CY trellis 21

Greenhouse Gas Emissions Profiles for Selected South Australian Local Governments

PREPARED FOR GREEN INDUSTRIES SA

Trellis Technologies Pty Ltd

1300 775 410
www.yourtrellis.com

trellis

Trellis Technologies Pty Ltd
ABN 15 123 897 012
Level 1 Mirnani Apinthi Building, Lot14, North Terrace, Adelaide SA 5000, Australia
T: 1300 775 410
E: info@yourtrellis.com
W: www.yourtrellis.com

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Acknowledgements

This work was supported by Green Industries SA. Active consent and participation of 12 South Australian Local Governments using Trellis Technologies online platform was received. Trellis Technologies would like to thank Green Industries SA and the participating councils for their willingness to share information in order to produce this report.

Green Industries SA works in supporting the circular economy through a range of business and industry engagements across four focus areas, including: Waste and Recycling, Circular Economy, Green Economy and People, Systems and Performance (see GISA Business Plan 2022-23 https://www.greenindustries.sa.gov.au/resources/business-plan-2022-23, accessed October 2022).

Benchmarking allows comparison across councils, encourages collaboration in the pursuit of better outcomes for all and opens up new discussions about what is possible.

Government of South Australia
Green Industries SA

SNAPSHOT : CY2021

Data & Analysis provided by Trellis Technologies

12 SA COUNCILS

5,653 FACILITIES

RESPONSIBLE FOR

$700M

OF RATEABLE REVENUE

TOTAL EMISSIONS MEASURED OVER THE PERIOD WERE:

36,534 tCO^2e

Executive Summary

Green Industries SA (GISA) engaged Trellis Technologies Pty Ltd to undertake a benchmarked analysis of South Australian local governments with respect to their relative performance in greenhouse gas (GHG) emissions targets, management goals and related data acquisition.

Trellis Technologies Pty Ltd through their Trellis web-based data acquisition, management and analysis platform currently serves 14 South Australian councils. As such, Trellis was well positioned to undertake a benchmarking study that compares and contrasts energy usage, emissions and costs at a corporate level for each consenting council.

The project was undertaken with the following broad objectives:

- Trellis would engage with its South Australian local government clients to invite their participation (note that a minimum of eight was required for the project to proceed).
- Compile and compare GHG emissions management strategies and carbon neutral/net zero targets across councils.
- Compile data on actual projects undertaken by participant councils (i.e. specific investments related to emissions management as opposed to proposed/aspirational goals).
- Identify appropriate benchmarks for standardisation of resource consumption and related emissions.
- Compare and contrast emissions data tracked by each council and provide recommendations for additional sources that should be considered.
- Analyse corporate level resource consumption and emissions as well broader operational categories (corporate, depots and maintenance, libraries, sporting and recreational facilities and parks and gardens).
- Results of the analysis to be communicated to GISA as well as participating councils, and depending on outcomes of discussion, shared more broadly with other councils.

Twelve South Australian local governments, encompassing around 49% of the state's population, agreed to an anonymised analysis of their greenhouse gas emissions management goals, projects, investments, data acquisition and management and overall maturity in progress toward carbon neutral targets.

The Climate Active carbon neutral accreditation process for organisations was used as a backdrop against which councils were independently compared. Climate Active is managed by the Australian Government Department of Climate Change, Energy, Environment and Water with the aim of coordinating carbon neutral accreditation in Australia in line with national and international legislation and protocols (see Appendices A, B). Importantly, it needs to be acknowledged that entities (including councils) do not have to go through accreditation to manage their emissions.

Half of the participating councils have declared a climate emergency. Two thirds of the councils have set carbon neutral target years, ranging from 2024 to 2050, with 2030 the most common goal. The remaining third had no publicly available carbon neutral target year, including two that declared a climate emergency. Note that lack of a target year did not mean a council was not engaged in emissions management activities.

Emissions management investments were broadly similar across all the participating councils, being primarily focused on renewable energy (both purchased and generated), efficiency investments (mostly street lighting) and ongoing fleet upgrades.

In general terms, the data currently collected in support of emissions management encompassed most, if not all, the mandatory sources that are required under Climate Active (including all stationary and transport fuels, electricity and natural gas – which are typically considered Scope 1 and 2 emission sources – refer to *Appendix C - Glossary* for explanation of 'scopes').

Conversely, the inclusion of non-mandatory sources covered under Climate Active (mostly covered under Scope 3 – refer to *Appendix C - Glossary)* was patchy, with water and waste being most consistently assessed. An examination of fourteen Climate Active accredited Australian local governments indicated a broad range of additional emissions categories that may be relevant.

Executive Summary

If Climate Active accreditation is considered a component of carbon neutral targets, councils will need to consider a varying but potentially large number of additional data categories in order to align with national standards. This gap entails a risk of a shortfall in planning across emissions management and investment. Even if accreditation is not required, alignment with national standards in a local government's carbon neutral journey is strongly recommended to enable ready comparison, enhance transparency and avoid perceptions of "greenwash".

Comparison of emissions across a continuous set of emission sources (electricity, natural gas, transport fuel, stationary fuel and water), standardised by the number of rateable properties, indicated that regional councils tend to have higher emissions intensity compared to their urban and peri-urban counterparts. This trend was most likely related to the need for a basic level of services to be delivered by councils regardless of their level of urbanisation, that are nonetheless spread over a smaller number of rateable properties in regional settings. With the need to maintain service delivery across a smaller revenue base, emissions management within regional councils may therefore be more challenging.

Effective unit cost (defined as the total resource usage divided by related costs) was used as a means of comparing consumption efficiency for natural gas, electricity, stationary fuel and transport fuel. Across the participant councils, there is a trend for higher effective unit costs as consumption decreases. This trend is most probably due to the greater influence of fixed costs, typically related to metering and supply charges. Several councils would likely benefit from further investigation of resource consumption and expenditure with a view to reviewing their procurement process.

Recommendations

As the most publicly accessible branch of government, councils have an important role in responding to climate change. However, emissions management for councils is particularly challenging as they are operationally and geographically diffuse. Development and implementation of a carbon neutrality strategy is complex, requiring rigorous data and management approaches across a potentially broad suite of activities in a manner that is both accountable and transparent.

Based on the outcomes of this investigation there are a number of areas of potential improvement for the councils that participated, including:

- Councils should seek to improve data quality and tracking for emissions and energy efficiency projects, both current and planned, as this would assist in understanding progress toward targets.
- Each council needs to determine whether their individual carbon neutral pathway is to include accreditation under Climate Active. If accreditation is the goal, there is a potentially urgent need (noting that two councils have an FY 2024 target) to develop a deeper understanding of the requirements and to implement additional data capture and reporting capability.
- If emissions management does not include certification under Climate Active, compliance with the framework should be encouraged as this provides transparency and certainty. Trellis Technologies recommends avoiding any perceptions of "greenwashing" through alignment with recognised legislation and standards. As a minimum, councils should ensure they maintain adequate data records to back-up any emissions management claims that are made, such that they can be independently assessed.

More broadly, there are potential improvements that could be considered through:

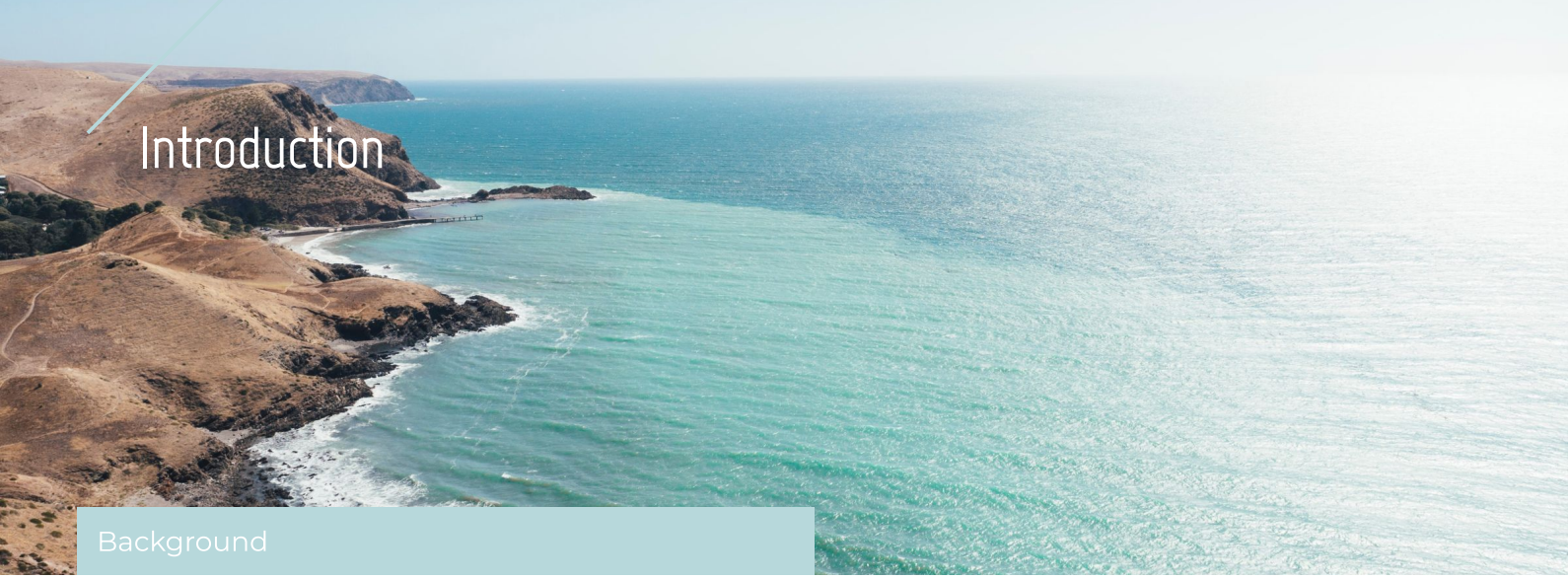
- Engagement with the Local Government Association which may be able to assist councils in developing their carbon neutral pathways, through establishing a communications strategy of the requirements for achieving carbon neutral targets (accredited or otherwise). This strategy would assist in promoting confidence, efficiency and consistency in approaches to emissions management and reporting. The latter may be particularly important if councils decide not to undertake accreditation.
- Encouraging local governments to engage in an ongoing (biannual) non-anonymised analysis along the lines of this study would likely improve the capacity to summarise and interpret data and draw more meaningful conclusions. This approach could foster collaboration and constructive competition across local governments as well as potentially expand the number of participants and therefore the value of reports such as this.

