ACU
AUSTRALIAN CATHOLIC UNIVERSITY

ACU Carbon Management Plan

2023 - 2025

Contents

1. Introduction

ACU generates thousands of tonnes of greenhouse gas each year. This emission of greenhouse gas is inconsistent with ACU's commitment to sustainability and to Catholic teaching on the relationship between people and the Earth.

This carbon management plan describes ACU's commitment to sustainability, its greenhouse gas emission inventory, its greenhouse gas targets, and the range of actions it must take to continuously reduce its greenhouse emissions.
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1.1. ACU'S SUSTAINABILITY COMMITMENT

ACU is committed to social justice, human dignity and the common good. This commitment is expressed in ACU's sustainability framework, which is built from two transformative prescriptions for a better world: Pope Francis' encyclical Laudato Si' and the United Nations Sustainable Development Goals (SDGs).

2. ACU's greenhouse gas target

1. ACU will reduce total greenhouse gas emissions by 60% by 2030 from a 2020 base year
2. ACU will reduce total greenhouse gas emissions by 95% by 2040 from a 2020 base year
3. Net Zero emissions (requiring the use of offsets) from 2040

3. ACU's greenhouse gas inventory

In 2023 emitted an amount of greenhouse gases equal in impact to 23,626 tonnes of CO2.

The inventory shows that nearly 95% of the greenhouse emissions attributable to ACU are in its supply chain (shown in column titled Scope 3 tCO2e). The inventory also shows that ACU has no Scope 2 emissions; this is because

Scope 2 emissions are those from the consumption of fossil-fuel electricity at sites it controls. ACU purchases 100% renewable electricity for all of those sites.

ACU has a very small amount of Scope 1 emissions; these emissions are those it emits through its own activities, such as burning gas in its boilers, or combusting fuel in vehicles it operates.

EMISSION CATEGORY	SCOPE 1 (TCO_2E)	SCOPE 2 (TCO_2E)	SCOPE 3 (TCO_2E)	TOTAL TCO_2-E
Accommodation and facilities	0	0	214	**214**
Cleaning and Chemicals	0	0	1524	**1524**
Construction Materials and Services	0	0	1849	**1849**
Food	0	0	798	**798**
Horticulture and Agriculture	0	0	90	**90**
ICT services and equipment	0	0	3749	**3749**
Machinery and vehicles	0	0	1379	1379
Office equipment & supplies	0	0	1135	**1135**
Postage, courier and freight	0	0	217	**217**
Products	0	0	80	**80**
Professional Services	0	0	7751	**7751**
Refrigerants	307	0	0	**307**
Stationary Energy (gaseous fuels)	981	0	104	**1086**
Stationary Energy (liquid fuels)	4	0	0	**4**
Transport (Air)	0	0	2870	**2870**
Transport (Land and Sea)	125	0	12	**137**
Waste	0	0	393	**394**
Water	0	0	44	**44**
Grand Total	636	**0**	**22208**	**23626**
Proportion	**6%**	**0%**	**94%**	**100%**

Greenhouse gas inventory glossary:

1. **tCO2e -** Tonnes of Carbon Dioxide equivalent: this refers to the amount of greenhouse gas with the global warming impact of one tonne of carbon dioxide. There are multiple greenhouse gases; this normalisation enables accurate accounting.
2. **Scope 1:** greenhouse emissions from owned or controlled sources
3. **Scope 2**: greenhouse emissions from the generation of purchased electricity
4. **Scope 3:** greenhouse emissions are the indirect emissions situated in an entity's supply or value chain.
5. **Stationary Energy**: this refers to energy used for any reason other than for transportation. Examples include gas used in boilers; petrol used in engines; and diesel used in generators.

4. Actions to cut greenhouse gas emissions

The following part of the plan lists and describes the actions that ACU can and must take to reduce its emission of greenhouse gas. The plan groups those actions into the categories shown in the table below.

