



MACQUARIE
University

Sustainability Targets Tracking

2021 Status Report



**SUSTAINABLE
DEVELOPMENT
GOALS**

2021 Sustainability Targets Tracking Report



CONTENTS

1.0 PURPOSE Page 2

- 1.1 Background
- 1.2 Headline Performance
- 1.3 Summary Performance Against Targets
- 1.4 Conclusion

2.0 SCOPE Page 4

- 2.1 Context
- 2.2 Approach

3.0 ENERGY Page 6

- 3.1 Consumption
- 3.2 Intensity
- 3.3 Savings

4.0 EMISSIONS Page 9

- 4.1 Production
- 4.2 Intensity (Scope 1 & Scope 2)
- 4.3 Savings
- 4.4 Scope 3 Travel Emissions
- 4.5 Definitions

5.0 CARBON NEUTRAL Page 13

- 5.1 Pathway to Carbon Neutral

6.0 WATER Page 14

- 6.1 Consumption
- 6.2 Intensity
- 6.3 Savings

7.0 RECYCLING, REUSE AND WASTE DISPOSAL Page 17

- 7.1 Waste Diversion from Landfill
- 7.2 Waste Streams
- 7.3 Waste Management
- 7.4 Furniture Reuse facility

NOTES Page 21

2021 Sustainability Targets Tracking Report



1.0 PURPOSE

The Macquarie University Campus Masterplan 2014 established sustainability targets for energy, emissions, water and waste reduction based around a 2009 baseline. This report provides an update on progress towards achieving these targets.

1.1 Background:

At Macquarie University, our understanding of sustainability is aligned with the United Nation's Sustainable Development Goals (SDGs). The SDGs are 17 interlinked goals designed as "a global blueprint to achieve a better and more sustainable future for all". Our targets and progress towards them help us to understand the impact of our actions and activities and enable us to make informed decisions around better sustainable practices.

1.2 Headline Performance:

Since 2009, although the University has increased its gross floor area (GFA) by 45% and increased its population by 37% (EFSTL + FTE), in 2020 / 2021 it has:

- Reduced energy consumption by 35% (target 40% by 2030);
- Reduced carbon emissions by 89% (combined Scope 1 & Scope 2);
- Decreased water consumption by 75%;
- Established a waste from landfill diversion rate of 90%.

1.3 Summary Performance Against Targets:

Energy

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

FY2021 Performance: 35% reduction achieved

Emissions

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

FY2021 Performance: 89% reduction achieved

Water:

2030 Target: 40% reduction in Water Intensity (kL/EFTSL +FTE) from 2007 baseline

FY2020 Performance: 75% reduction achieved against 2009 baseline

Waste:

2020 Target: 90% waste diversion rate from landfill from 2009 baseline

FY2020 Performance: 90% reduction achieved against 2011 baseline

2021 Sustainability Targets Tracking Report



1.4 Conclusion:

Undoubtedly the performance over 2020/2021 has been affected by Covid-19 as the University was not operating at full capacity during this period. However, 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 against 2009 benchmarks and have realised in the order of \$21.4 million in cost savings in the process.

2021 Sustainability Targets Tracking Report



2.0 SCOPE

2.1 CONTEXT

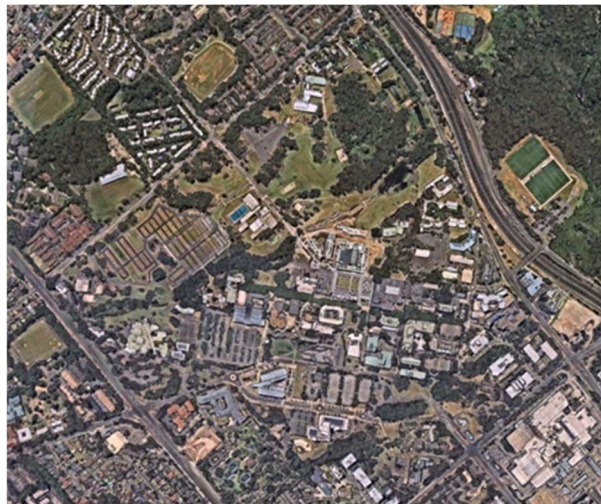
In 2021, Macquarie University has increased its size (gross floor area) by 45% and its population by 37% over 2009 levels.

This spatial growth includes:

1. New large-scale developments such as the Australian Hearing Hub, the Macquarie University Library and most recently, the Central Courtyard Precinct which includes student accommodation
2. New specialised buildings including the Brain Behaviour Building and the Biosciences Research Facility
3. Significant modernisation of older building stock including Science (12WW), Arts Precinct (25WW), MUSE/MAZE (18WW) and the Central Animal Facility.



2009 (image source – Nearmap)



2021 (image source – Nearmap)

2.2 APPROACH

As the campus develops, 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.

2021 Sustainability Targets Tracking Report



2021 image source - Nearmap

At a high level, focus areas for the University with regards to minimising our resource use and maximising our efficiency are based on:

- 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 of space
- Utilising our unique campus 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 reduce waste creation in the first instance.

