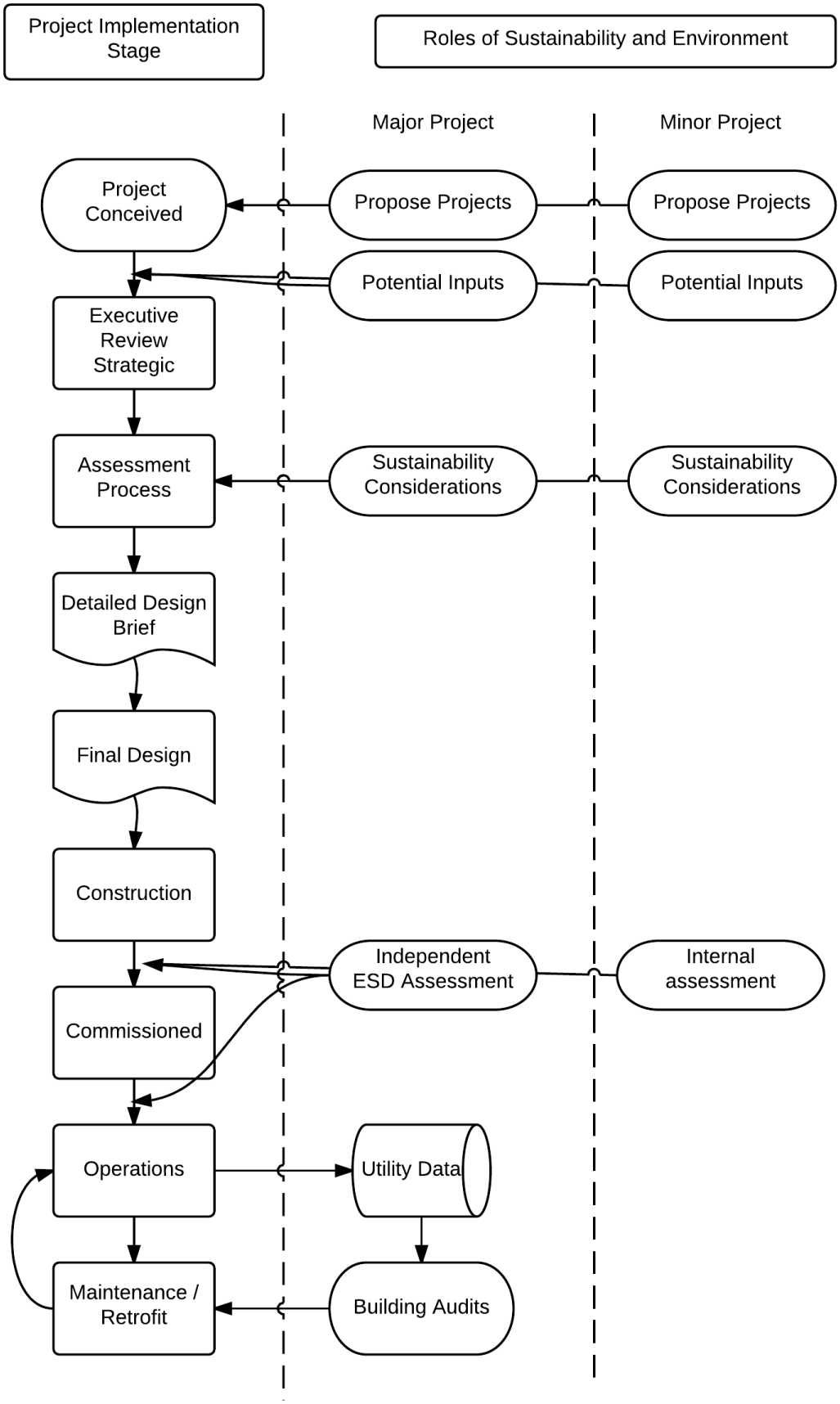


Figure 12 - Procedure for project implementation

Benchmarking and assessment

To ensure that the above process is consistent, it is recommended that a clear set of benchmarks are adopted to allow for effective assessment of capital works projects of all scales.

The following framework is proposed for adoption, providing a categorisation of new building projects:

Category	Building Project Type	Building Project Inclusions	Project Example
A	Major New	All new major building works with a total design and construction value of **$5M or more**	Construction of a new community centre
B	Minor New	All new minor building works with a total design and construction value of **less than $5M**	Construction of a new sports pavilion Installation of a public toilet or construction of a storage shed
	Upgrades	All upgrade or extension work	Upgrade or expansion of a Town Hall or leisure centre
C	Renewal	All renewal works to upgrade, refurbish or replace existing facilities with facilities of equivalent capacity or performance	Refurbishment/renewal of a childcare centre or sports pavilion
D	Maintenance	All reactive and routine maintenance work	Application of new finishes or fire alarm testing
E	Demolition	All major demolition work that includes 10m3 or more of waste	The complete or practical demolition of a building

Table 2 - Assessment framework for energy efficiency targets for Council's capital works

Once this framework is established, specific targets can be set across a series of performance standards for the relevant project types. The following targets are proposed for energy, however water and other targest could be adopted over time as part of a broader ESD Council Buildings Policy.