CATEGORY	ACTIONS
Grid renewable power	Purchase 100% renewable power from the grid until the National Electricity Market is decarbonised
Solar power/heating	Periodic reviews of the business case for retrofitting solar energy systems
	Assess the case for solar energy systems in all capital works projects
Energy efficiency	apply energy-efficiency design principles to its capital works projects
	specify energy efficiency as a procurement criterion for all energy-using goods
	Monitor building energy efficiency to identify opportunities to eliminate wasted energy
Electrification	Plan to replace ACU's fossil-fuelled equipment and vehicles by 2030
	Specify electric-only building services in capital projects
Transport	Conduct biannual staff and student commuting surveys
	Develop and apply a standard for campus bicycle infrastructure
	Develop an electric vehicle policy
	Improve timetable design to minimise students' days on campus
Refrigeration	Audit ACU fridges and freezers
	Apply a minimum energy performance standard to new fridges and freezers
	Establish a central HVAC refrigerant-gas data collection system
	Plan to transition HVAC to low-climate refrigerants
Procurement	Plan and initiate ACU's transition to a low-carbon supply chain
Carbon offsets	Prioritise emission reduction over the purchase of offsets
	Plan and apply a framework to assess the integrity of carbon offset projects
	Purchase only those offsets aligned to ACU's values

4.1. RENEWABLE POWER FROM THE GRID

Action: ACU must continue to purchase 100% renewable electricity until the Australian electricity grid is 100% renewable.

Timeline: 2021 until 2035 (estimated)

ACU purchases 100% renewable electricity for its Australian campuses. ACU entered its renewable electricity contracts with Engie and with Shell Energy from 01 July 2021; they will expire on 30 June 2024. The contract with Engie is a Power Purchase Agreement; it supplies ACU's twenty three large electricity accounts, which combined consume approximately 75% of ACU's electricity demand. The contract with Shell Energy is a standard retail contract for 100% GreenPower. GreenPower is the name of the Commonwealth government program that adds renewable electricity to the national grid to meet GreenPower customers' precise demand for electricity.

ACU uses these two types of electricity contracts because it's cost-efficient: Power Purchase Agreements supply renewable electricity to large market accounts at a discount to standard retail contracts for GreenPower. Meanwhile, GreenPower contracts are competitive for small market accounts.

ACU's purchase of renewable power eliminates at least 15,000 tonnes of ACU's annual carbon emissions. To limit its climate impact, ACU must continue to purchase renewable power until the Australian National Electricity Market obtains 100% of its power from renewable sources, an event expected to occur in the mid-2030s.

4.2. RENEWABLE POWER FROM ON-SITE SOLAR PANELS

Actions:

1. ACU will periodically review the business case for the installation of solar panels on existing campus buildings
2. ACU will examine the business case for the inclusion of solar hot-water and solar power in all capital works projects

ACU sources a small amount of power from on-campus solar panels and has installed a small number of solar hot-water systems for the supply of hot water to campus kitchens and bathrooms.

This low number of solar photovoltaic panels is deliberate; it is expensive to install solar panels on existing buildings and the return on investment period is more than seven years, imposing a substantial opportunity cost on the university.

In 2019 ACU assessed the solar-power potential of its campuses. That study showed that ACU's campuses could host a combined 0.78 MWh of solar panel arrays for a capital cost of $1,450,000 with a return on investment period of between 7 and 10 years. This means that those solar panels would produce power for a cost of 19 cents per kWh in that payback period. This is 11 cents more per kWh than ACU currently purchases renewable power from the grid.

The business case for adding solar panels to new projects is often much better than the case retro-fitting solar panels, however, and ACU should continue to assess the business case for solar panels in capital projects.

The solar water-heating and solar power installations are shown in Table X below

SYSTEM TYPE	SYSTEM SIZE	LOCATION
Photovoltaic panels	30 kilowatts	St Brigids School of Health Science, Ballarat
Photovoltaic panels	58.25 kilowatts	St Teresa of Kolkata Building, Melbourne
Solar Hot Water Collectors	8 x 180 litres	Daniel Mannix Building, Melbourne
Solar Hot Water Collectors	2 x 180 litres	St Brigids School of Health Science, Ballarat

4.3. ENERGY EFFICIENCY

Energy efficiency means using less energy to deliver the same level of service and it is often the cheapest or fastest way to cut energy use. Examples of energy efficiency fall into three categories:

1. Building design, such as well-insulated walls and ceilings, double-glazed windows, and correct sizing of HVAC equipment
2. Equipment upgrades, such as replacing fluorescent lights with LED lights, and
3. Building operation, such as matching room-heating to room-occupancy.

