

## 2018 ENERGY AND CARBON MANAGEMENT ACTION PLAN UPDATE: SUMMARY

The following table summarises the actions that have been implemented in 2018 as part of the UOW Energy and Carbon Management Action Plan 2017-2020. The aim of these actions is to support the achievement of the energy and carbon management targets defined in the UOW Environmental Management Plan (EMP):

**Table 1: 2018 Energy and Carbon Management Actions**

STRATEGIC AREA: ENERGY EFFICIENCY		
ACTION	STATUS	COMMENTS
Upgrade Building Lighting Systems to LED	Ongoing	<p>LED is the most energy efficient, cost effective and mainstream lighting technology available. LED lights consume less energy than other technologies resulting in significant energy savings.</p> <p>During 2017 a detailed feasibility study was conducted to assess the expected impact of upgrading the lighting systems across UOW buildings to more efficient LED lighting. Following the completion of this feasibility study the procurement, design and implementation works to deliver these LED upgrades were tendered in 2018. The delivery of the LED upgrade projects has been divided in 3 stages and comprehensive LED lighting upgrades have been completed in Buildings 3, 30 and 38 during 2018. Design works for additional projects in Buildings 2, 8, 10 and 13 have also been completed in 2018.</p> <p>Design and implementation of LED upgrades in additional buildings are planned to continue in 2019.</p>
STRATEGIC AREA: RENEWABLE ENERGY		
ACTION	STATUS	COMMENTS
Install Solar Photovoltaic Systems	Ongoing	<p>Solar photovoltaic (PV) systems convert energy from sunlight into electricity providing clean and free energy from a renewable energy source resulting in a reduction of carbon emissions and improvement on environmental performance.</p> <p>A 30kW solar PV system was installed on the P3 South West multistorey car park (Building 69) in 2017. During 2017 a detailed feasibility study was conducted to analyse the potential outcomes of installing solar PV systems on the roofs of UOW buildings. After the completion of this feasibility study the works to procure, design and install solar PV systems on UOW buildings were tendered and design works for the installation of a 130kW PV system on the roof of Building 13 were completed in 2018.</p> <p>Design and implementation works for the installation of solar PV systems on additional UOW buildings are planned to continue in 2019.</p>

**STRATEGIC AREA: ENERGY MONITORING**

ACTION	STATUS	COMMENTS
Monitor Energy and Carbon Consumption and Performance	Completed	<p>UOW energy and carbon consumption and performance has been monitored on a monthly basis during 2018. Energy consumption (grid electricity and piped natural gas) during 2018 was 110,918 GJ resulting in the following performance against the relevant 2020 EMP targets:</p> <ul style="list-style-type: none"> <li>• Wollongong Campus consumption of non-renewable energy in 2018 has been <b>0.49 GJ/m<sup>2</sup></b>. This is <b>7.5%</b> below the 2020 EMP target and <b>2.0%</b> lower than the previous 12 months.</li> <li>• <b>1,398 GJ</b> of renewable energy have been generated onsite at UOW in 2018, including 563 GJ generated on the Wollongong Campus. This is <b>10.9%</b> higher than the 2016 baseline.</li> <li>• Greenhouse gas emissions from energy consumption during 2018 have been <b>88.24 kgCO<sub>2</sub>-e/m<sup>2</sup></b>. These emissions are <b>5.9%</b> below the 2020 EMP target and <b>5.6%</b> lower than the previous 12 months.</li> </ul> <p>This information is also illustrated in Figures 1, 2 and 3.</p>
Upgrade Energy Metering System	Completed	<p>The energy (electricity and gas) metering system at UOW has been upgraded during 2017 and 2018. In 2017 a new network of 118 electricity smart meters were installed across buildings in Wollongong Campus to measure and monitor electricity consumption of specific buildings and loads. A network of 38 gas smart meters were also installed in 2018 to measure and monitor natural gas consumption. This new energy metering and monitoring system allows the UOW Facilities Management Division team to collect and analyse key parameters including:</p> <ul style="list-style-type: none"> <li>• Electricity and gas consumption at different intervals (e.g. hourly, daily, monthly)</li> <li>• Maximum demand profiles</li> <li>• Electricity loads (e.g. KVA, KVA<sub>r</sub>, power factor etc.)</li> <li>• Time of use energy consumption (e.g. peak, shoulder and off peak)</li> <li>• Generation of renewable energy</li> </ul> <p>In addition to the provision of these parameters the new energy metering and monitoring system also allows the UOW Facilities Management Division team to:</p> <ul style="list-style-type: none"> <li>• Measure impact of activities on utilities (e.g. energy savings)</li> <li>• Monitor performance of renewable energy systems</li> <li>• Assess onsite demand vs infrastructure capacity</li> </ul>
Develop Utilities Monitoring and Reporting Tool	Completed	<p>During 2018 a Utilities Monitoring and Reporting Tool has been developed to track and record UOW energy and carbon performance and to facilitate reporting against UOW EMP targets. This tool is used to:</p> <ul style="list-style-type: none"> <li>• Record and track monthly and annual energy and carbon consumption of different UOW supplies, campuses and buildings</li> <li>• Record key parameters required for performance reporting (e.g. building gross floor area)</li> <li>• Generate the Key Performance Indicators (KPI) required for energy and carbon reporting against the EMP targets</li> <li>• Visualise current and historical consumption and performance and analyse patterns</li> <li>• Identify and prioritise opportunities to improve performance</li> </ul>