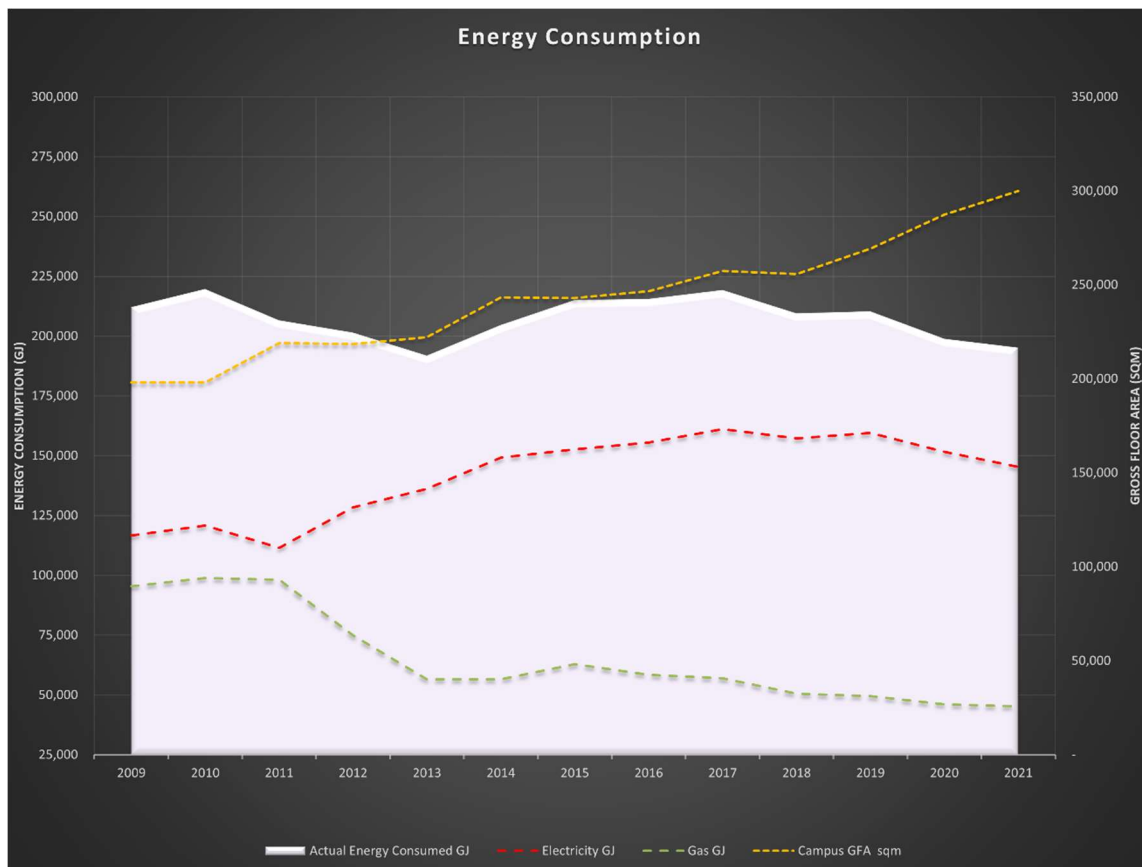
2021 Sustainability Targets Tracking Report



3.0 ENERGY

3.1 Energy Consumption

- 8% reduction in total annual energy consumption since 2009 despite the 45% increase in gross floor area (caveat: 2020-2021 consumption has been affected by covid-19)
- Reduced reliance on gas as an energy source due to increased efficiency of electrical infrastructure and provision of on-site renewable sources

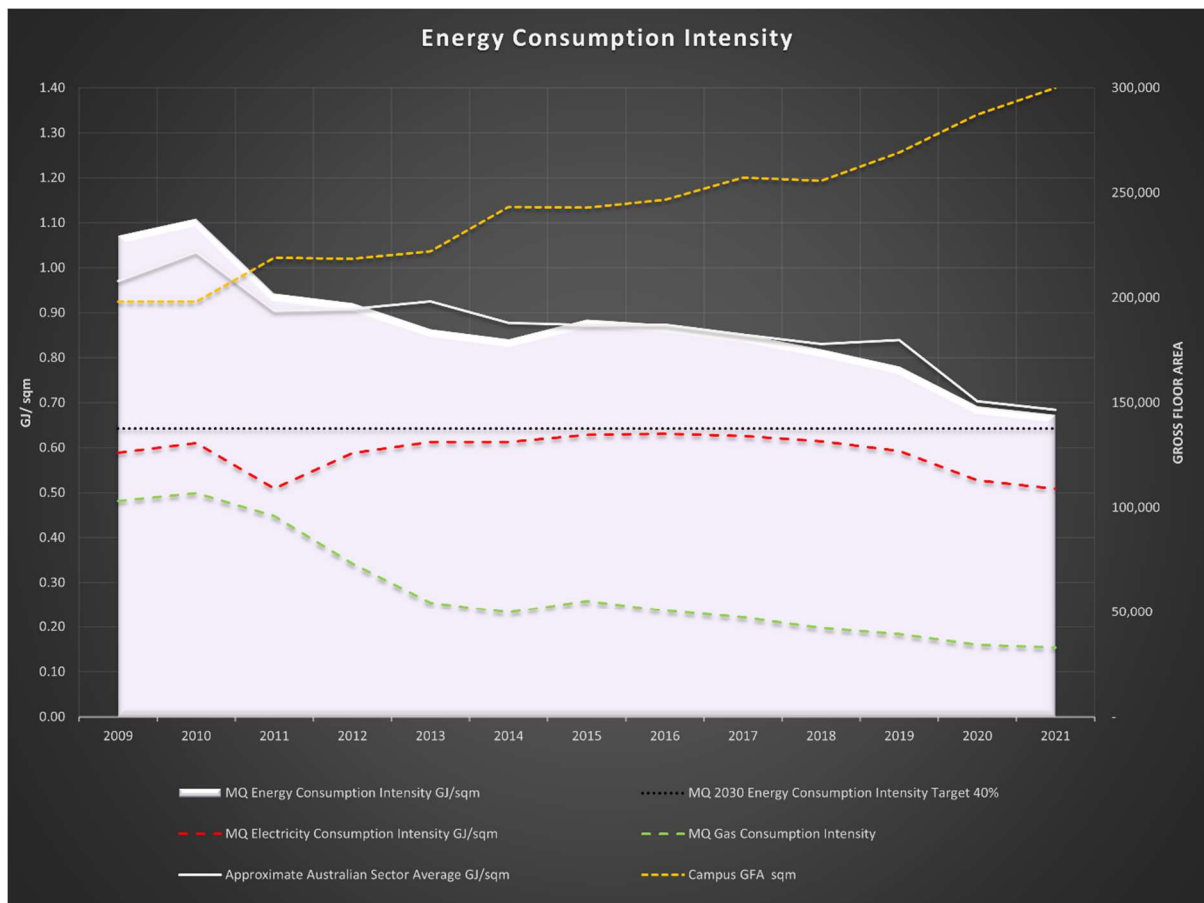


2021 Sustainability Targets Tracking Report



3.2 Energy Intensity

- Target Reduction: 40% by 2030 (2009 baseline) – GJ per square meter gross floor area
- Status as at FY2021: 35% reduction achieved (2009 baseline) (caveat: 2020-2021 energy intensity has been affected by covid-19)