PROCUREMENT FOR ENERGY EFFICIENCY

ACU regularly procures energy-using equipment such as air-conditioning and heating systems, lights, refrigeration and information technology. Those categories of equipment combined demand over 75% of ACU's annual energy use, at an annual cost in excess of $2.5 million.

It is also the case that highly efficient water-using equipment such as taps and shower-heads can indirectly reduce energy-demand, because they reduce the demand for total quantities of heated water.

ACU must include energy-efficiency and water-efficiency criteria in its procurement specifications for relevant products. In many cases, third-party energy efficiency certifications exist to guide procurement assessments. These certifications include the following:

- **ENERGY STAR** for information technology
- **Energy Rating Label** for many types of consumer electronic appliances purchased for ACU, such as fridges, microwave ovens, split-system air conditioners, televisions, dishwashers and washing machines
- **Water Rating Label** for many types of consumer water appliances purchased for ACU, such as taps, showerheads, dishwashers, and washing machines.

Where ratings are not available, procurement leads must consult widely to identify energy performance criteria to add to procurement specifications.

ENERGY EFFICIENT BUILDING OPERATIONS

ACU has the highest level of energy efficiency of any university in Australia. In 2021, ACU consumed just 0.30 gigajoules of energy per square meter of floor space, just 50% of the sector average.

Nonetheless, there is energy waste at ACU and the university can and must work to eliminate that waste to save money and to reduce its carbon emissions. To achieve the latter in its building operations, ACU must focus on gas efficiency, because its electricity supply is now obtained from 100% renewable energy sources.

ACU Properties Directorate can apply the following practices to improve campus energy efficiency:

- **Operate equipment only when it is needed**: to switch off unnecessary lights, appliances and HVAC immediately reduces campus energy demand, cost and emissions.
- **Heat and cool buildings according to the season**: an efficient HVAC strategy in any campus building will vary the heating and cooling settings to match the season. This ensures that cooling is rarely applied in the colder months and heating is rarely applied in the warmer months.
- **Heat and cool buildings according to the timetable**: an efficient HVAC strategy in learning and teaching spaces will vary the heating and cooling settings to match the timetable, wherever the building technology supports this level of control. Learning and teaching spaces are often empty throughout the day, even during semester. When the operation of HVAC is linked to the timetable, the HVAC operates only when and where it is needed.
- **Task cleaners and security staff to identify and reduce wasted energy**: ACU uses cleaning and security contractors very effectively to take simple actions such as turning off lights and air-conditioners in empty rooms after-hours. Consequently, ACU's after-hours energy consumption, particularly by lights, is very low.
- **Maintain equipment**: the maintenance of HVAC systems is essential for that equipment to operate efficiently. Low carbon operation of ACU campuses requires strict adherence to HVAC maintenance schedules.

- **Apply the full features of the Building Management Control System (BMCS)**: ACU has a high-quality BMCS that presents many opportunities to increase Facility Managers' control of heating and cooling, and in some instances, lighting.

ENERGY EFFICIENT BUILDING CONSTRUCTION

All projects for new and significantly renovated buildings must consider the following for integration into the project's design or specifications:

- **Building Design & Orientation:**
  - Incorporate passive solar design to maximize natural light and heating.
  - Orient buildings to reduce direct solar gain and enhance cross-ventilation.
- **Building Envelope**
  - Use highly efficient insulation materials, double or triple glazing, and reflective coatings to minimize heat transfer
  - Ensure building envelope thermal performance meets or exceeds Australian NCC standards.
- **Solar Energy**
  - Incorporate photovoltaic (PV) solar panels in all new constructions where feasible.
  - Maximize solar energy generation to meet a portion of the building's energy needs.
- **Lighting**
  - All lighting systems must be energy-efficient, utilizing LED technology or other energy-efficient alternatives.
  - Implement daylight harvesting and automated lighting controls to optimize energy use.
- **HVAC Systems**
  - Heating, ventilation, and air conditioning (HVAC) systems must be energy-efficient and use low-emission refrigerants.
  - Incorporate zoned heating and cooling systems to reduce energy use in unoccupied spaces.
  - Encourage the use of natural ventilation where possible.
- **Electrical Systems**
  - Ensure electrical systems are designed to minimize energy loss and optimize energy distribution.
  - Install energy meters and sub-meters for real-time energy monitoring.
- **Water Efficiency**
  - Install energy-efficient water heating systems, including solar water heating where appropriate.
  - Use low-flow fixtures and water-saving technologies to reduce water consumption and related energy use.
  - Implement rainwater harvesting and greywater recycling systems where feasible to minimize water demand.

