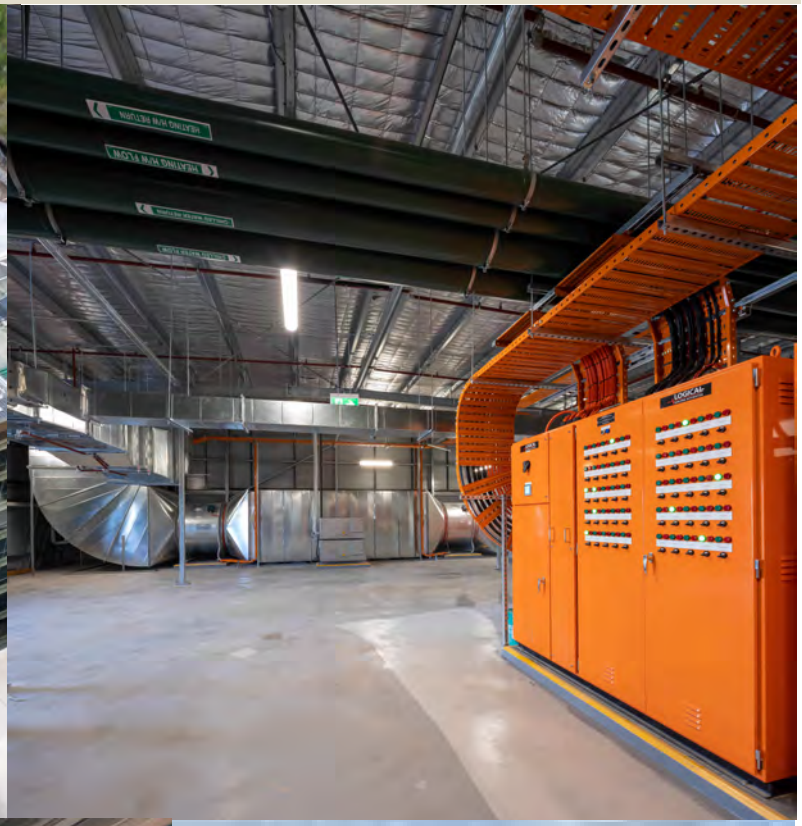
MACQUARIE University

Sustainability Targets Tracking

2020 Status Report



PROPERTY & SUSTAINABILITY
2020 SUSTAINABILITY TARGETS TRACKING REPORT

MACQUARIE University

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MACQUARIE University

1.0 PURPOSE

The Macquarie University Campus Masterplan 2014 established sustainability targets for energy, emissions, water and waste reduction. This report provides an update on progress towards achieving these targets.

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1.1 Background:

The targets set out in the Masterplan are based around a 2009 baseline. This baseline was established using publicly available data submitted annually for the TEFMA Benchmark report, which utilises data submitted annual to the Clean Energy Regulator for the annual National Greenhouse & Emissions Reporting scheme (which is a statutory report).

1.2 Headline Performance:

Since 2009, although the University has increased its Gross Floor Area (GFA) by 39% and increased its population by 40% (EFSTL + FTE), it has:

- Reduced energy consumption by 7%;
- Reduced carbon emissions by 5% (combined Scope 1 & Scope 2);
- Increased water consumption by 5%;
- Established a waste from landfill diversion rate of 84%.

1.3 Summary Performance Against Targets:

<u>Energy</u>

2030 Target: 40% reduction in Energy Intensity (GJ/sqm GFA) from 2009 baseline
FY2020 Performance: 33% reduction achieved

<u>Emissions</u>

2030 Target: 40% reduction in Emissions Intensity (CO2e(t)/sqm GFA) from 2009 baseline
FY2020 Performance: 32% reduction achieved

<u>Water:</u>

2030 Target: 40% reduction in Water Intensity (kL/EFTSL +FTE) from 2007 baseline
FY2020 Performance: 34% reduction achieved against 2009 baseline Note 2007 baseline not available

<u>Waste:</u>

2020 Target: 90% waste diversion rate from landfill from 2009 baseline
FY2020 Performance: 84% reduction achieved against 2011 baseline Note 2009 baseline not available

1.4 Conclusion:

Despite growth in building area, building complexity and population, the core principles focussing on efficiency, controls/automation and management integrated into the Macquarie University Campus Masterplan, Macquarie University Design Excellence Strategy & Urban Design Guidelines and Macquarie University Design Guidelines are delivering on the targets established and have realised in the order of $18.4 million in cost savings in the process.

2.0 SCOPE

2.1 CONTEXT

Since 2009, Macquarie University has increased its GFA by 39% and its population by 40%.

This spatial growth includes:

1. New large-scale developments such as the Australian Hearing Hub and the Macquarie University Library;
2. New energy intensive buildings such as the Brain Behaviour Building and the Biosciences Research Facility;
3. Significant modernisation older building stock including Science (12WW), Arts Precinct (25WW), MUSE/MAZE (18WW) and the Central Animal Facility, which has increasedthe consumption of energy and water within these buildings.

2009 Image Source - Nearmap

2020Image Source - Nearmap

Notes:

1. Data used for analysis sourced from annual submissions to:
   - Tertiary Education Facilities Management Association (TEFMA) for TEFMA Benchmark Report; and
   - Clean Energy Regulator for the annual National Greenhouse and Energy Reporting (NGERs) submission.
2. GFA excludes on-grade and open multi-deck carparks, Macquarie University Hospital, Macquarie University Village, Dunmore Lang College, Robert Menzies College and non-University tenanted space in commercial buildings.
3. No adjustment has been made for variances in operational hours (ie, buildings with 24/7 operation). This typically provides for an additional 2-3% saving in consumption and/or efficiency.