**STRATEGIC AREA: ENERGY MONITORING**

ACTION	STATUS	COMMENTS
Manage Energy Metering, Monitoring and Reporting Systems	Completed	<p>UOW Energy Metering, Monitoring and Reporting Systems have been continuously managed during 2018. Examples of some ongoing management actions include:</p> <ul style="list-style-type: none"> <li>• Add, remove and/or relocate smart meters as needed</li> <li>• Report, assess and repair faulty meters and sensors</li> <li>• Adjust calibration of smart meters</li> <li>• Manage metering contractors onsite and process invoices for metering and monitoring system services</li> <li>• Update meter registers</li> <li>• Update historical energy consumption data base</li> <li>• Improve data collection and visualisation for reporting purposes</li> </ul>

**STRATEGIC AREA: ENERGY ADMINISTRATION**

ACTION	STATUS	COMMENTS
Develop Energy Procurement Strategy and Renew Energy Contracts	Completed	<p>Due to the proximity of UOW energy contracts' expiry date and to the significant changes in the energy market during the previous months a specialised consultant was engaged to assist UOW in developing and energy procurement strategy. The objective of this exercise was to identify the most suitable energy procurement approach for UOW, to effectively minimise future energy expenditure and to identify and manage financial risks.</p> <p>Following the development and implementation of this procurement strategy UOW entered into new agreements to supply electricity and natural gas for UOW portfolio.</p>
Develop and Implement Energy Bill Verification Process	Completed	<p>An energy bill verification process has been developed and implemented in 2018. This process consists of regular checks of electricity and gas invoices to ensure that energy bills are correct and that UOW does not incur extra costs due to billing errors.</p> <p>Energy bills consist of different charges including retail, network, metering, service charges etc. All these charges are checked as part of the bill verification process to confirm they align with the contractual and regulated rates before approving the invoices. Substantial billing errors have been identified and corrected as part of this bill verification process.</p>
Manage Energy Supply Contracts	Completed	<p>Electricity and natural gas supply contracts have been actively managed during 2018. Some of the ongoing actions include:</p> <ul style="list-style-type: none"> <li>• Manage the integration and discontinuation of sites across UOW portfolio into UOW energy supply contracts</li> <li>• Organise supplies for new sites and electrical supply upgrades (e.g. new substations)</li> <li>• Liaise with retailers and relevant authorities to address billing and contractual issues</li> </ul>
Track, Forecast and Plan Energy Consumption and Expenditure	Completed	<p>During 2018 energy consumption and expenses have been tracked and recorded. This information is used along with expected future energy prices and planned changes at UOW that may have an impact on energy consumption (e.g. new developments) to forecast future energy consumption and costs.</p>

**STRATEGIC AREA: STRATEGIC AND TECHNICAL ADVICE**

ACTION	STATUS	COMMENTS
UOW Electrical Design Standards Review	Completed	<p>The UOW Electrical Design Standards have been reviewed and updated. As part of this review specific requirements to ensure that energy efficiency improvements are integrated as part of new building developments and refurbishments have been included. Some of these requirements relate to:</p> <ul style="list-style-type: none"> <li>• LED lighting</li> <li>• Lighting Controls</li> <li>• Consideration of solar PV systems</li> <li>• Metering requirements</li> </ul>