ENERGY EFFICIENT BUILDING UPGRADES

All projects for building upgrades must consider the following for integration into the project's design or specifications in order to increase the energy efficiency of the upgraded building:

- **Insulation Upgrades**
  - Improve roof, wall, and floor insulation to minimize heat loss during winter and heat gain during summer.
  - Install additional insulation where current levels are inadequate, with materials meeting or exceeding National Construction Code (NCC) requirements.
- **Window and Door Upgrades**
  - Replace single-pane windows with double or triple-glazed windows to reduce heat transfer.
  - Install energy-efficient, airtight doors with proper weather stripping to reduce drafts and thermal leakage.
  - Consider applying low-emissivity (Low-E) coatings on windows to enhance thermal performance.
- **Upgrade to High-Efficiency HVAC Systems**
  - Replace outdated heating, ventilation, and air conditioning (HVAC) systems with energy-efficient models (e.g., inverter-based air conditioners, heat pumps).
  - Implement zoned heating and cooling to control energy use in specific areas based on occupancy.
- **Optimize HVAC Controls**

- Install programmable thermostats and smart HVAC controls to manage temperatures efficiently based on occupancy and usage patterns.
- Integrate variable speed drives (VSDs) in fans and pumps to reduce energy consumption during low-demand periods.

- **Natural Ventilation**
  - Where applicable, introduce natural ventilation strategies such as operable windows, ventilation chimneys, or passive cooling techniques.
- **Replace Inefficient Lighting**
  - Replace incandescent, halogen, and older fluorescent lighting systems with energy-efficient LED lighting.Use energy-efficient outdoor lighting fixtures that reduce light pollution and minimize energy use.
- **Lighting Controls**
  - Install motion sensors, occupancy sensors, and daylight harvesting systems to reduce unnecessary lighting in unoccupied areas.
  - Ensure lighting schedules are aligned with occupancy patterns, particularly in common areas, offices, and lecture halls.
- **Install Solar PV Systems**
  - Where feasible, retrofit buildings with solar photovoltaic (PV) systems to generate renewable electricity on-site.
  - Consider integrating battery storage systems to store excess solar energy and reduce peak demand costs.
- **Solar Water Heating**
  - Install solar water heating systems to reduce reliance on conventional water heating sources.
- **Building Management and Control Systems (BMCS)**
  - Install or upgrade BMCS to monitor and control energy usage in real-time.
  - Integrate HVAC, lighting, and other energy-consuming systems into a single platform for improved efficiency.
  - Use data analytics to identify trends, inefficiencies, and areas for further optimization.
- **Smart Meters and Sub-Meters**
  - Install smart meters and sub-meters in major energy-consuming areas to track specific usage patterns and measure the effectiveness of energy efficiency upgrades.
  - Ensure real-time data collection and reporting, allowing facility managers to quickly identify and address energy wastage.

4.4. ELECTRIFICATION

Actions:

1. design and apply a program to replace ACU's fossil-fuelled equipment and vehicles with electrical equipment and vehicles by 2030.
2. Commission exclusively electrical campus development projects

Electrification refers to the process to replace equipment and vehicles that use fossil fuels with electrical equipment and vehicles. The object of this process is to ensure that electricity is the exclusive source of energy for ACU campuses and fleet vehicles.

In practice, this means gradually replacing all of the gas-powered equipment in ACU buildings with electrical equipment and removing petrol and diesel vehicles from ACU's vehicle fleet. Electrification is important for carbon management because ACU can power its electrical systems and vehicles with 100% renewable electricity from the grid and from on-site solar systems, eliminating whole categories of greenhouse emission sources from ACU's inventory.

There is an increasing number of electrical vehicles and equipment that can replace their gas, petrol and diesel equivalents, but replacement of larger and more complex items is complicated and not yet feasible technically nor financially. That will change over time, which is why this action has a long timeline.