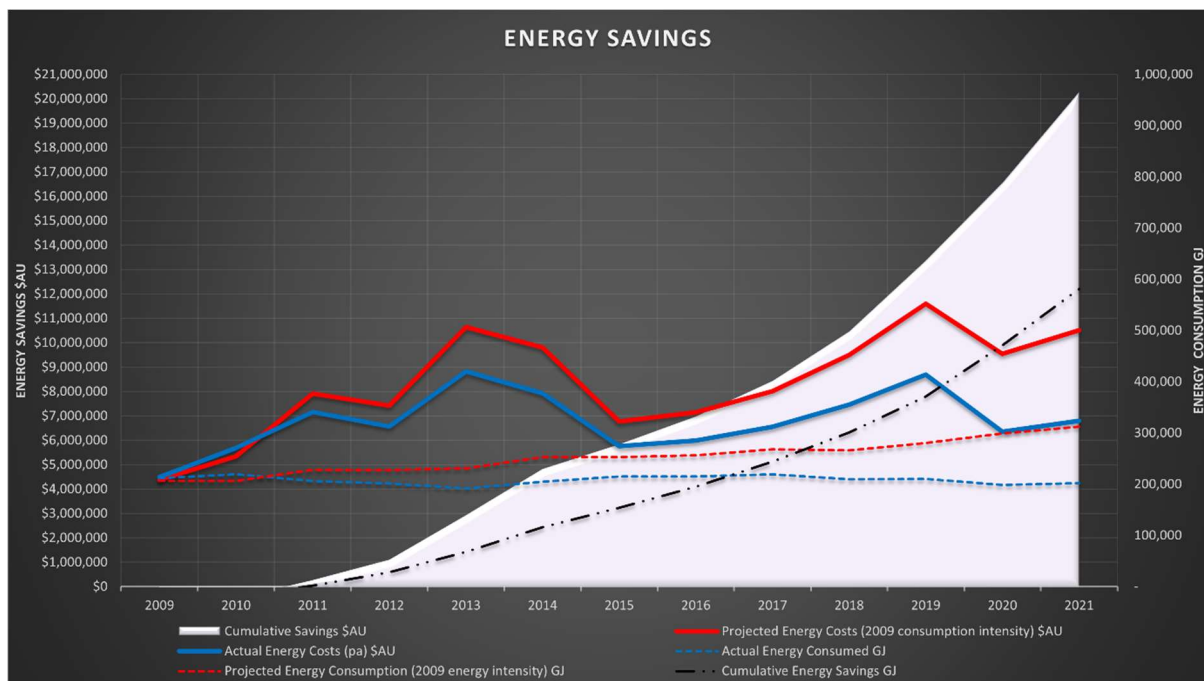


2021 Sustainability Targets Tracking Report



3.3 Energy Savings

- Approximately 580 TJ of energy saved since 2009
- Equivalent to 2.4 years' worth of energy saved
- Average energy savings of \$1.7m per annum since 2009
- Cumulative cost savings of approximately \$20.6m since 2009



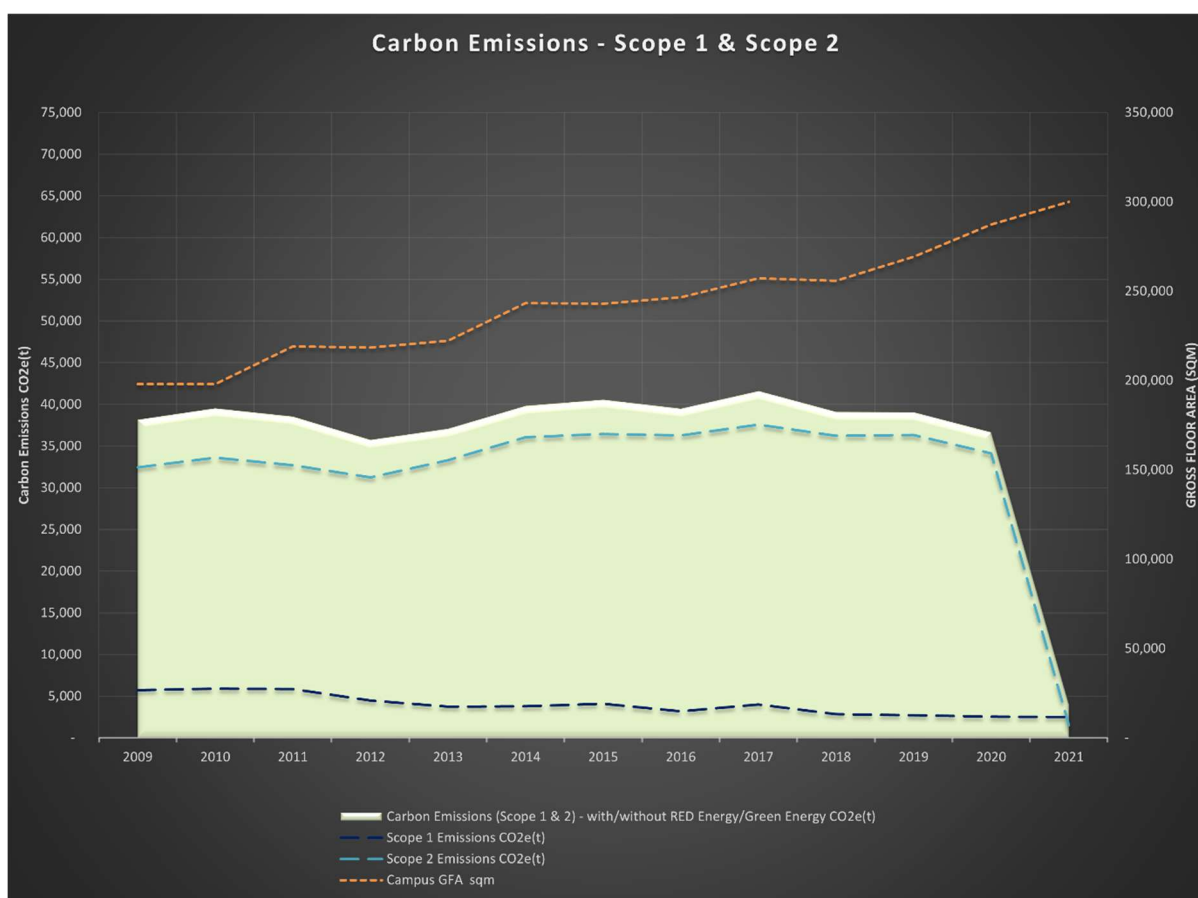
2021 Sustainability Targets Tracking Report



4.0 EMISSIONS

4.1 Production

- Commencement of electricity contracts with Red Energy (renewable source) in 2020 and Shell Energy (green power) in 2021, have offset 96% of carbon emissions from electricity (Scope 1) for FY2021
- Overall emissions (Scope 1 & Scope 2) have been reduced by 89%



Scope 1 greenhouse gas emissions are emissions released to the atmosphere as a direct result of an activity. For example, natural gas (used for heating, autoclaves, etc), or fuels used in cars, landscaping equipment, etc.

