

Emissions Reporting

Monitoring and Reporting Procedure

Central Queensland University



Contents

Preamble

P1 Introduction

P2 The Four Stages of Emissions Reporting Maturity

Step 1 - Understand and Accept Core Principles

1.1 Core Principles

1.2 Carbon accounting principles

1.2 Offset integrity principles

Step 2 - Measure

2.1 The four steps of measuring emissions

2.1.1 Defining the Organisation Boundary

2.1.2 CQU's Operational Boundary and Identifying Emissions

2.1.3 Scope 3 emissions

2.1.4 Establishing relevance

2.1.5 Included and excluded emissions

2.1.6 CQU's emissions aggregation approach

2.2 Setting the base year

2.3 Calculate Carbon Content and Identify Emissions

2.3.1 Scope 1 - Stationary energy (gaseous fuels) - Natural gas / LPG

2.3.2 Scope 1 - Transport energy - Petrol and diesel

2.3.3 Scope 1 - Industrial processes - HVAC-R and HV electrical equipment

2.3.4 Scope 1 - Physical or chemical processes

2.3.5 Scope 2 - Electricity

Step 3 - Act

3.1 Detailed decarbonisation actions

3.1.1 Emissions reduction strategy and initiatives

3.1.2 Emissions Reduction Strategy: quantifying potential emissions

3.1.3 Emissions Reduction Implementation Strategy: Overview

3.2 Emission Reduction Initiatives

3.2.1 Scope 1 - Stationery energy - Diesel and Gas

3.2.2 Scope 1 - Transport energy - Petrol and diesel

3.2.3 Scope 1 - HVAC-R Refrigerant Leakage

3.2.4 Scope 2 - Electricity

3.2.5 Scope 3 - Supply Chain Emissions

Stage 4 - Assurance/Certification

4.1 Data mangement plan

4.1.1 Stationary Energy Fuels - Natural Gas / LPG

4.1.2 Transport Fuels - Petrol, diesel, ethanol

4.1.3 Industrial processes - HVAC-R and HV electrical equipment

4.1.4 Electricity

4.1.5 PLACE HOLDER FOR SCOPE 3 EMISSIONS

4.2 Team members, roles and responsibilities

4.3 Governance, monitoring and reporting

4.4 Certification

Appendices

Appendix 1 Emission Standards and Protocols

Appendix 2 Scope 3 Emission Category Descriptions

Appendix 3 Emission Calculations

List of Figures

Figure P.1 Risk-based assessment of CQUs Scope 1 and 2 emissions

Figure P.2 The Four Stages of Climate Active compliance maturity and the annual reporting cycle

Figure 2.1 The four steps to measuring emissions

Figure 2.1.1a Central Queensland University national footprint

Figure 2.1.1b CQU corporate structure and organisational boundary

Figure 2.1.6 Central Queensland University emissions by site

Figure 2.2 Scope 1 and 2 emissions by source 2016-2022

Figure 2.3.1a Gaseous fuels emissions factors - Natural Gas / LPG

Figure 2.3.1b CQU's natural gas / LPG emissions as a proportion of total baseline emissions

Figure 2.3.1c CQU's natural gas / LPG emissions trend since 2016 is shown below.

Figure 2.3.2a Liquid transport fuels emissions factors (post 2004 vehicles)

Figure 2.3.2b CQU's gasoline (petrol) emissions as a proportion of total baseline emissions

Figure 2.3.2c CQU's petrol emissions trend since 2016 is shown below.

Figure 2.3.3a Figure 2.3.3a CQU's HVAC-R and HV emissions as a proportion of total baseline emissions

Figure 2.3.3b CQU's estimated HVAC-R and HV emissions based on 2023 asset register.

Figure 2.3.4a CQU's physical or chemical process emissions as a proportion of total baseline emissions

Figure 2.3.4b CQU's estimated physical or chemical process emissions based on 2023 asset register.

Figure 2.3.5a FY23 Emissions factors for Scope 2 emissions

Figure 2.3.5b Scope 2 - Electricity - Location based

Figure 2.3.5c FY23 Emissions factors for Scope 2 emissions - Market based

Figure 3.1 CQ University's emissions reduction strategy: Four stages 2024 - 2050

Figure 4.1.1 Natural gas / LPG data management plan

Figure 4.1.2 Transport fuels data management plan

Figure 4.1.3 Industrial Process data management plan

Figure 4.1.4 Electricity data management plan

Figure 4.2 Team Governance Structure and role description

Figure 4.3 CQ University's Decarbonisation Planning process documents, relationship, governance and reporting cycles

Figure 4.4 Applying for and maintaining carbon neutral certification under Climate Active

List of Tables

Table P.1 Risk-based assessment of CQUs Scope 1 and 2 emissions

Table 2.1.2a CQU summary of operations

Table 2.1.2b Emission materiality/relevance

Table 2.1.3 Central Queensland University Scope 3 emissions by category



P.1 Introduction

Central Queensland University (CQU) is developing an emissions reduction strategy that incorporates publicised near-term and long-term emissions reduction targets. This document provides CQU with a framework for identifying, monitoring and reporting its emissions data to support its emissions reduction strategy and targets. It is intended to be a living document that evolves as CQU's emissions management actions evolve. This includes the potential for altering its chosen monitoring and reporting framework over time as may be appropriate.

Background to reporting frameworks

A range of the most commonly adopted international and national emissions frameworks, standards and protocols were assessed (see Appendix 2). In summary, none of them are mandatory for CQU, several are not appropriate, yet several may be applicable as a guide for procedures. Examples that may be appropriate include:

- National Greenhouse Emissions Reporting Scheme (NGERS)
- Greenhouse Gas (GHG) Protocol, and
- Climate Active.

NGERS

NGERS is a mandatory reporting scheme for large emitters of greenhouse gases. Whilst CQU does not currently meet reporting thresholds, the focus on Scope 1 and Scope 2 emissions is aligned with CQU's current focus. The Clean Energy Regulator (CER) administers NGERS and, in addition to the legislation, provides a wealth of freely available information that provides consistency of reporting aligned with the Australian Government's domestic and international greenhouse gas emissions reporting obligations under the UN Framework Convention on Climate Change, Kyoto Protocol and Paris Agreement.

Climate Active

Like NGERS, Climate Active is an Australian Government initiative. The Climate Active Carbon Neutral Standard (the Standard) sets out the principles and processes for achieving carbon neutrality. Certification is awarded to organisations that demonstrate through reporting and audits that they meet the requirements of the Standard. Climate Active certification is available for organisations (business operations), products, services, events, precincts and buildings. The Climate Active initiative and Climate Active Carbon Neutral Standard supports and guides businesses as they account for and reduce carbon emissions. Climate Active Standard maintains a consistent approach to monitoring emissions, while providing an avenue to develop a more comprehensive reporting regime in the future should the need arise (i.e. Scope 3 measurement and carbon neutral claims).

Several other Australian universities, similar in size to CQU, have adopted Climate Active and achieved certification:

- University of Tasmania (UTas),
- Charles Sturt University (CSU), and
- University of Western Sydney (UWS).

Climate Active is arguably the most appropriate protocol for CQU to adopt given the following:

- it is Australian-based with the department of Climate Change, Environment and Water having ultimate responsibility for both NGERS and Climate Active schemes,
- increasing adoption and market penetration amongst major Australian organisations including peer Universities, and
- the flexibility to gain certification in the future.

However, during the development of this framework the Climate Active Program initiated a consultation process regarding proposed amendments to the program. The consultation process timeline is summarised as follows:

- Public Consultation Open - 20 October 2023
- Public Consultation Close - 15 December 2023
- Standard Specific Consultation - Early 2024
- Implementation - From early 2024 onwards

Further details of the process can be found on the Climate Active website [here](#).

In addition to the consultation process, training for accredited auditors has been postponed until implementation of the recommendations that may result from the proposed amendments and community feedback. Guidance tools that underpin the Standard are also not currently publicly available on the Climate Active website. Accordingly, this Framework blends elements of NGERS with the Climate Active Standard. In particular, emissions activities for Scope 1 and 2 emissions are predominantly NGERS. The initial references to Scope 3 emissions sources refer to key the Climate Active categories. The risk-based assessment of the likelihood of emissions is largely bench-marked on peer universities.

GHG Protocol

The Greenhouse Gas Protocol (GHG Protocol or the Protocol) is an international protocol that has gained comparatively large adoption compared with other initiatives. Indeed, The Climate Active Standard appears to be largely based on the GHG Protocol with the main difference being the addition of a certification mechanism. The GHG Protocol is a comprehensive Standard with a large body of supporting guidance and training material. It explicitly provides organisations with pathways to move from a focus on Scope 1 and Scope 2 emissions including setting baselines and targets before incorporating Scope 3 emissions measurement, target setting, re-baselining, reduction and reporting.

Given both the current status of Climate Active and CQU's current corporate sustainability focus, it is recommended that CQU utilise the GHG Protocol to develop its Scope 1 and 2 emissions reduction strategy. Importantly, this does not preclude CQU from developing its Scope 3 emissions reduction strategy under the GHG Protocol. Given the alignment between the Climate Active Standard and the GHG Standard it also provides the flexibility for CQU to secure Climate Active certification in the future with relatively limited changes to processes established under the GHG Standard.

The approach

EMMA conducted an initial risk-based scan of CQU's scope 1 and 2 emissions using NGERs emissions activities descriptions. The resulting assessment is summarised in Table P.1 below. Emissions sources and activities not included in Table P.1 were assessed as certainly or almost certainly immaterial based on CQU's operations. The concept of risk-based assessments of emissions is discussed in more detail in section 2 of the Framework.

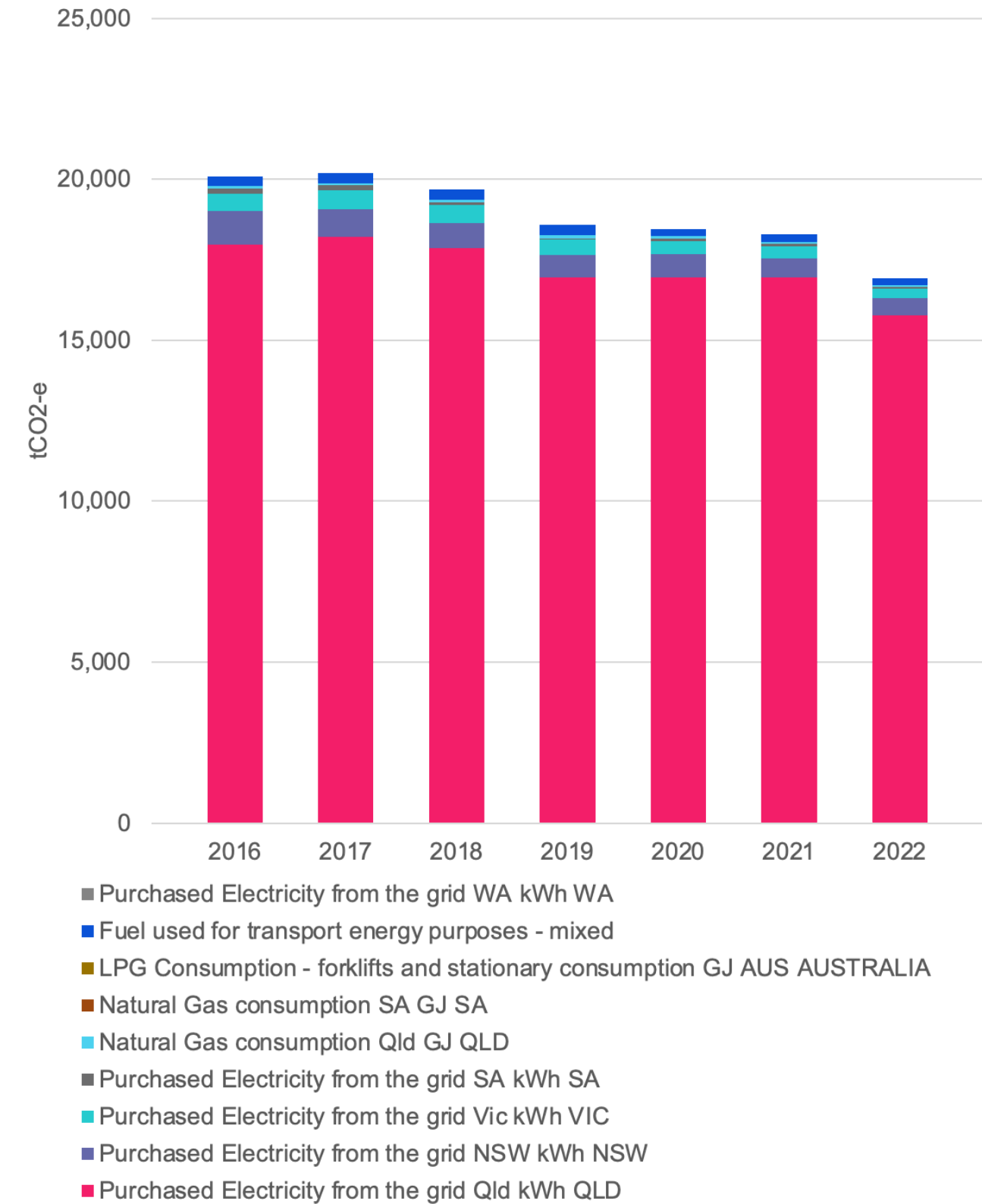
Table P.1 Risk-based assessment of CQUs Scope 1 and 2 emissions

Probability of exceeding thresholds													
		Adelaide											
		Brisbane											
		Bundaberg											
		Cairns											
		Emerald											
		Gladstone											
		Mackay											
		Melbourne											
		Perth											
		Rockhampton											
		Sydney											
		Townsville											
		Jakarta											
Emissions category													
Scope 1													
Stationary Energy (gaseous fuels)													
Natural gas in a pipeline													
LPG													
Stationary Energy (liquid fuels)													
Diesel (or other fuels for electricity)													
Solvents, oils and greases													
Stationary Energy (solid fuels)													
Coal, wood etc. for heating or elec.													
Transport Energy													
Diesel													
Petrol/gasoline													
LPG													
Industrial Processes													
HVAC-R - refrigerants													
HV equipment - SF6													
Waste - combustion													
Waste and wastewater - methane													
Other processes													
Scope 2													
Electricity													

Figure P.1 presents the summary of CQU's Scope 1 and 2 emissions that were identified and measured during the initial assessment.

This Framework builds on this initial work to develop a data collection and reporting framework to support CQUs emissions reduction targets. Whilst CQU's initial focus is on Scope 1 and 2 emissions, Scope 3 emissions will necessarily become a focus as CQU seeks to establish a baseline, measure, set targets and report on emissions against claims of carbon neutrality in the future.