The table below lists a range of fossil-fuelled equipment and their electrical equivalent. The table it illustrative only; it *does not* indicate their present suitability to replace ACU equipment. In several cases, the electrical technology needs to improve before it can match the practical performance of its gas-equivalent; and in most cases, the price of gas must increase in order to support the financial case for change.

Natural gas appliance	Electrical appliance
Gas stovetop	Conventional electric or induction stovetop
Gas boiler (large building)	Heat pump
Gas boiler (small building)	Electric boiler
Gas space heater	Reverse cycle air conditioner
Instantaneous gas hot water unit	Electric domestic hot water unit
Gas fired domestic hot water unit	Electric domestic hot water unit

ELECTRICAL-ONLY CAPITAL DEVELOPMENT

All future campus buildings must be powered exclusively by electricity. Fossil fuelled buildings are not only inconsistent with ACU's intention to decarbonise its operations, research and teaching, but encumber ACU with the financial burden of offsets for the lifetime of the building's fossil-fuelled equipment.

4.5. ORGANIC WASTE

EXTEND ACU'S ORGANIC WASTE COLLECTION SERVICE

ACU's organic waste collection service is available in staff locations only at present, as part of a graduated roll-out of the service to ensure campus Facility Managers can manage a waste stream that places unusual demands on cleaners and FM to maintain hygiene and to meet waste companies' strict management criteria.

From 2023, the organic waste service should be extended to the following areas in order to maximise the carbon-reduction benefit of the service:

- Camillus and Miguel Cordero Residence Living and Learning Communities
- Front of house areas for campus cafeterias, libraries, outdoor spaces, The Track (all campuses), the vicinity of key teaching spaces, and in other key student recreational spaces

ASSESS THE CASE FOR ON-SITE ORGANIC WASTE MANAGEMENT

On-site management of food waste reduces the carbon emissions of the food waste lifecycle, mainly because it eliminates the use of fuel-intensive waste trucks.

Equipment that enables the on-site management of food waste and garden waste is available but is too expensive or has onerous requirements for power supply, shelter, space and safety that make it impractical to install on ACU campuses and at ACU student accommodation sites.

Nonetheless, the range of suitable equipment available is increasing and it is likely that before 2025 ACU will have the opportunity to purchase or lease equipment that is safe, simple, compact and reduces the cost of managing food waste. ACU should periodically assess the market for this equipment to identify when the market can supply suitable on-site food waste equipment, and then conduct a tender for its provision to ACU.

ASSESS THE CASE FOR MANDATING THE SUPPLY OF COMPOSTABLE PACKAGING AND CONTAINERS

The Australian market for Australian-Standard compostable packaging and containers is small and prices accordingly are high. It is not yet feasible to require campus cafeterias to supply only compostable packaging and containers.

But major packaging suppliers are working to bring compostable packaging to market and it is likely that by or before 2025 ACU will have access to a competitive market for those items. ACU should periodically assess the market for compostable containers and packaging to identify when the market can supply suitable products, and then conduct a tender for its provision to ACU.

4.6. TRANSPORT

Actions:

1. Conduct staff and student commuting surveys biannually
2. Develop and apply a standard for campus bicycle infrastructure
3. Develop an electric vehicle policy for the University to inform campus development, fleet procurement, and staff and student expectations
4. Enable students to design their timetable to minimise the number of days they are required to attend campus

Transport heavily impacts ACU's carbon footprint both directly and indirectly. The distinction is critical. ACU's use of fleet vehicles and groundskeeping vehicles is a direct source of greenhouse emissions because ACU operates those vehicles. This means that most of ACU's transport greenhouse emissions are indirect, however, because they come from sources that ACU does not own or operate, such as aircraft, hire cars, Uber and taxi vehicles, railways, and buses.

The range of transport modes relevant to ACU is as follows:

1. Cycling and walking
2. Public transport
3. Groundskeeping vehicles
4. Cars
5. Air travel

To limit ACU's transport-related greenhouse emissions the following would need to occur:

1. Most staff and students would need to get to and from campus by cycling, walking, taking public transport and car-sharing
2. Staff and students would need to decrease their use of air travel and of hire cars with combustion engines, and increase their use of electric-vehicle hire cars powered by renewable electricity
3. The ACU vehicle fleet must become more fuel-efficient and eventually become an all-electric fleet powered exclusively by renewable electricity

There are few actions ACU can take to make these things happen. It cannot influence the uptake of electric vehicles, for example, and staff and students will always prefer a travel mode that in their personal assessment is convenient, safe, affordable and available. Staff and students will not consider ACU's carbon footprint when they make that assessment.

