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OF WOLLONGONG
AUSTRALIA

Energy and Carbon Management Action Plan 2017-2020

University of Wollongong

Prepared by: Ignacio Vigon

Sustainability Projects Engineer, Facilities Management Division

Reviewed by: David Low

Environment Manager, Facilities Management Division

Approved by: Kathleen Packer

Director Facilities Management Division

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1 INTRODUCTION

UOW is committed to the principles of environmental sustainability and has developed the 2017-2020 Environmental Management Plan (EMP) in line with the UOW Wollongong Campus Master Plan 2016-2036 to deliver improvements in the use of energy, water, waste management and campus biodiversity.

Energy consumption represents approximately 98% of the University's greenhouse gas emissions. As operations continue to grow, reducing energy consumption and greenhouse gas emissions will be a challenge.

The strategies required under the EMP 2017-2020 include the development and implementation of an energy management action plan. This Energy and Carbon Management Action Plan (ECMAP) defines strategic areas and specific actions to improve energy and carbon performance and support the achievement of UOW's energy and carbon targets specified in the EMP 2017-2020.

2 OBJECTIVE

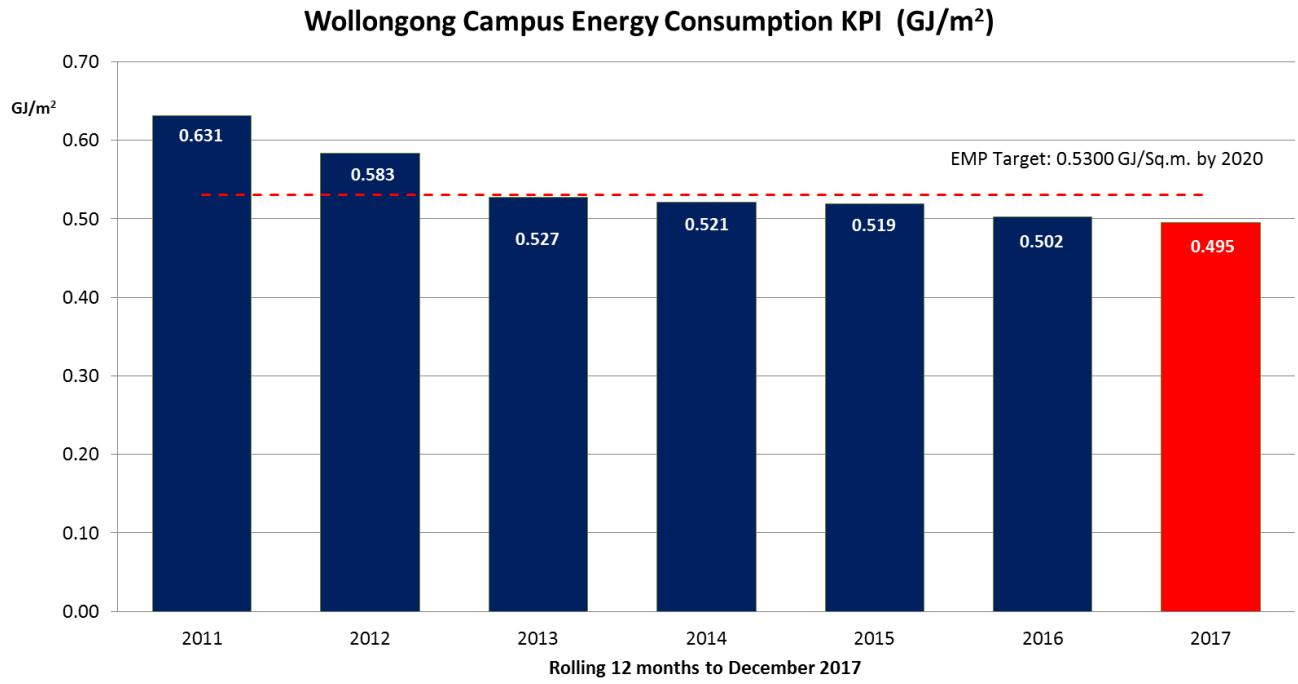
The objective of this Energy and Carbon Management Action Plan (ECMAP) is to define the strategies and actions to support the achievement of the following energy and carbon management targets defined in the EMP 2017-2020:

- Reduce non-renewable energy consumption to below 0.53 GJ/m^2 by 2020
- Increase onsite generation of renewable energy by 2020 (GJ)
- Reduce greenhouse gas emissions by 5% by 2020 (kg CO2e/m^2)

UOW also has long term targets to achieve 20% energy reduction by 2035.