Across the participating councils, facility groupings (aggregations of facilities based on operation type, see page 19) need to be reviewed to provide a more consistent suite of categories as well as resolving facilities that are not allocated to a group. This process would improve the capacity to compare and contrast across councils, with related benefits for collaboration on setting targets and assessing emissions management.

Analysis at the facility group level across councils may be improved by focusing on using a specific category (such as fleets) with target benchmark data (such as the number of vehicles).

There are also some participant-specific recommendations for councils to consider in relation to potential resource efficiency and related expenditure savings, specifically:

- Council L - investigate its procurement of natural gas.
- Councils A, B, F and L - consider a more in-depth analysis of their electricity procurement.
- Councils A, F and G - investigate water consumption and cost.



Introduction

Background

Local governments have an important role in responding to climate change as they are the most publicly accessible branch of government and can therefore provide visible on ground leadership in emissions management in line with growing community expectations.

However, the development of strategies to combat climate change within this sector is also quite challenging as local governments:

- are operationally complex
- operate across a geographically dispersed range of facilities
- need to be accountable for investments and demonstrate cost effective progress toward targets and
- are expected to educate, encourage and foster collaboration.

In developing and encouraging greenhouse gas emissions management across the local government sector there is a need to understand:

- levels of maturity in understanding the requirements for transparent and rigorous emissions management
- development of targets and underlying management strategies and
- breadth and depth of data required in support of emissions management.

In support of the above, Green Industries SA (GISA) engaged Trellis Technologies Pty Ltd to undertake a benchmarked analysis of the local government data maintained on the latter's web-based data acquisition, management and analysis platform. Trellis Technologies currently serves 14 South Australian councils. As such, Trellis was well positioned to undertake a benchmarking study that compares and contrasts energy usage, emissions and costs at a corporate level for each consenting council.

Twelve South Australian local governments consented to the analysis of their greenhouse gas emissions and related management based on data for calendar year (CY) 2021. These councils comprised around 18% of the 68 local government areas in South Australia and encompassed around 49% of the state's population as well as a broad range of geographic sizes, socio-economic states, levels of urbanisation and climate management objectives.

The Climate Active certification process was used as an independent framework against which the participating local governments were assessed. Certification of carbon neutrality in Australia is administered through Climate Active (see https://www.climateactive.org.au/, accessed July 2022; Appendix A) and is aligned with national and international legislation and protocols. Use of Climate Active as an independent backdrop for comparison therefore allows assessment of each council in the context of appropriate national standards (see Appendix B). While councils may choose to manage and report on emissions independently of Climate Active, alignment with the national accreditation framework is considered important to encourage consistency, promote transparency and avoid perceptions of "greenwash".

Note that, at the time of writing, around fourteen local governments were registered as carbon neutral under Climate Active (see https://www.climateactive.org.au/buy-climate-active/certified-brands, accessed July 2022).

As half of participating councils requested anonymity, the analyses were undertaken in such a manner as to restrict identification.

All participants data were collected and maintained via Trellis Technologies' online management system.

Introduction

Purpose

Specifically, the aims of the study were to:

- summarise the emissions management targets across the participating councils
- compare the current emission sources included within each council's emissions inventory for CY 2021
- compare total emissions across participants based on a shared set of resource types
- compare consumption and costs across major emission sources and
- encourage understanding of the broader context for emissions management and potential for accreditation under Climate Active (see Appendix A).

Approach

All emissions data in this assessment are collated, stored and managed for each council within Trellis Technologies' online platform (see https://yourtrellis.com/).

Data on council's investments in projects were also obtained from the Trellis platform, supported by targeted interviews. However, there may be other investments undertaken by participants that were not considered as being within scope.

Trellis Technologies Pty Ltd is a positive disruptor in the facilities, utilities, resources and greenhouse gas (GHG) accounting space (Figure 1) with the differentiator being a machine learning approach to data acquisition supported by a fully managed online data service. Trellis's approach provides highly resolved data on resource usage (and waste), GHG emissions (tCO2-e) and costs ($) to create a 'single source of truth' for utilities management. Data is acquired in close to real time which fosters trust among stakeholders, provides actionable insights and supports efficiency across multiple business areas to support, guide and ultimately speed up the sustainability journey.

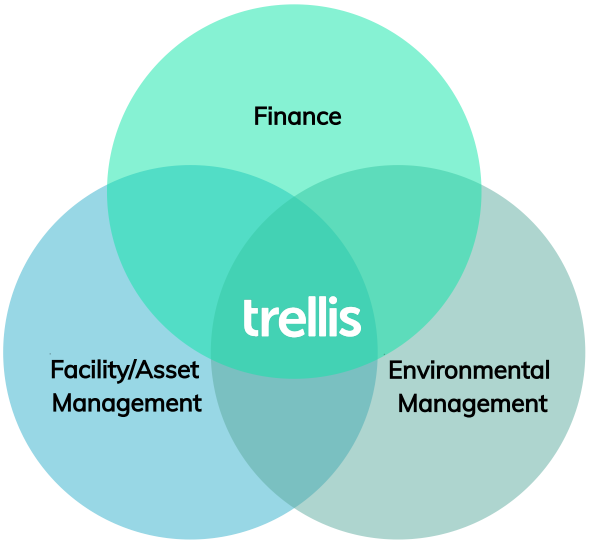


Figure 1 - Trellis provides actionable insights for finance, facility/asset management and environmental objectives.

Comparison between councils in the context of the reporting aims required:

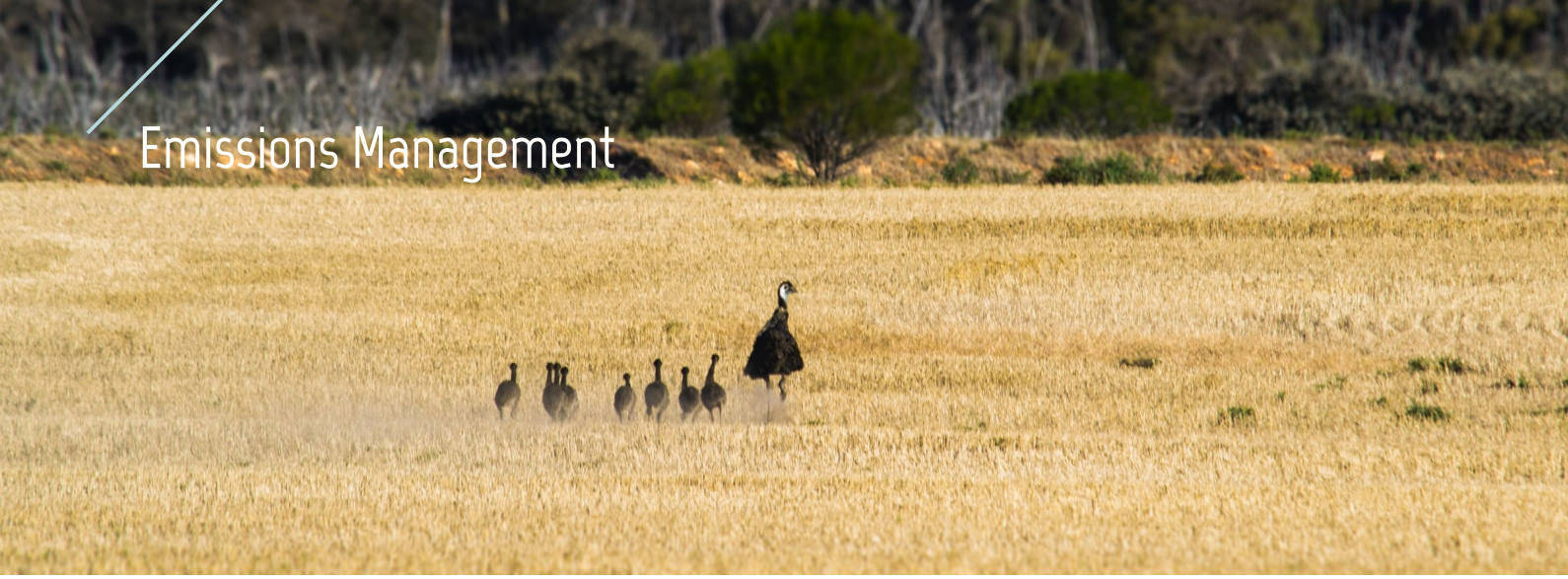
- assessment of emissions management targets and related current and future projects (see Emissions management)
- assessment of the data quality of each of the participants (data coverage and completeness) and strategies for assessing and accounting for data gaps (see Approaches to data)
- assessment of the emissions related types of data collected by councils in context with what might be expected based on the Climate Active approach (see Emission sources tracked across participating councils)
- identification of appropriate comparative benchmark metrics (see Approaches to data) and
- consideration of each council relative to its peers (see Emissions intensity across councils as well as Resource usage and cost).

Introduction

Note that initially, 13 of the 14 councils for which Trellis has data were involved in the assessment and were labelled A-M (Table 1), but one later declined to participate in the process. For this reason, there is no Council K in this report.

Table 1 - List of councils considered with an indication as to their level of urbanisation.

Label	Level of Urbanisation category
A	Peri-urban
B	Rural
C	Urban
D	Urban
E	Urban
F	Urban
G	Peri-urban
H	Urban
I	Urban
J	Rural
L	Urban
M	Rural



Emissions Management

The following is a brief summary of the targets and emissions management strategies applied across the participating councils. Information was obtained related to each participant's current activity data (as managed via Trellis) as well as related current and planned investments. The latter were obtained via conversations as well as literature reviews of online and shared plans.

Carbon neutral targets

Carbon neutral target years have been made publicly available by 66% (8) of the participating councils. Target years range from 2024 (earliest, 2 councils) to 2050 (1 council), with the largest portion (4 councils) aiming for 2030 (Figure 2). There was no correlation between data and planning maturity with respect to the proximity of carbon neutral targets.

Half of participating councils (6 councils) have declared a climate emergency, most of which did so in 2019, but this declaration did not necessarily relate to the immediacy of their respective carbon neutral targets. Indeed, two councils have declared a climate emergency without having (at least as of this analysis) a publicly available carbon neutral target (Figure 2). Conversely, 4 councils have a carbon neutral target but have not declared a climate emergency.

A third of the participating councils (4 councils) did not have a carbon neutral emissions target (Figure 2) but note that this did not translate to a lack of activity in emissions management.