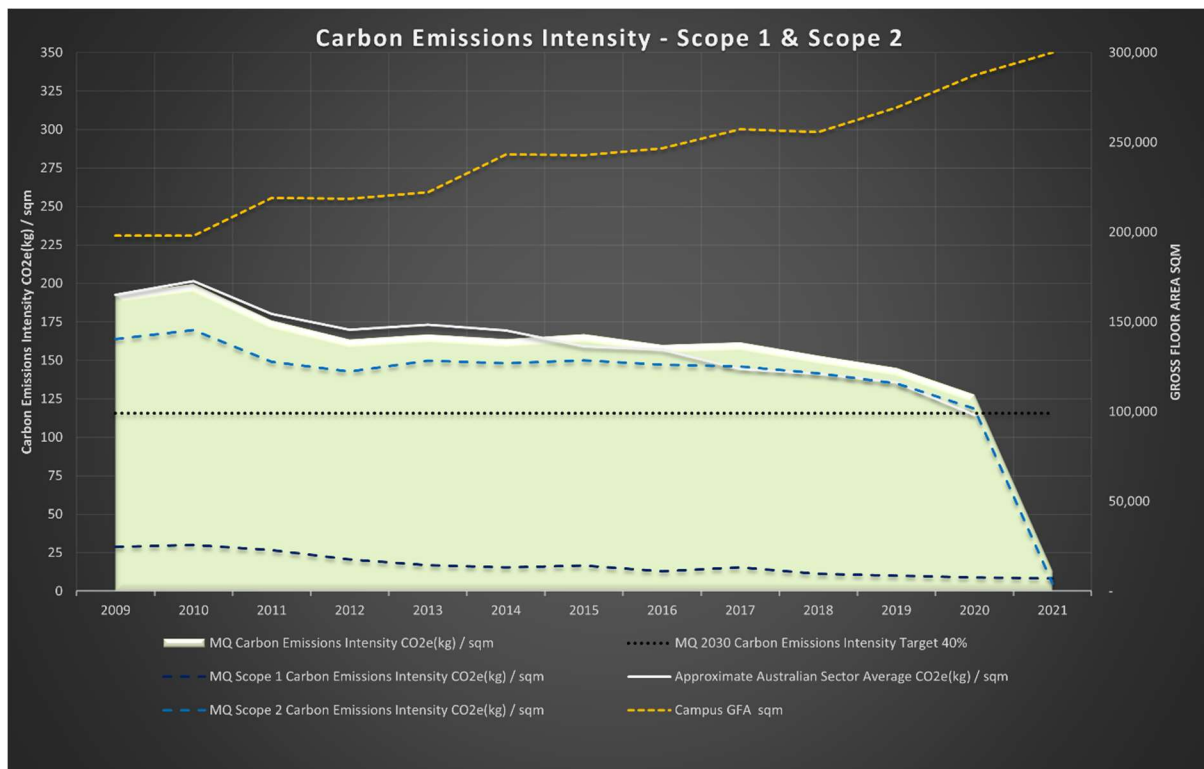
Scope 2 greenhouse gas emissions are the emissions released to the atmosphere from the generation of purchased electricity.

2021 Sustainability Targets Tracking Report



4.2 Emissions Intensity (Scope 1 & Scope 2)

- Target Reduction: 40% by 2030 (2009 baseline) t CO₂-e per square meter of GFA
- Status as at FY2021: 89% reduction achieved (2009 baseline) – target achieved



Case Study – Renewable Energy Contracts

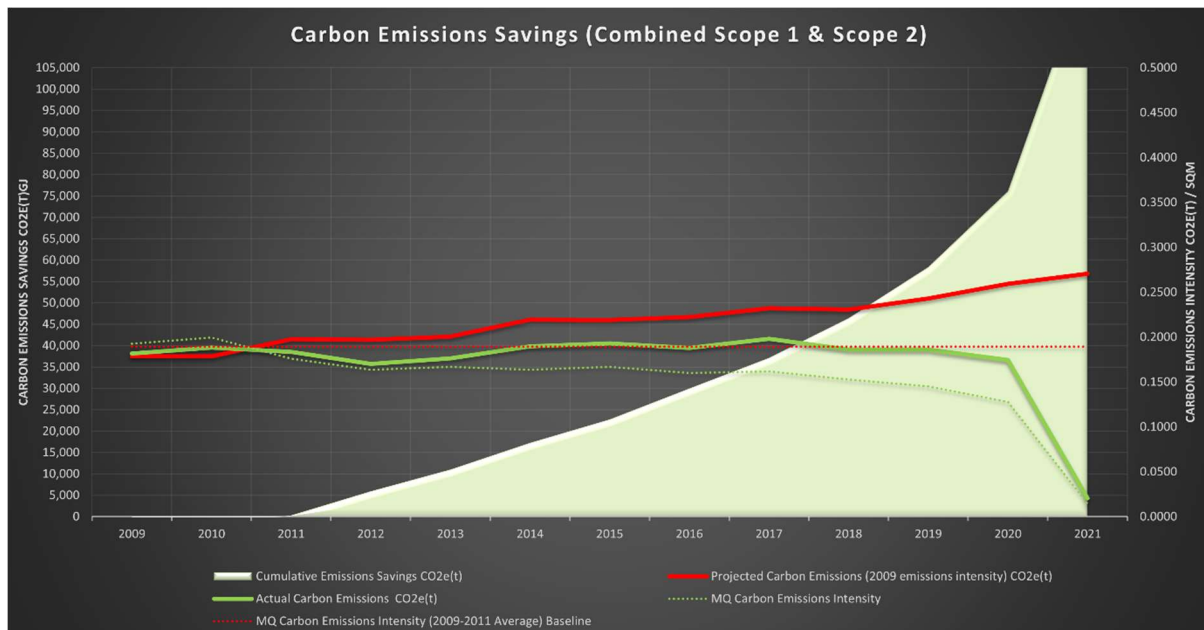
July 2020 saw the start of our contract with Red Energy for the provision of electricity to our main campus. Our electricity now comes from the Snowy Hydro Scheme in the alps of southern NSW, bringing us 100% renewable electricity for all our major market accounts. In addition, our smaller energy accounts were bundled together and our contract for supply of green energy for these accounts commenced with Shell Energy on 1 April 2021. In light of this, we will expect to see a further reduction in our Scope 2 emissions over the next 12 months.