3 BACKGROUND

The following graph illustrates the energy performance KPI of the Wollongong Campus over the previous 7 years:



It is estimated that annual energy expenditure will increase by approximately 25% from December 2018 due to changes in energy market prices. Additional increases in energy expenditure will result from the energy consumption of new UOW developments (e.g.

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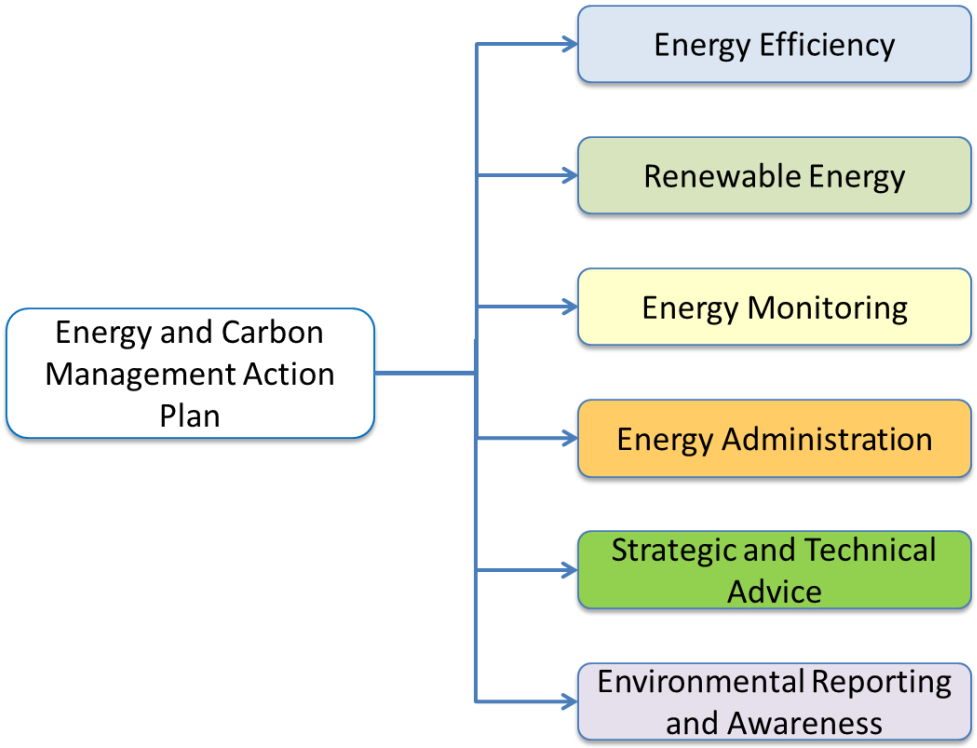
new Accommodation Services buildings, MLS, Western Building, Security Building and future campus expansion), additional energy loads (e.g. thermal comfort program) and expansion of operations (e.g. 24/7 opening hours of the Library).

As UOW operations continue to grow and energy prices increase, reducing energy consumption and greenhouse gas emissions as well as managing energy costs will be a challenge. Therefore adequate energy and carbon management actions are required to address these challenges and achieve UOW energy and carbon targets.

4 STRATEGIC AREAS

This ECMAP focuses on the following strategic areas for the identification and implementation of energy and carbon reduction and performance management opportunities:



ENERGY EFFICIENCY

Energy efficiency and renewable energy are the two pillars of sustainable energy and the key areas to reduce greenhouse gas emissions, improve environmental performance and minimise energy costs.

Energy efficiency consists of projects and initiatives to reduce energy consumption by using more efficient equipment and/or improving system controls and performance without compromising service.

RENEWABLE ENERGY

Renewable energy consists of the onsite generation of energy from a renewable source. This clean energy is then fed into the University's infrastructure reducing the demand of energy generated from fossil fuels and the associated emission of greenhouse gases.

ENERGY MONITORING

Energy monitoring consists of systems, tools and processes to meter and track energy consumption. Energy monitoring is paramount to measure consumption, understand patterns, assess performance and identify opportunities.

ENERGY ADMINISTRATION

Energy Administration strategies to effectively manage energy supply do not necessarily result in energy savings however they are necessary to minimise energy costs, forecast energy budgets, ensure the competitiveness and reliability of energy supplies and mitigate the risks derived from the exposure to energy markets.

STRATEGIC AND TECHNICAL ADVICE

Strategic and technical advice consists of the ongoing liaison with relevant stakeholders to ensure that projects and activities conducted at UOW such as new building developments and refurbishments incorporate the relevant sustainability and environmental features required to ensure adequate energy and carbon performance.