Figure P.1 Risk-based assessment of CQUs Scope 1 and 2 emissions



P.2 The four stages of emissions reporting maturity

Whilst there are differences between the GHG Protocol and the Climate Active Standard they have very similar stages of development that can be summarised as shown in Figure P.2. Each stage builds from the first:

- 1. Understanding and accepting the core principles,
- 2. Measuring, and
- 3. Taking action to reduce and/or offset emissions.

Where the GHG Protocol encourages an assurance process, Climate Active provides the option of certification. CQU does not currently intend to attain certification this document focuses on the first three stages.

Whilst the stages can be interpreted as maturity levels, they also reflect an annual reporting cycle.

Figure P.2 The Four Stages of Climate Active compliance maturity and the annual reporting cycle

1	2	3	4
Understand and accept core principles	Measure	Act	Assurance/Certification
Carbon accounting principles • Relevance • Completeness • Consistency • Transparency • Accuracy Offset integrity principles • Additional • Permanent • Measurable • Transparent • Address leakage • Independently audited • Registered	Step 1: Establish the emissions boundary. Step 2: Set a base year. Step 3: Collect data on identified emissions sources. Step 4: Calculate the total carbon account attributable to the organisation.	ReduceDevelop and maintain an emissions reduction strategy. Annually review its success in achieving emissions reductions. Aim to achieve emissions reductions wherever possible Follow the carbon reduction hierarchy of energy efficiency, onsite renewable energy generation and offsite renewable energy generation before undertaking carbon offsetting. OffsetPurchase offsets to compensate for remaining emissions. Develop and maintain a strategy for purchasing and cancelling eligible offset units for each year that is the subject of a claim of carbon neutrality. Include decisions regarding the types of offset units to be purchased. The strategy should also consider the timing of offset cancellation.	ValidateArrange independent validation on a regular basis at lease once every 3 years. Include assessment of the adequacy and appropriateness of the emissions boundary setting, emissions methodologies and emission factors. Maintain appropriate records for auditing. ReportAnnually publish statement of carbon neutral claim. Give a clear understanding of what has been done to achieve carbon neutrality. State actions to reduce absolute emissions or emissions intensity over time and offsetting of remaining emissions

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify

1.1 Core Principles

The core principles of the GHG Protocol and Climate Active Standard are near identical. CQU's key internal stakeholders should be aware of these principles to ensure that the resources required to execute CQU's decarbonisation plan can be committed by the organisation. The Climate Active Standard breaks the core principles into two categories:

1. Carbon accounting principles, and
2. Offset integrity principles

1.2 Carbon accounting principles

The following principles are considered best practice when calculating a carbon account.

If seeking to claim carbon neutrality against the Organisation Standard, the carbon account of an organisation must be calculated according to these principles:

- **Relevance:** ensure the greenhouse gas inventory of an organisation appropriately reflects the greenhouse gas emissions attributable to that organisation and serves the decision-making needs of users – both internal and external.
- **Completeness:** account for and report all greenhouse gas emissions sources and activities within the defined boundary of the organisation. Disclose and justify all exclusions.
- **Consistency:** use consistent methodologies to allow for meaningful comparisons of greenhouse gas emissions over time. Transparently document any changes to the data, boundary, methods or any other relevant factors in the time series.
- **Transparency:** compile, analyse and document greenhouse gas information clearly and coherently so that auditors and the public may evaluate its credibility. Disclose any relevant assumptions and make appropriate references to the calculation methodologies and data sources used.
- **Accuracy:** ensure the quantification of greenhouse gas emissions is unbiased (not systematically over or under actual emissions) and uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information. Where uncertainty is high, use conservative values and assumptions.

1.3 Offset integrity principles

Organisations can use offset units to support their emissions management activities.

Organisations seeking to become carbon neutral can use eligible offset units to compensate for emissions that cannot be completely reduced through energy efficiency, the procurement of renewable energy or supply chain management.

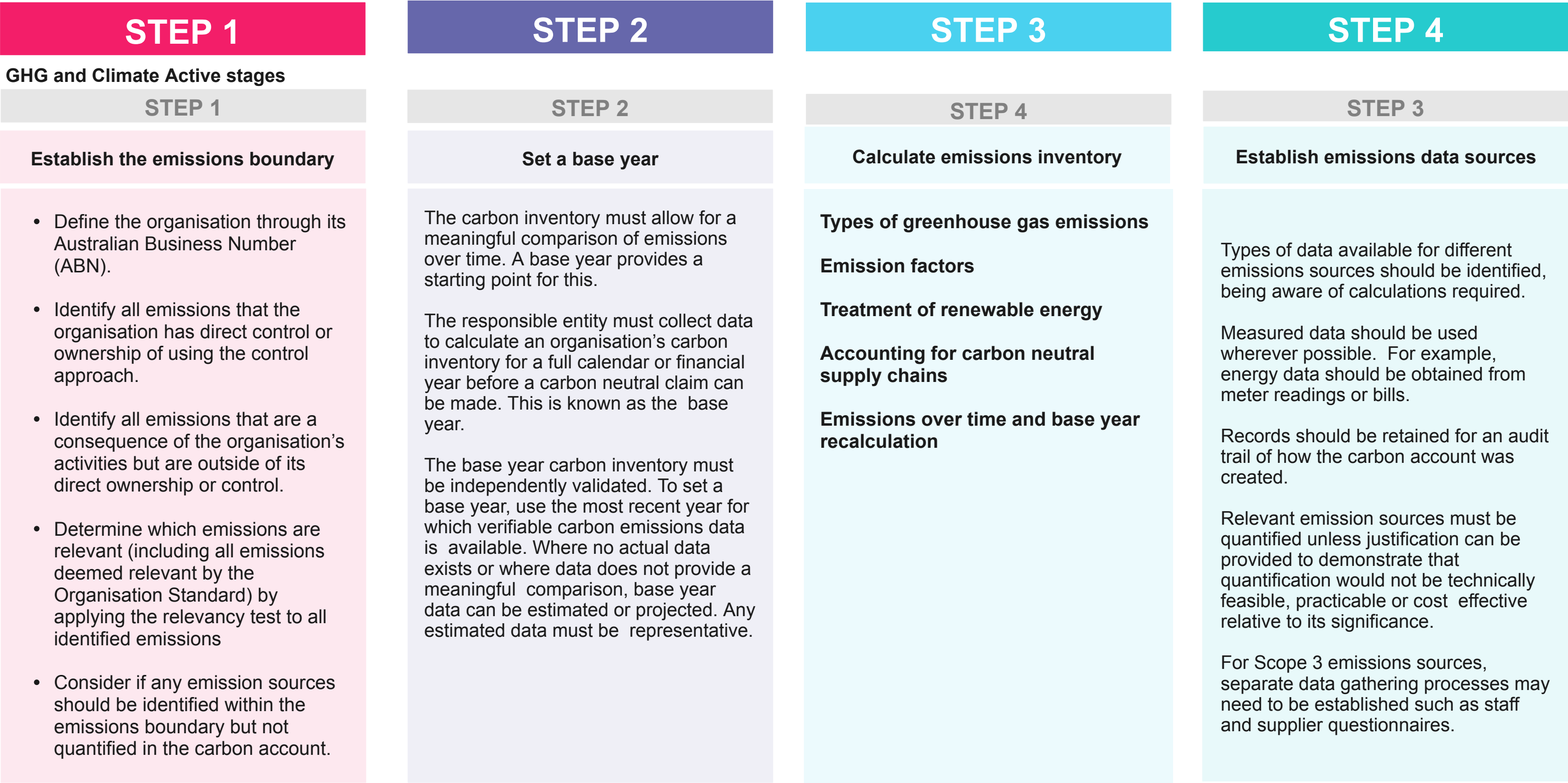
- **Additional:** it must result in emissions reductions that are unlikely to occur in the ordinary course of events, including due to any existing commitment or target publicly agreed by the entity responsible for issuing the units. It must represent abatement that has not been double counted. Permanent: it must represent permanent reductions in greenhouse gas emissions. In the case of sinks, this requires that the carbon stored is sequestered and will not be released into the atmosphere for a period of 100 years. Where a period of less than 100 years is applied to sequestration units, an appropriate discount must be applied
- **Measurable:** methods used to quantify the amount of emissions reductions generated must be supported by clear and convincing evidence.
- **Transparent:** consumers and other interested stakeholders must have access to information about the offset project that generated the abatement, including the applied methodology and project-monitoring arrangements.
- **Address leakage:** the system responsible for generating the offset unit must provide deductions for any material increases in emissions elsewhere which nullify or reduce the abatement that would otherwise be represented by the offset unit.
- **Independently audited:** the circumstances responsible for the generation of the unit must be verified by an independent, appropriately qualified third party and not found to be in contradiction with these integrity principles.
- **Registered:** the offset unit must be listed and tracked in a publicly transparent registry.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify

2.1 The fours steps of measuring emissions

The carbon accounting process has 4 steps and is described in the GHG Protocol and Climate Active as set out in Figure 2.1 below. The four steps are used as a guide in this framework to establish a reporting procedure, however, the order is modified to aid readability and understanding.

Figure 2.1 The four steps to measuring emissions
Decarbonisation Framework document flow



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 1: Establish the emissions boundary			

2.1.1 Defining the organisational boundary

Originally founded in Rockhampton in 1967, as the Queensland Institute of Technology (QIT) Capricornia, CQU Australia was granted full University status in 1992 and now has more than 30 000 students studying online and on-campus across Australia.

CQU is one of the largest universities based in regional Australia, with campuses in Adelaide, Brisbane, Bundaberg, Cairns, Emerald, Gladstone, Mackay, Melbourne, Rockhampton, Sydney, and Townsville. Along with these campuses, the University also partners with several of Regional Universities Centres (RUC's) in regional and remote parts of Australia.

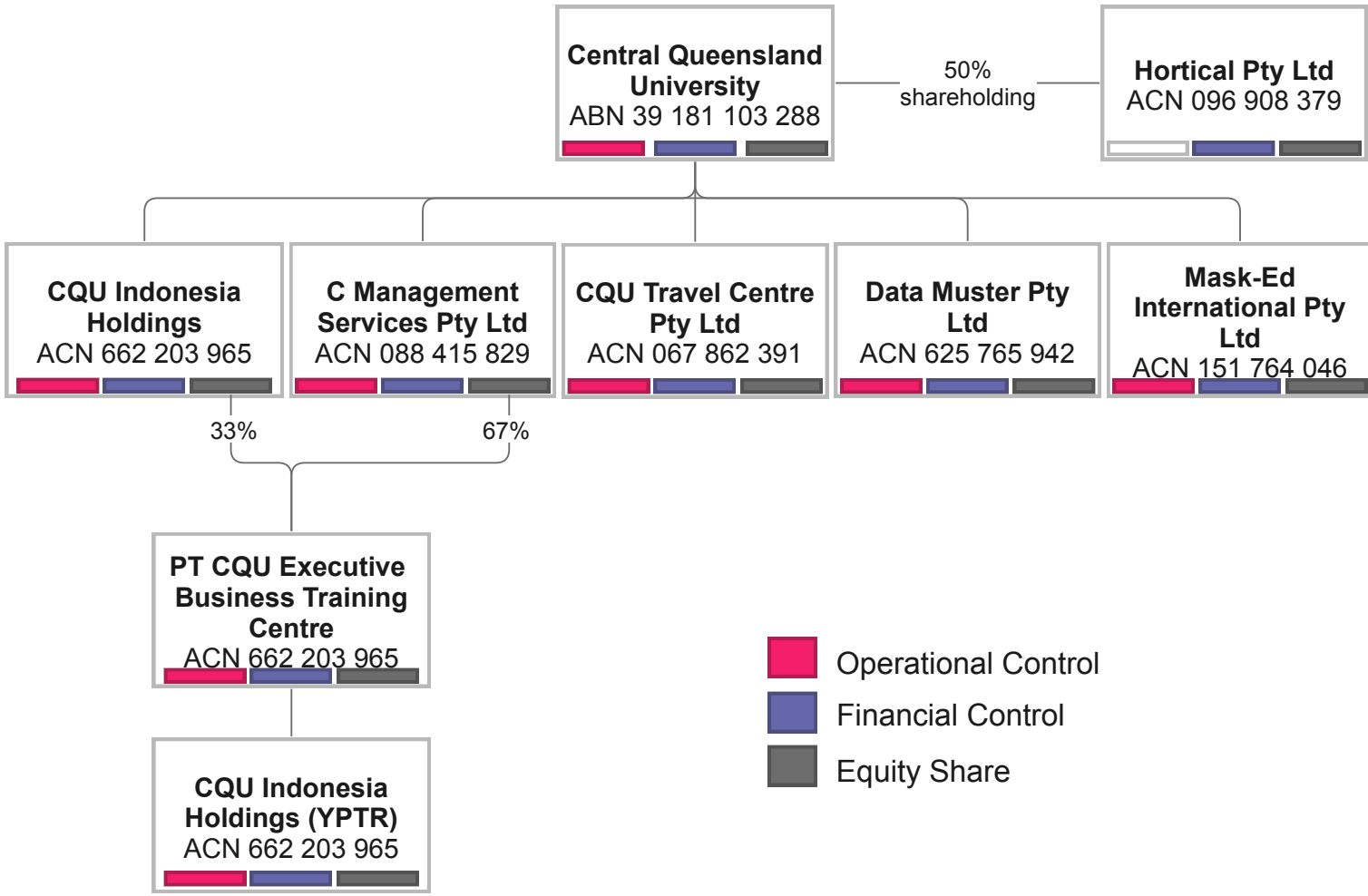
As a pioneer in the delivery of distance education, CQU also continues to be a leader in this area with almost half of the current student cohort made up of students studying off-campus through online and mixed-mode delivery, many of whom are based in rural and remote areas.

[Central Queensland University website](#)

The first step in establishing the emissions boundary requires defining the reporting entity or group of entities. This is an important step regardless of the chosen standard. Understanding exactly which entity is reporting on its emissions requires an understanding of CQU's corporate structure and clearly defining which entities are included or excluded based on whether CQU chooses to use operational control, financial control or equity share as the basis of the corporate boundary. The corporate boundary has a more significant impact when organisations are only focused on Scope 1 and 2 emissions. This is because regardless of the method chosen, once Scope 3 emissions are included emissions from organisations under operational control, financial control or with an equity share will be captured in one of either Scope 1, 2 or 3. For this reason, we recommend using operational control as the approach as this is consistent with NGERs which does not offer flexibility in this regard. Figure 2.1.1b illustrates CQU's corporate structure. The organisational boundary is subsequently defined as the activities and sources of emissions of the entities in CQU's corporate structure of which CQU has direct operational control.

Figure 2.1.1b CQU corporate structure and organisational boundary

Figure 2.1.1a Central Queensland University national footprint



Generation of electricity, heat, or steam. These emissions result from combustion of fuels in stationary sources, e.g., boilers, furnaces, turbines. CQU's stationary energy emissions arise from consumption of natural gas, diesel and LPG from the use of onsite generators, water heating and cooking.

Physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g., cement, aluminium, adipic acid, ammonia manufacture, and waste processing including waste water treatment. These processes include emissions from livestock including enteric fermentation and waste, use of fertilisers as well as land use, land use change and forestry emissions.

Transportation of materials, products, waste, and employees. These emissions result from the combustion of fuels in company owned/controlled mobile combustion sources (e.g., trucks, trains, ships, airplanes, buses, and cars). CQU's transport energy emissions arise from consumption of petrol (gasoline), ethanol and diesel from the use of university vehicles and rental cars.

Fugitive emissions. These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; hydrofluorocarbon (HFC) emissions during the use of refrigeration and air conditioning equipment; SF6 emissions during use of high voltage equipment and methane leakages from gas transport. CQU's fugitive emissions arise from refrigerant leakage in its HVAC-R (heating, venting, air-conditioning and refrigeration) assets and SF6 leakage in its high voltage electrical equipment. The predominant sources are air-conditioning units which range in size from small, domestic-style, split system air-conditioners to large chillers. The global warming potential (GWP) of these emissions is many thousand times higher than carbon dioxide (1500-4000 for refrigerants and 23600 for SF6), even small leaked quantities have the potential to dramatically increase emissions.

Table 2.1.2b Emission materiality/relevance

		Possibility of materiality/relevance		
		■ Certain/Probable	■ Likely/Possible	■ Unlikely/Improbable
Energy combusted	Natural gas	■	■	■
	LPG	■	■	■
	Diesel	■	■	■
	Oils and greases (combusted)	■	■	■
	Physical or chemical processing	■	■	■
Waste /wastewater processing		■	■	■
	Other processes	■	■	■
Transport fuels	Diesel	■	■	■
	Petrol	■	■	■
	LPG	■	■	■
	Fugitive emissions	■	■	■
HVAC-R (HFCs)		■	■	■
	Oils and greases	■	■	■
	HV equipment (SF6)	■	■	■
	Livestock (CH4)	■	■	■
Scope 2		■	■	■
		■	■	■

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 1: Establishing the emissions boundary			

2.1.3 Scope 3 emissions

CQU is yet to quantify its Scope 3 emissions. However, Table 2.1.3 identifies CQU's likely emissions under GHG Protocol categories (a detailed description of the categories is provided in Appendix 3). To appropriately identify and report its Scope 3 emissions, GHG Protocol requires value chain mapping to reveal emissions sources under each of the upstream, operational and downstream value chain categories.

Table 2.1.3 also highlights for which categories the GHG Protocol requires relevance tests ("must") and those that are recommended (should).

These categories are quite broad and not all are applicable to CQU. As a first step in investigating CQU's Scope 3 emissions, the categories have been benchmarked against Australian universities that have already achieved Climate Active certification and/or made public statements regarding emissions reduction plans. Emissions categories that are likely to be relevant for CQU are highlighted. Some are almost certain while others are possible and worthy of investigating in value mapping and data gathering for Scope 3 emissions.

Undertaking a value mapping and data gathering process for Scope 3 emissions is included in the decarbonisation action plan.

2.1.4 Establishing relevance

Emission sources are relevant if at least two of the following criteria are met:

- the emissions from a particular source are likely to be large relative to the organisation's electricity, stationary energy and fuel emissions
- the emissions from a particular source contribute to the organisation's greenhouse gas risk exposure
- the emissions from a particular source are deemed relevant by key stakeholders
- the responsible organisation could influence emissions reduction from a particular source
- the emissions are from outsourced activities previously undertaken within the organisation's boundary, or from outsourced activities typically undertaken within the boundary for comparable organisations.

Table 2.1.3 Central Queensland University Scope 3 emissions by category

Scope 3 Emission categories	Must	Should	Likelihood
Purchased goods and services	☐	☒	☒
Capital goods	☐	☒	☒
Fuel-related and energy-related activities	☒	☐	☒
Upstream transportation and distribution	☐	☒	☒
Waste generated in operations	☒	☐	☒
Business travel	☒	☐	☒
Employee commuting	☒	☐	☒
Upstream leased assets	☐	☒	☒
Downstream transportation and distribution	☐	☒	☒
Processing of sold products	☐	☒	☐
Use of sold products	☐	☒	☐
End-of-life treatment of sold products	☐	☒	☐
Downstream leased assets	☐	☒	☐
Franchises	☐	☒	☐
Investments	☒	☐	☒

Scope 3 Emission Category Descriptions are show in Appendix 3.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 1: Establish the emissions boundary			

2.1.5 Included and excluded emissions

All material emissions should be accounted for wherever possible. Some emissions may be non-quantified in the carbon inventory under the following scenarios:

- 1. Immateriality (i.e. <1 per cent for individual items and no more than 5 per cent collectively).
- 2. Quantification is not cost effective relative to the size of the emission
- 3. Data is unavailable
- 4. Initial emissions non-quantified but repairs and replacements quantified.

In most protocols, there are options to resolve these scenarios. For example, if emissions can not be cost effectively quantified, assumptions can be made to generate an *uplift factor*. If data is unavailable, a data management plan should be put in place to provide data within a set period.

2.1.6 CQU's emissions aggregation approach

The data available for measuring emissions varies depending on the activity types. For example, electricity is metered for invoicing purposes at the NMI level and large sites like CQU's campuses can have several NMI's. Detailed, site-specific analysis is conducted at the site level, NMI level and sub-meter level where available for the purposes of investment decisions. However, for decarbonisation monitoring and reporting the information is typically aggregated to state level.

For emissions sources such as Transport fuels, aggregation at a corporate level is often used due to the mobility of the emissions sources. However, similar to electricity, fuel data can be captured at a granular level e.g. the registration ID of each vehicle and investment decisions such as fuel-switching can be tracked at this level.

Table 2.1.6 summarises the level at which data CQU's data is aggregated for the purposes of decarbonisation reporting. This approach would be consistent with the requirements for Climate Active certification under the current standard in the event CQU chooses to obtain it.

Table 2.1.6 Central Queensland University emissions by site

CQU Entity	CQU	Site level
Energy combusted		
Natural gas	☐	☒
LPG	☒	☐
Diesel	☒	☐
Oils and greases (combusted)	☒	☐
Physical or chemical processing		
Waste /wastewater processing	☐	☐
Other processes	☐	☒
Transport fuels		
Diesel	☒	☐
Petrol and ethanol	☒	☐
LPG	☒	☐
Fugitive emissions		
HVAC-R (HFCs)	☒	☐
Oils and greases	☒	☐
HV equipment (SF6)	☒	☐
Livestock (CH4)	☒	☐
Scope 2		
Electricity	☐	☒

According to the principle of consistency (Section 1.2), the carbon account must allow for meaningful comparison of emissions over time. A base year provides a starting point for these emission comparisons.

Importantly, the GHG Protocol contemplates re-baselining under various scenarios including changing the emissions boundary to include Scope 3 emissions. CQU has chosen to define its current emissions boundary as comprising Scope 1 and Scope 2 emissions (for sites and active corporate entities under its operational control in Australia) for the purpose of measuring and reporting against its current targets. The baseline year has been selected as 2021 as it represents the beginning of a period of increased data quality, follows the completion of a major air-conditioning program at CQU campuses, reflects the beginning of a period of step-change focus on energy and emissions and prevents excessive claims of reductions in emissions that have naturally occurred through greening of the grid.

To identify the baseline year when CQU seeks to incorporate Scope 3 emissions will require value chain emissions mapping, relevance tests and data sources to be identified to establish the modified emissions boundary.

Year	Transport Energy - Gasoline (Petrol)	Transport Energy - Diesel	Stationary Energy - LPG	Industrial processes - HVAC-R - R134a	Industrial processes - HVAC-R - HCFC22	Industrial processes - HVAC-R - HFC32	Stationary Energy - Natural Gas	Industrial processes - HV elec equipment - SF6	Total
Sum of 2016	20.2	0.1	0.1	0.4	0.1	0.1	0.1	0.1	21.2
Sum of 2017	20.0	0.1	0.1	0.4	0.1	0.1	0.1	0.1	21.0
Sum of 2018	19.2	0.1	0.1	0.4	0.1	0.1	0.1	0.1	20.2
Sum of 2019	19.8	0.1	0.1	0.4	0.1	0.1	0.1	0.1	20.7
Sum of 2020	17.5	0.1	0.1	0.4	0.1	0.1	0.1	0.1	18.5
Sum of 2021	16.5	0.1	0.1	0.4	0.1	0.1	0.1	0.1	17.5
Sum of 2022	15.8	0.1	0.1	0.4	0.1	0.1	0.1	0.1	16.8
Sum of 2023	14.8	0.1	0.1	0.4	0.1	0.1	0.1	0.1	15.8

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3/4: Calculate carbon content			

2.3 Calculate Carbon Content and Identify Emisisions

2.3.1 Scope 1 - Stationary energy (gaseous fuels) - Natural gas / LPG

Summary of emissions activities

Natural gas is consumed by CQU at the following facilities:

- Rockhampton City, Rockhampton North and Adelaide

The natural gas has a variety of uses depending on the sites and may include:

- Heat for:
- domestic hot water for buildings,
 - high temperature hot water ring mains,
 - heating pool water,
 - cooking and
 - space heating.
- Steam generation used for:
- cleaning,
 - laboratory requirements??

LPG is consumed by CQU for a variety of uses depending on the sites and includes:

- heat for LPG cooking equipment (e.g. cafès and outdoor BBQs), and
- on site mobile equipment (e.g. forklifts)

Measurement method

Natural gas is supplied in pipelines operated by different network operators depending on the location of facilities in various states. Gas retailers provide metered quantities consumed on regular invoices. The invoices provided by retailers are used as a primary data source for the measurement of the quantity of gas consumed at each facility in gigajoules.

LPG is supplied in pressure vessels of various size operated by different retailers/distributors depending on the location of facilities in various states. Retailers provide consumption data on regular invoices. The invoices provided by retailers are used as a primary data source for the measurement of the quantity of gas consumed at each facility by energy content (GJ), mass (kg), or volume (L).

The consumption is multiplied by the emissions factor (EF) for the applicable grid description as provided by the CER each year which for LPG hasn't changed since the baseline year. The CER's published emissions factors for Natural Gas and LPG are presented in Figure 2.3.1a and are used to calculate carbon dioxide, methane and nitrogen oxide emissions in carbon dioxide equivalent.

Figure 2.3.1a Gaseous fuels emissions factors - Natural Gas / LPG

Source: The NGERs Determination, compilation date 21/9/2023.

Fuel combusted	Energy content factor (GJ/kL)	Emission factor (kg CO2-e/GJ) (relevant oxidation factors inc)		
		CO2	CH4	N2O
Natural gas transmitted or distributed in a pipeline	39.3	51.4	0.1	0.03
Liquified petroleum gas	25.7	60.2	0.2	0.2

Historical emissions

Figure 2.3.1b CQU's natural gas / LPG emissions as a proportion of total baseline emissions

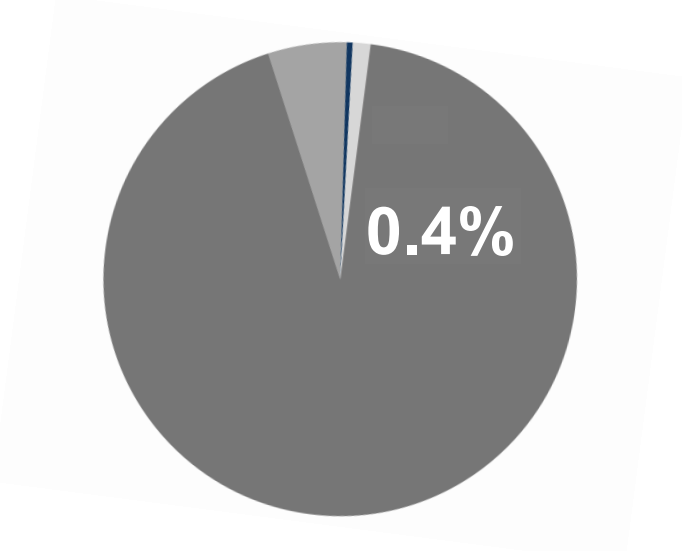
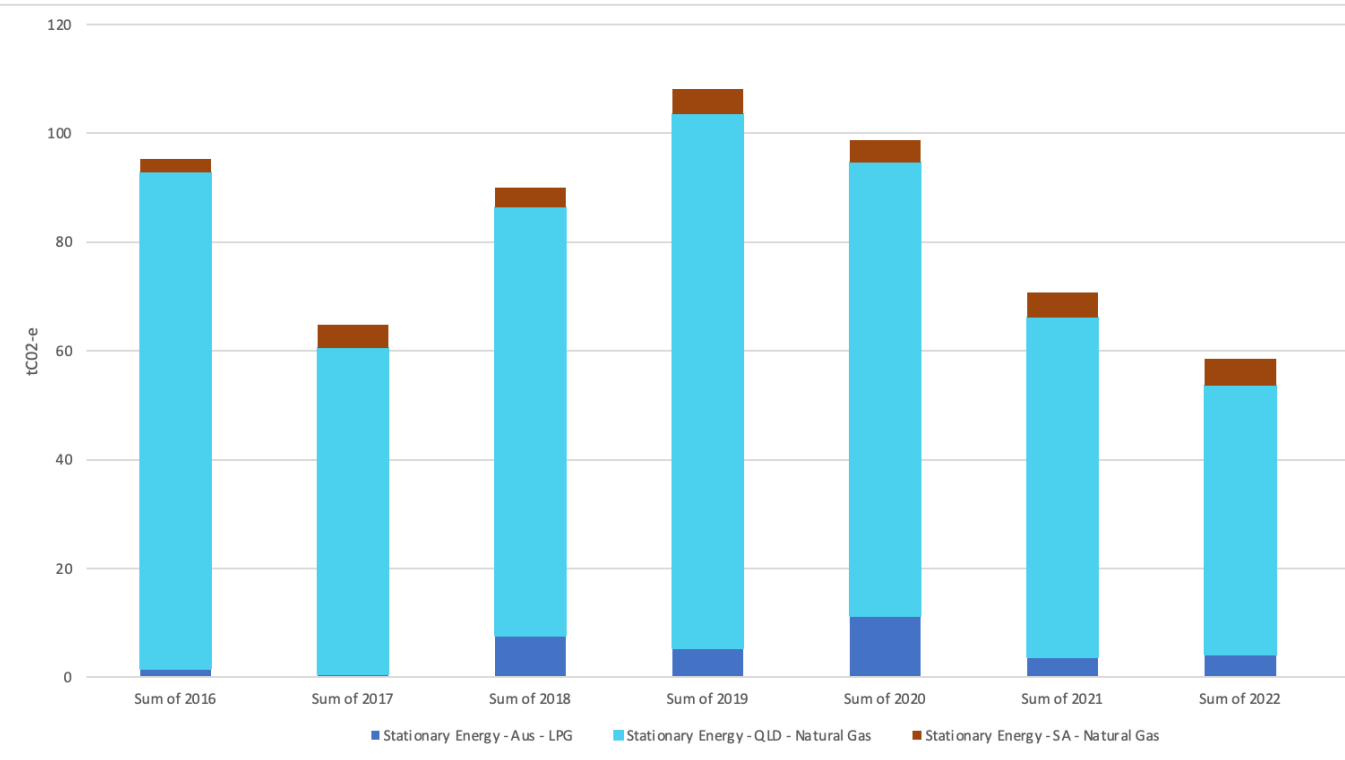


Figure 2.3.1c CQU's natural gas / LPG emissions trend since 2016 is shown below.