2021 Sustainability Targets Tracking Report



4.3 Savings

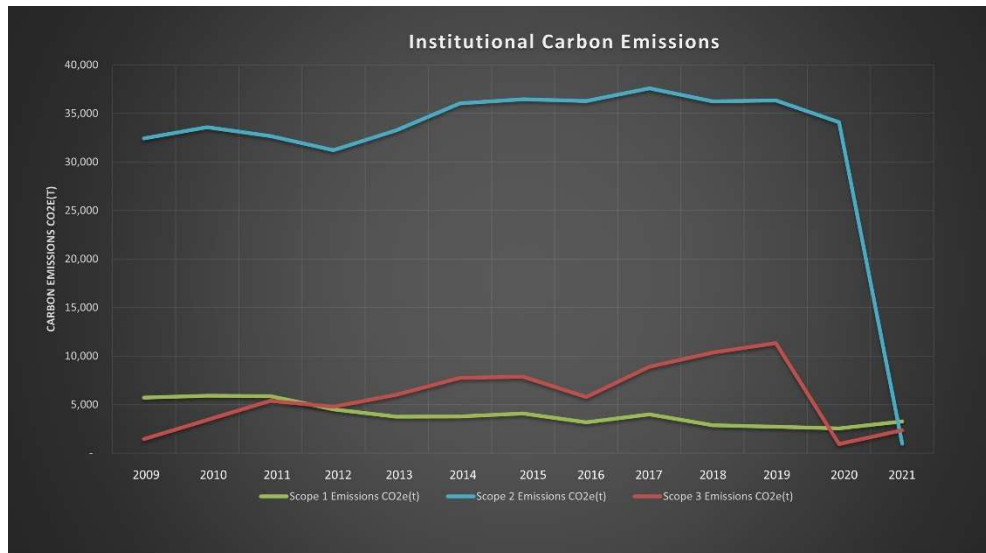
- Approximately 128,700 t CO₂-e of carbon emissions saved since 2009
- Equivalent of 3.4 years' worth of carbon emissions saved



2021 Sustainability Targets Tracking Report



4.4 Scope 3 Travel Emissions



Scope 3 emissions are the result of activities by the University that occur as a result of our indirect activities. They are often referred to as “value chain emissions”.

Macquarie University’s Scope 3 emissions related to staff travel are detailed above. They grew significantly from 4% of the total institutional carbon emissions in 2009, to approximately 25% in 2019.

However, with the effects of Covid-19 being felt during 2020 and 2021, the University’s scope 3 emissions have dropped significantly in this period. This data indicates substantial emissions reductions and cost savings can be achieved by reducing staff travel.

2021 Sustainability Targets Tracking Report



5.1 PATHWAY TO CARBON NEUTRAL

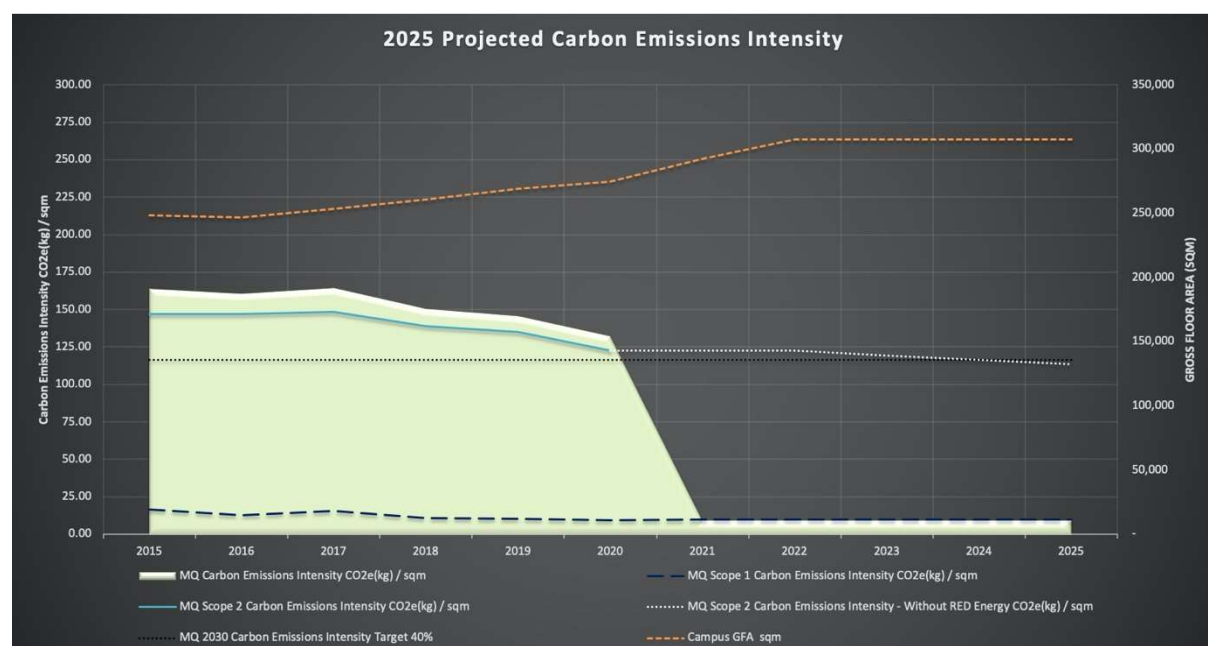
For any institution, the pathway towards a carbon neutral position presents a challenge that can ideally be achieved by a combination of direct and indirect activities.