Category	Building Project Type	Efficiency Target	Level 1	Level 2	Level 3
A	Major New	Green Star - Energy Section (ENE - 1)	30% reduction on reference building	40% reduction on reference building	50% reduction on reference building
B	Minor New	Meeting or exceeding energy benchmarks as outlined in BESS	Achieving 50% total score	Achieving 60% total score	Achieving 70% total score
	Upgrades	Meeting or exceeding energy benchmarks as outlined in BESS	Achieving 50% total score	Achieving 60% total score	Achieving 70% total score
C	Renewal	Meeting or exceeding energy benchmarks as outlined in BESS	Achieving 50% total score	Achieving 60% total score	Achieving 70% total score

Table 3 - Proposed energy efficiency targets for Council's capital works

BESS

The Built Environment Sustainability Scorecard (BESS) assesses energy and water efficiency, thermal comfort, and overall environmental sustainability performance of a new building or alteration. It was created to assist builders and developers to demonstrate that they meet sustainability information requirements as part of a planning permit applications but has useful applications for Councils assessment of their own capital works projects.

BESS replaces two tools that have supported assessment processes for the past decade. These are:

- STEPS, originally developed by Moreland City Council to assess residential buildings
- Sustainable Design Scorecard (SDS), originally developed by the City of Port Phillip to assess non-residential buildings.

The energy section in BESS is standalone and so can be used to benchmark non-residential projects.

Infrastructure Sustainability tool

Council has recently become a member of the Infrastructure Sustainability Council of Australia (ISCA), a national body promoting improved integration of sustainability principles into infrastructure design, construction and operation. ISCA administers a tool called Infrastructure Sustainability (IS) and certifies those projects that demonstrate achievement within the tool's various credits to achieve one of three benchmarks (commended or excellent). To date these projects have typically been major civil infrastructure projects such as road and rail tunnels, wastewater treatment plans and dams.

The tool offers three types of ratings relevant at different stages of project delivery, as illustrated below:

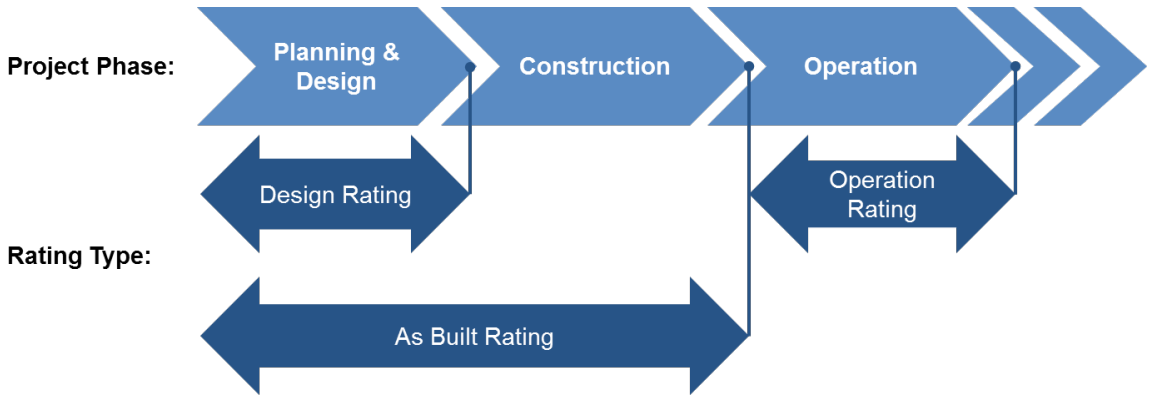


Figure 13 - Project implementation and relevant ratings

ISCA is seeking to establish a version of the framework that is designed for use in local government capital works projects, and Council is actively participating in this development. This presents an opportunity to adapt the framework outlined in this report to the specific characteristics of the sites being considered, and will ideally allow for Council to assess compliance in-house. This tailored framework is expected to be completed in early 2016.

Specific projects

The Sports Precinct redevelopment project is seen as an ideal opportunity to pilot the amended process and performance thresholds for capital works projects.

3.3. Energy Efficiency Projects

The energy efficiency of Council's facilities has a clear bearing on the organisation's energy profile. While addressing this in new facilities is critical, it is also recognised that many opportunities are available to improve the energy efficiency of existing assets.

Energy efficiency opportunity area	Description
Appliances	Appliances and IT equipment (such as computers, printers and servers) can be substantial consumers of power. Fortunately there has been significant progress in improving both their efficiency and the information available to consumers to assist with better product selection – staged replacement of poorly performing appliances and introduction of timers for example can significantly reduce energy use.
Heating, air-conditioning and ventilation (HVAC)	Heating, ventilation and air conditioning (HVAC) is a set of technologies that provide buildings with controlled temperatures and access to appropriate levels of fresh air. HVAC is a very important area of focus for energy efficiency because it typically consumes by far the most energy in a building, often more than lighting, computing and general appliances combined.
Lighting	Lighting upgrades can significantly reduce energy use by up to 82% in some circumstances, the scope of reduction is limited however by the fact that in many buildings it may comprise only 10–15% of total consumption.

Table 4 - Summary of energy efficiency opportunities relevant to existing facilities

Process and procedural change

For energy efficiency improvement projects to be effectively identified and implemented, a clear process that is recognised by the relevant parts of Council is required. To date, while some opportunities have been identified through periodic audits, a reliable mechanism or process hasn't been available to consistently progress from identified opportunities through to implementation.

The following key procedural changes are recommended to capitalise on specific energy efficiency opportunities in existing facilities:

- Amend the energy auditing process to systematically work through opportunities and facilitate the aggregation of actions across sites. All audit recommendations should be provided with the appropriate analysis to allow Council to proceed to implementation. This analysis should include estimates of utility savings, cost of implementation, operational cost impacts and carbon emissions reductions.
- Adopt a commitment to implement at least 50% of audit recommendations that project a payback period of 7 years or less. Importantly, this commitment must include making appropriate funding or financing available to these projects.
- Implementation of identified energy efficiency capital works projects will be driven by the project sponsor. The Sustainability and Environment team, with the buy-in of the relevant facility manager, are best placed to take the role of project sponsor for these projects. The energy audit reports should provide appropriate information to establish a strong business case to be submitted to Council's annual budgeting process to provide finance for implementation of the capital works.
- Establish a consistent monitoring and evaluation procedure for energy efficiency projects, to ensure that the outcomes of individual projects are properly understood.