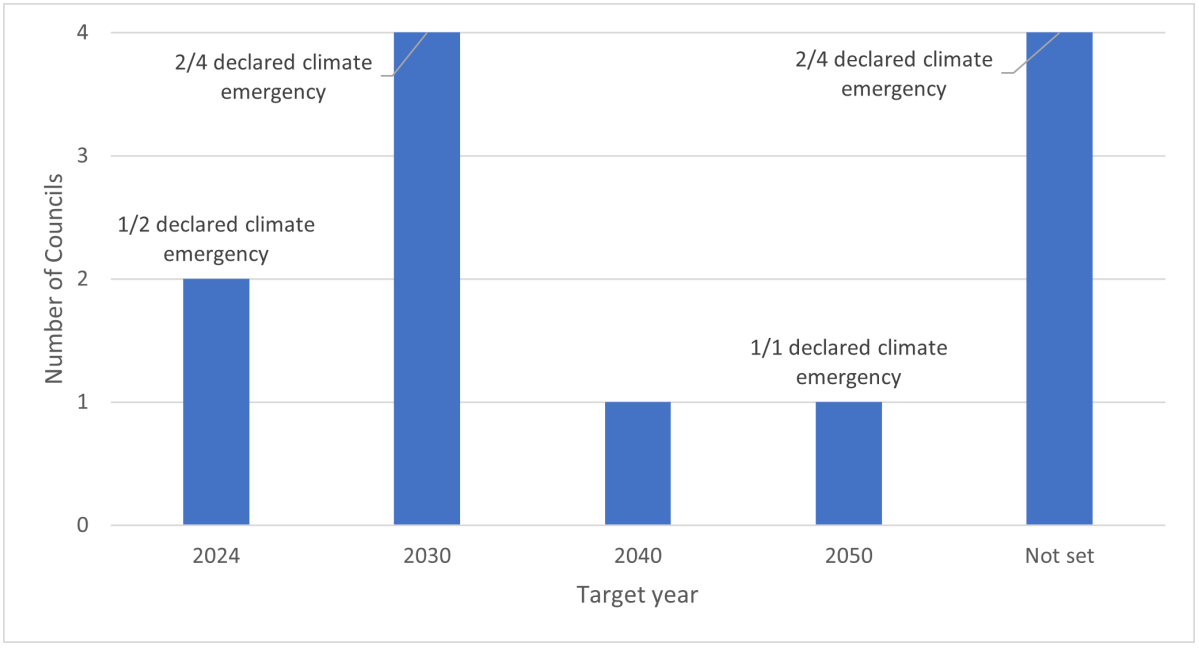


Figure 2 – Carbon neutral target years in conjunction with declarations of climate emergency across participating councils.

Emissions Management

There are arguably three broad types of emissions management strategy identified across participating councils, including:

- reducing activities leading to greenhouse gas emissions
- transitioning to the use of renewable energy and
- offsetting remaining emissions.

In addition, some councils may be investing in climate change adaptations. These may have no specific emissions management outcome but serve in risk management, particularly those related extreme weather events (such as heatwaves, floods and fire management).

Strategies are discussed below.

Emission Reduction Activities and Investment

Data on specific projects in terms of type, location, capital cost and implementation period varied widely across the participating councils.

Over the five years up to and including CY 2021, participating councils have recorded data against a range of emissions management activities (Table 2). Data on expenditure is sparse or perhaps poorly resolved in many instances, meaning that total investment and return on investment can be difficult to determine. Council F reported the broadest range of project types (5 investments), whereas many councils (A, G, J, L and M) indicated only one. Councils D and E did not have any data reported indicating an area in which they could utilise Trellis' Project tracking function to quantify the benefits of activities they are undertaking.

Improved data on emissions and energy efficiency investment, both current and planned would assist in understanding progress toward targets. This would extend to tracking of capital expenditure and return on investment (ROI).
Note that additional investments may be managed via alternative means (outside of Trellis) and were not in scope for this report.

Table 2 - Investment in emissions management projects across participating councils across the last five years (including CY2021) based on data stored in the Trellis platform. Values are Australian dollars excluding GST. NA indicates where a project was implemented but there was no data on investment. Blanks indicated no investment. Note that there were no emissions reduction projects indicated for Councils D and E for the reporting period (hence they are not shown below).

Council	Air-conditioning	Electric Vehicles	Energy efficient lighting	Green buildings and green leases	Solar	Waste/ resource recovery
A					122,000	
B			NA		NA	
C			NA		60,000	
F		22,940	1,850,780	1,788	94,033	15,000
G					465,405	
H	50,000		210,000		202,693	
I			NA		60,000	
J			NA			
L			38,000			
M					60,000	

Emissions Management

More than half of the participating councils (58%; Table 2) have undertaken or will undertake largescale projects to update street lights with LED technology, which would be expected to have substantial impacts (reductions) on their electricity consumption and related emissions.

Virtually all councils indicated a program for fleet transition to hybrid, electric or hydrogen vehicles, although only one (Council F; Table 2) had a current project related to electric vehicles.

Waste diversion strategies were also common across councils, both as part of corporate operations but also related to engagement on community generated waste, although only one participant (Council F) had a specific target (75% reduction in corporate and domestic landfill by 2030) as well as investment in this space.

One council has made a commitment to buy back 50% of kerbside-collected plastic for recycling by 2025. The fate of this plastic has not been specified, although there are a broad range of recycled products that may be involved (see below).

Improvements to building energy efficiency and/or encouragement for sustainable building design were proposed across four councils (33%), but only one council indicated any investment in "Green Buildings and Green Leases" (Table 2). Plans include upgrading existing facilities to be 25% more energy efficient as well as designating that buildings constructed after 2025 must have carbon neutral operational emissions. However, investments in building efficiencies were indicated for only two councils (Councils H and F).

Other than that, the most common initiative is the implementation of sustainable building practices with respect to both energy conservation and functional resilience, largely in terms of longevity (i.e. LED lights are known to last a long time). Energy conservation strategies may include staff behavioural changes (switching off lights, equipment on standby, adjusting ambient temperature settings, etc.) as well equipment updates (such as office lighting changes, air-conditioner gas updates and improvements to insulation).

Less widely adopted were commitments to, or trials of, sustainable procurement practices that favour carbon neutral and low emissions products, such as carbon neutral paper or flights.

There appears to be a larger emphasis on the use of recycled products in infrastructure, such as (amongst others) the use of recycled aggregate in asphalt or concrete, plastic and glass used in road construction and recycled plastics in playground and amenities infrastructure as well as bollards and fencing.

Water reduction targets were documented by a minority of councils, although one specifically indicated a commitment to rainwater harvesting to reduce reliance on mains water.

Renewable Energy

At least 7 out of the 12 participants (58%) published a commitment to a 100% renewable energy initiative by 2023 (three councils), by 2030 (one council) or with no indicated timeframe (three councils).

This approach is to be used in combination with fossil fuel replacement projects, in particular:

- Electrification of hot water systems to replace natural gas, notably in sporting complexes and swimming centres, and
- Transition to hybrid, fully electric or hydrogen-powered vehicle fleets.

Individual council preferences vary in fleet updates with completion dates largely falling between 2025 and 2035.

Eight councils indicated investments in solar (Table 2), but virtually all participants indicated a broader commitment in this space. No council indicated any plans for implementation of large-scale battery storage. It is worth noting that for sites on large market electricity contracts[1], solar feed-in does not generate any income in most states (NSW is an exception). This has resulted in solar systems being used to offset daytime demand, rather than scaled at a size that would generate feed-in that might otherwise be sent to a battery system.

One council indicated that solar-powered lighting projects were on the agenda, presumably as stand-alone units.

[1] *Electricity procurement for local governments typically encompasses two broad contractual categories – small market electricity which covers lower consumption sites that are generally billed together, and large market sites with higher consumption that are on site specific agreements. The latter entail a more complex approach to electricity procurement with capacity for forward purchases on wholesale markets.*

Emissions Management

Offset Strategies

Offsets are the mechanism for dealing with emissions than have not or cannot be reconciled by other approaches.

A formal plan to purchase offset credits for the balance of carbon emissions in the designated carbon neutral year has been documented by a minority (25%) of participating councils. Those participants with more immediate carbon neutral targets will likely need to invest more heavily in offsets as there is limited time to implement other emissions reduction strategies.

Climate Change Adaption

Initiatives for the mitigation of the effects of climate change have been implemented across all councils, the most prevalent being tree planting projects. It is unlikely that most council-initiated tree planting activities could be considered in terms of their potential for generating emissions reductions via certified offsets, particularly in urban environments. Currently, compliance with appropriate standards and requirements is challenging and the process can be both onerous and expensive. There is recent consultation from Climate Active that may offer opportunities in this space, particularly for regional councils (see https://www.climateactive.org.au/what-climate-active/news/consultation-open, accessed October 2022).

One council documented a goal to establish and develop sequestration activities at a large enough scale to attract national investment.

Community Empowerment

All councils have undertaken investments in broader engagement with ratepayers to educate, empower and motivate their communities in sustainable decision-making, although initiatives are largely based around broad aspirational incentives rather than quantified in terms of investment. These approaches include but are not limited to:

- education campaigns to drive behavioural change
- rebates for renewable energy acquisition
- grants for environmentally friendly activities
- increased access to waste recycling and
- community involvement in decision-making processes.

As the most accessible branch of government, councils can provide tangible leadership in emissions management both in terms of being accountable for internal investments as well as encouraging ratepayers and the community. The latter has the advantage of supporting emissions reductions more broadly as well as the potential to positively impact on council's targets (i.e. improved community waste management may reduce inputs to landfill but also lower the fuel required in kerbside collections).

Summary

All councils are invested in creating and/or promoting change although there was a large variance in the level of granularity provided by their climate change strategies within Trellis including the setting of quantifiable targets, deadlines and interim goals. Only a few councils noted the likely need to capture additional sources of emissions in their carbon neutral journey and none broke down their categories of emission sources in a manner that resembled the breadth required by the Climate Active framework.

None of the participating councils have indicated an intention for certification under the Climate Active framework, although the converse is also true (i.e. none have excluded it either).

Any council participating in an emissions management program will need to determine whether their individual carbon neutral pathway is to include accreditation under Climate Active[2]. If accreditation is the case, there is a potentially urgent need (dependent upon temporal proximity to their carbon neutral target) to develop a deeper understanding of the requirements.

Even if the ultimate goal does not include certification under Climate Active, compliance with the framework provides transparency and certainty and may avoid any perceptions of "greenwashing".

[2] *Climate Active accreditation has been used as an independent framework against which the participant South Australian Councils could be assessed. There are other possible emissions management accreditation frameworks that a local government could consider, such as the Science Based Targets Initiative (SBTI, see https://sciencebasedtargets.org/, accessed October 2022) but requirements for this framework were out of scope for this report.*

Approaches to Data

Emission Assessment

In broad terms, greenhouse gas emissions are estimated based on activity data (e.g. consumption of energy) from a broad range of resources consumed by council operations. Under the Climate Active framework, the activities include both a mandatory suite related to energy consumption (i.e. natural gas, stationary fuels, transport fuels and electricity - typically what are otherwise considered Scope 1 and 2 emissions, as well as a range of ancillary sources (typically encompassed under Scope 3) that are selected based on a set of criteria). Please note that while scope 1, 2 and 3 are commonly utilised labels, Climate Active does not require differentiation by scope, but does require a full emissions profile related to the entity to be reported. See Appendices A and D for more information.