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 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.



From 1st July 2020, Macquarie University has switched to a 100% renewable electricity source with its energy contract with Red Energy for large market electricity accounts. In addition, the smaller energy accounts have been bundled together and the contract for supply of green energy for these accounts commenced with Shell Energy on 1 April 2021. Together, these actions have seen the University's scope 2 greenhouse emissions reduce by 96% in 2021, with further reductions expected over the next 12 months.

However, whilst the impact of the renewable green energy contracts is extremely positive, it does not yet put us in a Carbon Neutral Position.

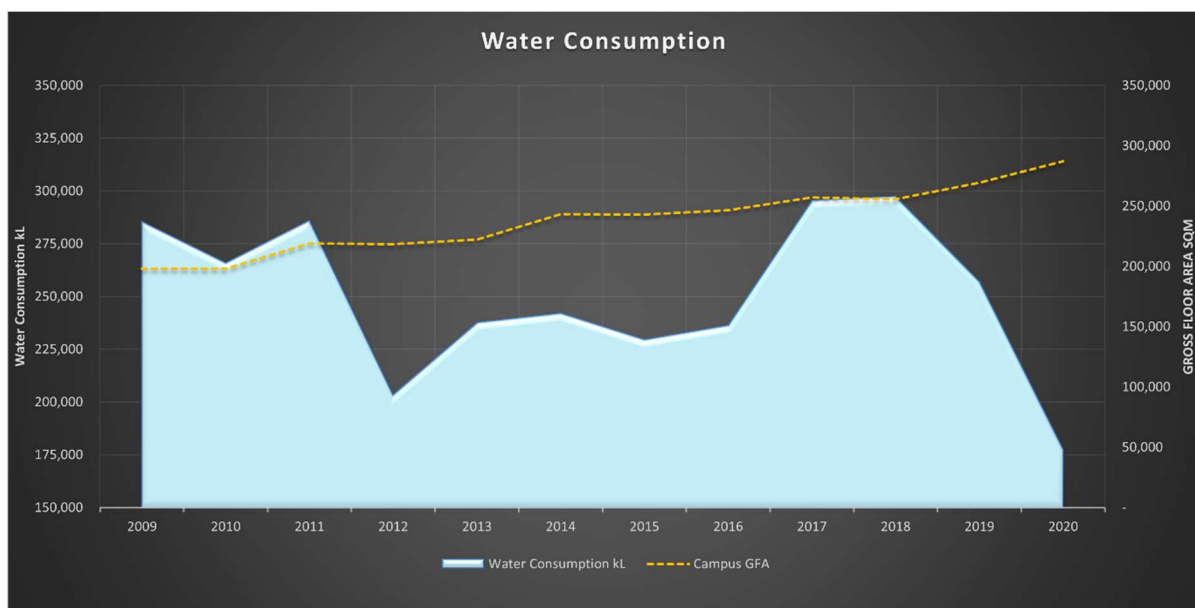
2021 Sustainability Targets Tracking Report



6.0 WATER

6.1 Consumption

- 38% reduction in total annual water consumption from 2009 level (caveat: 2020-2021 water consumption has been affected by covid-19 resulting in greatly reduced student numbers on campus)



Case Study – declining water usage

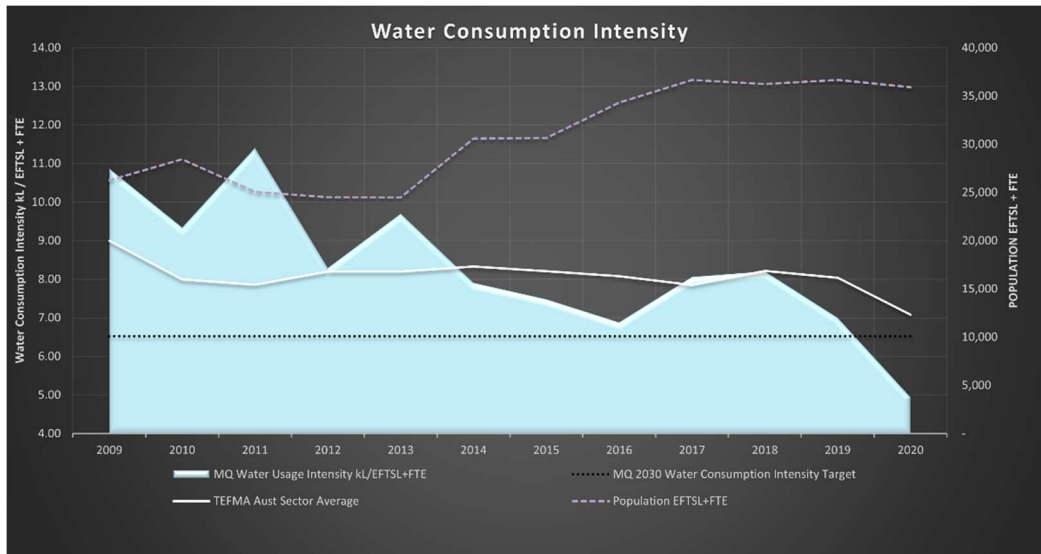
A substantial reduction in water usage has been achieved since 2018. A combination of efficiency measures plus proactively seeking out areas of waste, priority given to repairing leaks, better metering capabilities and improvements to the kilometers of aging water infrastructure on Campus have reaped rewards. There has been a 20 ML reduction and considerable cost savings of almost \$40,000.