It should be noted that while financial return and payback period are likely to be primary drivers, a number of qualitative metrics should be considered when selecting specific energy efficiency projects:

- **Visibility and leadership** – the extent to which a project can demonstrate leadership for the community and which the outcomes can be used a visible communication tool
- **'Replicability' and scale-ability** – the extent to which a successful project could be adapted, scaled up and replicated at other corporate sites
- **Innovation and learning potential** – the extent to which it creates new learning, promotes greater understanding for Council
- **Risk management** - the likelihood and consequences of risk scenarios and the extent to which risks to the project can be mitigated / addressed
- **Policy and practice alignment** – the extent to which the project aligns with broader department and organisational objectives.

Energy auditing tool

An auditing aggregation tool was developed as part of this Energy Reduction Plan, which will provide a mechanism for better management of energy audits and the recommendations that come from them. All auditing work should submit recommendations through the tool, allowing all actions to be compared on equal footing, and ensuring that identified opportunities are kept up to date. Note that in particular, all identified opportunities should be appropriately costed (total capital cost outlay) with estimates of savings attributable to the intervention in both gas and electricity. The image below demonstrates a screenshot of the tool.

	A	B	C	D	E
1	Location	Category	Recommendation	Date of Review	Responsible Group
2					
3	Arthur Dickman Childcare Centre	Childcare	Upgrade security lighting	Jul-14	O&M
4	Arthur Dickman Childcare Centre	Childcare	Turn off air conditioning after hours	Jul-14	Daily operations
5	Arthur Dickman Childcare Centre	Childcare	install temperature ranges on air conditioning	Jul-14	O&M
6	Arthur Dickman Childcare Centre	Childcare	Upgrade exit and emergency lighting	Jul-14	O&M
7	Arthur Dickman Childcare Centre	Childcare	turn off boiling hot water unit after hours	Jul-14	Daily operations
8	Arthur Dickman Childcare Centre	Childcare	Upgrade to natural gas dryer	Jul-14	Capital project
9	Arthur Dickman Childcare Centre	Childcare	Upgrade fluorescent lighting to LED	Jul-14	Capital project
10	Doyles Road Operations Complex	Depot	Fix warehouse compressed air leaks	Jan-12	O&M
11	Doyles Road Operations Complex	Depot	Drink vending machines: optimise control via seven day timer	Jan-12	O&M
12	Doyles Road Operations Complex	Depot	Glass door drinks fridge: optimise control via seven day timer	Jan-12	O&M
13	Doyles Road Operations Complex	Depot	Hot water dispenser: optimise control via seven day timer	Jan-12	O&M
14	Doyles Road Operations Complex	Office	Ice machine: switch off end of day and re-start 8 hours before first shift	Jan-12	Daily Operations
15	Doyles Road Operations Complex	Depot	Install time delay switches on money counting room air conditioner	Jan-12	O&M
16	Doyles Road Operations Complex	Office	Daylight controls: install on warehouse highbay lighting	Jan-12	Capital project
17	Doyles Road Operations Complex	Office	Additional occupancy sensors: install on recommended lighting	Jan-12	Capital project
18	Doyles Road Operations Complex	Office	Daylight controls: install on recommended lighting circuits	Jan-12	Electrical
19	North Shepparton Community Hub	Community Centre	Boiling hot water dispenser: optimise control via seven day timer	Jan-12	O&M
20	North Shepparton Community Hub	Community Centre	Calibrate thermostats and optimise control parameters for package air conditioners	Jan-12	O&M
21	North Shepparton Community Hub	Community Centre	Drink vending machines: optimise control via seven day timer	Jan-12	O&M
22	North Shepparton Community Hub	Community Centre	Install time delay switches for recommended air conditioning systems	Jan-12	Capital project
23	Council offices, eastbank, SAM	Office	Improve computer switch off practices and image computer switch off script over network	Dec-07	IT Team
24	Council offices, eastbank, SAM	Office	Improve server room ventilation - main frame server	Dec-07	Capital project
25	Council offices, eastbank, SAM	Office	Improve server room ventilation - Ground floor server	Dec-07	Capital project

Specific projects

Examples of specific projects that should be pursued include:

» Street lighting upgrade (in progress)

» Installing of fluorescent fittings in the Saleyards (estimated savings of 33MWh per year)

» Monitoring and evaluation of Aquamoves including cogeneration plant and building optimisation.

3.4. Operations and maintenance

The day to day operations and maintenance of buildings and facilities has a cumulative influence over energy consumption. Ensuring that opportunities to improve energy efficiency in operations and maintenance are properly targeted is critical to the ongoing minimisation of energy consumption across Council's assets.

Operations and maintenance is also critical to the success of capital works projects and energy efficiency upgrades. Without effective input from operations and maintenance staff in the procurement of new buildings, facilities and significant building retrofits, modelled improvements in energy efficiency may not be realised.

Process and procedural change

It is proposed that two steps can be taken to improve the role that operations and maintenance plays in reducing energy consumption.