ENVIRONMENTAL REPORTING AND AWARENESS

Environmental reporting initiatives aim to ensure that energy and environmental performance, achievements and opportunities are effectively documented and communicated to provide relevant information and facilitate decision making. Environmental awareness initiatives also facilitate behavioural changes and enhance the understanding of sustainable energy practices and the positive environmental impact of energy conservation actions taken by energy users.

5 ENERGY AND CARBON MANAGEMENT ACTIONS

The following actions have been identified as potential projects/initiatives to improve energy and carbon performance according to the strategic actions defined in Section 4:

STRATEGIC AREA	ACTION	PRIORITY	INDICATIVE IMPLEMENTATION DATE
Energy Efficiency	Upgrade Building Lighting Systems to LED	High	2018 - 2021
	Upgrade Outdoor Lighting Systems to LED	Low	Gradually as required
	Investigate Automatic Controls for Lighting	Low	After completion of LED upgrades
	Review HVAC Schedules and Set Points	Medium	Ongoing
	Integrate HVAC equipment into Building Management System	Medium	Ongoing
	Optimise HVAC Systems and Controls	Low	Ongoing
	Investigate Building Heat Gain Reduction Strategies	Low	2020
	Evaluate Efficient Hot Water Systems and Controls	Medium	2019
	Evaluate Condition of Water Pipe Insulation	Low	Ongoing
	Assess Strategies to Reduce Swimming Pool Heating Demand	High	2019
	Investigate Energy Reduction Strategies for Information and Communication Technology Systems	Low	2020
	Investigate Overnight Energy Consumption	Medium	2019
	Review Power Factor Correction	Medium	Ongoing
	Conduct Energy Saving Audits	Low	As required
Renewable Energy	Install Solar Photovoltaic Systems	High	2018 - 2021

STRATEGIC AREA	ACTION	PRIORITY	INDICATIVE IMPLEMENTATION DATE
	Investigate Alternative Renewable Energy Opportunities	Low	After completion of solar PV systems
Energy Monitoring	Upgrade Energy Metering System	High	2018
	Develop and Manage Energy Metering and Monitoring System	High	Ongoing
	Monitor Energy and Carbon Consumption and Performance	High	Ongoing
	Measurement and Verification of Energy Actions	Medium	Ongoing
Energy Administration	Develop Energy Procurement Strategy	High	2018
	Renew Energy Contracts	High	2018
	Develop and Manage Energy Billing Verification Process	High	Ongoing
	Track, Forecast and Plan Energy Consumption and Expenditure	Medium	Ongoing
	Investigate Funding Opportunities	Medium	Ongoing
Strategic and Technical Advice	Provide Sustainability Input and Liaise with Key Stakeholders	Medium	Ongoing
	Integrate Sustainability Requirements into UOW Design Standards	Medium	Ongoing
	Update UOW Ecologically Sustainable Design Standards	High	2019
Environmental Reporting and Awareness	Provide Energy Performance Reports	High	Ongoing
	Review and Update Environmental Reporting	High	2018
	Develop and Implement Behavioural Change and Awareness Programs for Energy Users	Medium	Ongoing

Energy Efficiency

UPGRADE BUILDING LIGHTING SYSTEMS TO LED

LED is the most energy efficient, cost effective and mainstream lighting technology in the market. LED lights consume less energy than other technologies resulting in significant energy and cost savings. They also have a longer lifetime resulting in lower maintenance costs. LED lights present the following advantages compared to other technologies:

- Reduction in energy consumption, greenhouse gas emissions and operational costs due to their higher efficiency and longer lifetime.
- Lower lumen depreciation resulting in higher illuminance levels achieved over the life of the lamps.
- No flicker at start up.
- No UV radiation.
- Shock resistance and lack of hazardous materials such as mercury, which is present in fluorescent lamps.