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3/4: Calculate carbon content			

2.3.2 Scope 1 - Transport energy - Petrol, diesel and ethanol

Summary of emissions activities

Petrol is consumed by CQU in vehicles under the operational control of CQU (owned, short-term and long-term hire):

- light passenger vehicles,
- light commercial vehicles,
- heavy commercial vehicles, and
- marine vehicles.

Measurement method

Petrol and diesel (and ethanol if any) purchases are captured corporately via corporate fuel cards, hire cars and grounds equipment monitoring. Petrol consumed in generators is also included in transport fuel consumption as it is aggregated at the purchasing level. However, it is small compared with the total petrol consumption and would be captured as a Scope 1 direct emission even if it were able to be extracted.

The aggregated consumption is multiplied by the emissions factor (EF) published by the CER each year. The CER's most recently published emissions factors for petrol are presented in Figure 2.3.2a and are used to calculate carbon dioxide, methane and nitrogen oxide emissions in kilograms of carbon dioxide equivalent.

Figure 2.3.2a Liquid transport fuels emissions factors (post 2004 vehicles)

Source: The NGERs Determination, compilation date 21/9/2023.

Fuel combusted	Energy content factor (GJ/kL)	Emission factor (kg CO ₂ -e/GJ) (relevant oxidation factors inc)		
		CO ₂	CH ₄	N ₂ O
Gasoline (other than for use as a fuel in an aircraft)	34.2	67.4	0.02	0.2
Diesel oil	38.6	69.9	0.01	0.5
Ethanol	23.4	0	0.2	0.2

Historical emissions

Figure 2.3.2b CQU's gasoline (petrol) emissions as a proportion of total baseline emissions

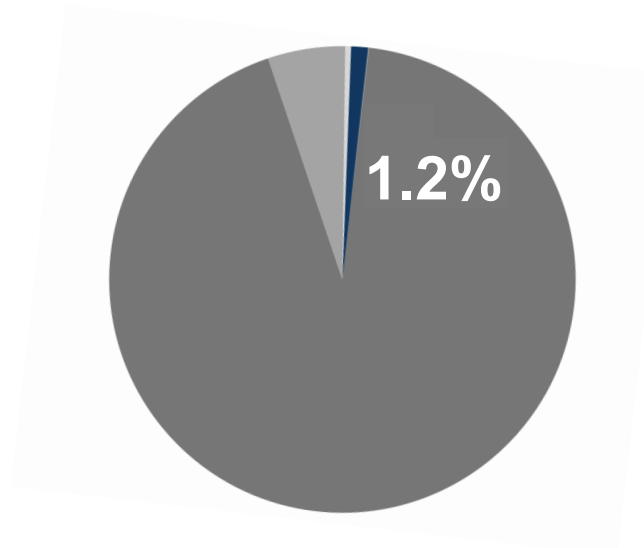
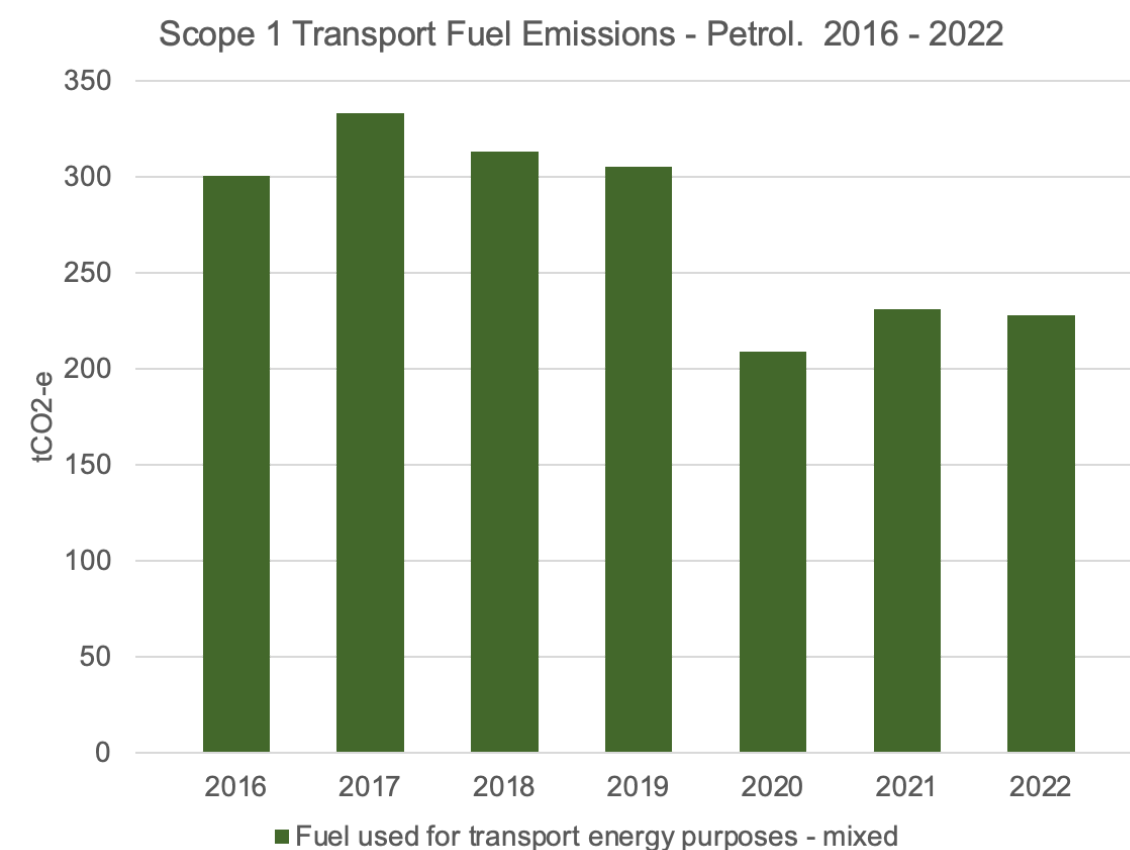


Figure 2.3.2c CQU's petrol emissions trend since 2016 is shown below.



Summary of emissions activities

CQU have a number of HVAC-R equipment at each facility.

Heating, ventilation, and air conditioning (HVAC) systems and refrigeration equipment can emit greenhouse gases (GHGs), such as hydrofluorocarbons (HFCs), which are used as refrigerants in these systems. When these HFCs are released into the atmosphere, they contribute to global warming.

CQU have HV switching gear on site.

SF6 is a potent greenhouse gas, with a global warming potential (GWP) of 23,500 times that of CO2. It is used as an insulating gas in high voltage equipment such as switchgear, transformers, and circuit breakers.

Under GHG protocols, businesses that operate high voltage equipment containing SF6 are required to capture their emissions of the gas that occur when the gas is released during the installation, maintenance, or disposal of HV equipment.

Measurement method

Under the various protocols, businesses are required to report on their direct emissions from HVAC and refrigeration equipment that occur when refrigerant is leaked or intentionally vented during the installation, maintenance, or repair of HVAC and refrigeration equipment.

To accurately report on their emissions from HVAC and refrigeration equipment, businesses must maintain accurate records of refrigerant usage, leak rates, and equipment maintenance. They must also ensure that their equipment is maintained and serviced by trained professionals, and that any refrigerant leakage is detected and repaired as soon as possible.

To accurately report on their SF6 emissions, businesses must maintain accurate records of their SF6 inventory and usage, including the quantity of gas contained in their equipment and any emissions resulting from equipment leaks, maintenance, and disposal. They must also ensure that their equipment is properly maintained and that any leaks are promptly detected and repaired.

In addition, businesses are encouraged to adopt measures to reduce their use of SF6 in HV equipment, such as through the use of alternative gases and technologies. By reducing their SF6 emissions, businesses can not only comply with reporting requirements under the GHG protocols, but also contribute to the global effort to mitigate climate change.

Historical emissions

Figure 2.3.3a CQU's HVAC-R and HV emissions as a proportion of total baseline emissions

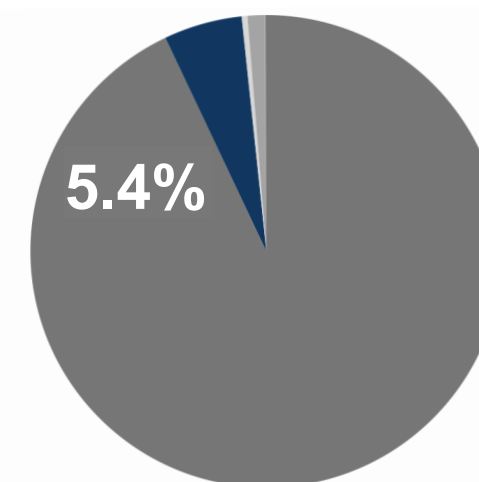
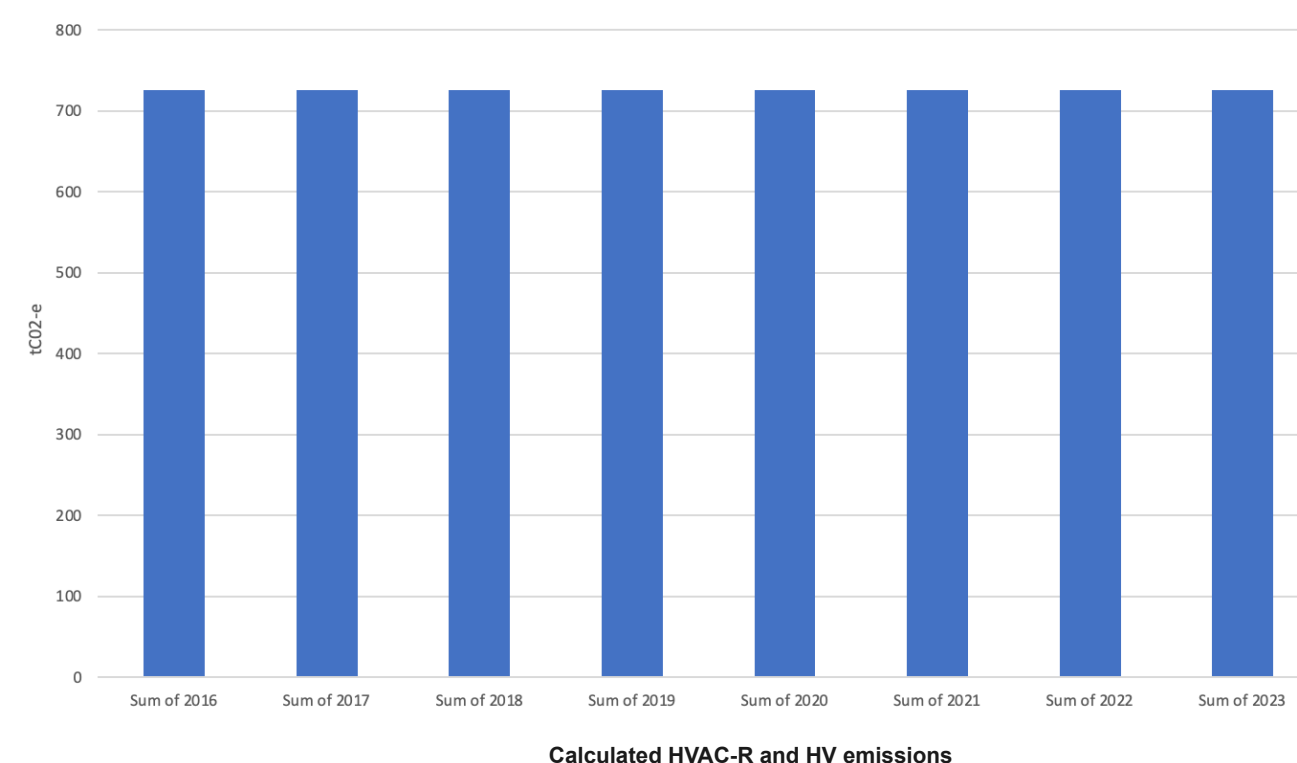


Figure 2.3.3b CQU's estimated HVAC-R and HV emissions based on 2023 asset register.



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3/4: Calculate carbon content			

2.3.4 Scope 1 Physical or Chemical Processes

Summary of emissions activities

These emissions result from manufacture or processing of chemicals and materials, e.g., cement, aluminium, adipic acid, ammonia manufacture, and waste processing including waste water treatment. These processes include emissions from livestock including enteric fermentation and waste, use of fertilisers as well as Land Use, Land use change and forestry emissions.

CQU have a number of livestock for research purposes. There are a number of cattle at the Rockhampton campus which fluctuates from 10-60 per head per year. Sheep do not exceed around 20 per year and there are around 1000 chickens for 28 days ranging from 40kg to 1.5 kg size for 4 weeks per year.

Measurement method

The livestock calculations are a crude estimate based on a primary industries carbon calculator, beef and sheep tool, using the standard inputs. Note emissions calculated are based purely on methane production per animal as farm/environmental conditions were not known.

Historical emissions

Figure 2.3.4a CQU's Physical or Chemical Process emissions as a proportion of total baseline emissions

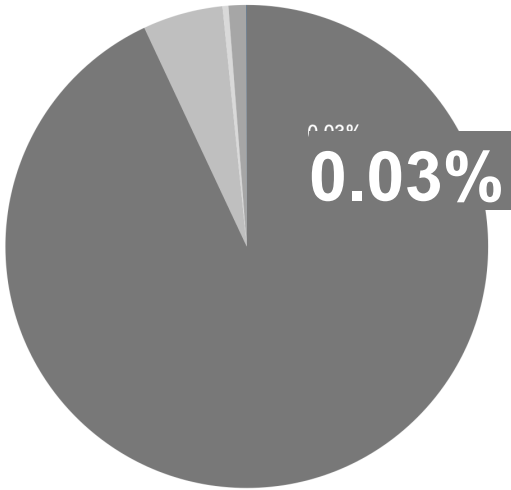


Figure 2.3.4b CQU's estimated Physical or Chemical Process emissions based on 2023 data.



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3/4: Calculate carbon content			

2.3.5 Scope 2 - Electricity

Summary of emissions activities

Electricity is CQUs largest aggregated emissions source by a considerable margin. Electricity is consumed at all major sites, by CQU for a variety of reasons including:

- HVAC-R
- hot water heating,
- building mechanical systems (lifts, fluid pumping, fire management)
- pumps,
- lighting,
- electric vehicle charging, and
- appliances and equipment.