2021 Sustainability Targets Tracking Report



6.2 Intensity

- Target Reduction: 40% per person (EFTSL) by 2030
- Status as at FY2020: 75% reduction achieved (2009 baseline) – target achieved (caveat: 2020-2021 water intensity has been affected by covid-19 resulting in greatly reduced student numbers on campus)

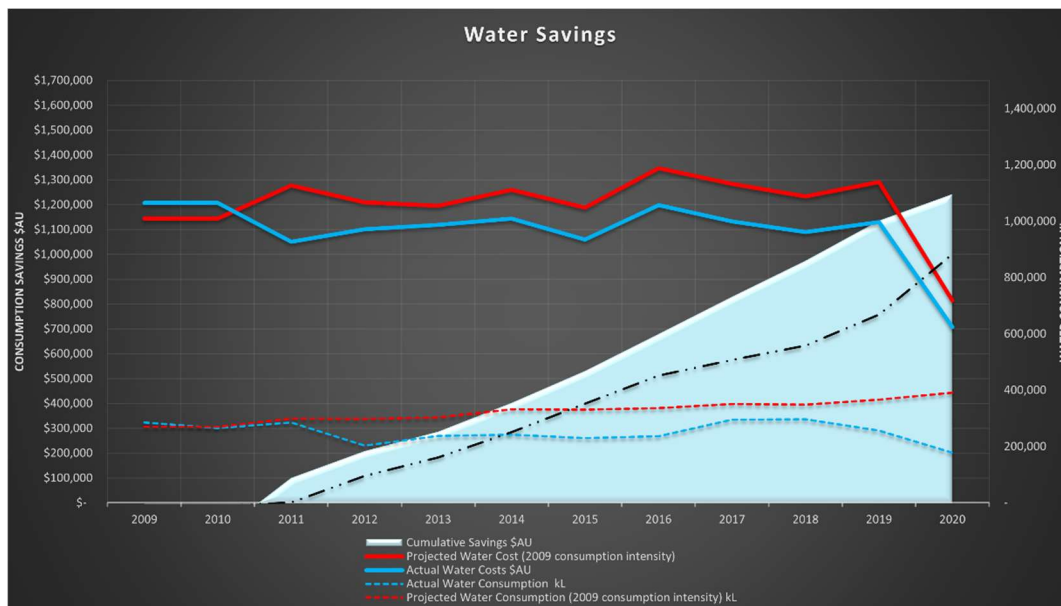


2021 Sustainability Targets Tracking Report



6.3 Savings

- Approximately 880 ML 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 \$1.25 million since 2009



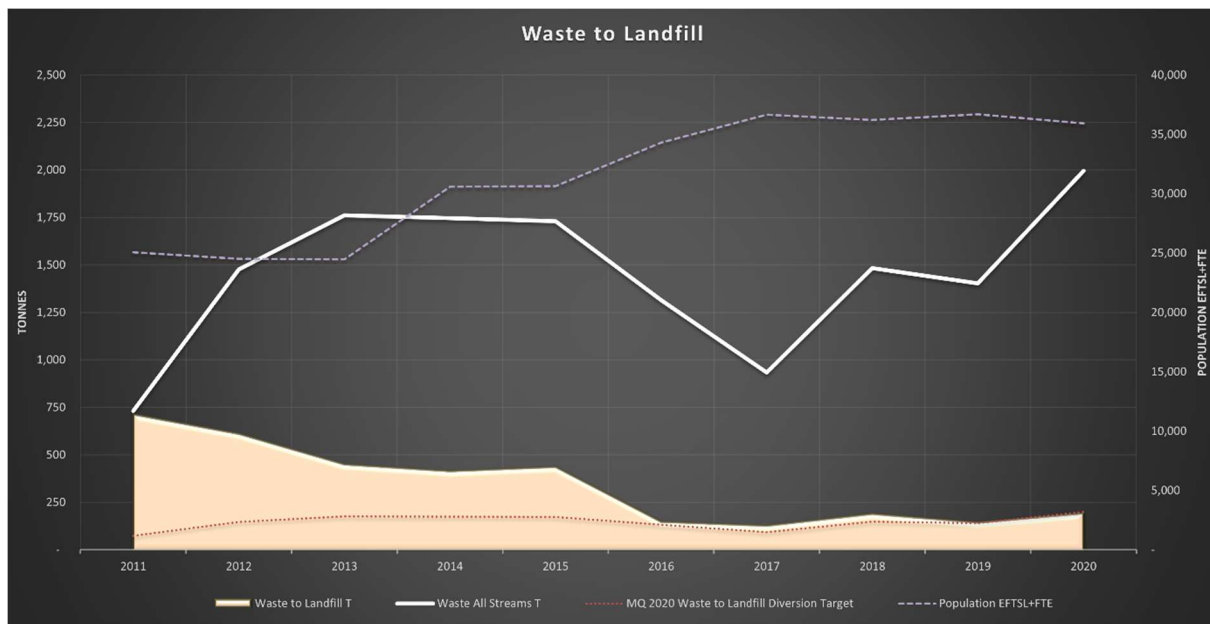
2021 Sustainability Targets Tracking Report