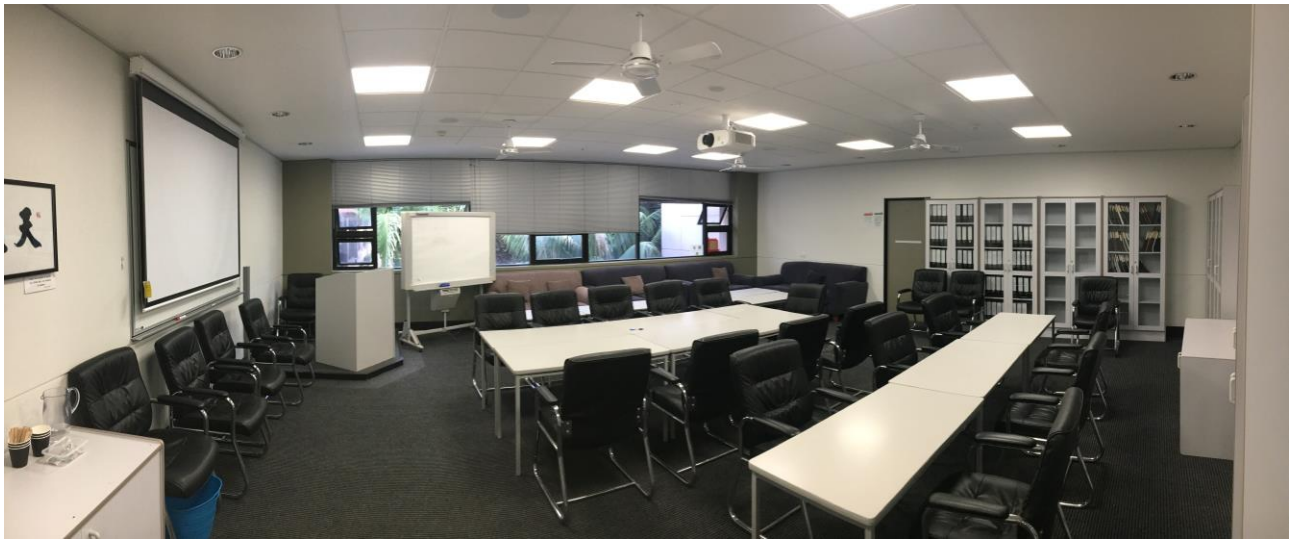


Figure 1: LED Lights

LED lights have been installed in several areas at UOW as part of building refurbishments or as localised energy saving initiatives. Replacing existing lights with LED as larger upgrade projects will result in more cost effective projects due to economies of scale and will minimise disruptions.

UPGRADE OUTDOOR LIGHTING SYSTEMS TO LED

Outdoor lights can also be replaced with more efficient LED lights. This includes:

- Building floodlights
- Pedestrian walk path lights
- Road lights
- Parking lights
- Bollard lights
- Other

Outdoor LED lights have already been installed in some areas at UOW. In addition to the energy and environmental outcomes previously described for indoor LED lights, external LED upgrades provide the opportunity to further reduce environmental impact by ensuring that new outdoor fittings minimise night light pollution which is harmful for wildlife whose biological rhythm is negatively affected by artificial light during the night.

The financial outcomes of replacing outdoor lighting with LED differ from the replacement of indoor lighting for two main reasons:

- Implementation costs
- Cost savings

The cost of implementing outdoor LED upgrades is normally higher than indoor upgrades because products are more expensive and there are generally higher material and labour requirements (e.g. new light poles). Cost savings are usually lower than those generated by indoor LED upgrades because outdoor lighting is mainly used during the night when electricity prices are lower (off peak period).

The higher implementation cost combined with lower cost savings result in a longer paybacks than indoor LED upgrades and therefore indoor LED upgrades are a higher priority.

INVESTIGATE AUTOMATIC CONTROLS FOR LIGHTING

The installation of automatic controls for lighting results in energy savings due to reduced operating hours of the lights. Automatic controls ensure that the lighting system in different areas operates only when necessary and is automatically switched off when not required e.g. in empty rooms, afterhours or when there is enough natural light. This eliminates energy waste and avoids relying on human behaviour to switch off the lights.

Figure 2: Motion Sensor for Lighting

Automatic controls including motion sensors, timers and daylight cells have been installed in many areas at UOW. Additional energy savings can be achieved by tuning the existing controls on a regular basis and installing additional controls in areas that have not been automated yet. This will ensure that the existing systems operate effectively and that new opportunities to further reduce energy consumption are identified and implemented.

Importantly, while the installation of automatic controls reduces energy consumption, higher energy savings and cost benefits are derived from the installation of efficient LED lights. Therefore installing automatic controls is a second priority and will be considered after the lighting systems have been upgraded to LED.

REVIEW HVAC SCHEDULES AND SET POINTS

The majority of the existing heating, ventilation and air conditioning (HVAC) systems are controlled by Building Management Systems (BMS). BMSs allow setting specific parameters such as room temperature and start and finish operation times to automatically control the operation of the systems. These controls allow minimising energy wastage by ensuring that the systems do not remain switched on afterhours and that they operate within the adequate temperature ranges.