2.2 APPROACH

Macquarie University continues to focus on resource efficiency, controls and management, using less, self-generating energy where appropriate, while maintaining functionality and enhancing the occupant experience required in this unique operating environment.

2020 Image Source - Nearmap

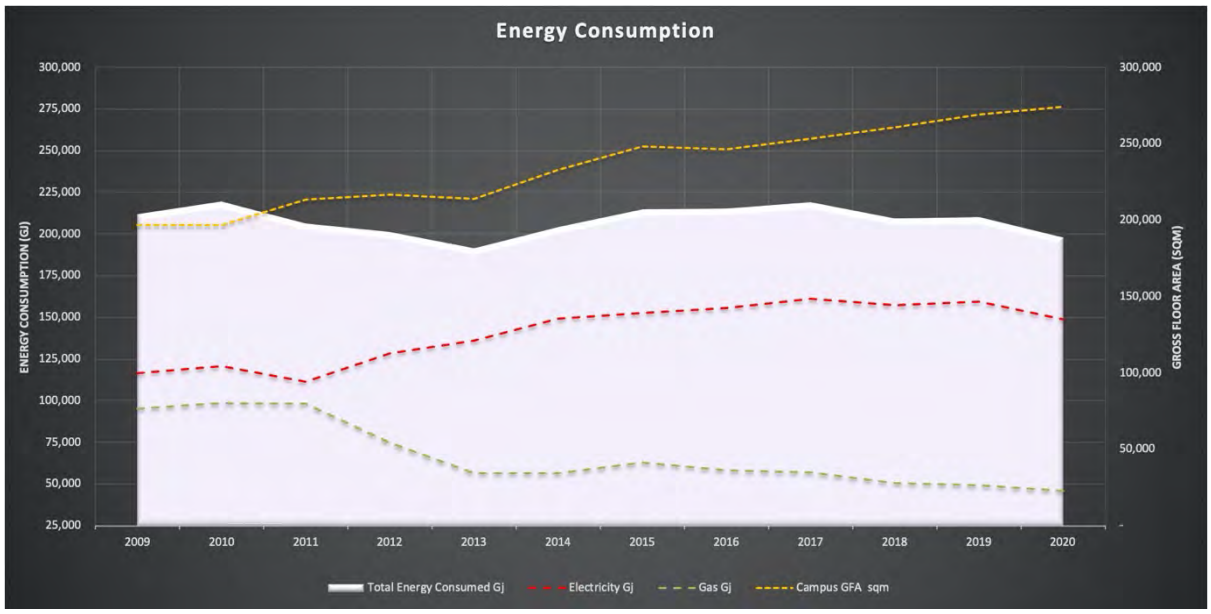
At a high level, focus areas for the University are:

- Continual improvement to our precinct model of energy and district thermal systems
- Precinct load diversification resulting in peak load reduction
- Implementation of behind the meter renewable supplies to contribute to reducing baseload power consumption
- Continual improvements to metering, monitoring, automation and building intelligence systems
- Lifecycle building upgrades with a focus on utilisation, efficiency, flexibility and functionality
- Utilising the unique landscape and creek systems as a biofilter to improve downstream water quality, enhance biodiversity and mitigate localised flood impacts
- Waste separation strategies that understand the waste streams, target minimisation of contamination and seek to develop waste creation strategies.

3.0 ENERGY

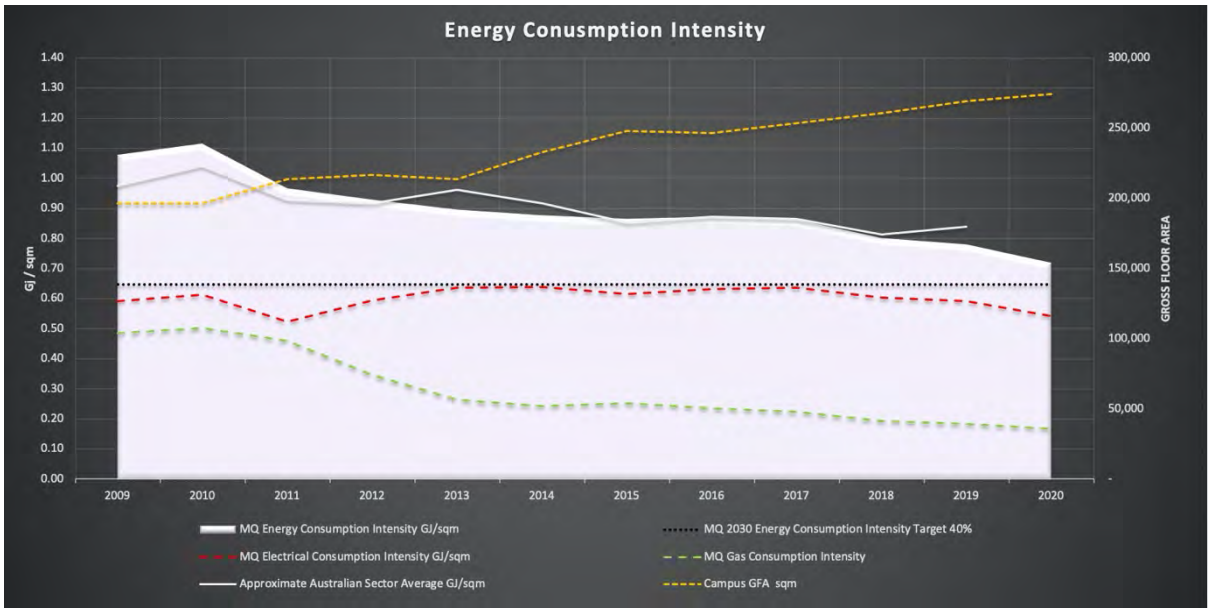
3.1 Consumption

- 7% reduction in annual energy consumption since 2009
- Reduced reliance on gas as an energy source due to increased efficiency of electrical infrastructure and provision of on-site renewable sources.