Building optimisation expert

» Council has several facilities that incorporate complex building management systems (BMSs) and other plant that open opportunities for substantial optimisation (noting an opportunity of approximately 240 tonnes of CO2 savings per year). This role should incorporate the following:

- Building management building optimisation
- Data analysis from energy sub-circuit monitoring and issue identification
- Liaison with other council officers to implement behaviour change and other strategies for improved energy efficiency

It is recommended that Council consult with relevant stakeholders internally (such as operations and facility management staff) to assess what skills exist and what might be needed. If it is identified that an additional role is required, then this this role may be considered on a temporary basis (such as for a three month period) to assess the efficacy of building improvements. This role may also be suitable for a subcontractor in order to obtain the appropriate skill sets.

Iterative improvement to procurement processes

Procurement of new material is an ongoing activity for Operations and Maintenance. It would be possible to achieve some of the energy efficiency opportunities identified through energy audits without incurring notable additional costs through revising the procurement strategy to systematically select for higher efficiency replacements. This should include:

» Replacing air conditioning and heating systems with higher star rated units

» Replacing appliances such as fridges, TVs and washing machines with higher star rated appliances

» Upgrading hot water systems from gas and electric storage systems to solar boosted or heat pump systems

» Swapping low efficiency light fittings with higher efficiency units, such as LED downlights

Specific projects

Examples of specific projects that should be pursued include:

» Review and optimisation of Building Management System (BMS) at Aquamoves

» Review and optimisation of BMS at municipal office

» Thermal comfort policy for municipal office, targeting seasonally adjusted temperature setpoints

3.5. Renewable Energy Generation

The generation of renewable and low carbon energy within Council's own facilities represents a significant opportunity to reduce the ongoing financial costs and greenhouse gas emissions associated with energy consumption. However, while the capital costs of technologies such as solar PV have dropped dramatically, they still represent a significant investment.

Process and procedural change

Council should look carefully at options for installing as much solar generation capacity as possible within agreed financial criteria. Because of the important role of solar in contributing to significant reductions in energy use it will be important to agree on parameters for approving a PV funding source and/or financing product to facilitate roll-out. See the *Financing the Energy Reduction Plan* section for further discussion of the financing approaches available.

Specific projects

A number of scenarios are available to Council with regard to specific solar PV projects or programs. Depending on the outcomes sought, funding available and the nature of each opportunity, any one or combination of the following scenarios may be deemed most appropriate.

Scenario 1: Ad hoc small scale solar PV systems

Such systems (typically 2 to 7kW capacity) can be installed on various buildings based on 1) their solar potential and 2) their use of electricity in particular during peak tariff times (matching supply / demand for maximum return) in an opportunistic way, when other work is being done. The key objective is to reduce electricity bills and get the fastest possible payback (5-7 years typically). Feeding into the grid is minimised, as feed-in tariffs are low. A key consideration in targeting the sites best suited is whether high tariffs apply in periods of high consumption and whether solar potential is good at these times.

Capital requirement for each system is likely to be between $3K and $15K depending on system chosen and technical complexity of the installation.

Scenario 2: Large scale PV systems on one or two sites (total 250kW)

There are two possible options for the installation of larger PV systems. On the few sites that have large consumption (such as the Welsford Street offices) it may be feasible to install PV systems that meet a conventional cost/benefit approach (where the majority of electricity is consumed on site). For other sites, however, the expectation would be that a large system would mainly export its generation. This second arrangement has typically had poor paybacks and may be hard to justify from a purely financial basis, however it could form an effective method of reducing emissions totals. Virtual Net Metering (VNM) is also a potential option for increasing the viable size for installation. For an explanation of the concept refer to the following page boxed text.

Assumed total capital requirement is $450K.

Scenario 3: Centrally managed program of decentralised small scale PV systems on multiple sites (total 250kW)

The last envisaged scenario is to roll out a program of small scale PV on Council's properties to make the best use of their solar potential and take advantage of "bulk" arrangements and economies of scale. While the same type of priorities may be set to determine which buildings should be prioritised as in scenario 1, the program approach would be open to different implementation and funding opportunities.

Assumed total capital requirement is $450K, in line with scenario 2 (note: no calculation has been undertaken nor quote required, hence this should be considered as a pure order of magnitude estimate).

Assessments

MEFL's social enterprise *Positive Charge* has undertaken a preliminary solar assessment for one of Council facilities. The snapshot below shows the key information presented in these assessments (in this case for the Council-owned Community Hub at 14 Parkside Drive).

positive charge

Solar PV

Property Address

14 Parkside Drive, SHEPPARTON VIC 3630

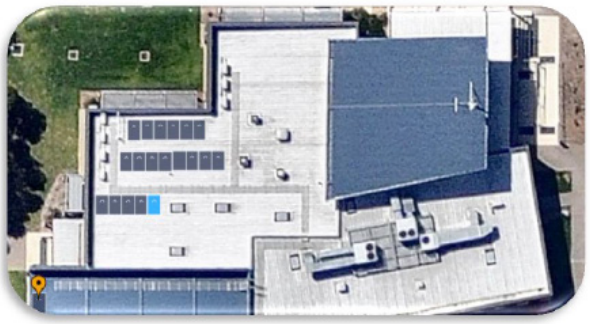
Building Summary

+ North N/E facing
+ Ample roof space
+ Intermittent electricity usage

Solar PV

System Size	5 kW system - 20 x 250W panels
Annual system output	6582 kWh
System Cost*	$6,900
Estimated cost savings pa*	$999
Electricity provided by solar	25%

Proposed PV Array Placement



Estimated Payback Period

We estimate based on the information provided that a 5 kW solar PV system for the Community Hub would pay for itself within 6.9 years. The total savings after 10 years is estimated to be $9,175 and $19,041 after 20 years.