Reviewing the HVAC schedules and set points on a regular basis ensures that the default control parameters remain relevant to the use of the space and allows identifying opportunities to further reduce energy consumption.

INTEGRATE HVAC EQUIPMENT INTO BMS

Heating, ventilation and air conditioning equipment to be installed as part of new buildings or refurbishments will be integrated into the existing Building Management System. This will allow the automatic control of operation times, temperature set points etc. to ensure the efficient operation of this equipment.

OPTIMISE HVAC SYSTEMS AND CONTROLS

Heating, ventilation and air conditioning (HVAC) accounts for a large proportion of the energy consumption of a building. Ensuring that all these systems and controls operate in an efficient way is very important to minimise energy consumption.

Strategies to optimise HVAC systems and controls have been previously implemented at UOW resulting in significant energy savings. HVAC systems will be reviewed to identify further improvement opportunities and energy efficiency optimisation strategies will be considered for new systems and refurbishments. Some examples of potential strategies include:

- Use of efficient chillers and boilers
- Use of heat recovery variable refrigerant flow (VRF) systems
- Efficient chiller staging settings
- Variable speed drives
- Automatic controls (e.g. BMS, timers, presence detection, request buttons, etc.)
- Economy cycle/night purge
- CO_2 monitoring controls
- Other

INVESTIGATE BUILDING HEAT GAIN REDUCTION STRATEGIES

The use of air conditioning to achieve comfortable room temperatures during warm periods is one of the most energy intensity activities. Energy consumption of air conditioning systems can be reduced by minimising building heat gains. While this is something that needs to be addressed at the building design stage, there are potential opportunities to implement building heat gain reduction strategies for existing buildings. These include:

- Reflective heat reduction window films
- Shading structures
- Natural ventilation
- Improved building insulation
- Other

These strategies have been implemented in some buildings at UOW. Assessing similar opportunities for all existing and new buildings can result in energy and cost savings.

EVALUATE EFFICIENT HOT WATER SYSTEMS AND CONTROLS

Gas boilers and electric water heaters are used for hot water and space heating purposes across the campus. There are more energy efficient systems that could be used to provide hot water which use less gas and electricity.

Condensing boilers are more efficient than conventional gas boilers because they provide the same amount of useful heat while consuming less natural gas by recovering part of the heat lost during the combustion process. Therefore condensing boilers are an energy efficient replacement for conventional gas boilers. Condensing boilers operate at their maximum efficiency when the temperature of the return water is low.

Heat pumps are hot water systems that use electricity instead of natural gas. They operate by absorbing heat from the surrounding air and transferring it into the water. This is a much more efficient process than using electricity to directly heat the water as conventional electric hot water systems do and therefore heat pumps are an energy efficient alternative to electric systems. Heat pumps require very good ventilation to operate effectively.

Instant electric systems use less energy than electric storage tanks because they only heat the water when the hot water tap is open instead of continuously keeping the temperature of water in a tank.

The feasibility of installing condensing boilers and heat pumps strongly depends on several factors including:

- Efficiency and age of existing system
- Electricity and natural gas prices
- Patters and frequency of usage of each system
- Location of system

Depending on these factors, installing more efficient systems could be feasible as energy efficiency upgrades or recommended as a replacement at the end of life of the existing system.

Opportunities may also be available to reduce hot water consumption by installing automatic controls for existing systems.

EVALUATE CONDITION OF WATER PIPE INSULATION

Water pipe insulation ensures that heat losses through the pipes (chilled water and hot water) are minimised. Overtime pipe insulation may degrade losing its effectiveness which results in higher energy consumption of the chillers/boilers. Ensuring that chilled and hot water pipes are effectively insulated will minimise energy waste.

ASSESS STRATEGIES TO REDUCE SWIMMING POOL HEATING DEMAND

The swimming pool requires high amounts of energy to maintain the water at the required temperature, resulting in swimming pool heating being responsible for approximately 29% of the total natural gas consumption at Wollongong Campus.

Reducing the heat demand of the swimming pool can have a significant impact on the gas consumption of the swimming pool and overall Wollongong Campus. This can be achieved by reducing heat losses (e.g. evaporation) or by managing temperature set points when the swimming pool is not in use.

INVESTIGATE ENERGY REDUCTION STRATEGIES FOR INFORMATION AND COMMUNICATION TECHNOLOGY SYSTEMS

The energy consumption of information and communication equipment (e.g. data servers, computers, screens, multifunction printers, etc.) can represent a significant proportion of the overall energy consumption of a building.