Measurement method

Electricity is supplied by different network operators depending on the location of facilities in various states. Electricity retailers provide metered quantities consumed on regular invoices for every NMI (meter). Some facilities have several NMIs thus specific data is relatively easy to obtain by aggregating NMIs.

The invoices provided by retailers are used as the measurement method of the volume of electricity consumed at each facility. The Climate Active standard describes two methods: The **location-based method** and the **market-based method**. **Achieving certification will require calculation of both; the dual reporting approach.** It isn't particularly complicated to do both. The retailer's invoiced consumption is multiplied by the emissions factor (EF) for the applicable grid description as provided by the CER each year. The Emissions factors published by the CER for 2023 are presented in Figure 2.3.4a.

Climate Active Electricity Reporting: Dual Reporting.
Climate active requires assessing electricity emissions for organisations using both the location-based method and the market-based method. Either method can be chosen and disclosed on the Public Disclosure Statement as the primary electricity accounting method.

The **location-based method** shows a business’s electricity emissions in the context of its *location*. It shows the physical emissions from a business’s electricity consumption, as it reflects the emissions intensity of the electricity grid(s) it relies on to operate.

The **market-based method** shows a business’s electricity emissions in the context of its electricity *purchases*. It reports emissions according to a business’s investments in different electricity products and markets, including from voluntary purchases of renewable electricity and mandatory schemes like the Renewable Energy Target.

Figure 2.3.5a FY23 Emissions factors for Scope 2 emissions

Source: The Determination, compilation date 21/9/2023

Part 6—Indirect (scope 2) emission factors and residual mix factors for consumption of electricity

Item	Column 1 State, Territory or grid description	Column 2 Emission factor kg CO ₂ -e/kWh	Column 3 Residual mix factor kg CO ₂ -e/kWh
77	New South Wales and Australian Capital Territory	0.68	0.81
78	Victoria	0.79	0.81
79	Queensland	0.73	0.81
80	South Australia	0.25	0.81
81	South West Interconnected System in Western Australia	0.53	0.81
82	Tasmania	0.12	0.81
83	Northern Territory	0.54	0.81

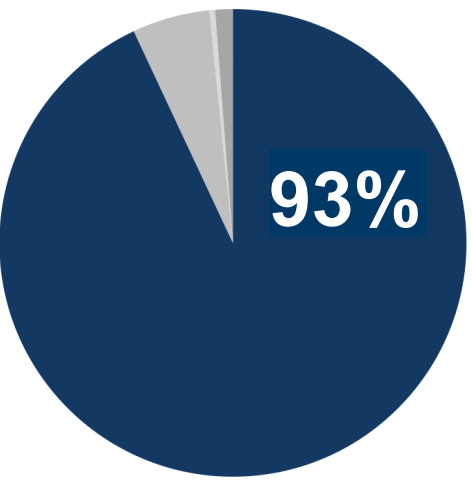
Note: Scope 2 emissions result from activities that generate electricity, heating, cooling or steam that is consumed by a facility.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3/4: Calculate carbon content			

Figure 2.3.5b Scope 2 - Electricity - Location based



Figure 2.3.5c FY23 Emissions factors for Scope 2 emissions - Market based



Note: Scope 2 emissions result from activities that generate electricity, heating, cooling or steam that is consumed by a facility.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3: Develop and Maintain an Emissions Reduction Strategy			

3.1 Detailed decarbonisation actions

3.1.1 Emissions reduction strategy and initiatives

An emissions reduction strategy has been developed to guide CQU as it works towards its emissions reduction targets. The targets have been set based on alignment with the Australian Government's target of net zero by 2050. An interim target has been set to achieve a 40% reduction in Scope 1 and Scope 2 emissions by 2030.

Initiatives identified in the emissions reduction strategy have been based on the following key principles:

- Apply a hierarchy of emissions reduction:
 - Target conservation principles such as avoidance of waste
 - Use resources more efficiently and avoid disposable or single-use items and packaging
 - Replace fossil fuels with renewable energy sources
 - Utilise offsets and Carbon Capture technology only for the most hard to abate emissions after all other initiatives have been completed.
- Investment Strategy:
 - Continue investing in conservation and efficiencies to reduce consumption of energy, leading to reduced capacity of on-site generation and storage required.
 - Staged investments in renewable energy and storage to reduce the potential for over-capitalisation.

A key criteria for including these initiatives is little to no cost impact and a material reduction in emissions, leading to no regrets for implementation. Nevertheless, the opportunities available for CQU to reduce Scope 1 and 2 emissions vary depending on the following:

- size of impact,
- cost of implementation,
- ease of implementation,
- speed of delivery, and
- quantifiability.

3.1.2 Emissions Reduction Strategy: quantifying potential emissions

Many of the potential emissions reduction actions are able to be quantified. A number will require some further consideration and the measurement of existing emissions.

For example, the potential emissions reductions for a number of Scope 1 (Fuels) and Scope 2 (electricity) emissions have been quantified (see Table 2). In addition, a high level assessment of the ease with which they can be implemented has been undertaken. The initiatives have thus been prioritised for execution based on the combination of their unit cost of emissions, ease of implementation and overall scale of emissions reduction potential.

Scope 1: Some scope 1 emissions reductions have been quantified and some estimated based on the potential uptake of measures such as fuel efficiency initiatives and reduction of travel in CQU vehicles.

Some strategies are subject to further consideration of the University such as the rate that the existing vehicle fleet is replaced with Electric Vehicles and powered by renewable energy.

Scope 2: Many of the potential Scope 2 emissions reductions have been quantified as the initiatives have been identified in the energy audit. Some others such as measures to reduce air conditioning load will need further analysis to determine the potential emissions reductions.

Scope 3: Once Scope 3 emissions have been quantified, it will be possible to quantify the potential emissions reductions available from actions in the emissions reduction strategy. For example, once waste audits have been conducted, it will be possible to estimate the potential emissions reductions from waste initiatives. Scope 2: Many of the potential Scope 2 emissions reductions have been quantified as the initiatives have been identified in the energy audit. Some others such as measures to reduce air conditioning load will need further analysis to determine the potential emissions reductions.

3.1.3 Emissions Reduction Implementation Strategy: Overview

Stage 1 - Direct reductions

The direct reductions stage is characterised by a period of investing in initiatives that directly reduce CQUs Scope 1 and Scope 2 emissions. It is near-term, immediate and focused. During this period CQU may choose to develop its Scope 3 inventory in preparation for incrementally addressing Scope 3 emissions reductions.

Stage 2 - Transition

The transition stage is defined by significant change.

- CQU will observe diminishing returns in direct emissions reductions for its electricity.
- Emissions from grid supplied electricity will naturally be decreasing but will unlikely be zero emissions by 2030.
- CQU's large market site electricity contract will expire in 2028 requiring CQU to decide what proportion of its supply should be renewable.
- The RET will terminate in 2030 meaning LGCs may no longer be available beyond 2030 for offsetting residual emissions.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3: Develop and Maintain an Emissions Reduction Strategy			

- The transition to EVs will accelerate which will further reduce a portion of Scope 1 emissions yet increase electricity consumption (albeit a relatively small increase for CQU given transport energy is equivalent to approximately 1% of total current electricity).

During this period, CQU may choose to offset residual Scope 1 and 2 emissions by surrendering LGCs acquired through its large site electricity contract to achieve a desired emissions reduction target. The need for offsets will decrease over time as the grid naturally transitions to net zero.

Stages 3 - Net Zero

Stages 3 is focused on achieving net zero emissions for Scope 1 and 2 emissions by 2050.

3.2.2 Scope 1 - Transport energy - Petrol and diesel

Scope 1 emissions from transport energy - Petrol and Diesel are the emissions arising from the use of university vehicles. These emissions are a relatively small proportion of overall emissions.

There are a number of low-cost emissions reduction actions that can be implemented to reduce these emissions. In addition to switching to an ethanol blend fuel, initiatives such as establishing an eco-driving campaign for the university will contribute to emissions reduction regardless of the fuel mix.

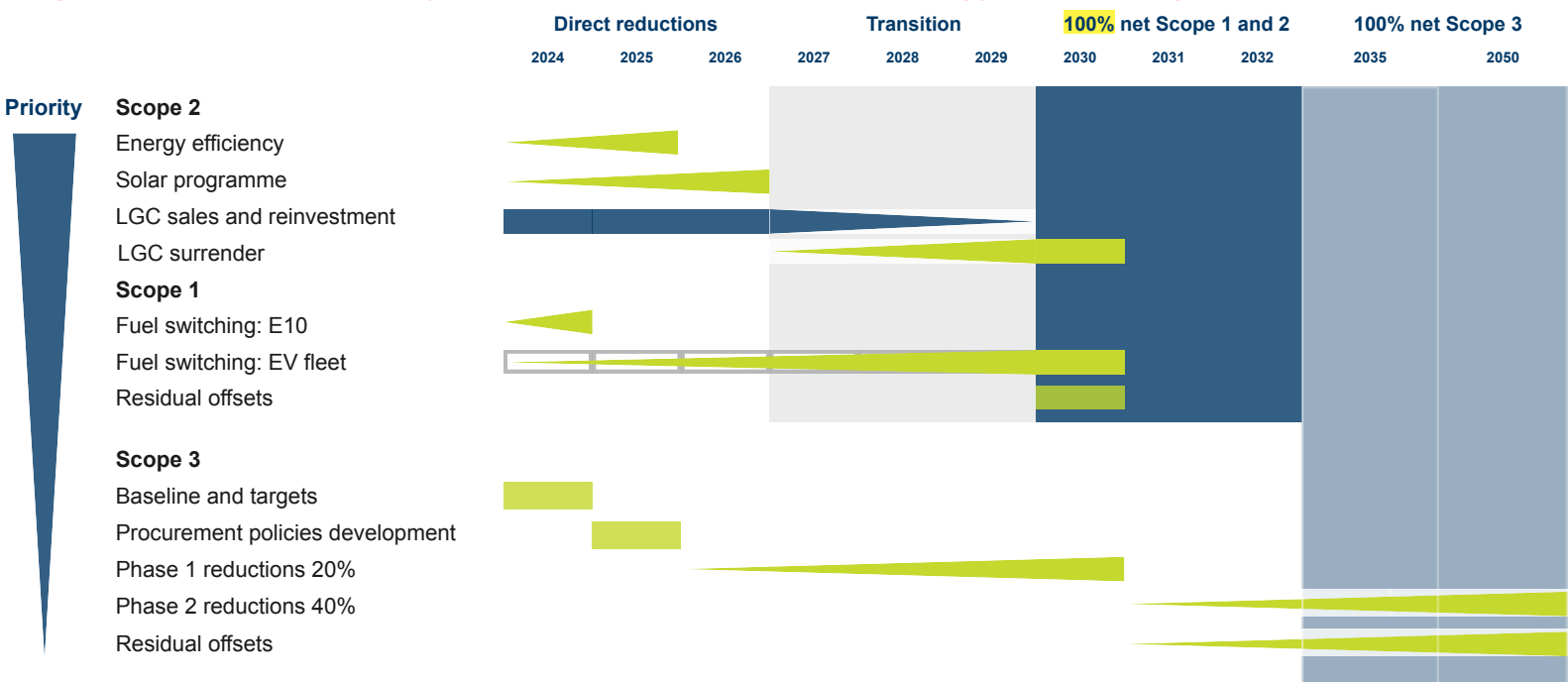
Over time the University may consider transitioning the vehicle fleet to electric vehicles which can be charged from the grid that is greening rapidly and will ultimately be 100% renewable. On site renewable electricity can help accelerate the decarbonisation of CQUs fleet.

Priority initiatives

Scope 1 fuel switching: E10. The opportunity to switch from various unleaded petrol blends (standard, premium, ultra-premium etc.) to E10 is seen as an immediate quick win. Only a small amount of E10 is being purchased by CQU’s fleet users leaving significant potential for further immediate benefits. The potential benefit is only minor but the vehicle fleet transition to EVs is envisaged as a medium-term slow burn thus the E10 switch has potential to raise awareness within the CQU community that it is within the capacity of each individual to make a difference to CQU’s carbon footprint.

Scope 1 fuel switching: ZEV fleet transition. The switch to ZEVs (zero emissions vehicles) is seemingly inevitable. However, the speed of the transition is highly dependent on market factors and stakeholder appetite. Accordingly, the immediate initiative is to undertake a desktop study to identify and categorise vehicle use cases and prioritise trials of various low emission and zero emission vehicle types and fuels including PHEV (plug-in hybrid electric vehicles), BEV (battery electric vehicles), FCEV (fuel cell electric vehicles including hydrogen) vehicles based on vehicles most likely to experience improved performance (as determined by the use case) thereby garnering support with early adopters. As the market offers more vehicle types at competitive total cost of ownership the fleet transition can accelerate. Integral to the ZEV fleet transition is the provision of EV charging for staff, students, and visitors. This has potential to reduce not only direct Scope 1 emissions but Scope 3 emissions too. The full effect of ZEVs on operational emissions is expected to occur beyond 2030.

Figure 3.1 CQ University's emissions reduction strategy: Four stages 2024 - 2050



3.2 Emission Reduction Initiatives

It is important to note that activities to reduce emissions can commence even before the emissions inventory has been completed. For example, initiatives to reduce emissions from staff commuting can be designed and implemented prior to the Scope 3 inventory being completed in the same way that CQU has already made an impact with innovative waste management initiatives.

3.2.1 Scope 1 - Stationery energy - Diesel and Gas

Over time the University may consider transitioning appliances over to electric equipment such as heat pump water heating and electric cooking. Consideration could also be given to replacing generators with Solar PV systems and batteries.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3: Develop and Maintain an Emissions Reduction Strategy			

3.2.3 Scope 1 - HVAC-R Refrigerant Leakage

Similarly with high voltage electrical systems, Scope 1 emissions arise from leakage of insulating gases.

To accurately report HVAC and refrigeration fugitive emissions requires accurate records of refrigerant usage, leak rates, and equipment maintenance and that any refrigerant leakage is detected and repaired as soon as possible. Reducing these emissions will initially be through actions to repair and prevent leaks, and then to procure appliances that have lower leakage rates and refrigerant gases with lower Global Warming Potential (GWP).

3.2.4 Scope 2 - Electricity

Scope 2 emissions from electricity purchased from the grid are the most significant emissions in the CQU inventory noting that Scope 3 emissions are yet to be quantified.

The emissions factor of scope 2 emissions is gradually decreasing with the increasing penetration of renewable energy in the grid. The grid may eventually supply only carbon-neutral electricity as the proportion of renewable energy generation approaches 100%.

Scope 2 emissions will also be reduced with the implementation of on-site renewable energy generation such as solar photovoltaic systems (Solar PV).