3.2 Intensity

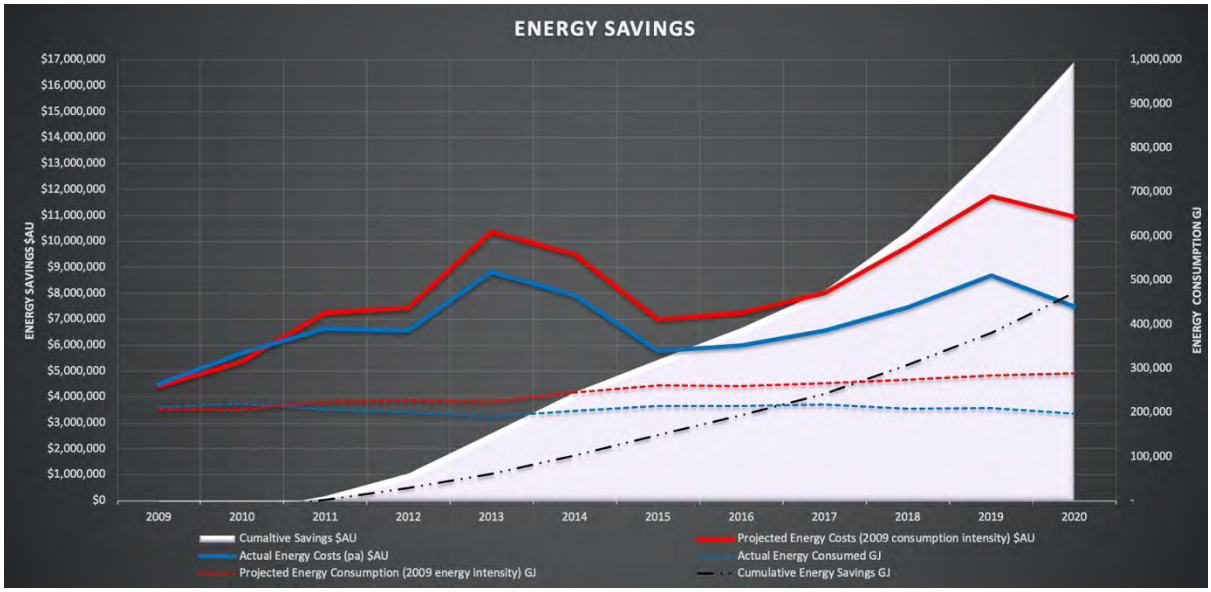
- Target Reduction: 40% by 2030 (2009 baseline)
- Status as at FY2020: 33% reduction achieved (2009 baseline)



3.3 Savings

MACQUARIE University

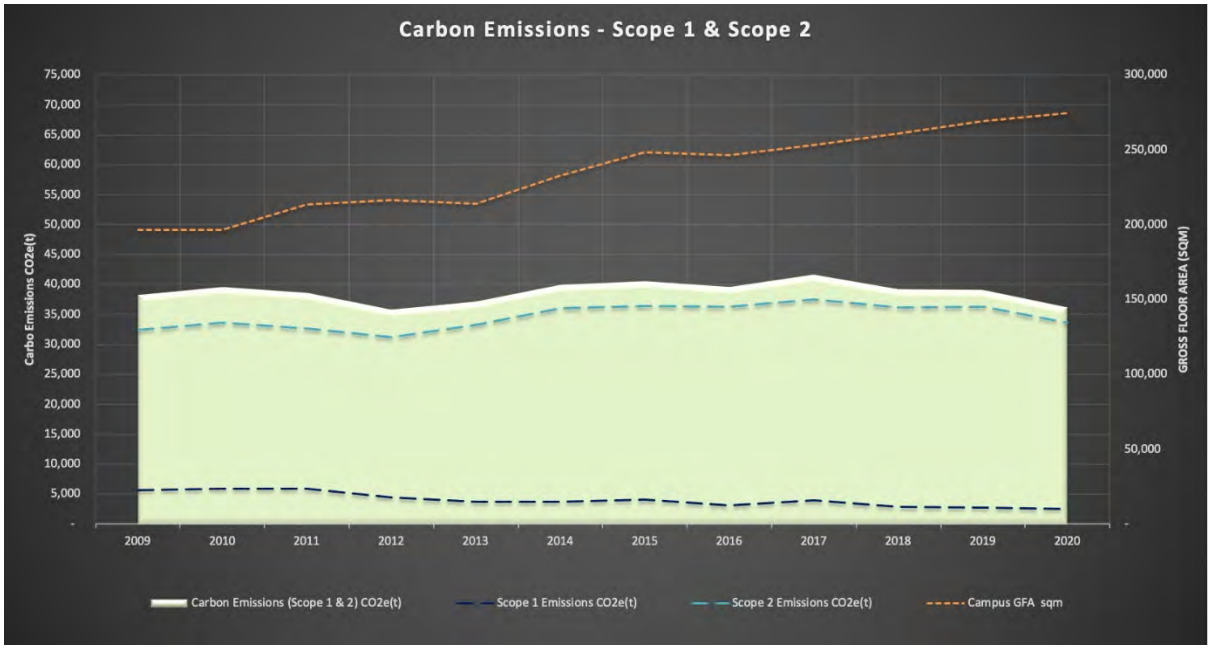
- Approximately 475TJ of energy saved since 2009
- Equivalent to 2.3 years' worth of energy saved
- Average energy savings of $1.4m pa since 2009
- Cumulative cost savings of approximately $17m since 2009