Virtual net metering

Virtual Net Metering (VNM) is a term that describes the sale of excess electricity from a distributed energy resource (like a solar rooftop array) to a third-party located nearby at a cost that reflects the limited use of the regional network. By focusing on local interactions, the concept effectively expands "behind the meter" activities in an attempt to reduce the costs associated with full market participation and by extension the barriers to adoption of distributed energy.

In 2013 the Institute for Sustainable Futures (ISF) prepared a comprehensive account of VNM in Australia to inform efforts at promoting its more widespread use. A key insight within this report relates to the limited uptake of the model due to lack of a regulatory framework or imperative. In the absence of this, there is little reason for Distribution Network Service Providers (DNSP's) to consider reducing network charges for customers as this would effectively undermine their ability to recover costs on their network investment.

Consideration of the VNM model forms part of a broader discussion around cost-reflective pricing for networks, a process which is ongoing. Across the electricity market, participants are engaged in a debate that aims to more appropriately apportion costs for use of network assets.

In considering an approach to a DNSP seeking an offer for reduced network charges under a VNM scenario, it is recommended that proponents take note of these contextual issues beforehand. While there is a greater chance of attracting an offer for a scenario involving a single customer/end-user (such as Council) who is effectively supplying energy between their own facilities, good reasons remain from the DNSP perspective for this to be declined.

As the regulatory framework changes over time a more conducive operating environment may allow Council to take advantage of a VNM opportunity. Council should also be aware that certain funding models may restrict this opportunity (refer Financing models section).

3.6. Water Pumping and Treatment

As discussed in Section 3, energy used in water pumping and wastewater treatment represents a significant proportion of overall energy use within Council. As a result, any effective interventions that reduce this consumption substantially will also have a tangible impact on the organisation's overall energy consumption.

This noted, with the key factor driving energy use related to water (climate) completely out of Council's control, it is important to be realistic about the ability to achieve absolute and reliable reductions in this area. As a result, it is proposed that the key focus in this area is on improving energy efficiency and decarbonising the energy used in water pumping and treatment.

Process and procedural change

Currently there are excellent informal processes in place for the systematic improvement of water related energy efficiency. Because of the highly variable rate of energy consumption due to factors external to Council, this informal approach is beneficial until more structured methods for benchmarking and target setting can be established.

With this in mind, the following process changes are suggested for water pumping and treatment

- New water projects should consider all opportunities for implementing solar PV installations to support the energy needs. This may include adding requirements for 'solar pumps' to contract terms, and similar applications
- Electricity consumption figures should be used as an additional point of feedback for operational decisions, and should be reviewed on a monthly or quarterly basis.

Specific projects

While a detailed exploration of specific solar pumping opportunities was beyond the scope of this project, a brief desktop analysis has identified a number of pumping facilities that have relatively high daytime energy usage and also appear to have the potential to accommodate ground or roof mounted solar PV. The following is recommended:

- Implementation of water reuse facilities at the Sports Precinct development
- Trialling solar pumping on suitable test sites and assessing impact on relevant energy use (the first solar pump will be installed as part of the upgrade of the retention basin at the Doyles Rd Complex. These works will commence in January 2016).

4. Energy reduction target

4.1. Overview

Targets are important in enabling organisations to understand success, as well as providing specific points of reference to enable overall objectives to be achieved. In the case of the Energy Reduction Plan, targets help define the level of ambition Council is taking to the task of reducing its greenhouse emissions, and how this ambition will be fulfilled.

Targets need to be grounded in reality while maintaining relevance to the ambition of the plan. In this case, targets must be achievable in the context of the opportunities outlined in Section 4, while also aligned with Council's desire to reduce greenhouse gas emissions in accordance with accepted climate science. It is inevitable that circumstances will change during the delivery of the plan, so it is also important that targets are reviewed and refined over time to avoid the risk of undershooting the target at the end of the plans life.

Figure 14 below shows the projection of Council's total emissions to 2020 under a BaU scenario, along with proposed target of a 20% reduction. This target is the product of the quantification and aggregation of the opportunities presented in Section 4.

20% reduction by 2020

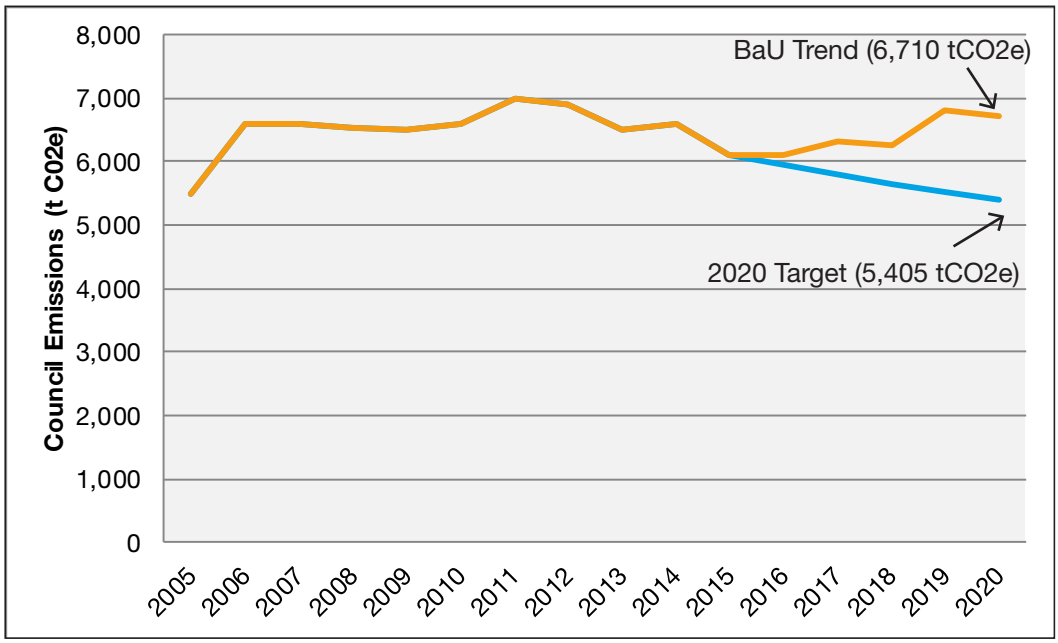


Figure 13 Total corporate emissions from energy projection to 2020, demonstrates BaU trend and the proposed target.