In addition to the quantified Scope 2 initiatives, a number of initiatives were identified that relate to the operation and/or utilisation of buildings and using control technologies to manage lighting and cooling systems.

Consider adopting a minimum building efficiency rating for major projects such as renovations and new construction projects. Incorporate sustainable design principles to ensure solar orientation, natural ventilation and lighting is maximised. This will assist in reducing Scope 2 emissions through reduced on site electricity use.

Priority Initiatives

Scope 2 priority 1 Energy efficiency. A suite of energy efficiency opportunities has the potential to reduce CQU’s scope 2 emissions by as much as 35% compared with 2021 emissions levels. They are low-hanging fruit requiring limited capital. They generally relate to modifications to building management systems to reduce cooling loads. Some involve modifying technical parameters of HVAC such as duration and timing of operation. Others require modifying business operating parameters. As such, the difficulty of implementing individual initiatives ranges from moderately hard to relatively easy. Once implemented, they should provide enduring benefits beyond 2026.

Scope 2 priority 2 Solar programme. CQU has approximately 150 kW of rooftop solar installed. It generates in the order of 250 MWh of electricity per year. This reduces emissions by 220 tonnes of CDE based on the 2021 national residual mix emissions factor. This is equivalent to offsetting CQU’s total transport fuels emissions in 2021 (210 kT CDE). Yet, there is potential for significantly more. Rooftop solar has the potential to deliver up to 25% of CQU’s load subject to further feasibility to confirm site-specific conditions support the potential. It is envisaged that 2024 would see a desktop study undertaken to prioritise sites by value and impact. Following this, a rolling programme of site investigations would be conducted to confirm suitability and sizing and finalise individual site business cases for investment. The realised financial and emissions savings benefits would be commence in the latter half of 2024 with full investment potential culminating in the end of the direction emissions reduction stage in 2026.

Scope 2 enabler LGC sales and re-investment. Integral to the strategy is the sale of LGCs acquired as part of CQU’s large market site contract in Queensland with CS Energy. By selling LGCs and re-investing gains in the energy efficiency and solar programme, CQU is aligning its emissions reduction initiatives with the core principles of the GHG Protocol and Climate Active Standard. Current estimates indicate 6700 LGCs will be transferrable to CQU in calendar years 2024-2028 under CQU's contract with CS Energy. These LGCs have a market rate of \$300 k based on the current forward LGC price of \$48/certificate for calendar year 2024. With the solar programme having the potential investment of approximately \$1m per year over three years, the LGC sale strategy liberates 30% of the funding required. This will provide emissions reduction benefits for 20 years or more.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Certify
STEP 3: Develop and Maintain an Emissions Reduction Strategy			

3.2.5 Scope 3 - Supply Chain Emissions

A key component of the Decarbonisation Framework is to quantify Scope 3 emissions.

A number of emissions reduction activities have been indentified which will reduce Scope 3 emissions and can be commenced prior to the quantification of emissions.

Scope 3 emissions vary significantly and accordingly

- reducing all forms of staff, student and business travel including commuting in favour of teleconferencing, working from home and other innovations
- facilitating greater use of low-carbon transport for travel including active travel, public transport and low-emissions vehicles
- reviewing procurement to improve the efficiency of materials usage, reducing single-use items, and purchasing items that are carbon neutral or with low embodied carbon, such as for renovations and new construction projects, office supplies, copy paper.
- reducing waste to landfill through measures such as reducing the amount of single-use items, increasing recycling rates and diverting organic waste to composting.

A coordinated approach and education of staff, students and suppliers will be required to implement these measures. Importantly, implementation of these measures can commence before the Scope 3 emissions inventory has been completed.

The University is well positioned to influence emissions beyond its inventory through further research and teaching of emissions reduction such as:

- further incorporation of emissions reduction, resilience and climate transition into research and teachings.
- monitoring and conducting research into from the Universities' emissions reduction activities to increase the likelihood of success and publish research outcomes which will assist others in successful decarbonisation.

Priority initiatives

Scope 3 Enabling actions – Establish baseline and targets. In parallel with direct reductions of Scope 2 emissions, CQU can undertake value stream mapping and peer benchmarking to identify its Scope 3 emissions boundary and baseline emissions. This process will inform the development of detailed, quantifiable Scope 3 emissions reductions actions. Notwithstanding the need for the value mapping process, the indicative Scope 3 emissions reduction 'soft target' is to seek reductions from CQU's value chain that are commensurate with its own Scope 1 and 2 direct reductions i.e. nominally 40%.

Scope 3 Enabling actions – Procurement strategies and policies. Following the calculation of baseline emissions, procurement policies will need to be developed before material emissions reductions are able to be observed.

Scope 3 - Phase 1 Low hanging fruit. The Scope 3 emissions reductions are expected to occur over a longer period than the Scope 1 and 2 direct reductions and offsets. Accordingly, the plan contemplates a first phase of low-hanging fruit delivering in the order of 20% reduction.

Scope 3 - Phase 2 harder to abate emissions. Phase 2 of the scope 3 direct emissions reductions initiatives will target the remaining 20% to achieve a total 40% reduction in scope 3 emissions. This is commensurate with CQU's own scope 1 and 2 direct emissions reductions.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.1 Data mangement plan

4.1.1 Stationary Energy Fuels - Natural Gas / LPG

Data sources and custodian

The Directorate of Facilities Management is the custodian of the gas data. CQU capture gas consumption data from the retail gas invoices. Following issue of invoice, this is receipted in Finance One. Data is then entered into the relevant TEFMA spreadsheet, a PDF copy is saved and a hardcopy filed. Invoice data from gas retailers has been used to measure emissions from 2016 to date.

Data quality management

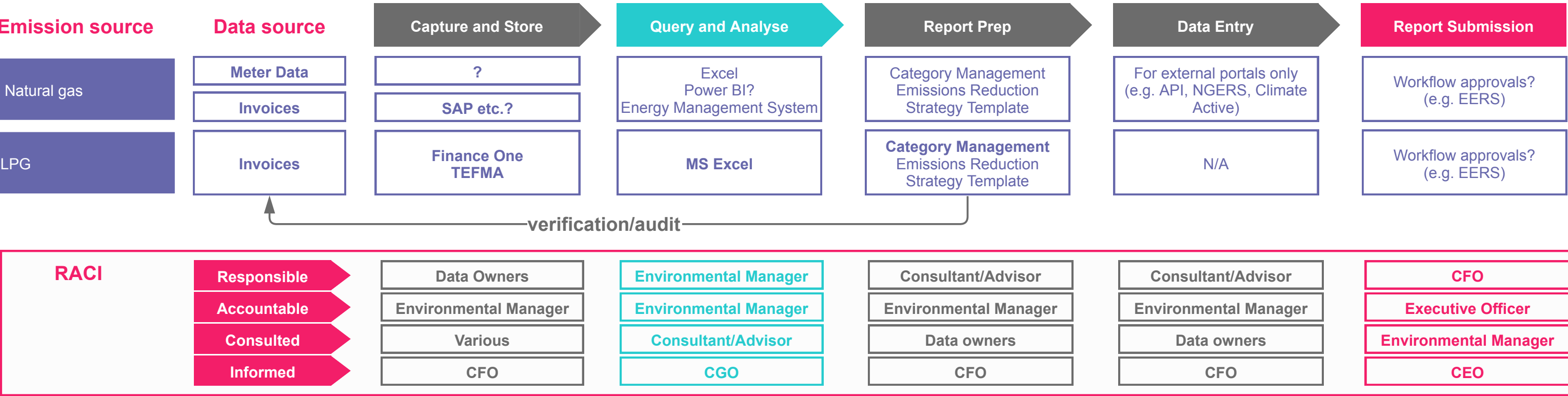
Data should be captured on a monthly basis where available. Data is validated by the DFM Administration Officer periodically. Direct inspection of invoice data from retailers is useful to verify the energy management system data. Alternatively invoice and meter data can be used as the primary source of information in preparing and verifying the emissions reporting.

The site list should be confirmed to ensure any acquisitions or disposals throughout the year are captured. Data should be captured at the MIRN level (meter identification reference number) and aggregated to the site/facility level. Accordingly, the gas retailer/s for each site is captured along with the number of days in the year each site was under operational control by CQU.

Recommendations for improvement

After action reviews following annual reporting should be utilised to recommend improvements to managing gas data

Figure 4.1.1 Natural gas / LPG data management plan



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.1.2 Transport Fuels - Petrol, diesel, ethanol

Data sources and custodian

The finance department is the custodian of the fuel invoice data. CQU captures fuel consumption data via Ampol Fuel Card Greenhouse Gas Emissions Reports. Other fuel sources are required to be entered manually, which include:

- Ad hoc fuel purchases with corporate cards.
- The fuel tank for the grounds crew.

This data is entered into the relevant TEFMA Spreadsheet. CQU's corporate fuel provider has been used to measure emissions since 2019. Prior to 2019, total fuel usage has been used with the split between fuel types based on the average split between 2019 and 2023.

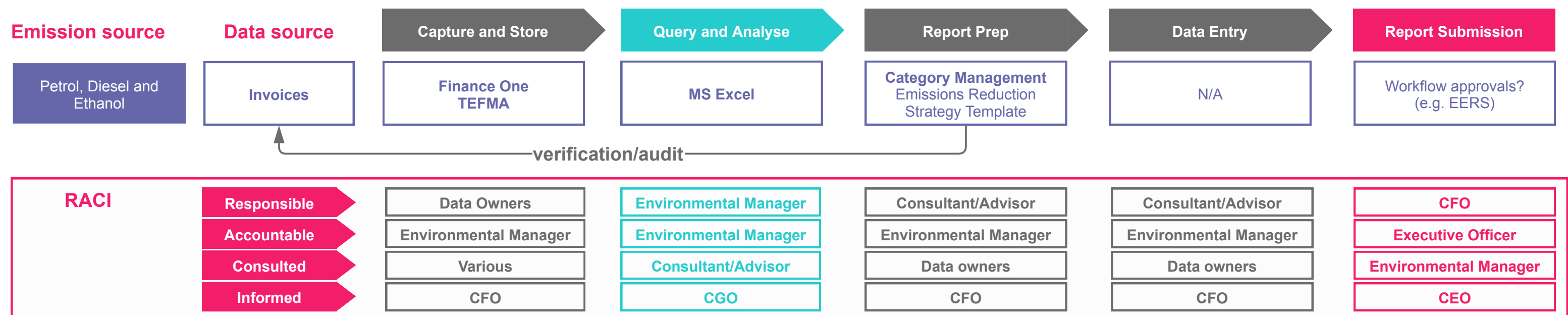
Data quality management

That data is captured at vehicle registration level and aggregated to the site/facility level based on the current vehicle inventory. Data is validated by the DFM Administration Officer periodically.

Recommendations for improvement

After action reviews following annual reporting should be utilised to recommend improvements to managing fuels data

Figure 4.1.2 Transport fuels data management plan



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.1.3 Industrial processes - HVAC-R and HV electrical equipment

Data sources and custodian

he Directorate of Facilities Management is the custodian of the HVAC- R data. This data is maintained in the Archibus Asset Register.

CQU's fugitive emissions arise from refrigerant leakage in its HVAC-R (heating, venting, air-conditioning and refrigeration) assets and SF6 leakage in its high voltage electrical equipment. The predominant sources are air-conditioning units which range in size from small, domestic-style, split system air-conditioners to large chillers.

Measurement has been based on CQU's 2023 asset register comprising x refrigeration assets. Assumed leakage rates have been based on relevant GHG categories for appropriate unit types.

Data quality management

Data quality management needs to be established. HV Switching Data was approximated by equipment specifications. This will be confirmed in the future by CQU's HV Maintenance Contractor.

Recommendations for improvement

Further develop the records management system to capture refrigerant charge volumes and performance characteristics of current HVAC-R and HV electrical asset inventory at site. The intent should be to better assess likely leakage volumes. In addition ensure recording of activities related to HVAC-R and HV equipment such as:

- refrigerant usage,
- leak rates,
- equipment maintenance, and
- new acquisitions.

Step 1: seek invoices for equipment that has been regularly serviced and topped up - gas quantity should be listed, noting a smaller recharge may be included as part of a service fee so no volume recorded

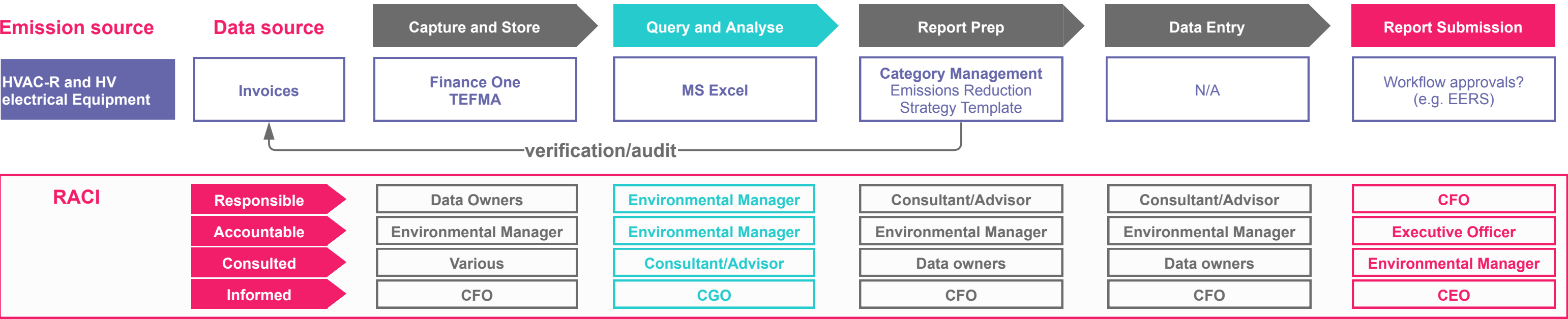
Step 2: For the assets that are not routinely serviced, use the refrigerant used volume in the machine and use the assumed leakage rates for those pieces of equipment.

Step 3: where detail is not available use a climate active assessment to make assumptions about the systems

Continue to do this

Ensure equipment is maintained and serviced by trained professionals, and that any refrigerant leakage is detected and repaired as soon as possible.

Figure 4.1.3 Industrial Process data management plan



STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.1.4 Electricity

Data sources and custodians

The **finance department** is the custodian of the electricity invoice data. CQU capture data using XX, it is important to ensure changes to the underlying data sources don't interrupt or corrupt data integrity and workflow.

Market based data?

what LGCs have been acquired in addition to CS Energy contract?