4.0 EMISSIONS

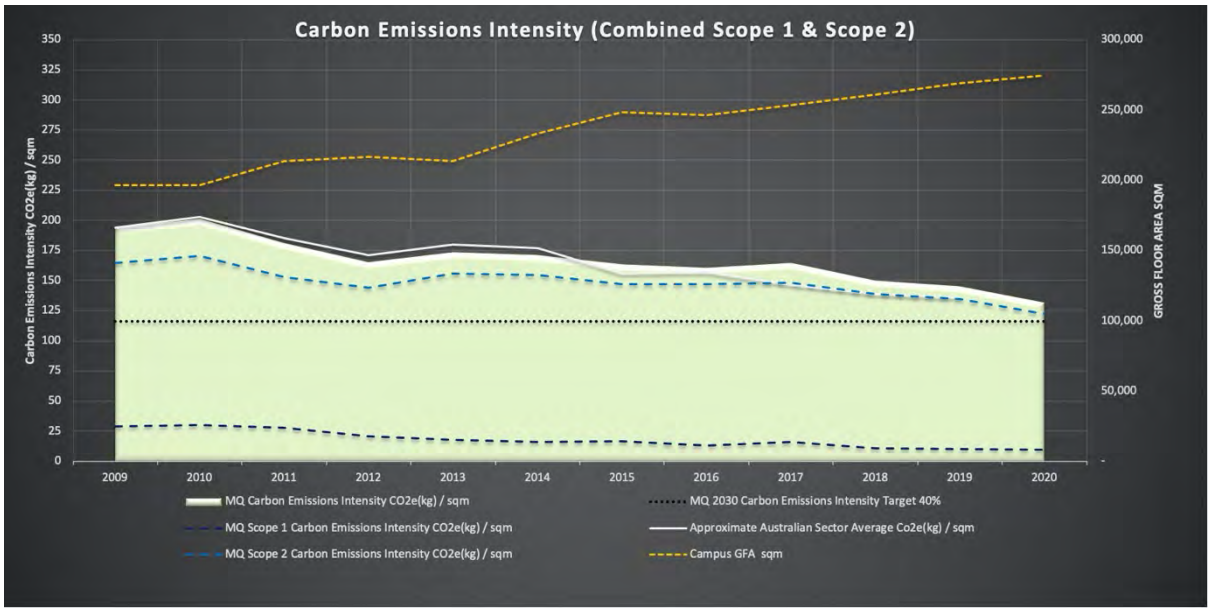
4.1 Production

- 5% reduction in annual carbon emissions since 2009 (Scope 1 & Scope 2)



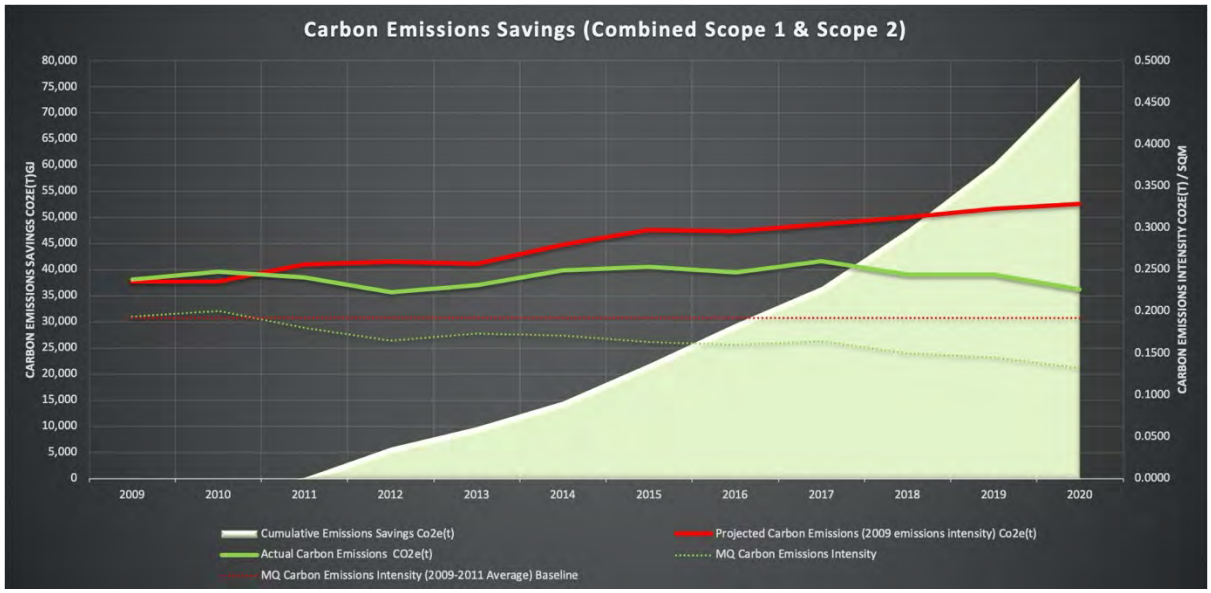
4.2 Intensity (Scope 1 & Scope 2)