4.2. Target Breakdown

The headline target of 20% energy reduction by 2020 is considered both ambitious and achievable. However the achievement of this target is reliant on Council's ability to commit to and deliver on a series of sub-targets, targeting each of the activity areas of corporate energy consumption explored throughout this plan.

The table below provides a breakdown of targets specific to each.

Activity area	Target	Potential energy reduction from projected BAU	Estimated capital cost
Capital Works	40% lower operational energy use than reference building for major new build projects (combination of thermal performance, systems, renewable energy)	5.8%	TBD
Energy Efficiency	Implement at least 50% of retrofit actions identified in energy audits with simple payback period of 7 year or less.	4.1%	$120,000
Operations and Maintenance	Budget allocation for 0.5 FTE role to specialise in energy management, to drive systematic improvement in facilities management.	2.3%	$55,000
Renewable Energy	250kW of new installed generation capacity by 2020. This will equate to approximately 8.5% of total electricity use in 2014.	8.5%	$450,000
Total target		20.7%	

Table 5 - Breakdown of the activity area targets which are modelled to deliver an overall reduction in energy consumption of 20% by 2020

5. Action Plan

The following Action Plan directs implementation of the Energy Reduction Plan over the five key opportunity areas outlined.

CAPITAL WORKS

Process Revised Sustainability Integration Process for Capital Works drawing on existing examples				
Action	Responsible	Timeframe	Resources	Budget Requirements
Formalise the revised Sustainability Integration Process for all Capital Works projects.	Lead: Manager Projects Support: Team Leader sustainability and environment	July 2015 – December 2015 to formalise and adopt the revised process.	Staff time.	Existing Operational Budget
Subject to successful development and evaluation, utilise ISCA Local Government framework where relevant and useful.	Lead: Manager Projects Support: Team Leader sustainability and environment		Ongoing ISCA membership. Staff time.	Existing Operational Budget
Specific projects Implementation of revised integration, benchmarking and assessment process on the Sports Precinct				
Action	Responsible	Timeframe	Resources	Budget Requirements
Apply Sustainability Integration Process to this project as pilot	Lead: Manager Projects Support: Team Leader sustainability and environment	As dictated by the capital works timelines for the project.	Staff time.	Existing Operational Budget

ENERGY EFFICIENCY

Process Revised energy efficiency project establishment process				
Action	Responsible	Timeframe	Resources	Budget Requirements
Create revised periodic energy auditing brief for contractor. Brief to stipulate that Auditors use the Audit aggregation tool for new entries and to review previous actions.	Lead: Team Leader sustainability and environment	Within next 6 months	Continuing from existing auditing processes.	Existing Operational Budget
Apply commitment to implement at least 50% of audit recommendations that project a payback period of 7 years or less. Importantly, this commitment must include making appropriate funding or financing available to these projects.	Lead: Manager Projects	Delivered over 5 years of plan	Resources to be made available if viable business cases can be established.	External funding and new Capital Works Budget
Establish a consistent monitoring and evaluation procedure for energy efficiency projects, to ensure that the outcomes of individual projects are properly understood.	Lead: Sustainability and Environment Officer Support: Team Leader sustainability and environment	Within 12 months	Staff time	Existing Operational Budget
Specific projects Street lighting upgrade (in progress) Initial projects identified in audit review and site walk throughs.				
Action	Responsible	Timeframe	Resources	Budget Requirements
Put forward proposal for funding or finance to implement all existing energy efficiency opportunities with a pay-back of 7 years of less.	Lead: Manager Projects	Initial budget allocation in 2015-2016 budget.	Staff time. Budget allocation of up to $100,000 per annum for energy efficiency capital works OR financing	$500,000 over 5 years. External Clean Energy Financing OR External funding / new Capital Works Budget

OPERATIONS AND MAINTENANCE

Process Data management human resource Data collection and distribution Building management up-skilling				
Action	Responsible	Timeframe	Resources	Budget Requirements
Assign additional responsibility for energy data management and related activities to a position within Sustainability branch. Include additional specific tasks within position description and work plan as outlined below: » Preparation, circulation and communication of periodic energy data reports » Engage with facility managers to identify opportunities for energy savings through operations and maintenance » Manage energy relationships internally and drive improvements to BMS practices and thermal comfort (including evaluation and update BMS as required) » Administration of Energy Audit Data Tool (refer above) and the integration of this data into Planet Footprint.	Lead: Team Leader sustainability and environment	Within next 12 months		Existing Operational Budget
Revise reporting standard for all departments/directorates to include mandatory reporting on energy consumption and energy reduction activities.	Lead: Team Leader sustainability and environment	Within next 6 months	Staff time	Existing Operational Budget

Run training program for Council facility managers, covering: » Energy efficiency » Optimal use of Building Management System » Behaviour change strategies.	Lead: Team Leader sustainability and environment Some implementation assistance available through plan development.			Existing Operational Budget