Greenhouse gas emissions are then based on the product of the activity data with a related emissions factor to generate an estimate of emissions in terms of carbon dioxide equivalents. The emissions factors used in this assessment are in alignment with those employed by Climate Active. For electricity, natural gas, fuels and waste, these are derived from the National Greenhouse Accounts Factors (e.g. https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021, accessed August 2022). Emissions related to water are based on the AusLCI database (http://www.auslci.com.au/, accessed August 2022).

Emission Sources

The range of sources considered, and the quality of the underlying activity data is therefore critical in the development of an emissions assessment as well as developing management strategies.

Participating councils were assessed across:

- The resource types (Scope 1 and 2 emission sources, and some Scope 3) captured in CY 2021.
  Activity data sources across each of the participating councils was summarised for CY 2021 and placed in context with the range of categories likely be required under Climate Active. Categories were based on the most recently available (as of 2022) Public Disclosure Statements for currently accredited councils (14 in total across Australia wide - see https://www.climateactive.org.au/buy-climate-active/certified-brands, accessed July 2022).
- The level of completeness of this data was assessed and a mechanism for dealing with data gaps was implemented (see Data gap imputation).
- Total emissions that were quantified across a contiguous set of resource types and standardised against a range of benchmarks including:
  - Number of rateable properties
  - Total rate revenue
  - Council spatial area
  - Council population
  - Mean income for the council area (based on ABS data)
  - Distance from Adelaide CBD which assisted in analysis of urban, peri-urban and regional participants.
  - A categorical assessment as to their level of urbanisation, specifically urban, peri-urban or regional.

Analysis of the relative merits of the above benchmarks indicated that rateable properties, population and rate revenue were linearly aligned and therefore entailed broadly the same amount of information.
Total council area was not informative in terms of explaining differences between councils. Similarly, mean income did not appear to be overly informative across the group of councils considered. Not surprisingly distance from the Adelaide CBD also broadly aligned with the level of urbanisation.

Comparisons between the participating councils was therefore standardised based on the number of rateable properties overlayed with the urbanisation category.

Approaches to Data

Emission Sources

For the purposes of comparison across councils a suite of emission sources was selected that were either broadly shared across all participants or deemed to be highly relevant to their emissions profile (see Table 3), and included:

- electricity – included by all 12 councils
- natural gas – included (or considered not pertinent) by all councils
- transport fuel – included across 11 councils
- stationary fuel – included for 5 participants but considered likely to be important for regional councils in lieu of natural gas and
- water – included by all 12 councils.

Data Gap Imputation

Trellis Technologies' proprietary imputation tool was used to estimate cost, consumption and emissions where the data coverage did not encompass the entire reporting period. The datasets stored in Trellis are dynamic and updated when new data is received from utility providers. As such this report represents a snapshot, the interpretation of which is subject to change as more up to date data is received, recognising that all data that could be acquired for a CY2021 report had been obtained.

Imputation of data gaps was undertaken for electricity, natural gas and water as these comprise continuous (metered) data. Conversely, transport and stationary fuel (where present) comprise non-continuous data and were assumed to have full coverage without imputing any gaps.

Consideration of total days for which data exist compared to the total number of days for which data were expected provides a ready measure of the degree to which gaps where imputed within each resource type.

Electricity coverage was high across all councils, with all but one (Council L – 94%) having coverage of 98% or higher (Table 3).

Natural gas coverage was also high but more varied with the lowest (Council L) having 91% coverage for the reporting period. Note that some regional councils do not have access to the piped gas network and therefore they do not include any natural gas consumption (see "NA" for Councils A, B and J; Table 3). For this reason, it was decided to include stationary fuels in the assessment as this resource type was considered likely to be more relevant to these councils.

Water coverage was similar to electricity. Note that water data coverage for Councils I and L look to be rather poor compared to other participants, but data for this resource type was initiated by these councils as of March 2021 (in both instances) meaning that water data for portions of the January to March 2021 period was not collected.

Transport fuel coverage was generally very high, but two (Councils D and M) were 43% and 50% respectively while one participant (Council I) has not considered this resource type for CY 2021 (Table 3). Low coverage may be due to the intermittent nature of fuel purchases, unlike utilities, consumption of transport and stationary fuels is not continuous.

Where stationary fuel data was collected it was much patchier (Table 3). However, as noted above, this category was considered worthy of inclusion owing to its likely importance to regional councils.

Overall, data completeness for the purposes of analysis was considered very good.

Approaches to Data

Data Gap Imputation

Table 3 -Indication of data completeness across the participating councils which implies the level of imputed data (i.e. percentages lower than 100 indicate areas where data has been imputed). Green indicates where data completeness was greater than 95%, NA indicates where source data is not applicable to the relevant council and considered complete for that data source.

Council	Electricity	Natural Gas	Stationary Fuel	Transport Fuel	Water Usage
A	100%	NA	3%	100%	100%
B	100%	NA	89%	100%	100%
C	100%	98%	-	93%	100%
D	99%	97%	-	43%	99%
E	100%	100%	3%	100%	100%
F	99%	96%	-	100%	100%
G	99%	99%	3%	100%	99%
H	99%	98%	-	99%	100%
I	98%	96%	-	-	94%
J	99%	NA	100%	100%	99%
L	94%	91%	-	100%	94%
M	99%	94%	-	50%	100%

Transport and stationary fuel were not included in all inventories, in which case it was assumed that consumption (and thereby emissions) from these resources were equivalent to the average per rateable property for those councils that did record this data irrespective of other factors (such as the degree of urbanisation).

Emission sources tracked across participating councils

Councils varied substantially in terms of the resource types and related activity data considered across the reporting period (Table 4), ranging from 3 resource types (Council I) to 10 (Council A) with an average of 6 resource types per council. Over a third of the participants had captured 4 or less resource types.

Electricity, water and natural gas were common to all participants (noting that at least some regional councils have no access to piped natural gas), while transport fuel was included for all but one participant (Council I; Table 4).

Table 4- List of resource types tracked, ordered by emission Scope (blue = 1, grey = 2, orange = 3) considered by each of the participating councils across the reporting period (green squares). NA indicates where source data is not applicable to the relevant council. In this instance, piped natural gas is generally not available for less urbanised councils but has been considered as an included emission source (as the alternative would imply a gap where none exists). Otherwise, gaps indicate that a source has not been considered for that council.

Resource types by scope	Council											
	A	B	C	D	E	F	G	H	I	J	L	M
Fugitive gasses	Y											
Natural gas	NA	NA	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y
Transport fuel	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y
Stationary fuel	Y	Y			Y		Y			Y		
Electricity	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Business travel (flights)	Y						Y					
Chemical usage		Y								Y		
Purchased paper	Y	Y			Y		Y					
Staff commute	Y	Y										
Waste and recycling	Y	Y				Y	Y				Y	
Water usage	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Total Resource Count	10	9	4	4	6	5	8	4	3	6	5	4

There was sporadic coverage across the other resource types, including stationary fuels as well as waste and recycling (5 participants each), followed by purchased paper (4 councils), business travel, chemical uses and staff commuting (2 for each) and fugitive gasses (only 1 council; Table 4).

Apart from stationary fuels, the bulk of mandatory energy related resource types required under the Climate Active framework are included in Trellis by all the participating councils (see Appendix D for a broader list of the potential sources).

There was a high level of variability across data capture for the remaining (Scope 3) resource types considered, although water usage was an exception. Data capture for water consumption and cost for Trellis is comparatively straightforward as it uses the same approach to other utilities (electricity and natural gas).

Emission sources tracked across participating councils

Additional Resource categories that may need to be considered

Across the Australian councils currently certified under Climate Active (14 in all see https://www.climateactive.org.au/buy-climate-active/certified-brands, accessed July 2022) in addition to the mandatory (Scope 1 and 2) emissions, there is a broad suite of additional (Scope 3) categories common to most assessments (see Appendix D for a list of the potential categories as well as the related selection criteria).

Regardless of whether the aim is for accreditation under Climate Active, participating councils will likely need to consider a broad suite of additional emissions categories (see Appendix D), particularly if their carbon neutral claim is to be compliant with national and international legislation and standards (Appendix B). However, given the operational diversity across local governments, there may be very specific emission categories that need to be considered for each.

The potential for projecting emissions for participating councils based on what is known for accredited local governments was considered as a component of this analysis. However, the number of missing sources across participating councils and variability in the source data indicated that this exercise presented a high risk of producing misleading or erroneous results.

Councils participating in this study will need to undertake a review of their specific carbon neutral objectives with regard to the emissions categories covered by Climate Active.

Even if certification is not the ultimate goal for a particular local government, compliance with the Climate Active framework in achieving carbon neutral targets should be encouraged as this would align with recognised legislation and standards. As a minimum, councils should ensure they maintain adequate data / records to back-up any emissions management claims that are made such that they can be independently assessed.

There may be a role for the Local Government Association to assist councils in developing their carbon neutral strategies, such as, establishing a communications strategy for achieving carbon neutral targets across local governments. This strategy could assist in promoting consistency, confidence and efficiency in approaches to emissions management and reporting. The strategy should outline the requirements for Climate Active accredited carbon neutrality as guidance for emissions assessment, management and communication of progress with respect to targets, acknowledging that councils may choose to self-declare rather than undertake certification.

It is worth noting that there appears to be only one Climate Active certified local government in South Australia (City of Adelaide), whereas the bulk (8 of the 14) are in Victoria with the remainder scattered across New South Wales (3), Queensland (1) and Western Australia (1) (see https://www.climateactive.org.au/buy-climate-active/certified-brands, accessed July 2022).

Emissions Intensity Across Councils

Emissions intensity per rateable property was considered for each of the target resource types (electricity, fuels, natural gas and water), presented in the cumulative order of total relative magnitude (Figure 3).

Total emissions intensity was consistently higher for regional councils (Councils J, B and M) than their urban or peri-urban counterparts (Figure 3). There was a more or less consistent pattern of emissions intensity relative to the level of urbanisation (Council I was an exception), although there was no sharp transition.

It needs to be noted that applying a categorical label for levels of urbanisation will be to some extent subjective, although ordering the data by distance from the Adelaide CBD produced a very similar outcome (data not shown).