- Target Reduction: 40% by 2030 (2009 baseline)
- Status as at FY2020: 32% reduction achieved (2009 baseline)

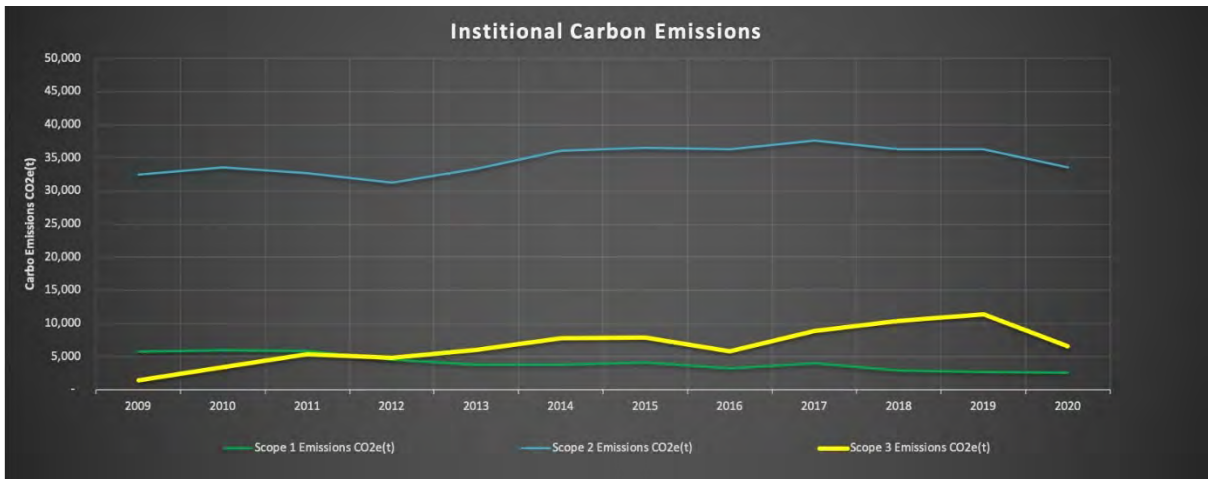


4.3 Savings

- 5% reduction in annual carbon emissions since 2009
- Approximately 76,800 CO2e(T) of carbon emissions saved since 2009
- Equivalent of 2 years worth of carbon emissions saved.



4.4 Scope 3 Travel Emissions



Whilst often overlooked any analysis of an institution's emissions needs to include Scope 3 emissions. Macquarie University's Scope 3 emissions are primarily related to travel. They have grown significantly from 4% of the total institutional carbon emissions in 2009, to approximately 25% in 2019.

With COVID-19 in the first two quarters of 2020, the University's emissions dropped significantly in this period, however the data indicates substantial emissions reductions and cost savings can be achieved by significantly reducing travel.

4.5 Definitions

Scope 1 greenhouse gas emissions are the emissions released to the atmosphere as a direct result of an activity, or series of activities at a facility level – eg natural gas usage (heating, autoclaves, cogen plant, fuel used in vehicles and boats).

Scope 2 greenhouse gas emissions are the emissions released to the atmosphere from the indirect consumption of an energy commodity – eg mains electrical supply from a non-renewable source.

Scope 3 greenhouse gas emissions are indirect greenhouse gas emissions other than scope 2 emissions that are generated in the wider economy. They occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business – eg flying on a commercial airline by a person.

5.1 PATHWAY TO CARBON NEUTRAL

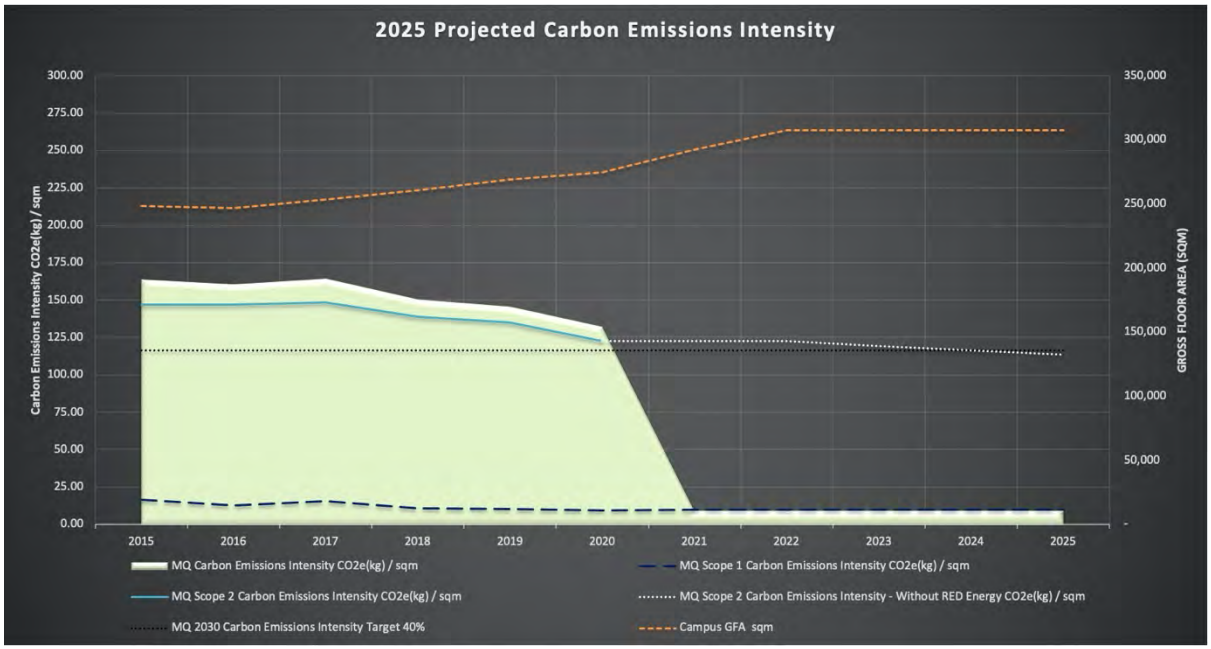
For any institution, the pathway towards a carbon neutral position presents a challenge that can ideally be achieved by a combination of direct and indirect activities.