**STRATEGIC AREA: ENVIRONMENTAL REPORTING AND AWARENESS**

ACTION	STATUS	COMMENTS
Provide Energy Performance Reports	Completed	<p>Energy performance has been regularly reported during 2018. This includes FMD internal reporting to provide monthly updates as well as scheduled reports to provide relevant information on energy consumption and performance to:</p> <ul style="list-style-type: none"> <li>• UOW Environmental Advisory Committee</li> <li>• UOW Finance and Resources Committee</li> <li>• Tertiary Education Facilities Management Association (TEFMA)</li> <li>• National Greenhouse and Energy Reporting (NGER)</li> </ul>
Review of Environmental Reporting Process	Completed	<p>In 2017 UOW conducted an external review of its environmental reporting processes and management of utilities bill data to identify and implement opportunities for improvement.</p>
Develop and Implement Behavioural Change and Awareness Programs for Energy Users	Completed	<p>Communications and provision of key information have been organised as part of Orientation and Earth Hour activities to promote the efficient use of energy on campus and social media platforms have been regularly monitored and utilised for environmental initiatives.</p> <p>During holiday periods equipment such as computers, fans, lights etc. can remain switched on in some areas resulting in unnecessary energy consumption. Communications to encourage staff to switch off equipment during the Christmas period have been organised to minimise energy consumption during this time of the year.</p>

**Prepared by:**

Sustainability Projects Engineer, Facilities Management Division – Ignacio Vigon

**Endorsed by:**

Senior Manager Environment, Facilities Management Division *David Low*  
David Low (Dec 9, 2019)

Director Facilities Management Division *Kathleen Packer*  
Kathleen Packer (Dec 9, 2019)