Specific projects Energy audit and BMS optimisation in municipal office				
Action	**Responsible**	Timeframe	Resources	Budget Requirements
Undertake an energy audit (based on Level 2) of the Council offices at 90 Welsford Street.	Moreland Energy Foundation	July 2015	Existing auditing budget	Existing Operational Budget
Review function of existing BMS at Council offices and other large facilities and optimise according to results of review and energy audit.	Third party assessor Support: Team Leader sustainability and environment	Within 6 months	Consultant review (approx. $20-$30k)	Existing Operational Budget
Development of a formal thermal comfort policy, and utilise this in establishing specifications as part of Capital Works, Energy Efficiency and building optimisation projects.	Lead: Team Leader sustainability and environment	12 months	Staff time	Existing Operational Budget

RENEWABLE ENERGY

Process Establish PV rollout program Agree parameters for PV funding/finance approval				
Action	Responsible	Timeframe	Resources	Budget Requirements
Establish a PV program to identify, evaluate and prioritise sites for a 5 year rollout (based on 5 PV assessments undertaken by Positive Charge)	Lead: Team Leader sustainability and environment	6 months	$450,000	New Capital Works Budget $450,000 over 5 years 16/17 - 20/21
Agree on parameters for approving a PV financing arrangement to allow roll-out.	Lead: Team Leader Financial accounting	6 months	Staff time	Existing Operational Budget
Specific projects				
Action	Responsible	Timeframe	Resources	Budget Requirements
Maintain engagement with DNSP and retailers to ensure that opportunities for other business models for solar PV are captured. The Tatura community project may provide an opportunity for Council to proactively engage with the DNSP and facilitate a significant community renewable energy project.	Lead: Sustainability and Environment Officer	Next 2 years	Staff time	Existing Operational Budget

WATER PUMPING AND TREATMENT

Process Recognise and factor in energy implications of water projects and operations in project evaluation.				
Action	Responsible	Timeframe	Resources	Budget Requirements
Formalise the consideration of energy efficiency in capital works projects related to water pumping and treatment.	Lead: Team Leader Landscaping and native open space Support: Sustainability and Environment Manager	12 months	Staff time	Existing Operational Budget
Specific projects Solar Pumping Water reuse				
Action	Responsible	Timeframe	Resources	Budget Requirements
Trial the installation of solar pumping as part of the DRC Retention basin upgrade.	Team Leader Landscaping and native open space	6 months	Staff time	External funding OR Capital budget $80,000

6. Financing the Energy Reduction Plan

6.1. Overview

Councils face the challenge of doing more with less, as they have to demonstrate careful use of ratepayers' money. In the context of rate capping, there will be increasing competition for financial resources, even for projects that reduce the long-term draw on Council's financial resources by reducing energy demand.

However, for energy efficiency and renewable energy projects it is possible, in the right circumstances, to access mechanisms and services that effectively transfer the financing burden (and even sometimes the risk) to a third party. This, of course, comes at a cost, to cover the transaction cost, financing cost and cost of risk for the third party. The purpose of this section is to present the general advantages and drawbacks of the financing options available for the types of projects identified as relevant to Council, to allow informed decision making during the implementation phase.

It is also worth noting that the actions noted as being related to process or organisational changes may have no direct cost, or at least no cost that can be easily accounted for, and therefore no financing implication. They may however have resourcing or commitment implications in terms of time investment for council staff. This includes behavioural changes, such as switching off equipment when not in use, finding alternatives to travelling by car, etc.

The actions feeding into the Energy Reduction Plan and outlined in previous sections have been classified into four broad categories, based on both their nature and the responsibility area within council:

- New capital works projects
- Energy efficiency focused projects – capital works
- Operation and maintenance
- Renewable energy

There is some potential overlap between these categories, as actions may be complementary and mutually reinforcing, but, for the purpose of this financing section, we focus mainly on:

- Energy efficiency capital works projects, as they typically require a more significant investment; and
- Solar PV, as they are not reducing the energy cost base as such, but rather creating an alternative energy source, which either offsets the need for grid energy or creates an additional income.

Procurement of new facilities, while relevant to sustainability performance, is subject to an established process within Council. While it has been identified that this process can be improved to better account for sustainability considerations, it is not relevant to this discussion of alternate financing specific to stand alone actions as part of the Energy Reduction Plan.

Other projects mostly require reallocation of human resources or incidental operational costs rather than a significant upfront outlay of funds.

6.2. Energy efficiency projects – capital works

Capital projects vary greatly in nature, size and payback time. All these parameters are relevant to a decision on how to finance projects. However, it is also important to step back and consider solutions that combine implementation and financing, as these also remove some of the need to look closely at which upgrades need to be implemented first.

Direct funding

This is the simplest form of funding, which applies regardless of the type of project. Council allocates funds from its general budget or borrows the money from a financial institution at the usual interest rate. Typically savings from energy bills will not be directly allocated to the repayment of the loan, the financing cost and the energy bill savings remaining separate (although monitoring and verification of expected savings is strongly recommended).

Energy Performance Contract (EPC) / Energy Services Company (ESCo)

Through an EPC, an organisation outsources the implementation of energy efficiency measures and projects (and in some cases renewable energy opportunities). A specialised contractor assesses the potential for energy savings and puts forward a portfolio of actions, usually accompanied by guarantees that the savings produced will be sufficient to finance the full cost of the project. The contractor's fees and the cost of the recommended actions and projects are typically financed through the difference between the current energy bill and the post-implementation energy bills. That is, council would continue to pay the same amount as currently and the contractor would get the difference between this amount and the actual (reduced) bill amount, until the full project and financing costs have been recovered from the savings.