Direct activities are typically on-site (eg building and infrastructure that improves energy efficiency, or on-site renewable energy supplies) which have operational, functional and financial benefits to the University. However, these will only take us part of the way.

The balance of the journey is a typically a financial exercise of annually purchasing indirect alternatives (eg commercially available renewable energy) and/or entering into carbon offset schemes.

In this challenging economic climate where access to funding is limited, Macquarie University continues to invest in direct, on-site activities that reduce our ecological footprint, improve our operational and functional performance, and also provide a financial benefit to the University.

This continued focus on efficiency, self-generating where appropriate, and seeking out sustainable alternative renewable options are critical to this and core to working towards a carbon neutral model.



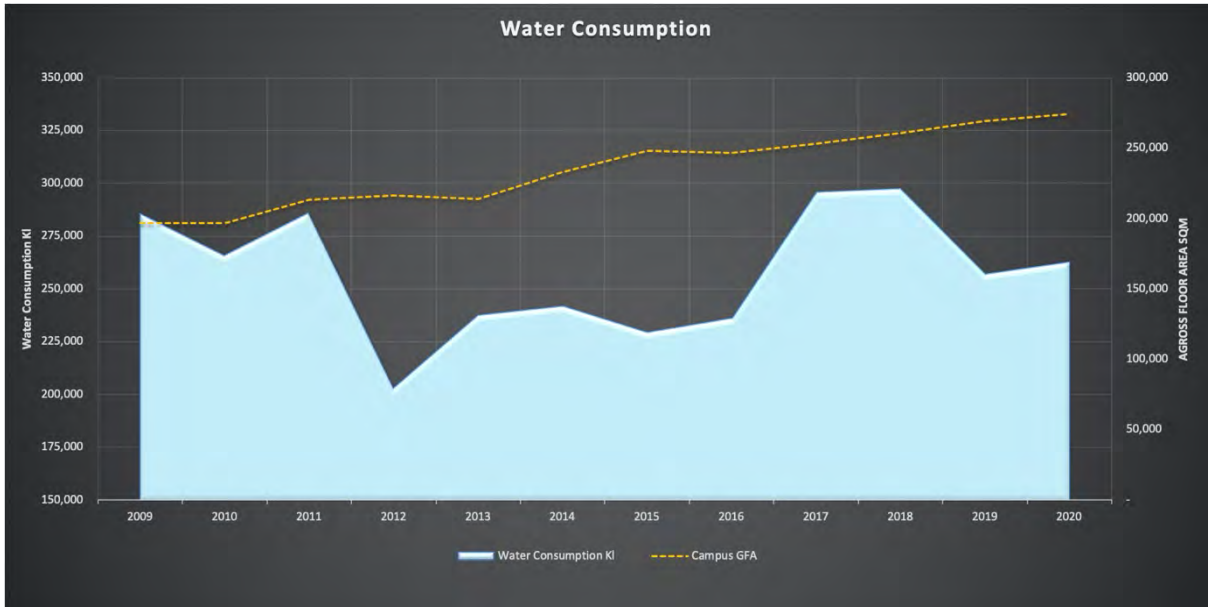
Whilst this this approach has yielded a 32% reduction in Carbon Emissions Intensity since 2009, as at 1st July 2020, Macquarie University has switched to a 100% renewable energy source for its North Ryde Campus with its energy contract with Red Energy. The move will see the University's total greenhouse gas emissions cut by a further 92% with the campus' electricity being sourced from Snowy Hydro.

Whilst the impact of the RED Energy Contract is extremely positive, it does not yet put us in a Carbon Neutral Position.