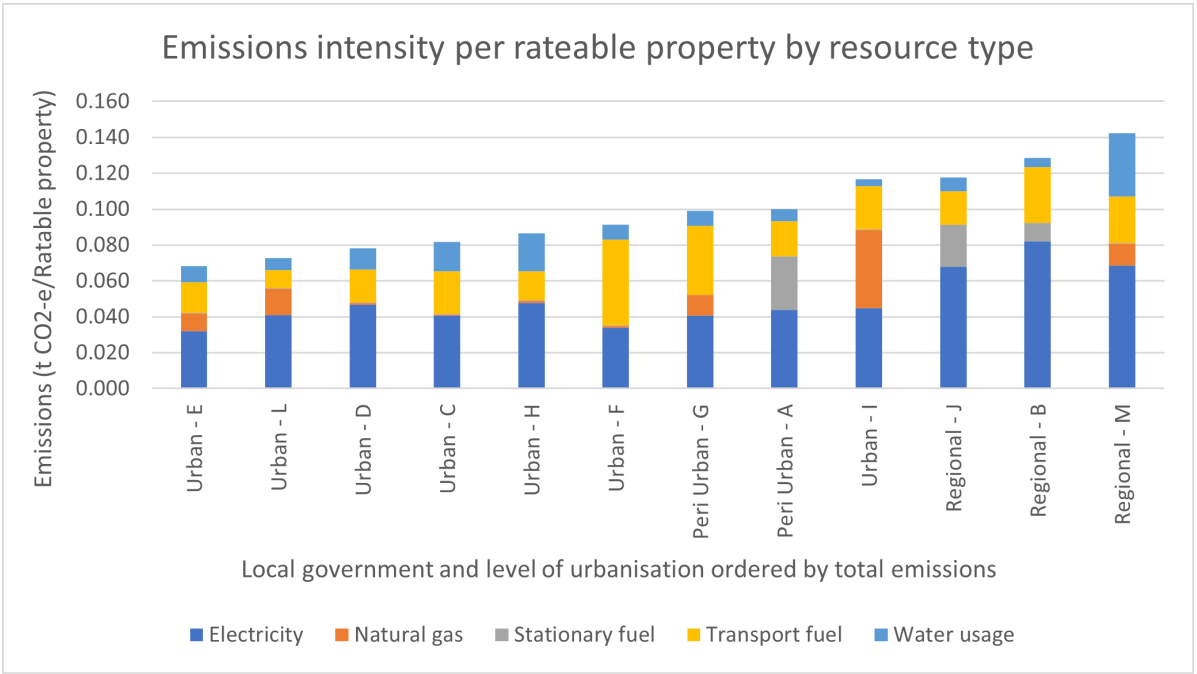


Figure 3 - Emissions intensity per rateable property based on a shared set of resource types (electricity, natural gas, transport fuel, stationary fuel and water) across each of the participating councils. Data is ordered from lowest to highest emissions intensity.

The emissions intensity related to electricity consumption was consistently higher in regional councils relative to urban and peri-urban local governments (Figure 3). There is also a trend for higher input from stationary fuel across some, but not all, of the peri-urban (council A) and regional councils (J and B). This difference may be due to the lack of access to piped natural gas in some councils resulting in greater reliance on electricity and stationary fuels. However, note that the council with highest emissions intensity (council M) is shown to have a non-trivial contribution from natural gas with very little input from stationary fuel, however the latter data was modelled for this council and so this comment is somewhat speculative.

Council M also had the highest emissions intensity contribution per rateable property from water consumption (25%), in contrast to the other regional and peri-urban participants (Figure 3). Council M is considered as regional but is a comparatively flat and dry area compared to the other regional participants, which suggests a lack of capacity for rainwater runoff storage options (such as dams or tanks) as well as limited direct access to substantial riverine sources. These factors would suggest a high reliance on mains water, when combined with a relatively smaller number of rateable properties results in the increased water related emissions intensity.

Emissions Intensity Across Councils

Across all councils, there were differing levels of reliance on mains water versus the use of other sources (aquifer, riverine, dams or tanks).

Council F (urban) stood out because transport fuels made a substantially higher contribution to emissions intensity relative to other councils (51%; Figure 3). Closer inspection found this to be due to the inclusion of fuel used by their fleet of waste removal trucks in their emissions profile (under Scope 3). Obtaining this information can be problematic as it requires a level of engagement and willingness on the part of waste collection contractors to both collate and communicate this data, which is likely why other councils do not measure waste transport fuel.

Across councils E, L, G, I and M there was a stronger contribution from natural gas (14%, 20%, 12%, 37% and 8%) of total emissions intensity respectively (Figure 3). A broader check of these councils indicated most maintained a public swimming pool that has a large demand for natural gas.

Regardless of the degree of urbanisation, councils must supply a broadly similar suite of basic services to their residents which entails a need to maintain a similar suite of basic facilities (e.g. community centres, depots, libraries, sporting facilities). With a tendency for fewer rateable properties, regional councils will therefore have a higher emission intensity than their urban counterparts. On this basis, achieving carbon neutral emissions targets for regional councils is likely to be more challenging when compared to urban/peri-urban local governments.

Reconsideration of the emissions intensity across the urban councils (a subset of the data in Figure 3) ordered by mean residential income does not indicate any trend in terms of the overall emissions (Figure 4). This result indicates that mean residential income in urban councils does not explain differences in emissions profiles between councils. Differences in approach to some of the underlying data (as noted for Council F with the inclusion of waste truck fuel consumption in their transport fuel emissions) may confound interpretations at this level of resolution.

Consistency in approaches to emissions data would assist in understanding the relative differences between councils.

Note that this interpretation assumes that differences in mean income between adjacent councils are the same, which is not actually the case. There are similar issues with use of distance from the Adelaide CBD as a categorisation variable.

Encouraging local governments to engage in a non-anonymised analysis would likely improve the capacity to summarise and interpret data and draw more meaningful conclusions. This approach would foster collaboration and constructive competition across local governments as well as potentially expand the number of participants.

Understanding more about the drivers for increased emissions intensity will allow for improved targeting of support and encouragement of carbon neutral targets.

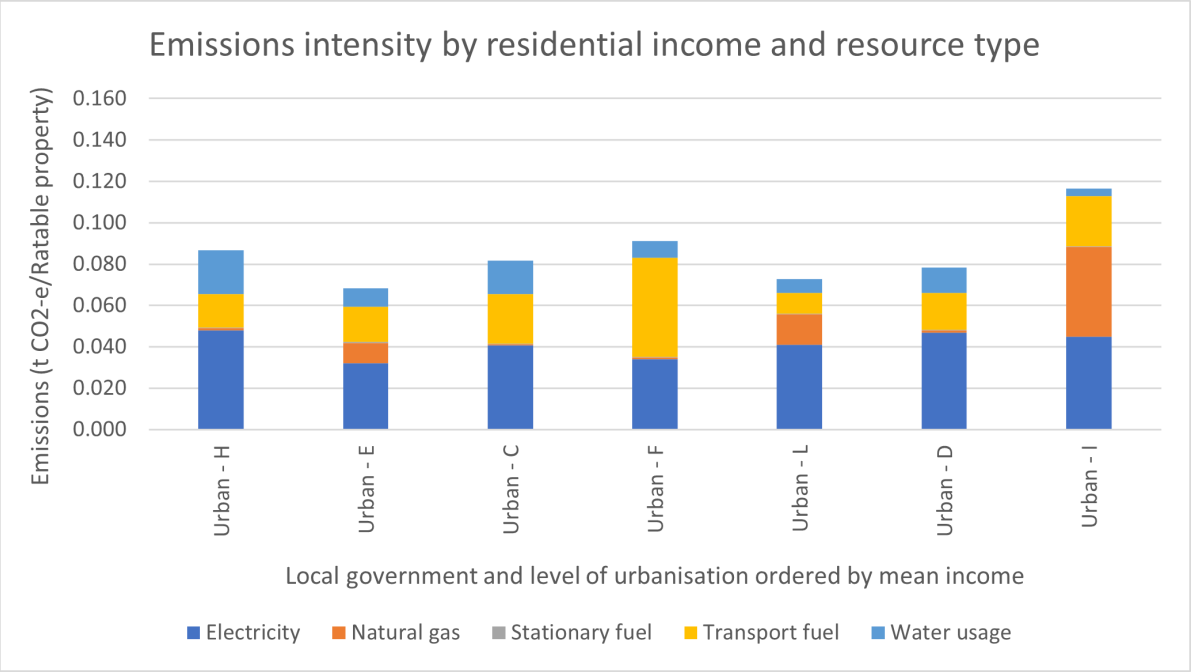


Figure 4 - Emissions intensity per rateable property based on a shared set of resource types (electricity, natural gas, transport fuel, stationary fuel and water) across each of the urban councils. Data is ordered based on mean residential income.

Emissions Intensity Across Councils

Each facility within each participating council was allocated to one of ten broad facility groups largely based on their operational type, including:

- Civic Centres – including libraries, community centres and administration offices, and combinations of these
- Depots – maintenance compounds and related infrastructure
- Fleet – as a functional group rather than a location, as a vehicle fleet is often centrally managed but diffusely operated
- Park Reserve Open Spaces – including gardens, street scapes, reserves, parks and playgrounds
- Public Amenities – public toilets, carparks and shelters
- Sporting – club buildings, sporting grounds, swimming pools
- Street Lighting – as a functional group rather than a location, as the "facility" is nominally the council area itself
- Water management – includes flood and irrigation infrastructure
- Other – a broad group of facilities that are operationally specific to councils, including caravan parks, aged care facilities, waste management operations, rented locations, business travel and other
- Unallocated – facilities that have not been allocated to a group by the participating council.

Emissions intensity across rateable properties was considered across each of the above groups as a means of examining their relative importance and therefore provided further avenues for the targeting of emissions management and/or further investigation. Owing to the spread of emissions across different facility groups within each client, this analysis included the same subset of emissions (fuels, energy and water as with above).

The total related energy intensity across rateable properties for facility groups was also considered as this offers an alternative window on the data, with a focus on transport and stationary fuels, natural gas and electricity (i.e. Scope 1 and 2 sources) rather than the remainder (Scope 3) activities as the latter typically do not include any estimate of energy content.

There is little pattern to the emissions intensity per facility group within or between participating councils (Figure 5). The latter is to be expected, owing to different emission sources considered across the analysis. However, this result is also a reflection of diversity in council operations noting that 'Other' and 'Unallocated' facilities comprise varying but often substantial portions of each participant's profile.

Sporting facilities were a surprisingly large portion of some council's profiles, encompassing over 20% of emissions intensity for Councils L and J and over 40% for Council I (Figure 5). This result may relate to the inclusion of swimming pools as sporting facilities.