Data quality management

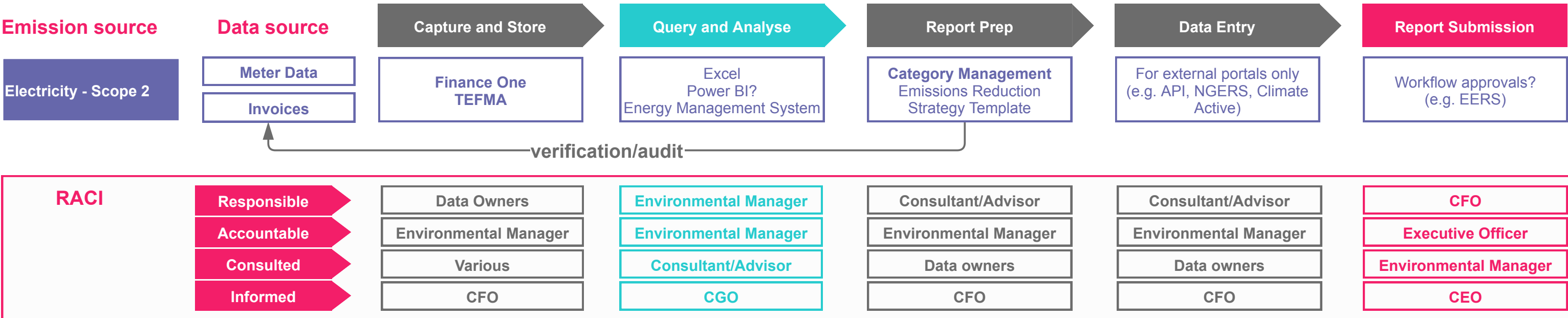
Direct inspection of invoice data from retailers is useful to verify the energy management system data. Alternatively invoice and meter data can be used as the primary sources of information in preparing and verifying the emissions report.

Emission data is captured using the emissions template.

The site list should be confirmed to ensure any acquisitions or disposals throughout the year are captured. Data should be captured at the NMI level (national meter identification) and aggregated to the site/facility level. Accordingly, the electricity retailer/s for each site is captured along with the number of days in the year each site was under operational control by CQU.

If seeking certification Climate Active, assessment of electricity emissions will occur using two methods: The **location-based method** and the **market-based method**.

Figure 4.1.4 Electricity data management plan



Note: Scope 2 emissions result from activities that generate electricity, heating, cooling or steam that is consumed by a facility.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.1.5 Scope 3 Emissions

Scope 3 emissions refer to categories of emissions that arise from an organisations operations by sources that are not directly owned or controlled by that organisation. These emissions include the supply of goods and services, the use and disposal of an organisations products and any resulting travel. They are typically the largest contributor to an organisations carbon footprint.

In particular, scope 3 emissions are categorised under the Climate Active Standard as follows:

- Purchased goods and services
- Capital goods
- Fuel-related and energy-related activities
- Upstream transportation and distribution
- Waste generated in operations
- Business travel
- Employee commuting
- Upstream leased assets
- Downstream transportation and distribution
- Processing of sold products
- Use of sold products
- End-of-life treatment of sold products
- Downstream leased assets
- Franchises
- Investments

Accordingly, developing an inventory of an organisation's Scope 3 emissions can be complex and many of the categories (and sub-categories) of emissions sources may not be relevant. Nevertheless, based on public reports of universities that have obtained Climate Active accreditation, there seems to be a relatively consistent categorisation of emissions sources at the level below the categories mentioned above. These are reflected in the table below.

Not all of the emissions from these categories will be relevant to CQU and so they should be tested for relevance.

Recommendations for improvement

Consider the likely Scope 3 emissions for the organisation and determine when to commence calculating and reporting Scope 3 emissions and develop a records management plan.

Continue to do this

Continue to undertake Scope 3 mitigation activities even prior to quantification as these will reduce the emissions footprint. Examples include: reducing waste to landfill through on-site composting and recycling, reducing travel, encouraging walking and cycling and leasing energy efficient spaces.

Emissions category (Scope 3)	
Purchased goods and services	Accommodation and facilities
Capital goods	Carbon Neutral Products and Services
Fuel-related and energy-related activities	Cleaning and Chemicals
Upstream transportation and distribution	Construction Materials and Services
Waste generated in operations	Electricity
Business travel	Food
Employee commuting	Horticulture and Agriculture
Upstream leased assets	ICT services and equipment
Downstream transportation and distribution	Livestock
Processing of sold products	Machinery and vehicles
Use of sold products	Office equipment & supplies
End-of-life treatment of sold products	Postage, courier and freight
Downstream leased assets	Products
Franchises	Professional Services
Investments	Refrigerants
	Stationary Energy (gaseous fuels)
	Stationary Energy (liquid fuels)
	Stationary Energy (solid fuels)
	Transport (Air)
	Transport (Land and Sea)
	Washroom paper
	Waste
	Water and wastewater
	Working from home

Intentionally left blank until scope 3 emissions mapping and data sources identified

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.2 Team members, roles and responsibilities

It is prudent to identify and develop a dedicated team for emission reporting to ensure that the reporting requirements are met effectively and efficiently. The team is responsible for coordinating data collection, verifying data accuracy.

The team not only ensures that the reporting process is conducted efficiently and effectively, it provides a centralized point of contact for stakeholders within the business, such as facility managers and environmental staff, to obtain information and support related to emissions data and similar environmental reporting as well as clear lines of communication with external stakeholders such as the CER.

The team should have clear responsibilities and authority to ensure meeting the GHG protocol requirements. The team should consist of individuals with relevant experience, knowledge, and skills in environmental management, emissions reporting, data analysis, compliance and auditing. This should include regular training and awareness programs for relevant staff members.

The organization's executive leadership should have oversight of the emissions reporting process to ensure that it is given the necessary resources and attention. This includes ensuring that the necessary staff and funding are allocated to the team and that the organization's policies and procedures are being followed.

Figure 4.2 Team Governance Structure and role description

CentralQueensland University	General Counsel and Company Secretary	Complete	Take reasonable steps to ensure that the company keeps records and calculates emissions, energy consumption, and production data in accordance with the Climate Active requirements and that the corporate profile is up to date.
	Chief Financial Officer	Complete	Accountable for verification of financial data and reports
	Financial Controller	Complete	Responsible for verification of financial data used in the preparation of reports
	HSE Standards and Compliance Manager	Complete	Responsible for regular data capture, monitoring of existing and new energy consumption and emissions sources, data analysis and reporting in accordance with Climate Active
	Adelaide	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Brisbane	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Bundaberg	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Cairns	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Emerald	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Gladstone	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Mackay	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Melbourne	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Rockhampton	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Sydney	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Rockhampton	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.
	Sydney	Site representative	Assist the regular capture of data and the preparation, review and auditing of reports.

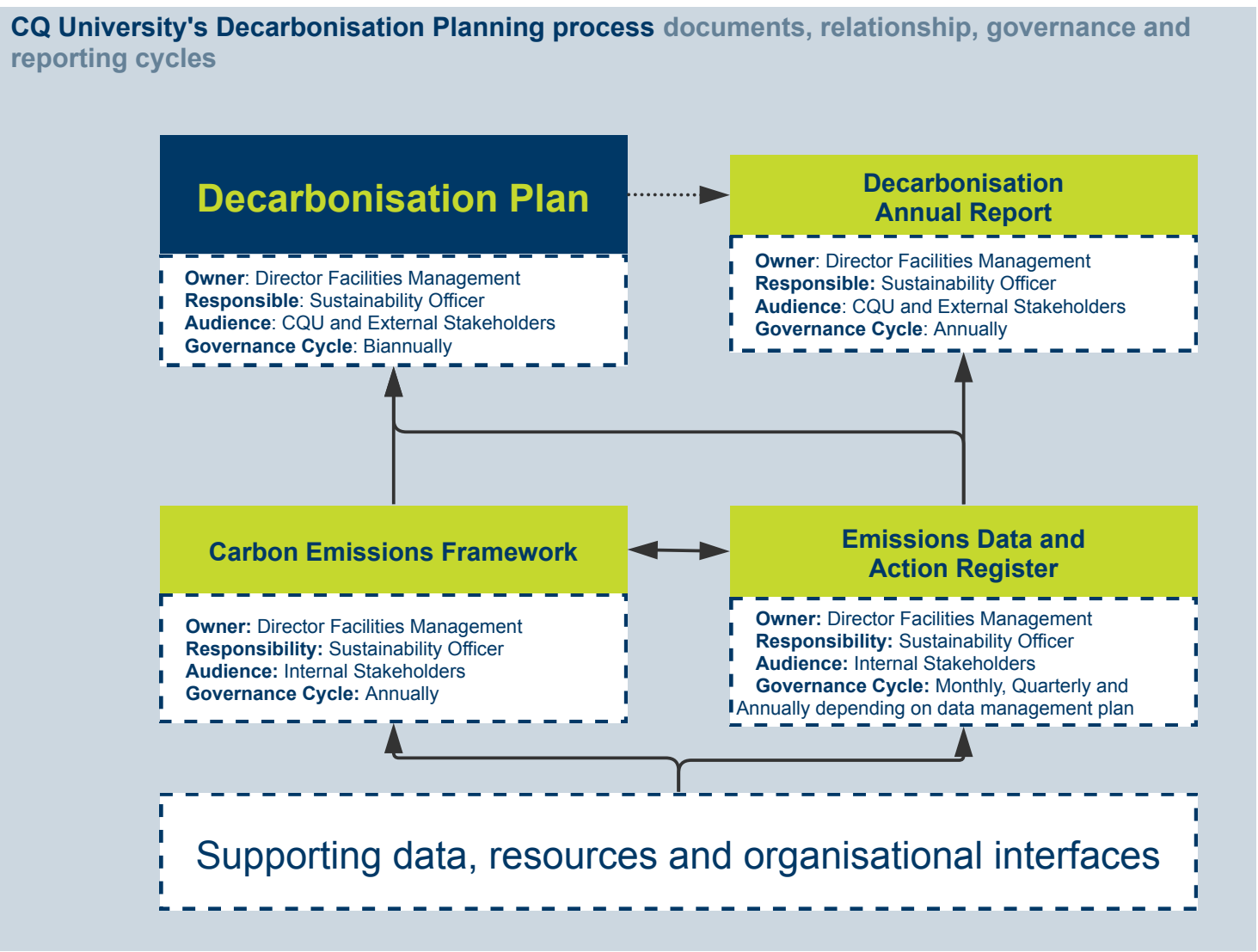
STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.3 Governance, monitoring and reporting

CQU has developed detailed decarbonisation planning procedures and process drawing on several guidelines and protocols including the international greenhouse gas (GHG) protocol, Australia’s Climate Active Standard and the National Greenhouse Emissions Reporting Scheme (NGERS).

The Decarbonisation Strategic Plan, Annual Decarbonisation Report, Decarbonisation Framework, and Emissions Data and Action Register are owned, prepared and updated by CQUs Facilities Management Directorate. Ongoing quality management of data is paramount to a credible emissions reporting plan. Key interfaces with internal stakeholders such as the sustainability team will be important to ensure data such as research-specific emissions are captured accurately and tested for relevance with respect to reporting.

Figure 4.3 CQ University's Decarbonisation Planning process documents, relationship, governance and reporting cycles



Decarbonisation Framework. The framework underpins this Decarbonisation Strategic Plan and is intended to be a living document that provides a record of CQU’s approach to identifying and measuring its carbon inventory. Importantly, the framework is not only fit for CQU’s current needs, it also forms a foundation for future development that CQU may choose to adopt, such as;

- extending its emissions measurement and reporting to include Scope 3 emissions, and/or
- certification under a scheme such as Climate Active.

In doing so, it provides the necessary detail expected of the GHG Protocol, Climate Active Standards and NGERS for:

- defining its emissions boundary,
- identifying and managing data requirements,
- establishing a baseline year and triggers for re-baselining,
- measuring and reporting emissions,
- principles for prioritising decarbonisation actions,
- recording actions and progress towards targets, and
- governance including assurance and auditing.

The framework is intended to be updated annually. By doing so it will capture changes to CQU’s carbon inventory resulting from:

- changes in emissions boundary that may occur due to acquisitions or divestments,
- changes to operations that alter control and/or influence over emissions,
- the need, if any, to re-baseline,
- changes in emissions intensity,
- reduction in emissions due to decarbonisation initiatives.

Decarbonisation Annual Report. By updating the framework annually, CQU will have the appropriate robustness in its processes to provide an annual decarbonisation report that includes:

- total annual emissions by scope and emissions source,
- a comparison with the baseline year and targets,
- progress on decarbonisation initiatives, and
- updates to the decarbonisation action register.

Emissions Data and Action Register. Updating the Framework requires a significant amount of data and information from various internal stakeholders and interfaces. The data is collated and aggregated in a central data repository. The repository is used to calculate and report on emissions in accordance with the requirements of the framework. The Action Register also requires regular updating to ensure annual reporting of progress against targets.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

Organisational interfaces. Updating the Framework requires a significant amount of data and information from various internal stakeholders and interfaces. The data is collated and aggregated in a central data repository. The repository is used to calculate and report on emissions in accordance with the requirements of the framework. The Action Register also requires regular updating to ensure annual reporting of progress against targets. In particular interfaces with the sustainability team and research centres will ensure appropriate data integrity for emissions related to specific research programs.

It is important for efficient and timely reporting that key stakeholders and data custodians are engaged regularly and early and understand the significance of the Decarbonisation Plan to CQU in terms of reporting on measures within the strategic plan as well as embodying their roles as **“agents of profound social impact”**.

Assurances. Every effort is made by the Directorate of Facilities to capture relevant emissions activities and sources and to accurately track, estimate and manage emissions and emissions reduction initiatives in accordance with the decarbonisation planning system. Nevertheless, it is important that independent verification is undertaken from time to time to not only assure integrity of the process and outcomes but to identify opportunities for improvement. Accordingly, an internal audit will be conducted biannually in conjunction with an update to this Plan.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Understand and accepting core principles	Measure	Act	Assurance/Certification

4.4 Certification

We understand at present that CQU is focused on Scope 1 and Scope 2 emissions management and reporting. However, by following the Carbon Active Standard CQU could progressively work towards certification in the future if desired. Incorporating a high level overview of the Carbon Active certification process and principles it provides CQU with a heads-up towards possible future opportunities and requirements.

In the event CQU chooses to gain Climate Active certification this section of the framework would require additional detail to capture the 6 steps for getting certified and staying certified as illustrated in Figure x.x below.

Figure 4.4 Applying for and maintaining carbon neutral certification under Climate Active



5.1

Carbon Account for Base Year

The responsible entity seeking carbon neutral certification must have all relevant data and must be able to calculate the organisation’s carbon account for a full year before applying for carbon neutral certification. This is known as the base year.

The base year carbon account:

- demonstrates an understanding of what must be included in the organisation’s carbon account, and what data must be collected and reported annually to maintain certification
- provides a starting point for comparing emissions over time
- sets the timing of the annual reporting obligations (either on a financial or calendar year cycle) that will have to be met to maintain carbon neutral certification. Either a financial or calendar year can be chosen as the base year, depending on which best suits the timing for carbon account data collection or aligns with business processes.