6.0 WATER

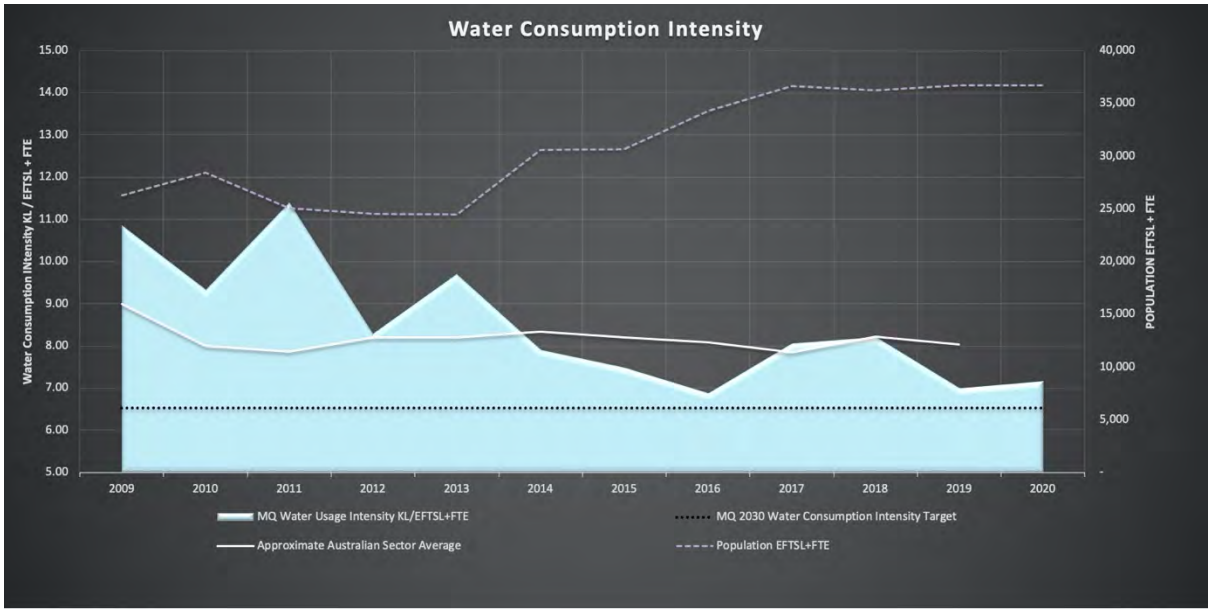
6.1 Consumption

- 8% reduction achieved in annual water consumption since 2009



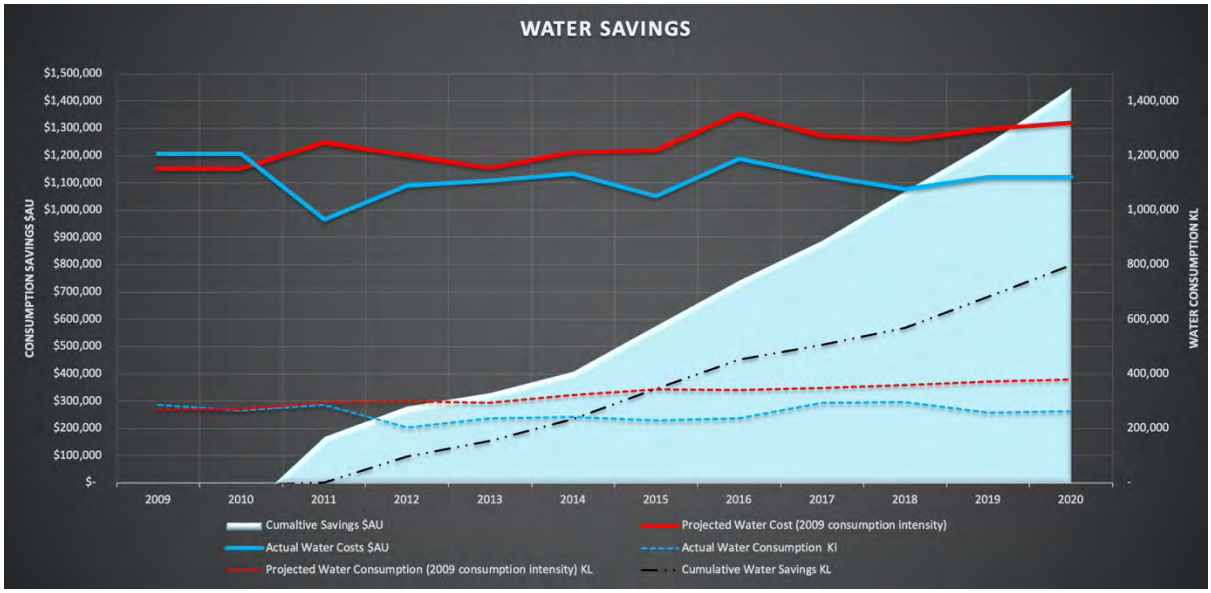
6.2 Intensity

- Target Reduction: 40% by 2030 (2007 baseline)
- Status as at FY2020: 34% reduction achieved (2009 baseline)



6.3 Savings

- Approximately 800mL of water saved since 2009
- Cumulative savings equivalent to 3 years of water usage
- On average, cost savings of $120,000 pa since 2009
- Cumulative cost savings of approximately $1.45 million since 2009



Case Study – 2017-2019 water usage

In 2019, we reduced annual water consumption on campus by 40,000kL (14% decrease and approximately $95,000 per annum in savings) via reactive maintenance to 'invisible' subterranean water infrastructure (this is clearly evident in the Water Consumption Graph).

The University has many kilometers of aging sub-terranean water supply infrastructure, where issues are not visibly apparent. Therefore, a focus on preventative maintenance combined with expansion of sub-metering infrastructure will go a long way to preventing significant losses.

Case Study – Where does the water go?