Street Lighting often comprised a large portion of each council's profile, with only one council (A) having less than 15% of the overall emissions intensity, whereas seven councils had more than 20% allocated to street lighting (D, C, H, F, I, G and M; Figure 5). Given that street lighting comprises the largest electricity demand for a local government, this result was not unexpected.

Otherwise, the allocation of emissions based on facility groups offers limited insights owing to variation in the emission sources across councils, lack of appropriately resolved benchmarking data for each group as well as the large portions of each participant's profile that are encompassed by other and unallocated facilities as well as some ambiguities in facility allocation.

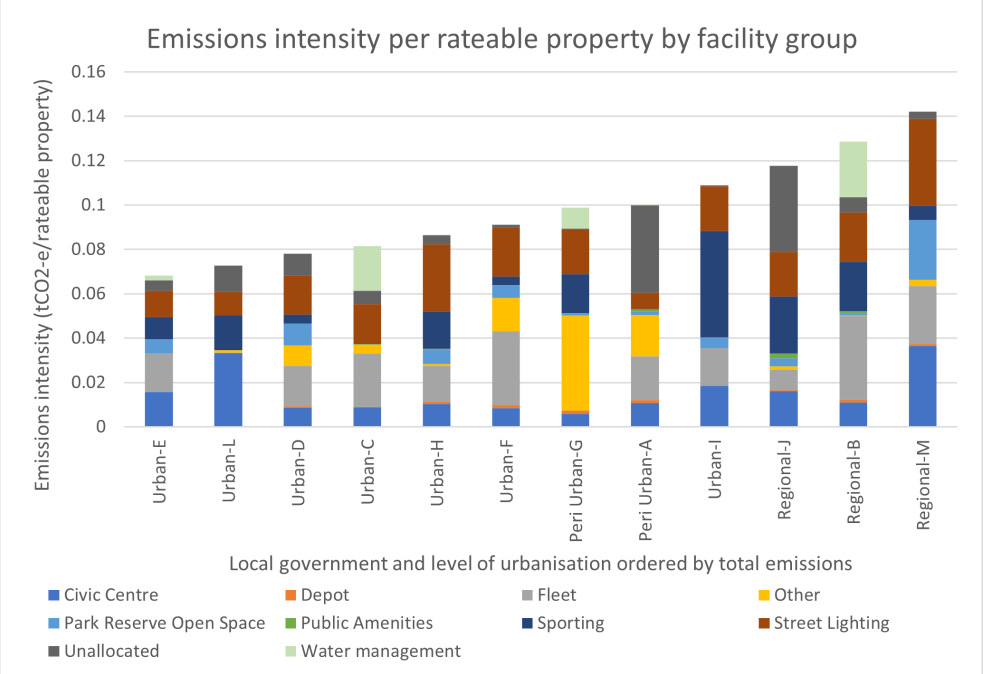


Figure 5 - Emissions intensity per rateable property of facility groups within each of the participating council.

Emissions Intensity Across Councils

The energy intensity per rateable property across facility groups presents a somewhat different outcome relative to emissions intensity (Figure 6), with an apparent split of the participants into two groups: one with (mostly) peri-urban and regional councils and the other comprising most of the urban participants. These groups were delineated based on a mixture of the tendency for lower numbers of rateable properties in regional councils, as well as the relative level of input from emission sources for which energy can be related (i.e. Scope 1 and 2 sources) versus those for which it is not applicable (Scope 3).
Otherwise, the results suggest much the same outcomes as for the emissions assessment in that there is a need for more targeted analysis within facility groups using specific benchmarks wherein comparisons would likely be more informative. For example, parks and reserves could be compared across councils using hectares of area as the standardisation metric.

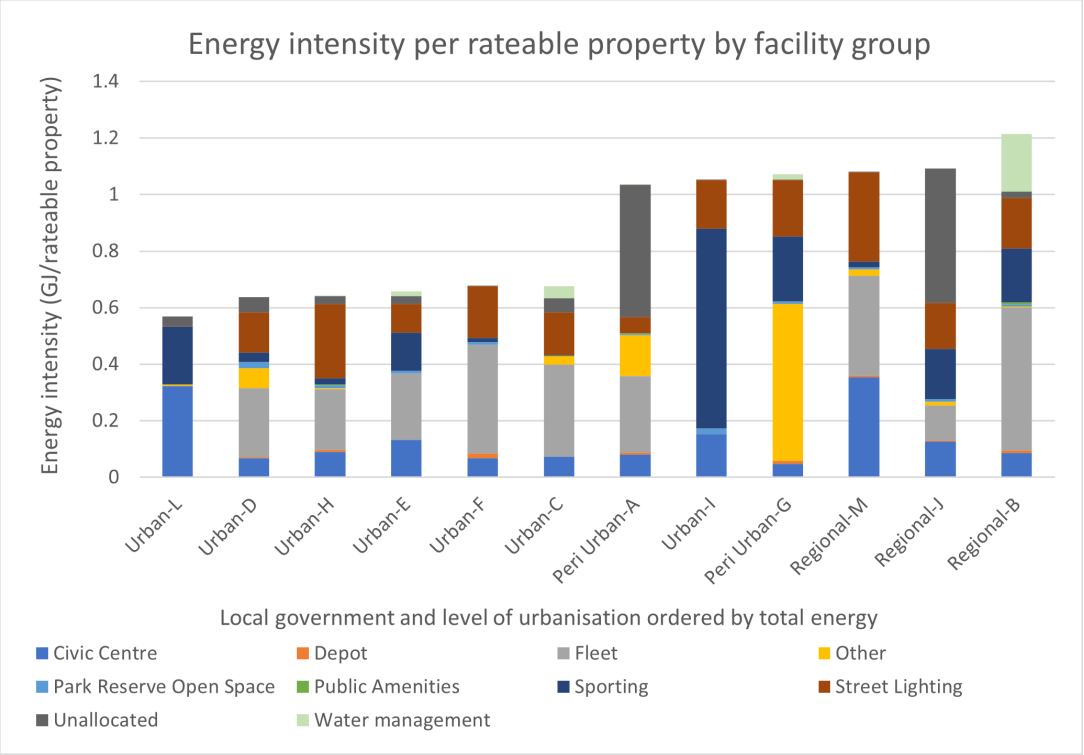


Figure 6 - Energy intensity per rateable property of facility groups within each of the participating council.

Comparison of facility groups across councils requires more a more consistent suite of categories as well as resolving the unallocated facilities.

In developing targets for emissions management, analysis of appropriately benchmarked specific facility groups may be more informative than the combined approach as used here. Differences in the operational scale encompassed across these categories make direct comparison problematic.

Targeted benchmarks might include (amongst others):

- Total area in hectares for parks, reserves and open space
- Gross floor area for civic centres and related infrastructure
- Number of vehicles for fleet
- Numbers of lights for street lighting.

Resource Usage and Cost

Consumption and cost across the target resources were considered in terms of the "Effective Unit Cost", which essentially comprises the total cost of delivery over the total consumption.

For each resource type, the effective unit cost was considered relative to the total consumption using a power curve trend-line as a measure of central tendency. Any effective unit cost above the trend-line is an indication that, the council in question is potentially paying more than average for that resource at that level of consumption.

Natural Gas

Natural gas offers the best representation of the notion of effective unit cost (Figure 7). As consumption increases, the effective unit cost declines. This trend, at least in part, is due to higher guaranteed consumption enhances the capacity for a procurement process to negotiate a lower fee. At the lower end of the consumption spectrum, the non-consumption related (or fixed) costs (such as metering fees and demand charges) represent a greater proportion of the overall charge.

The bulk of participating councils have a cost-efficient procurement of natural gas, with Council M seeming to achieve a better deal, while Council L would appear to be paying more than their peers (Figure 7), which is perhaps in the order of around $40,000 per annum.

Council L should investigate its procurement of natural gas to determine if a more competitive rate can be provided.

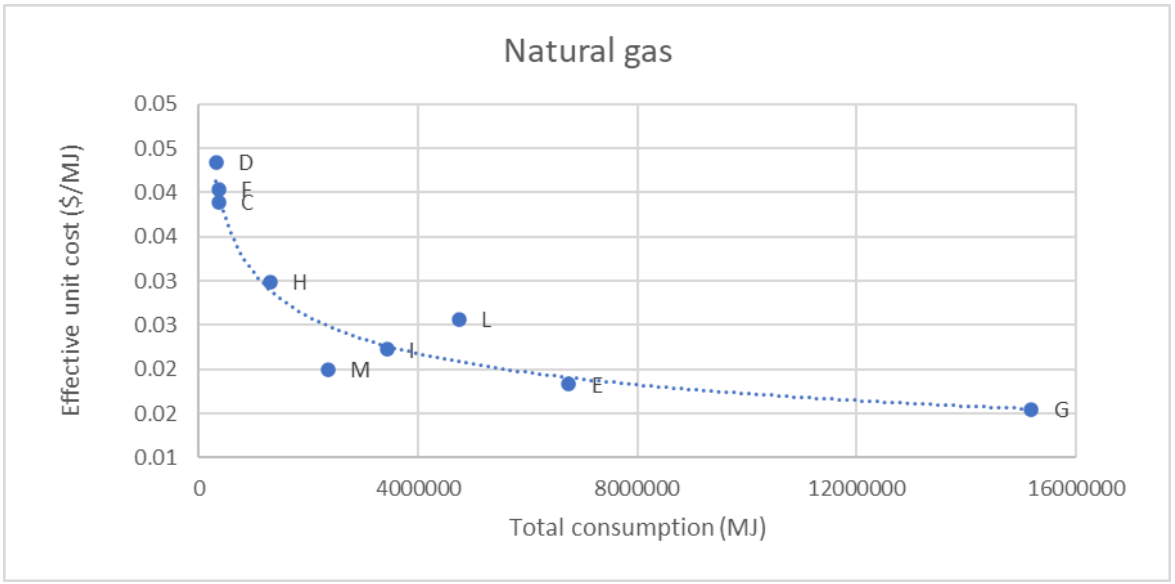


Figure 7 - Effective unit cost for natural gas versus related total consumption across each of the participating councils, where applicable. Councils A, B and J do not use natural gas and are therefore not shown.

Resource Usage and Cost

Electricity

Effective unit cost for electricity across the participating councils is substantially more complex (Figure 8), not least of which as it encompasses a far larger number of installations compared to natural gas, and the underlying diversity of applications to which electricity may be used, which includes:

- small versus large market sites
- sporadic usage (i.e. stormwater pumps)
- unmetered sites that have no electricity consumption but nonetheless contribute to costs
- facilities that drift into or out of a council's operational control (typically sporting facilities)
- installations that may have been targeted for efficiency mechanisms (such as addition of PV systems or implementation of street lighting upgrades) and
- diversity in suppliers – generally at least two or more electricity retailers for each council.