7.0 RECYCLING, REUSE AND WASTE DISPOSAL

7.1 Waste Diversion from Landfill

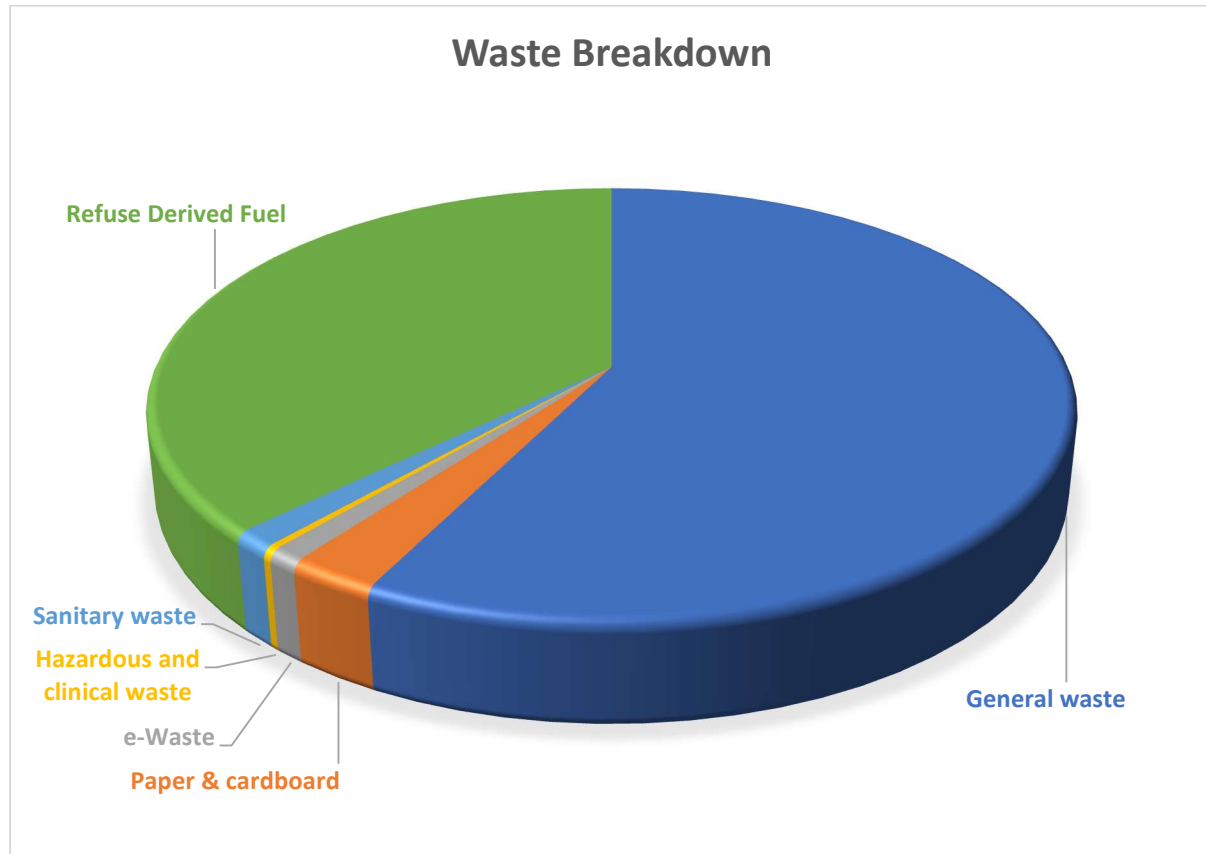
- Target Diversion Rate: 90% by 2020 (2011 baseline)
- Status as at 2020: 90% reduction achieved – target achieved



2021 Sustainability Targets Tracking Report



7.2 Waste Breakdown – 2020



Case Study: Macquarie's waste turned into "white coal"

Our waste provider, Doyle Bros, take waste which was previously destined for landfill and turn it into a fuel source known as **white coal**. Refuse Derived Fuel (RDF) is made by taking plastics and other non-recyclable waste, shredding it into small pieces (5-10mm), then baling and wrapping it. Next it is shipped to Japan where it is utilised as an alternative fuel source in the concrete-making process. All impurities in the RDF, including things like plastics, are incorporated into the concrete itself, strengthening the concrete and at the same time keeping waste contaminants out of the environment.

2021 Sustainability Targets Tracking Report



7.3 Waste Management

At Macquarie we have many different waste types:

General waste

- Cardboard
- Glass
- Metal
- Organic matter – both putrescible and non-putrescible
- Paper
- Plastics

Specialist waste

- Biomedical
- Chemical
- Construction
- E-waste
- Fixtures and furniture
- Gaseous
- Hazardous
- Sewerage
- Stormwater

One Bin System

Macquarie's One-Bin System utilises a single commingled bin to put rubbish in. Sorting and separation occurs later, at the waste management facility where it is sorted into:

- Paper, cardboard and mixed metals recovered for recycling
- Other items are shredded, compacted and turned into processed engineered fuel

Only around 5% of waste generated via the One-Bin System at Macquarie eventually ends up in landfill.



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

With the *Plastic Free @ 1CC* initiative, all food and beverage retailers in the new Central Courtyard precinct are on-board and use compostable packaging for their food and beverage packaging.

Within the 1CC precinct there is 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).

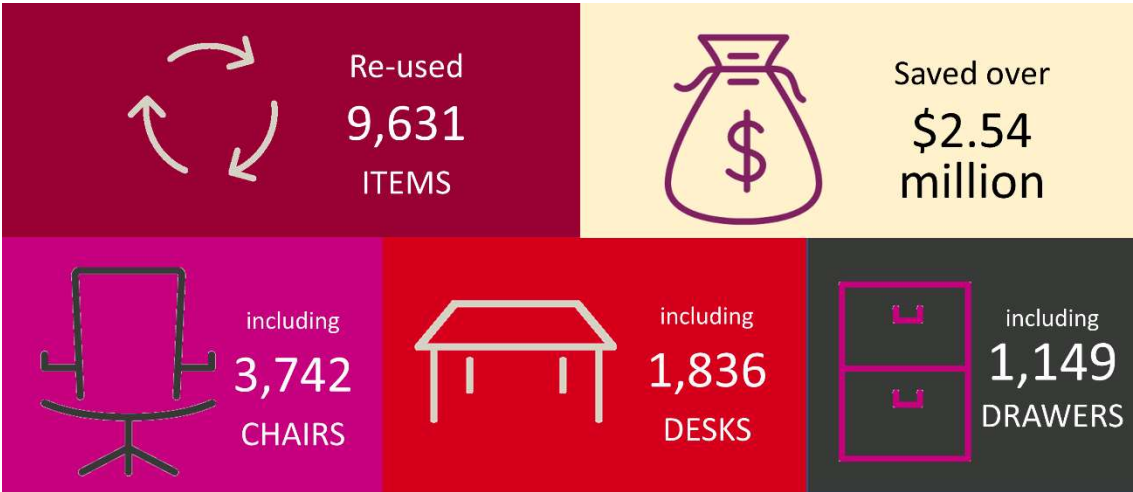
In addition, there is a biodigester located in the basement of the main Central Courtyard building which takes all the organic food waste from the precinct, processes it and disposes of it directly into the sewer. Waste is loaded into the unit on-site, microorganisms are added, aerobic digestion begins, and the food waste is digested and eventually turns into a liquid. This liquid is then filtered and disposed of via the existing plumbing structure.

2021 Sustainability Targets Tracking Report



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:



2021 Sustainability Targets Tracking Report



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 car parks, 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.
4. Data for energy and emissions uses current NGERs submission figures for FY2021 and includes on-campus and off-campus operations MQ, MGSM & U@MQ.
5. Water and waste data are for calendar year 2020.



MACQUARIE
University

Macquarie University Property

2 Link Road
Macquarie University
NSW 2109, Australia

T: +61 (2) 9850 7145
E: sustainability@mq.edu.au



Image source: Nearmap 2021