## 2018 ENERGY AND CARBON MANAGEMENT ACTION PLAN UPDATE: GRAPHS

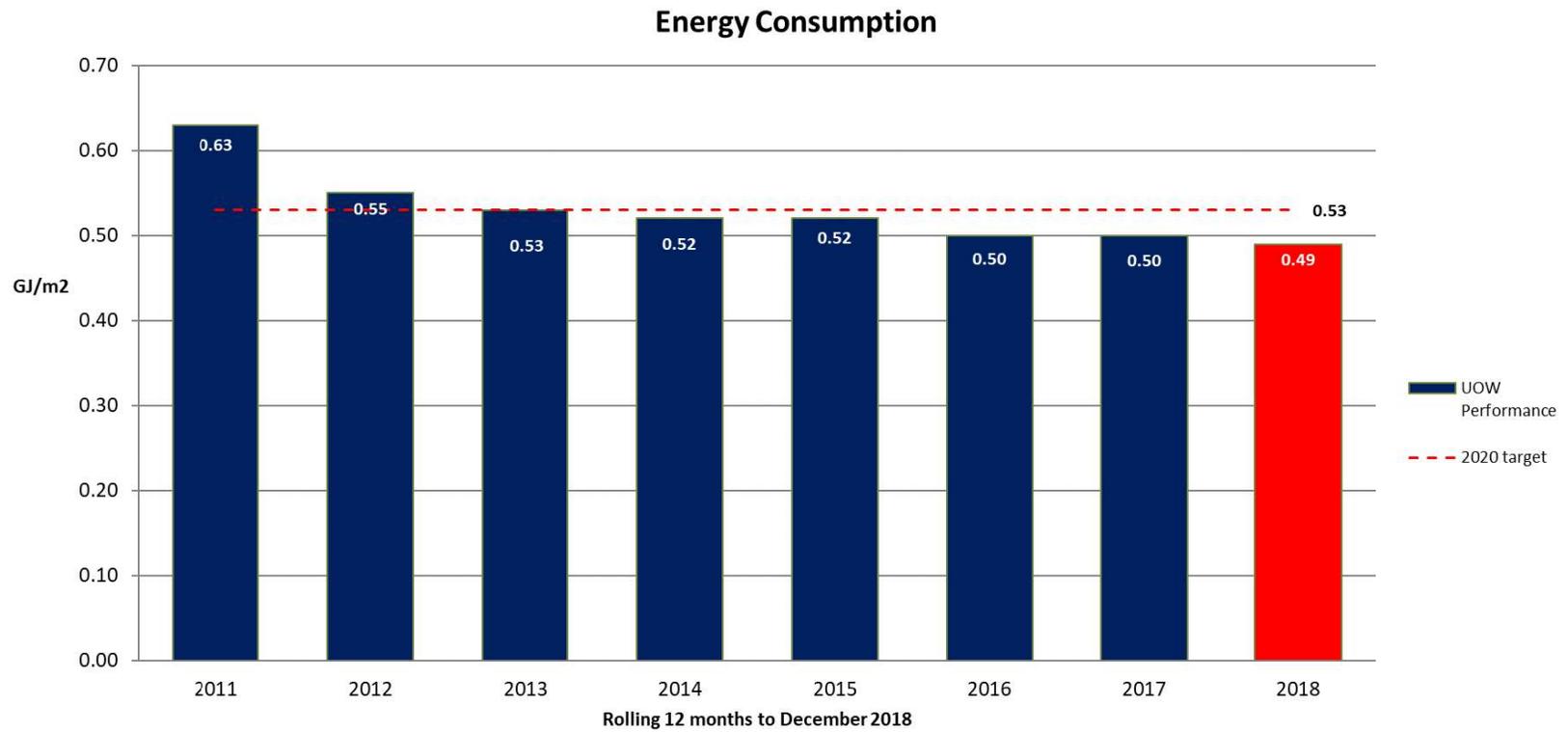
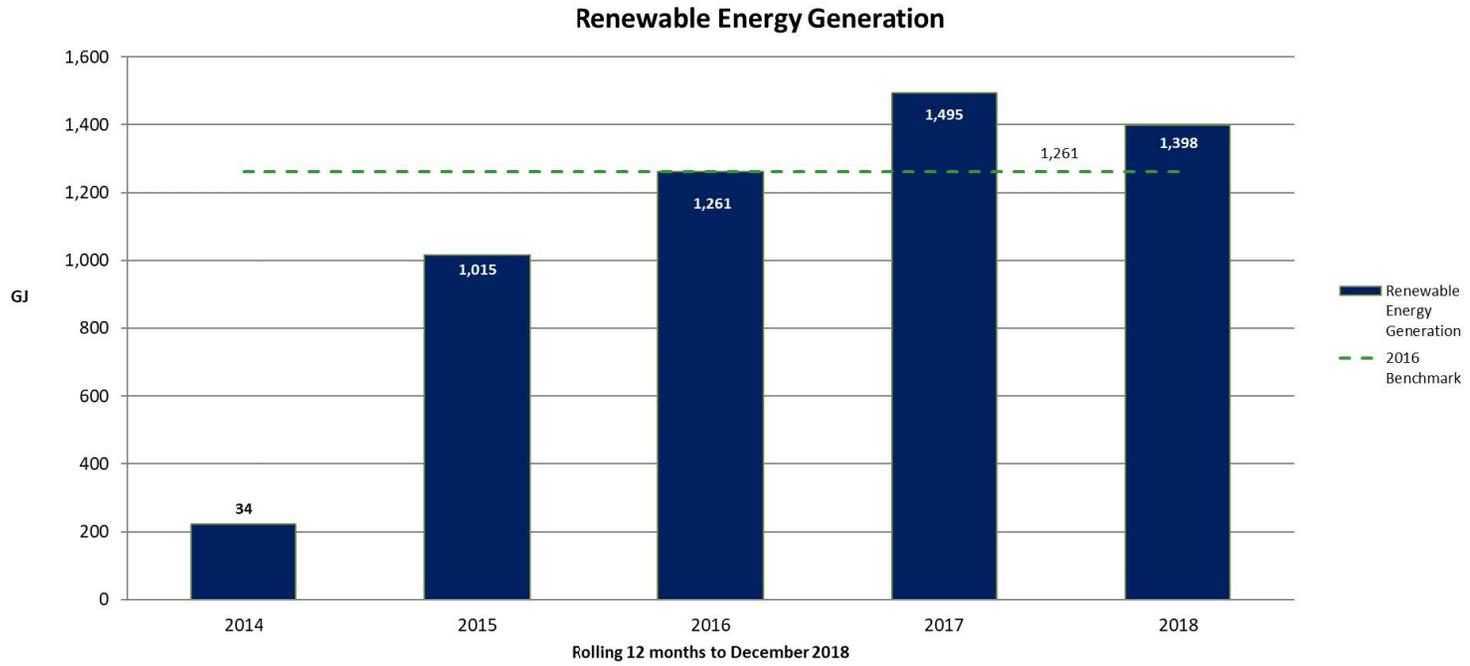