Notwithstanding these various applications, the effective unit cost of electricity follows the same broad pattern as natural gas (i.e. more consumption corresponds to improved cost efficiency), with Councils A, B, F and L appearing to pay above trend; and councils J, M and G falling below the trend indicating more cost effectiveness (Figure 8).

Councils shown above the trend line should consider a more in-depth analysis of their electricity procurement to determine if a more competitive rate can be provided.

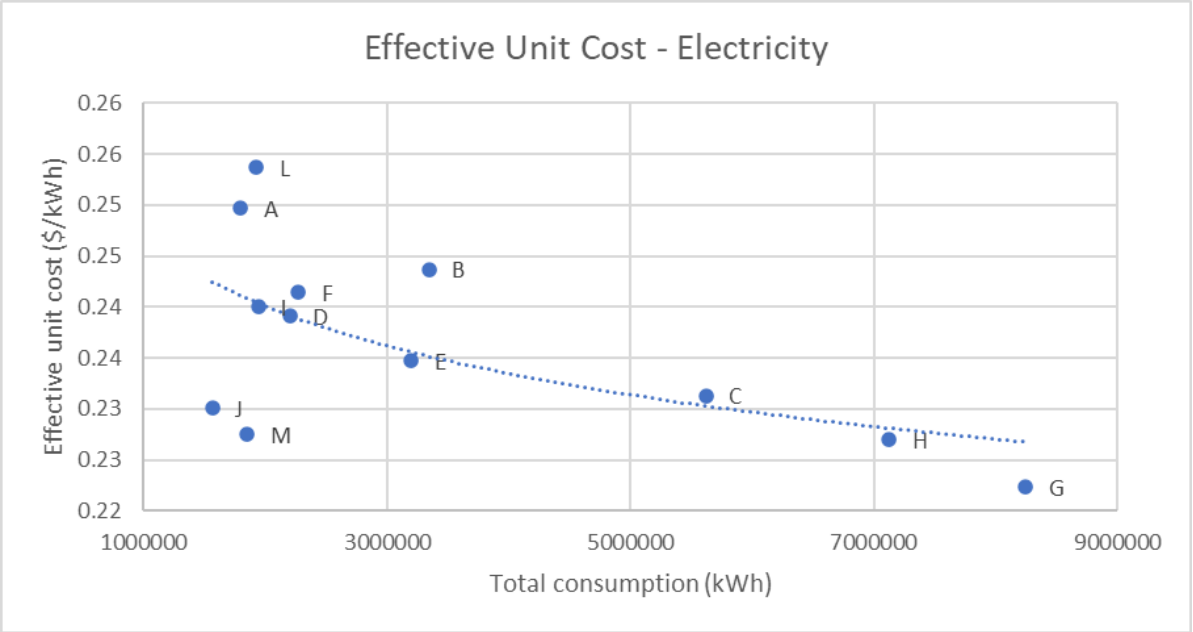


Figure 8 - Effective unit cost for electricity versus related total consumption across each of the participating councils.

Water

Water in terms of effective unit cost has similar levels of underlying complexity to electricity, wherein there are a large number of locations involved, unpredictable demand and potential for turnover and addition of sites.

There is also high potential for accumulation of costs related to watering points that are no longer used, such as those used in the establishment of vegetation areas and some watering points may be maintained purely for emergency use – specifically for firefighting. These sites may incur fixed support fees, but rarely if ever contribute to water consumption.

In addition, there are also alternative sources for water that may be included in consumption but not necessarily contribute to cost (at least directly), such as water taken from bores, dams and rivers. These alternative sources are substantially more prevalent in regional councils and for this reason they were excluded from this analysis.

Notwithstanding the above, there is a trend for increased effective unit cost as consumption declines (Figure 9).

Council A probably warrants a closer inspection of their water consumption because their effective unit costs are well above trend (Figure 9). Council G may also benefit from closer scrutiny in this space. Similarly, Councils D, L and perhaps I might also review the mix of water sources and/or data completeness in terms of costs as they were below trend and may have an approach to water procurement that can be shared in the spirit of collaboration. However, unlike other sources, there are water sources that a have minimal related cost or the costs are expensed under another source (such as electricity or diesel used to run pumps).

Resource Usage and Cost

Councils A, F and G should investigate water consumption and cost to determine if a more competitive rate can be provided.

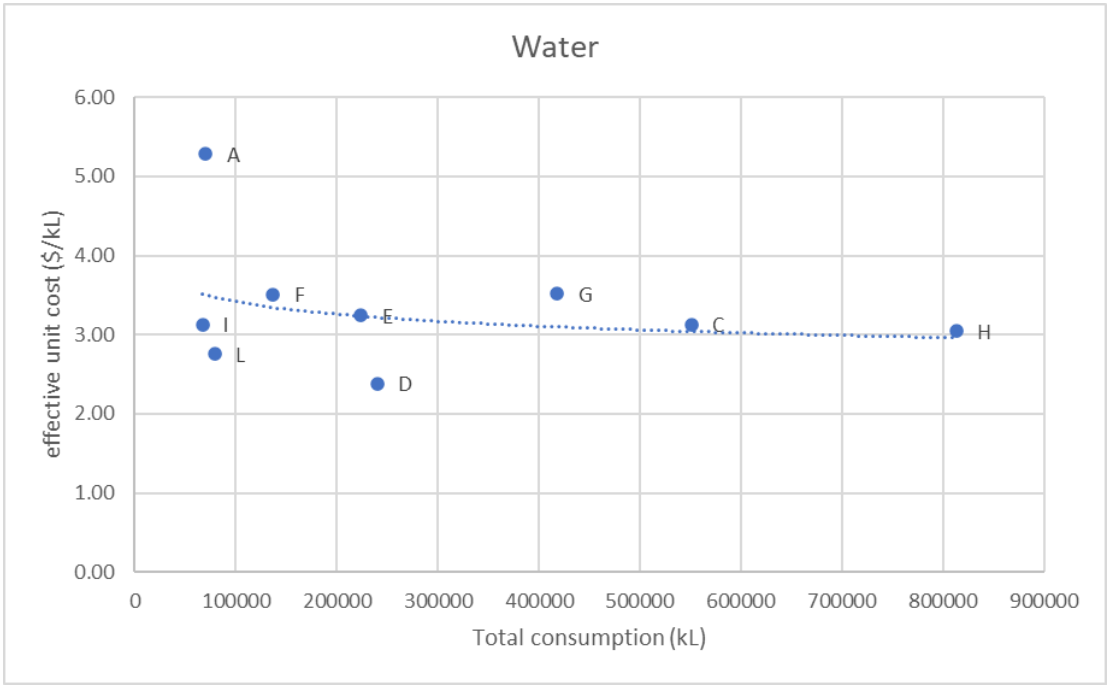


Figure 9 - Effective unit cost for water versus related total consumption across each of the participating councils excluding those designated as regional (councils B, J and M).

Transport Fuel

Transport fuel comprises the total across fuel types (unleaded and diesel mostly) and the costs are therefore a mixed input. Further, cost data may be lacking for some councils that report waste truck fuel consumption (Council F) but not necessarily cost. The degree to which councils, particularly those in regional areas, make use of a bulk supply to support their vehicle fleet is not considered in this analysis.

Given the spread of results (Figure 10), and in light of the above it was not considered sensible to extract recommendations for effective unit cost for transport fuel.

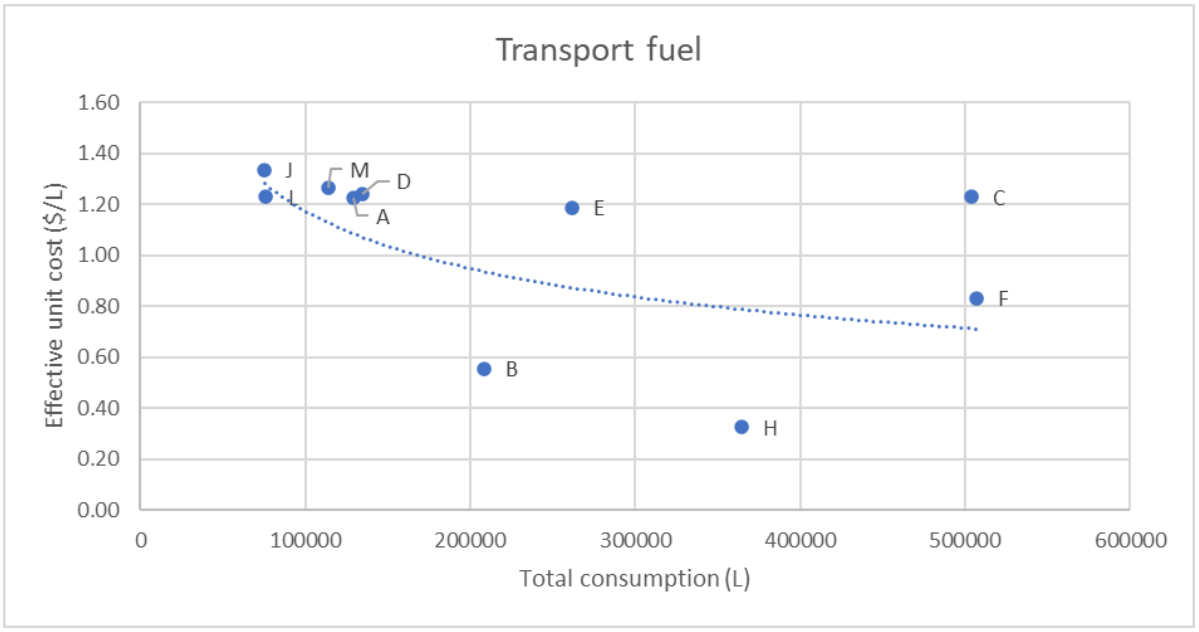


Figure 10- Effective unit cost for transport fuel versus related total consumption across each of the relevant participating councils - not including council G and I wherein either or both cost and consumption data were unavailable.

Resource Usage and Cost

Stationary Fuel

Stationary fuel totals also include mixed types (mostly diesel and liquified petroleum gas) and there are substantially fewer councils reporting this resource (only 5 out of the 12; Figure 11).

As with transport fuels, but also owing to the low number of data points, it was not considered useful to interpret the effective unit cost data for stationary fuels (Figure 11).