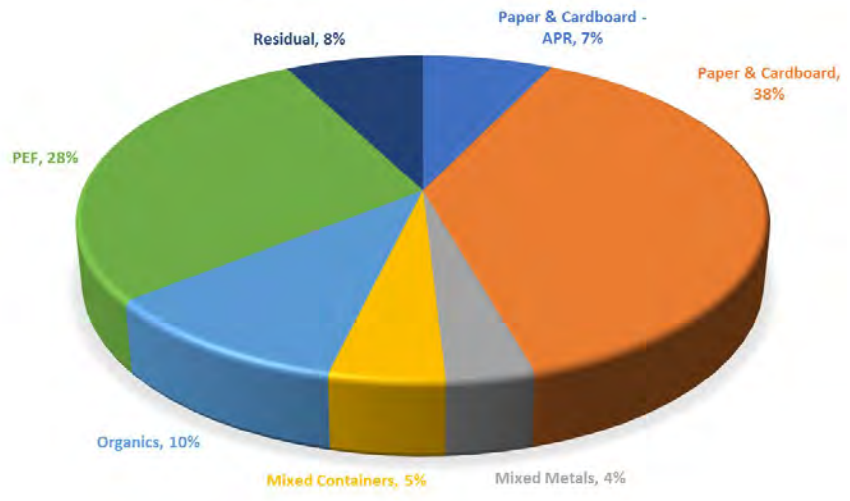
A detailed understanding of where and how water is used is required to manage its efficient consumption – eg, In 2019 the sports fields used approximately 36,000kL of potable water (around 12% of the Campus' annual consumption), yet there is only anecdotal data on the output of the Blackwater Treatment Facility which this is supplementing.

7.0 RECYCLING, REUSE AND WASTE DISPOSAL

7.1 Waste Diversion from Landfill

- Target Diversion Rate: 90% by 2020 (2009 baseline)
- Status as at FY2020: 80% reduction achieved (2011 baseline)

7.2 Waste Breakdown – FY2019



Note: Waste to Landfill comprises residual waste plus a component of Processed Engineered Fuel (PEF).

7.3 Waste Management

Waste disposal is managed in three distinct areas:

1. Co-mingled General Waste – via Doyle Bros
   General waste collection takes the onus of responsibility for separation away from the individual at the point of disposal (which cannot be relied upon) and this occurs at the waste management facility downstream, where it is automatically separated and forwarded to respective recycling/reuse facilities (note also the waste separated at the point of disposal would also go through this downstream separation to remove contaminates).

2. Paper & Cardboard collection (workplace) – via Suez
   Typically, secured and unsecured paper recycling bins in offices, Library, Muse etc.

3. Green waste (from landscaping)
   Sent to vegetation recycling facility for mulching

On analysis of the data set, you would expect a significant spike across most areas at the commencement and throughout each semester (when the population on campus dramatically increases) however this is not the case. This indicates that the vast majority of waste produced is not 'personal waste' (eg food related), but 'operational waste' (business related). Therefore, waste reduction strategies should be focussing on these areas of operations, whilst supporting changes in occupant behaviour which further lead to a reduction in 'personal waste'.

Case Study – 2019 paper usage

$86,500 was spent on purchasing paper – approximately 90 tonnes.

In the order of 36.5 tonnes of paper was sent to recycling via the 'blue bins' at a cost of $15,500.

This would indicate that somewhere between 50%-61% of paper purchased (or $42,000-$50,000) in 2019 left the Campus in a recycling bin.

Whilst recycling is great, focusing on minimising usage has both environmental and economic benefits.

Case Study – Central Courtyard Precinct - *Plastic Free @ 1CC*

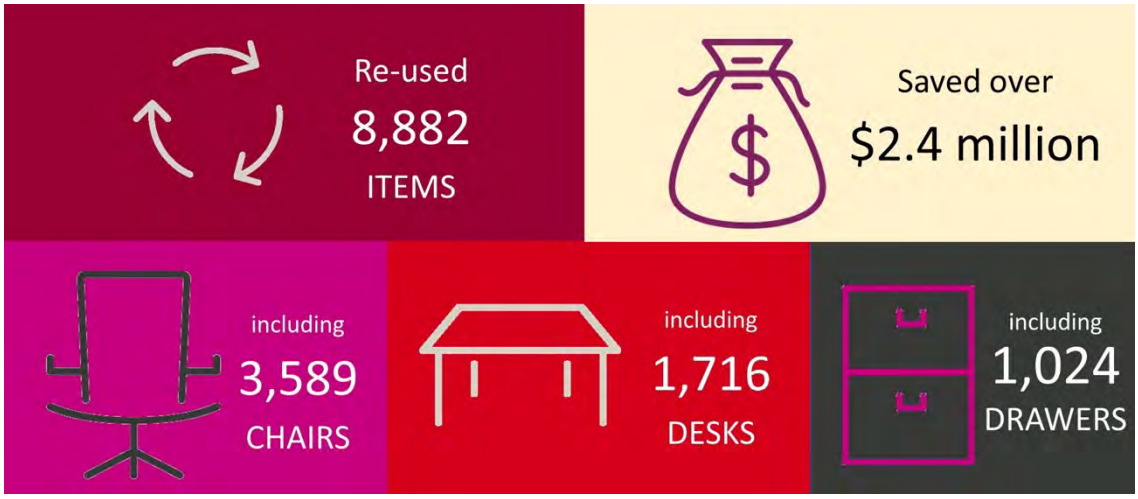
With the *Plastic Free @ 1CC* initiative, all retailers in the new Central Courtyard precinct will be asked to use compostable packaging for their food & beverage packaging. There are a number of packaging providers that are certified compostable and this is important to ensure that the packaging can be composted without risk of contamination.

Within the 1CC precinct there will be a clearly marked 2 bin system, - 1 bin for all packaging and food purchased within the precinct (ie, compostable packaging) and 1 bin for all other types of waste (commingled).

For this program to be a success all retailers need to be on board so that the message that all packaging purchased within the food court is compostable is very clear to our staff, students and customers.

7.4 Furniture Reuse Facility

The Furniture Store was setup in late 2010 to enable re-use of surplus office furniture across all departments and faculties on campus. Since then we have:



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