Figure 1: Non Renewable Energy Consumption



**Figure 2: Onsite Generation of Renewable Energy**

### Greenhouse Gas Emissions

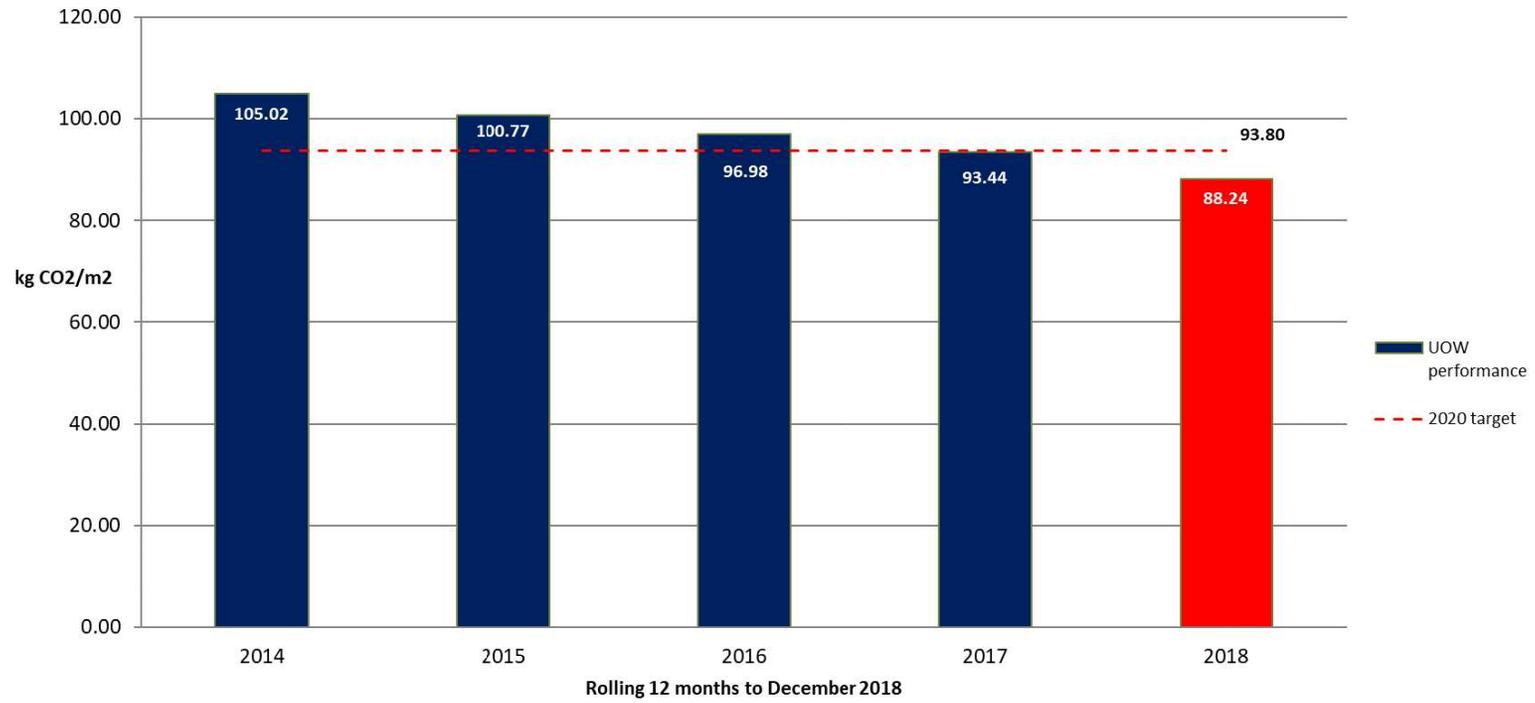


Figure 3: Greenhouse Gas Emissions