Opportunities to liaise with relevant stakeholders (e.g. IMTS, staff, and students) will be assessed to identify and implement energy saving strategies for information and communication systems.

INVESTIGATE OVERNIGHT ENERGY CONSUMPTION

Energy consumption at UOW is high during the night and weekends. This can be partially due to equipment that needs to operate 24 hours, information and communications equipment, outdoor and emergency lighting, hot water systems, activities conducted out of hours etc.

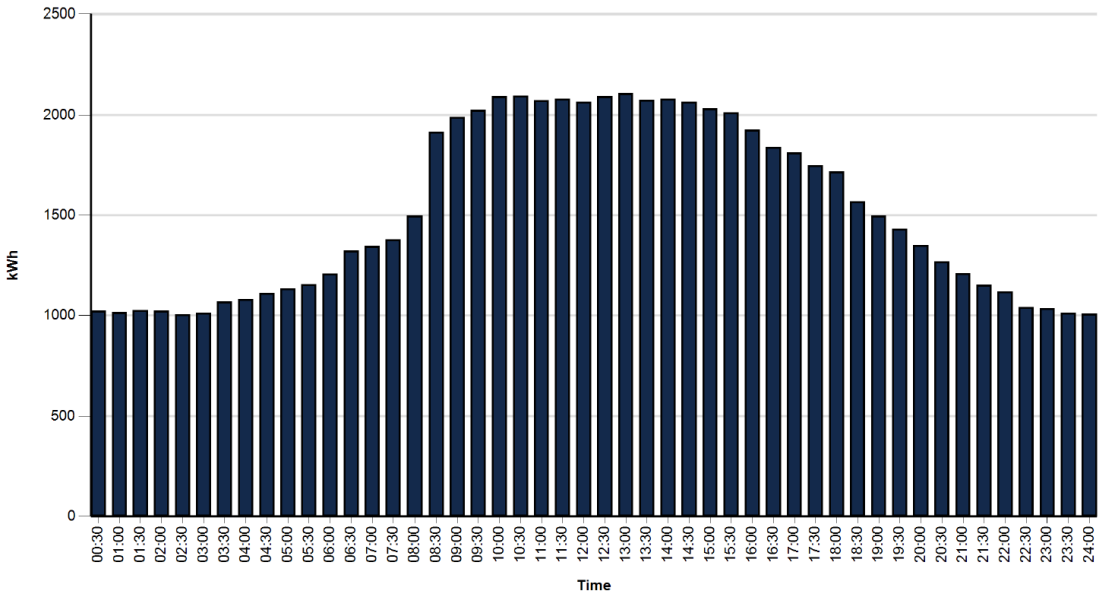


Figure 3: Daily Electricity Consumption Profile

However it is likely that some of this energy consumption is caused by equipment that unnecessarily runs after hours. Investigating the possible causes of this high energy consumption will allow identifying potential opportunities to reduce consumption overnight e.g. by implementing automatic controls or behavioural changes.

REVIEW POWER FACTOR CORRECTION

Power factor is, generally speaking, a measure of how effectively the electricity supplied to a site is being converted into useful energy. The power factor of a site varies between 0 and 1 and the closer it is to 1, the most efficient use of the electricity purchased.

The power factor of a facility can be improved by installing power factor correction equipment. Power factor correction has been installed at several points of the electrical infrastructure at UOW.

Changes to the electricity loads on campus (e.g. equipment upgrades and new buildings) can have an impact on the power factor. Therefore assessing the performance of existing power factor correction units on a regular basis and identifying potential opportunities to further deploy power factor across UOW electrical infrastructure will minimise energy demand and costs.

CONDUCT ENERGY SAVING AUDITS

The purpose of an energy audit is to assess the energy systems and usage of a site and to identify opportunities to reduce energy consumption. There are different types of energy audits that can be conducted in accordance with the Australian Standard for Energy Audits depending on the type of building and the detail required (AS/NZS 3598:2014).

Conducting the adequate type of energy audits to address specific needs and requirements will assist UOW identifying opportunities to further improve energy efficiency, reduce consumption, costs and carbon emissions and to improve energy and environmental performance. Energy audits will be conducted as required to investigate opportunities to improve the performance of specific systems or when all energy efficiency projects at UOW are completed.