ACU can, however, take the following actions:

1. Conduct commuting surveys to obtain insights into staff and student commuting behaviour, preferences, and barriers to low-carbon commuting. This would empower ACU to plan effective ways to influence commuting choices.
2. Design the timetable so that students can choose to consolidate their on-campus classes to the minimum number of days. This would reduce the number of times per semester that a student would need to commute to campus.
3. Improve on-campus cycling infrastructure. This would incentivise staff and students to cycle to campus

4.7. REFRIGERATION

Actions

1. Audit ACU fridges and freezers for Energy Rating, siting, effective seals and coil-cleanliness, to inform a refrigeration improvement program
2. Impose a minimum standard of 5-Star Energy Rating for all new consumer-style fridges and freezers
3. Establish a central HVAC refrigerant data collection system, to capture data on refrigerant-recharge of campus HVAC systems
4. Develop a plan to transition ACU's HVAC to refrigerants with low climate impact, as a component of ACU's asset replacement program.

ACU relies on refrigeration and refrigerants to provide practical and amenable spaces for working, learning, research and catering. Refrigeration units are a significant source of energy consumption and refrigerants that leak from HVAC are a significant source of greenhouse gas emissions. For this reason, they must be managed to obtain the highest possible energy efficiency and to limit their impact on the climate.

Some simple measures are required to achieve these goals:

FRIDGES AND FREEZERS:

1. Conduct an audit of ACU's fridges and freezers to establish a baseline of their quantity, location, condition and energy rating
2. Develop a refrigeration improvement program based on the audits findings. The scope of the improvements should include fridge and freezer siting (to ensure air-flow), coil-cleanliness, door seals, and possible replacement or disposal
3. Establish a policy or procurement standard that all new fridges and freezers must have a minimum Energy Star rating of 5 stars. This will ensure lower operational costs through lower energy costs

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC):

1. ACU must institute a system to capture data on the annual amount of refrigerants that are recharged in its HVAC units in order to assess the amount of refrigerant that leaks from those units. This is critical to carbon management because common refrigerants are hundreds to thousands of times more potent as a greenhouse gas than carbon dioxide.
2. ACU must use this data to develop a program to progressively transition to low-impact refrigerants over the next decade, as part of university's existing asset replacement program.

4.8. PROCUREMENT

Action:

1. Develop and implement a program to transform ACU's supply chain so that it supplies ACU with low-carbon goods and services

ACU's suppliers of goods and services generate over 95% of the university's greenhouse gas emissions. Reducing these emissions is the university's most urgent carbon-management task but it is also a very difficult task, for at least three reasons:

1. ACU does not control the companies that produce the goods and services it buys
2. The local and global economy is carbon-intensive, so there are few low-carbon suppliers
3. The complexity of supply chains makes it nearly impossible to account for their carbon emissions

For these reasons, ACU must plan for a long and slow transition to a low-carbon supply chain. To achieve that, ACU should assess the utility of the following supporting actions, and apply those that it considers effective:

1. **Prefer to purchase or lease goods** with high-levels of energy efficiency. This includes but is not limited to IT, kitchen appliances, lights, HVAC, vehicles, generators, barbecues
2. **Prefer to purchase professional services** from firms that use 100% GreenPower in their own facilities and operate low-carbon vehicles
3. **Prefer to purchase building services** from firms that use 100% GreenPower in their own facilities and operate energy-efficient equipment and low-carbon vehicles
4. **Engage with current suppliers** to explain ACU's requirement for low-carbon goods and services and obtain information on those suppliers' carbon footprints and carbon management plans, if available;
5. **Educate and assist staff** engaged in procurement to specify low-carbon goods and services and assess related claims about product and service
6. **Apply a shadow carbon price** on procurement of goods and services above a threshold value to assess the financial impact of those goods and services in the event they are subject to a carbon price.

4.9. REVIEW

This plan will be reviewed in 2025. The point of contact for this plan is the National Sustainability Manager.