In most cases, this also means that the client has to relinquish some control over the operation of the buildings (or any asset that may be concerned by the contract), as well as over the projects that get implemented, as the client is effectively purchasing a service from the contractor, with energy savings and provision of heating / cooling / light / etc. from the contractor.

An Energy Services Company (ESCo) operates essentially under the same model, in that, the client purchases a service or services (light, heating, cooling) from the ESCo. This offers the possibility to negotiate a price for a set outcome, for example, zero emissions or as specific energy outcome. As a result, cost may go up if requirements are set high and require high investments.

Evaluation

	Advantages	Drawbacks	Best suited for
Direct funding	Lowest cost option Full impact of savings Full flexibility / minimal contractual processes Capacity building within council	Upfront funding / ties up fund, may affect financial ratios Full operational responsibility and performance risk	Easy to implement, low investment individual items and shorter payback projects
Energy Performance Contractor	Ongoing payment for services rather than capital outlay Removes need for feasibility studies and operational risks	Requires a qualified company to be operating in the region Projects cannot be mandated by Council: the contractor bears the risk and hence control decisions, including some of the day-to-day operation decisions Transfer of equipment at the end of the contract needs to be clearly defined Funding costs built into the model and contractors benefit from any over-performance An EPC will not allow "stretched" energy reduction measures as short payback measures will be targeted	Requires significant saving potential, hence best suited for larger sites Can also be rolled out on smaller sites with similar characteristics

Recommended approach

Whatever the choice of financing mechanism, it is recommended to ensure that:

- Current low cost / low effort measures are implemented first under existing budgetary outlays; this may include incidences where buildings do not operate at their optimum level because of errors in settings, etc; but also instances where "low hanging fruit" actions have been identified but not yet implemented.
- Future upgrades or retirement of existing buildings in the next 5 years are clearly identified: this is to avoid spending money on a building that is going to be significantly modified, demolished or sold. When a building undergoes major refurbishment, there is an opportunity of implementing best energy performance standard within the financial envelope allocated.

When these basic steps are taken, council can then decide whether to engage in negotiations with an EPC to avoid having to outlay any significant capital upfront. However, the following points must be kept in mind:

- only significant buildings or sites will be of interest to EPC suppliers (Welsford St Council offices, Eastbank, SAM, aquatic centre for example),
- these sites will need to be able to yield some "low hanging fruit", i.e. if they are already performing well, it will not be of interest to an EPC (and it would be costly to engage an ESCo),
- operational control over the heating/cooling of the sites may be reduced over the period of the contract if entering into an agreement, and
- solar PV may be part of the solution implemented by the EPC supplier, but this typically cannot be mandated in / out (see overlap with the following section on solar PVs).

Alternative approaches to financing have been implemented elsewhere, such as setting up a revolving fund with seed money coming from an initial budget allocation or sale of specific assets and savings from energy efficiency projects fed back into the fund. This requires specific savings accounting discipline, but removes the need to apply for new funding for each new project.

6.3. Solar PV

Financing options best suited for solar PV depend on the characteristics of the specific solar project considered – and specific contractual details, including actual cost, will be revealed through a tender process.

Note that some Energy Performance Contractors (mentioned above) may consider solar PV as part of their packaged solutions. For clarity, it has been assumed that solar PV would be financed separately.

Assets to be financed

At this stage of the exploration of the feasibility of solar PV, and for the purpose of this financing section, three scenarios have been considered. The scenarios are described in Section 3.5 with appropriate financing options for each scenario as outlined below.

Learn more about each funding model

What is direct funding?

This is the simplest form of funding, which applies regardless of the type of project. Council allocates funds from its general budget or borrows the money from financial institution at the usual interest rate. Typically savings from energy bills will not be directly allocated to the repayment of the loan, the financing cost and the energy bill savings remaining separate (although monitoring and verification of savings is strongly recommended).

Pros

- Lowest overall cost option
- Full capture of savings
- Full flexibility
- Builds capacity within Council

Cons

- Requires 100% upfront funding
- Council assumes full operational responsibility

What is a solar lease?

A direct alternative to borrowing, with a limited initial capital outlay, with periodic lease payments. The asset (solar PV) remains the property of the institution / lessor until the end of the contractually agreed leasing period, at which stage the lessee (council) may purchase the asset against a final payment (potentially minimal, depending on the financial arrangements). The lessee benefits from the production of electricity from the panels.

Although site specific modeling is required, ongoing lease payments may not be matched by reduction in energy bills. Contractual arrangements need to be carefully examined.

Pros

- No upfront funding
- No implementation risk
- No maintenance responsibility
- Same renewable energy benefit as ownership

Cons

- High financing cost (rolled into monthly payments)
- May require acquisition payment at end of lease

What is a Power Purchase Agreement?

A contract to buy electricity at an agreed price and for an agreed (usually) long period of time from a renewable energy generation asset built on council's property. The arrangement is usually “take or pay”: if, for any reason, council does not use the full electricity allocation in a given period, the agreed amount still has to be paid.

The contractor builds, owns and operates the renewable energy asset on council owned premises, with an agreement usually in place to transfer the asset at the end of the contractual period. Council then has the full benefit of the asset, but has to manage its operation from that point.

The main difference between PPAs and solar leasing, apart from the size of the asset (usually) is that the financial arrangements are all rolled into the purchase of electricity produced by the asset. In contrast, under a solar lease the council simply leases the asset from its

Pros

- No upfront funding
- No implementation risk
- No maintenance responsibility
- Guaranteed electricity price

Cons

- Long term agreement, sometimes with a ‘take or pay’ arrangement
- Higher overall cost than ownership
- Fairly recent model in Australia (but common in the US), meaning that contractual arrangements may be complex to set up