Renewable Energy

INSTALL SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic (PV) systems convert clean renewable energy from sunlight into electricity which can be used onsite offsetting the use of electricity purchased from the network and generated from fossil fuels. Solar PV systems provide the following benefits:

- Provision of clean and free energy generated onsite from a renewable energy source
- Reduction of carbon emissions and improvement on environmental performance
- Reduction of the electricity demand from the grid and energy expenditure
- Protection against future increase in electricity prices
- Increased environmental awareness and commitment to sustainability practices

Solar PV systems have been installed on several buildings in the Innovation Campus and Wollongong Campus.

Figure 4: Solar PV System

INVESTIGATE ALTERNATIVE RENEWABLE ENERGY OPPORTUNITIES

Solar PV systems are the most effective and feasible renewable energy technology suitable to UOW. However alternative options to increase the renewable energy generated onsite will be investigated once the implementation of solar PV systems is completed.

Energy Monitoring

UPGRADE ENERGY METERING SYSTEM

The energy metering system at UOW consisted of an electricity metering system and a natural gas metering system owned and maintained by UOW which operated using 2G network technology. The 2G networks have been phased out during 2017/2018 therefore these systems had to be upgraded.

In addition to adapting to the closure of the 2G network the aim of this upgrade is to be able to:

- Improve data reliability and accuracy
- Outsource the metering services and improve efficiency of UOW resources
- Have access to software platforms to monitor energy consumption (electricity and gas)
- Measure consumption at the sub meter level (e.g. by building)

DEVELOP AND MANAGE ENERGY METERING AND MONITORING SYSTEM

Development and management of the energy metering and monitoring system includes all the ongoing tasks required to ensure that the system operates adequately and that it is maintained and tailored to UOW operations and requirements. This includes (but is not limited to):

- Define specific energy consumption loads and assess patterns
- Set up and adjust specific alarms/notification events (e.g. excessive usage overnight)
- Develop and implement processes to manage events
- Manage the integration of loads into the system (e.g. new buildings)
- Develop and maintain metering asset registers and diagrams
- Develop and maintain energy data record management processes and tools
- Manage energy metering and monitoring system contracts

MONITOR ENERGY AND CARBON CONSUMPTION AND PERFORMANCE

UOW has specific energy and carbon targets as part of its EMP. Therefore actively monitoring energy consumption and carbon emissions is required to understand current performance and ensure that UOW is on track to achieve these targets.

This will be achieved by regularly monitoring and recording all the relevant parameters (e.g. electricity consumption, natural gas consumption, GFA, renewable energy generation, carbon emissions etc.) and KPIs defined in the EMP and taking the required actions to further investigate issues and opportunities for improvement when required.

MEASUREMENT AND VERIFICATION OF ENERGY ACTIONS

Measurement and verification (M&V) is the process of gathering information and conducting assessments to evaluate the savings resulting from the implementation of energy saving actions. This can also be extended to any other project, activities or events that have an impact on the energy consumption of an organisation (e.g. installation of new energy loads, new buildings, operational changes etc.).

There are different approaches to conduct M&V depending on the characteristics of the project, information available, resources required etc. The M&V method will be specific and relevant for each project.

M&V will also allow developing a register of energy actions that have an impact on UOW energy consumption to keep a record of these action and their outcomes.

Energy Administration

DEVELOP ENERGY PROCUREMENT STRATEGY AND RENEW ENERGY CONTRACTS

UOW electricity and gas contracts are due to expire between 31/8/18 and 30/6/19 and UOW needs to enter into new agreements for the supply of energy.

Energy prices have significantly increased and the energy markets have changed since the time when the current contracts were negotiated. Furthermore energy demand at UOW is expected to vary due to operational changes (new buildings, additional energy loads, energy saving actions etc.) which will have an impact on energy supply and expenses.

A tailored energy procurement strategy will be developed to identify the most suitable procurement process for UOW, manage energy supply and financial risks and minimise future energy expenditure. The outcomes of this strategy will provide the advice required to enter into the new electricity and gas contracts.

DEVELOP AND MANAGE ENERGY BILLING VERIFICATION PROCESS

UOW receives a significant number of energy bills which include different types of charges (e.g. retail, network distribution, supply, discounts etc.). Errors on these bills are not uncommon and can have a significant impact on the energy expenditure. Therefore

developing and implementing a process to check and verify energy bills will ensure that UOW does not incur unnecessary expenses and may result in significant cost savings.

TRACK, FORECAST AND PLAN ENERGY CONSUMPTION AND EXPENDITURE

This action consist of the tasks required to actively track and record the energy consumption and expenses across UOW portfolio and to understand the impact that UOW plans (expansion, developments, projects, activities) may have on future energy usage.