5.3

Public Report

Transparency of information is important for maintaining consumer confidence in carbon neutral claims. An organisation seeking certification by the Climate Active team must prepare a public report as described in the Climate Active Standards as part of the application for carbon neutral certification and on an annual basis thereafter.

5.2

Independent Validation

An organisation applying for carbon neutral certification must have the source data in the carbon account (base year) independently audited or verified. An organisation may also be required to have the carbon neutral claim (such as inclusions and exclusions from the emissions boundary) independently assessed.

Common Emission Framework, Standards and Protocols

The table below summarises several of the most commonly adopted international and national emissions frameworks, standards and protocols. Given NGER reporting is focused on compliance for organisations that exceed thresholds as opposed to the voluntary nature of most other standards it isn't the best fit for CQU at present. The remaining protocols are global except for Climate Active and have varying levels of uptake. Based on the criteria presented in Figure P.1, most protocols are similar. There is no apparent downside to adopting the Climate Active standard over the global alternatives. Moreover, it provides scope for achieving certification should that be of interest in the future.

Common emission framework, standards and protocols

	Climate Active	Greenhouse Gas Protocol (GHG)	ISO 14064	National Greenhouse Gas and Energy Reporting (NGER)	Science-Based Targets initiative (SBTi)	PAS 2060
	Climate Active is an Australian Government initiative. The Climate Active Carbon Neutral Standard sets out the principles and processes for achieving carbon neutrality and certification is awarded to organisations that meet the requirements of the Standard. Climate Active certification is available for organisations (business operations), products, services, events, precincts and buildings.	The Greenhouse Gas Protocol is an internationally recognised greenhouse gas accounting standard which focuses on the accounting and reporting of emissions. It provides standards guidance and tools to business and government to measure and manage emissions.	This international standard addresses the quantification and reporting of greenhouse gas emissions and the verification of this information. ISO 14064 exists as a guide for the private and public sector in developing GHG inventories for their organisation as well as foundation for policy makers to address the global environmental challenge of climate change.	The NGERs reporting mechanism was introduced in 2007 and only applies to corporations exceeding the Greenhouse Gas thresholds. The accounting method is based on the Greenhouse Gas Protocol (GHG) and covers scope 1 and 2 emissions only.	Science-based targets provide a clearly-defined pathway for companies to reduce greenhouse gas (GHG) emissions. Targets are considered 'science-based' if they are in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement – limiting global warming to 1.5°C above pre-industrial levels.	An internationally recognised standard that specifies a four stage process to demonstrate carbon neutrality. The standard defines the requirements for assessing, reducing and offsetting GHG emissions. The standards supports verification through qualifying explanatory statements and public disclosure.
Recognition	Australia Only	Global	Global	Australia Only	Global	Global
Objective	Carbon neutrality	GHG Accounting	GHG Accounting	GHG Accounting	Net Zero Emissions	Carbon Neutrality
Emissions Coverage	Scope 1,2 and 3	Scope 1,2 and 3	Scope 1,2 and 3	Scope 1 and 2	Scope 1,2 and 3	Scope 1,2 and 3
Provides Certification	Provides certification	No Certification	Provides certification	No Certification	No Certification	Provides certification
Level of Uptake	Medium	High	Medium	Low	High	Medium

Scope 3 Emission Category Descriptions

Scope 3 Emission Categories	Description
Purchased Goods and Services	This category includes all upstream (i.e., cradle-to-gate) emissions from the production of products purchased or acquired by the reporting company in the reporting year. Products include both goods (tangible products) and services (intangible products).
Capital goods	This category includes all upstream (i.e., cradle-to-gate) emissions from the production of capital goods purchased or acquired by the reporting company in the reporting year. Emissions from the use of capital goods by the reporting company are accounted for in either scope 1 (e.g., for fuel use) or scope 2 (e.g., for electricity use), rather than in scope 3. Capital goods are final products that have an extended life and are used by the company to manufacture a product; provide a service; or sell, store, and deliver merchandise.
Fuel-related and energy-related activities	This category includes emissions related to the production of fuels and energy purchased and consumed by the reporting company in the reporting year that are not included in scope 1 or scope 2. Category 3 excludes emissions from the combustion of fuels or electricity consumed by the reporting company because they are already included in scope 1 or scope 2.
Upstream transportation and distribution	Transportation and distribution of products purchased in the reporting year, between a company's tier 1 suppliers and its own operations in vehicles not owned or operated by the reporting company (including multi-modal shipping where multiple carriers are involved in the delivery of a product, but excluding fuel and energy products). Third-party transportation and distribution services purchased by the reporting company in the reporting year (either directly or through an intermediary), including inbound logistics, outbound logistics (e.g., of sold products), and third-party transportation and distribution between a company's own facilities.
Waste generated in operations	Emissions from third-party disposal and treatment of waste generated in the reporting company's owned or controlled operations in the reporting year. This category includes emissions from disposal of both solid waste and wastewater. Waste treatment at facilities owned or controlled by the reporting company is accounted for in scope 1 and scope 2.
Business travel	This category includes emissions from the transportation of employees for business related activities in vehicles owned or operated by third parties , such as aircraft, trains, buses, and passenger cars.
Employee commuting	This category includes emissions from the transportation of employees ⁴ between their homes and their worksites. Emissions from employee commuting may arise from: • Automobile travel • Bus travel • Rail travel • Air travel • Other modes of transportation (e.g., subway, bicycling, walking). Companies may include emissions from teleworking (i.e., employees working remotely) in this category.
Upstream leased assets	Emissions from the operation of assets that are leased by the reporting company in the reporting year and not already included in the reporting company's scope 1 or scope 2 inventories. This category is applicable only to companies that operate leased assets (i.e., lessees).
Downstream transportation and distribution	This category includes emissions that occur in the reporting year from transportation and distribution of sold products in vehicles and facilities not owned or controlled by the reporting company.
Processing of sold products	Emissions from processing of sold intermediate products by third parties (e.g., manufacturers) subsequent to sale by the reporting company. Intermediate products are products that require further processing, transformation, or inclusion in another product before use, and therefore result in emissions from processing subsequent to sale by the reporting company and before use by the end consumer. Emissions from processing should be allocated to the intermediate product.
Use of sold products	This category includes emissions from the use of goods and services sold by the reporting company in the reporting year. A reporting company's scope 3 emissions from use of sold products include the scope 1 and scope 2 emissions of end users. End users include both consumers and business customers that use final products.
End-of-life treatment of sold products	Emissions from the waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life. This category includes the total expected end-of-life emissions from all products sold in the reporting year.
Downstream leased assets	This category includes emissions from the operation of assets that are owned by the reporting company (acting as lessor) and leased to other entities in the reporting year that are not already included in scope 1 or scope 2. This category is applicable to lessors (i.e., companies that receive payments from lessees).
Franchises	Emissions from the operation of franchises not included in scope 1 or scope 2. A franchise is a business operating under a license to sell or distribute another company's goods or services within a certain location. This category is applicable to franchisors (i.e., companies that grant licenses to other entities to sell or distribute its goods or services in return for payments, such as royalties for the use of trademarks and other services). Franchisors should account for emissions that occur from the operation of franchises (i.e., the scope 1 and scope 2 emissions of franchisees) in this category.
Investments	This category includes scope 3 emissions associated with the reporting company's investments in the reporting year, not already included in scope 1 or scope 2. This category is applicable to investors (i.e., companies that make an investment with the objective of making a profit) and companies that provide financial services.

Fuel Combustion - Calculating Carbon Content

Division 2.4.2—Method 1—emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum based oils or greases

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1\,000}$$

where:

E_{ij} is the emissions of gas type (j), being carbon dioxide, methane or nitrous oxide, released from the combustion of fuel type (i) from the operation of the facility during the year measured in CO₂-e tonnes.

Q_i is the quantity of fuel type (i) combusted from the operation of the facility for:

- (a) stationary energy purposes; and
- (b) transport energy purposes;

during the year measured in kilolitres and estimated under Division 2.4.6.

EC_i is the energy content factor of fuel type (i) estimated under section 6.5.

EF_{ijoxec} is the emission factor for each gas type (j) released from the operation of the facility during the year (which includes the effect of an oxidation factor) measured in kilograms CO₂-e per gigajoule of fuel type (i) according to source as mentioned in:

- (a) for stationary energy purposes—Part 3 of Schedule 1; and
- (b) for transport energy purposes—Division 4.1 of Schedule 1.

2.49 Purpose of Division

This Division sets out how quantities of liquid fuels combusted from the operation of a facility are to be estimated for the purpose of working out the emissions released from the combustion of that fuel.

2.50 Criteria for measurement

- (1) For the purpose of calculating the combustion of a liquid fuel from the operation of a facility for a year and, in particular, for Q_i in sections 2.41 and 2.42 the combustion must be estimated in accordance with this section.

Acquisition involves commercial transaction

- (2) If the acquisition of the liquid fuel involves a commercial transaction, the quantity of fuel combusted must be estimated using one of the following criteria:
 - (a) the amount of the liquid fuel delivered for the facility during the year as evidenced by invoices issued by the vendor of the fuel (**criterion A**);
 - (b) as provided in section 2.51 (**criterion AA**);
 - (c) as provided in section 2.52 (**criterion AAA**).
- (3) If, during a year, criterion AA, or criterion AAA using paragraph 2.52(2)(a), is used to estimate the quantity of fuel combusted then, in each year following that year, only criterion AA, or criterion AAA using paragraph 2.52(2)(a), (respectively) may be used.

Acquisition does not involve commercial transaction

- (4) If the acquisition of the liquid fuel does not involve a commercial transaction, the quantity of fuel combusted must be estimated using one of the following criteria:
 - (a) as provided in paragraph 2.52(2)(a) (**criterion AAA**);
 - (b) as provided in section 2.53 (**criterion BBB**).

2.51 Indirect measurement—criterion AA

For paragraph 2.50(2)(b), criterion AA is the amount of the liquid fuel combusted from the operation of the facility during the year based on amounts delivered during the year (evidenced by invoices) as adjusted for the estimated change in the quantity of the stockpile of the fuel for the facility during the year.

2.52 Direct measurement—criterion AAA

- (1) For paragraph 2.50(2)(c), criterion AAA is the measurement during the year of the liquid fuel combusted from the operation of the facility.

Fuel Combustion - Calculating Carbon Content

4.3.2.2 Energy content and emissions factors by fuel

Part 4 of the Determination sets out the energy content and emissions factors to be applied to the Method 1 formula for transport fuels.

There are alternative tables for specific vehicles based on their age and thus emissions standards. The tables from the Determination are presented below.

Source: The Determination, compilation date 21/9/2023

Part 4—Fuel combustion—fuels for transport energy purposes

Division 4.1—Fuel combustion—fuels for transport energy purposes

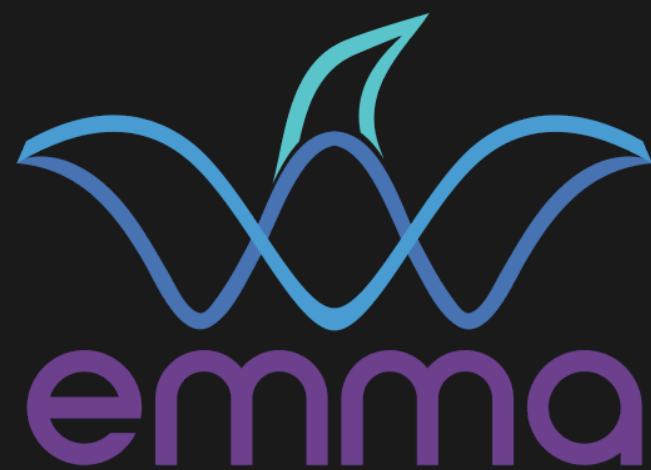
Item	Fuel combusted	Energy content factor (GJ/kL unless otherwise indicated)	Emission factor kg CO ₂ -e/GJ (relevant oxidation factors incorporated)		
			CO ₂	CH ₄	N ₂ O
53	Gasoline (other than for use as fuel in an aircraft)	34.2	67.4	0.6	1.6
54	Diesel oil	38.6	69.9	0.1	0.4
55	Gasoline for use as fuel in an aircraft	33.1	67.0	0.06	0.6
56	Kerosene for use as fuel in an aircraft	36.8	69.6	0.01	0.6
57	Fuel oil	39.7	73.6	0.08	0.5
58	Liquefied petroleum gas	26.2	60.2	0.7	0.6
59	Biodiesel	34.6	0.0	0.8	1.7
59A	Renewable aviation kerosene	36.8	0.0	0.01	0.6
59B	Renewable diesel	38.6	0.0	0.1	0.4
60	Ethanol for use as fuel in an internal combustion engine	23.4	0.0	0.8	1.7
61	Biofuels other than those mentioned in items 59, 59A, 59B and 60	23.4	0.0	0.8	1.7
62	Compressed natural gas that has reverted to standard conditions (light duty vehicles)	39.3 × 10 ⁻³ GJ/m ³	51.4	7.3	0.3
63	Compressed natural gas that has reverted to standard conditions (heavy duty vehicles)	39.3 × 10 ⁻³ GJ/m ³	51.4	2.8	0.3
63A	Liquefied natural gas (light duty vehicles)	25.3	51.4	7.3	0.3
63B	Liquefied natural gas (heavy duty vehicles)	25.3	51.4	2.8	0.3

Division 4.2—Fuel combustion—liquid fuels for transport energy purposes for post-2004 vehicles

Item	Fuel combusted	Energy content factor GJ/kL	Emission factor kg CO ₂ -e/GJ (relevant oxidation factors incorporated)		
			CO ₂	CH ₄	N ₂ O
64	Gasoline (other than for use as fuel in an aircraft)	34.2	67.4	0.02	0.2
65	Diesel oil	38.6	69.9	0.01	0.5
65A	Renewable diesel	38.6	0.00	0.01	0.5
66	Liquefied petroleum gas	26.2	60.2	0.5	0.3
67	Ethanol for use as fuel in an internal combustion engine	23.4	0.0	0.2	0.2

Division 4.3—Fuel combustion—liquid fuels for transport energy purposes for certain trucks

Item	Fuel type	Heavy vehicles design standard	Energy content factor GJ/kL	Emission factor kg CO ₂ -e/GJ (relevant oxidation factors incorporated)		
				CO ₂	CH ₄	N ₂ O
68	Diesel oil	Euro iv or higher	38.6	69.9	0.07	0.4
68A	Renewable diesel	Euro iv or higher	38.6	0.00	0.07	0.4
69	Diesel oil	Euro iii	38.6	69.9	0.1	0.4
69A	Renewable diesel	Euro iii	38.6	0.00	0.1	0.4
70	Diesel oil	Euro i	38.6	69.9	0.2	0.4
70A	Renewable diesel	Euro i	38.6	0.00	0.2	0.4



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