This will provide valuable information to model and forecast energy consumption and costs which is very important for the successful negotiation of energy contracts, minimise energy costs and establish budgets.

INVESTIGATE FUNDING OPPORTUNITIES

Grants, rebates and other financial mechanisms can be available for the implementation of sustainable energy initiatives. Being aware of these funding opportunities allows reducing the investment requirements or improving the financial outcomes of implementing sustainable energy actions.

Strategic and Technical Advice

PROVIDE SUSTAINABILITY INPUT AND LIAISE WITH KEY STAKEHOLDERS

In order to successfully implement energy and carbon management actions it is required that other needs and priorities of the University are understood and considered and that the relevant communication and collaboration processes between the Environment Unit and key internal stakeholders be developed, implemented and sustained. This includes (but is not limited to):

- Maintenance Works – to integrate maintenance requirements into sustainability projects, identify and address electricity and/or gas consumption issues, assess the impact of sustainability projects in UOW infrastructure etc.
- Capital Works and Planning – to integrate environmental and sustainability requirements into capital works developments/projects, facilitate the integration of new energy supplies into UOW energy contracts, integrate new buildings into UOW energy metering and monitoring system, understand the impact of future developments in the energy portfolio, gather and provide utility data required by stakeholders (e.g. for refurbishments, electrical infrastructure, planning etc.).
- Financial Operations – to manage electricity and gas contracts, track and forecast energy expenditure, manage and approve energy bills, etc.
- Relevant building representatives – to inform about unexpected energy consumption levels, understand possible causes and identify energy reduction opportunities.
- SBRC – to exchange information on sustainability, collaborate on the management of renewable energy systems and identify opportunities to collaborate.
- All other units and departments whose activities may influence or be impacted by energy and carbon management actions.

INTEGRATE SUSTAINABILITY REQUIREMENTS INTO UOW DESIGN STANDARDS

Sustainability requirements and specifications will be integrated into UOW Design Standards to ensure that relevant and up to date sustainability considerations are integrated into new buildings and refurbishments. This will result in the optimum sustainability performance of the buildings and facilities, reducing resources usage, carbon emissions and costs.

UPDATE UOW ECOLOGICALLY SUSTAINABLE DESIGN STANDARDS

UOW has and Ecologically Sustainable Design (ESD) Standard for all new construction and refurbishment works. This ESD Standard was created in 2012 and therefore needs to be reviewed and updated. The development of the new ESD Standard will be conducted in collaboration with UOW Sustainable Buildings Research Centre to ensure that design characteristics, technologies and resources are applied to minimise environmental impact, maintain ecological processes and increase the quality of life.

Environmental Reporting and Awareness

PROVIDE ENERGY PERFORMANCE REPORTS

Regular reports will be provided to inform relevant stakeholders on energy and carbon emissions against targets and to facilitate required information related to UOW energy and carbon performance. This includes reports to the Environment Unit, Facilities Management Division, Environment Advisory Committee, Finance and Resources Committee, UOW Council, National Greenhouse and Energy Reporting (NGER), TEFMA and all other internal and external reporting requirements.

Environmental reporting also includes actions required to provide specific information that may be required by UOW staff and to share relevant environmental information.

REVIEW AND UPDATE ENVIRONMENTAL REPORTING

The current Environmental Reporting process will be reviewed to improve and ensure that reports are fit for purpose and provide the relevant information required to effectively inform on energy and carbon performance.

DEVELOP AND IMPLEMENT BEHAVIOURAL CHANGE AND AWARENESS PROGRAMS FOR ENERGY USERS

Energy management awareness consists of initiatives to facilitate behavioural changes across the campus, enhance the understanding of sustainable energy practices and their positive environmental impact and to increase accountability of all energy users including staff and students.

6 DELIVERY

The prioritisation and implementation of specific actions defined in this EMAP will depend on the environmental and financial benefits of each action, technical feasibility, budget and resources available and interaction with other projects and works at UOW.

A strategic and structured approach will be taken to ensure the suitable assessment, development and implementation of these actions by:

- Identifying and prioritising actions based on environmental benefits, financial feasibility and onsite investigations.
- Liaise with the relevant stakeholders to assess technical, operational and financial requirements.
- Prepare detailed business cases for UOW approval including:
    - Recommendation
    - Objectives
    - Scope
    - Environmental, operational, financial and risk analysis
    - Delivery method
    - Program

The final evaluation, planning, funding and implementation of these actions are intended to be achieved utilising the resources of the Facilities Management Division and engaging relevant contractors when required.