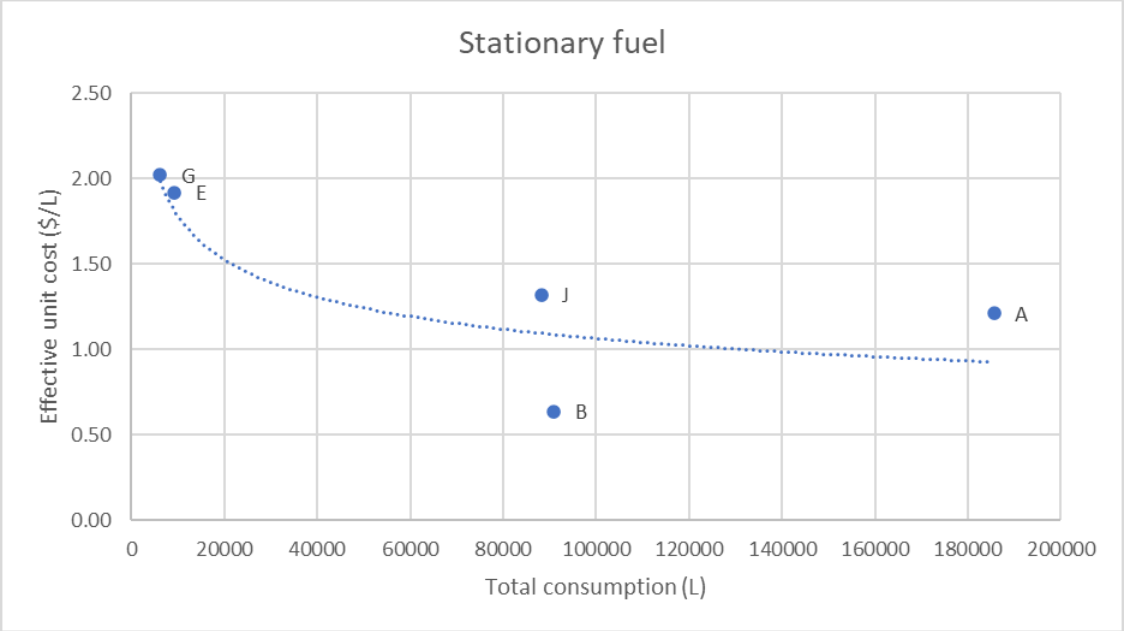


Figure 11- Effective unit cost for stationary fuel versus related total consumption across each of the relevant participating councils - not including councils C, D, F, H, I, L and M wherein there was no data available.

Conclusion and Recommendations

Twelve South Australian local governments, encompassing around 49% of the state's population, agreed to an anonymised analysis of their greenhouse gas emissions management goals, investments, data acquisition and management, emissions, energy and resource usage profiles and overall maturity in progress toward carbon neutral targets.

All councils have current and planned investments in emissions and energy management, largely focused on street lighting updates, fleet replacement and renewable energy acquisition. These investments have been undertaken despite the lack of carbon neutral targets for a third of the participants and scattered declarations of a climate emergency. Note that there did not appear to be any relationship to declaration or lack of a climate emergency relative to the size of the council (either by population, area or number of rateable properties), the number of emission sources considered by councils in their assessment or the related magnitude of emissions.

None of the participating councils mentioned an intention to seek accreditation for carbon neutrality under Climate Active as part of their emissions management journey, although none have specifically excluded this approach either.

Based on the nature of the data maintained by participating councils, there would appear to be a broad lack of understanding of the requirements for Climate Active certification, particularly as relates to non-mandatory emission sources. For councils with robust carbon neutral targets (2 councils have a FY 2024 target) that may seek accreditation, there may be a gap in related planning that will need to be addressed expeditiously. Even if accreditation is not the ultimate goal of a carbon neutral journey, councils should align with the national and international standards to promote consistency, cooperation and avoid perceptions of greenwashing by any carbon neutral claims that may be made by councils.

Current emissions related data capture is broadly in line with the mandatory suite of sources required under Climate Active, with some gaps most notably related to stationary fuel. The underlying data quality appears to be very high, with minimal need to impute gaps. The non-mandatory data sources are patchy and incomplete based on what has been considered by accredited councils.

For the above reasons, the level of maturity in approaching carbon neutral goals, particularly for councils with more pressing target dates is likely to present significant challenges. The risk is that there is a shortfall in planning, communication and clarity across emissions tracking, management and investment. There is therefore a need for councils to revenue their emissions assessment strategies in light of the requirements for accreditation.

A range of benchmarks for comparing councils was considered, including, number of rateable properties, rate revenue, area, population, mean resident income, distance from CBD and level of urbanisation. Across these, rateable properties proved to be the most useful, with a similar information level to population and rate revenue.

The level of urbanisation (urban, peri-urban or regional) proved to be a useful descriptor that could be linked to differences in emissions between councils.

Based on a benchmarked analysis of a common set of emission sources (electricity, natural gas, transport fuel, stationary fuel and water), there was a broad gradient across total emissions intensity per rateable property ranging from urban (lower) to peri-urban and regional councils (higher). This trend suggests that achieving carbon neutral emissions targets for the latter is likely to be more challenging when compared to urban/peri-urban local governments.

Across this dataset, electricity was generally the largest contributor to emissions intensity followed by transport fuel. These sources comprise the primary targets for emissions management activities that focus on renewable energy, lighting updates and fleet transition.

Consideration of the emissions intensity contribution, broken down by facility groups indicated more about inconsistencies and gaps in the underlying data on facility allocations, although street lighting can be seen to make a substantial contribution. There is a need to review facility groupings across councils to encourage more robust comparative analyses. However, analysis of specific groups across councils may be more meaningful, but this would likely require targeted standardisation data to be identified and collated (i.e. metres squared of floor area for building comparisons, hectares of green space for parks and gardens).

Conclusion and Recommendations

Based on the outcomes of this investigation there are a number of areas of potential improvement for the councils that participated, but also more broadly, including:

- Councils should seek to improve data on emissions and energy efficiency projects, both current and planned, as this would assist in understanding progress toward targets.

- Each council needs to determine whether their individual carbon neutral pathway is to include accreditation under Climate Active. If accreditation is the case, there is a potentially urgent need (dependent upon temporal proximity to their carbon neutral target) to develop a deeper understanding of the requirements.

- If emissions management does not include certification under Climate Active, compliance with the framework should be encouraged as this provides transparency and certainty and would be recommended to avoid any perceptions of "greenwashing" through alignment with recognised legislation and standards. As a minimum, councils should ensure they maintain adequate data / records to back-up any emissions management claims that are made such that they can be independently assessed.

More broadly, there are potential improvements that could be considered through:

- Engagement with the Local Government Association which may be able to assist councils in developing their carbon neutral pathways, through establishing a communications strategy of the requirements for achieving carbon neutral targets (accredited or otherwise). This strategy would assist in promoting confidence, efficiency and consistency in approaches to emissions management and reporting. The latter may be particularly important if councils decide not to undertake accreditation.

- Encouraging local governments to engage in an ongoing (biannual) non-anonymised analysis along the lines of this study would likely improve the capacity to summarise and interpret data and draw more meaningful conclusions. This approach could foster collaboration and constructive competition across local governments as well as potentially expand the number of participants and therefore the value of reports such as this.

- Across the participating councils, the allocation of facilities to the groupings provided by Trellis need to be reviewed to provide a more consistent suite of categories as well as resolving a large number unallocated sites. This process would improve the capacity to compare and contrast across councils, with related potential benefits to targeting and assessment of emissions management to specific facilities within council operational control.

Analysis at the facility group level across councils may be improved by focusing on using a specific category (such as fleets) with target benchmark data (such as the number of vehicles).

There are also some participant-specific recommendations for councils to consider in relation to potential resource efficiency and related expenditure savings, specifically:

- Council L - investigate its procurement of natural gas.
- Councils A, B, F and L - consider a more in-depth analysis of their electricity procurement.
- Councils A, F and G - investigate water consumption and cost.

Appendix

Appendix A - Climate Active Accreditation

Climate Active provide the mechanism for carbon neutral accreditation in Australia in line with national and international legislation and protocols, in order to create certainty, maintain continuity across jurisdictions and avoid "greenwash" (or perceptions thereof).

An entity may choose to manage their emissions and "self-declare" without seeking accreditation (which is not without costs), but it is recommended that greenhouse gas management should, at a minimum, be undertaken based on the Climate Active approach even if certification is not pursued.

Development of emissions management strategies therefore requires an understanding of Climate Active certification as this provides an independent backdrop against which councils (and other entities) can be compared.

The following is a brief description of the Climate Active accreditation process – more detailed information can be obtained from Climate Active (see https://www.industry.gov.au/data-and-publications/climate-active-carbon-neutral-standard-for-organisations, accessed March 2022).

Climate Active certification can cover one or more of a range of areas, encompassing:

- Organisations
- Events
- Products and services
- Precincts

Most entities including councils are accredited under the organisational framework, although the certification processes required within each of the above are broadly similar, including:

- Defining the organisational boundary – generally based on the facilities over which the entity has operation control.

- Identify the emission sources relevant to this boundary, including:
  - o All on-site combustion of fuels and electricity consumption must be included.
  - o A potentially broad range of additional data sources, generally related to purchased goods and services, the inclusion of which is based on a set of criteria (see Appendix D for details). While some, if not most, of the emission sources may be broadly similar across entities within the same sector (such as local governments), a Climate Active submission may also include organisation specific sources. For this reason, other accredited entities within the same sector may serve as a guide to the emission sources that need to be considered, but they should not be used as the primary/sole source.

- Each emission source is then allocated to:
  - o Quantifiable sources where activity data is available.
  - o Non-quantified sources – these are deemed relevant to the inventory but no data is available. In these instances, an estimate may be used in conjunction with a data management plan aiming to improve data quality in future assessments.
  - o Excluded sources – emission types that might typically be expected for this type of entity but are not included in the assessment in this instance. The reasons for any exclusions must be documented.

- Obtain or generate estimates of activity data and related emissions relative to each emission source.
  Activity data will vary according to the nature of the source and the requirements of the related emissions factor. The emissions factor is a multiplier that converts consumption activity such as litres of fuel into a carbon equivalent in tonnes of carbon dioxide.

- Develop an emissions estimate based on the activity data – basically the sum across the above.

- Obtain and retire[3] (offset) within an accredited registry the required quantity of appropriate carbon credits to achieve carbon neutrality.

- Document all the above within a Public Disclosure Statement (PDS), that includes:
  - o Information on the nature of the entity.
  - o Source data included in the submission, including information on sources that are quantified, non-quantified or excluded from the assessment boundary.
  - o Changes relative to previous submissions (where applicable).
  - o Approaches to improve data acquisition (where applicable).
  - o An (updated) emissions management plan.
    The plan needs to include quantifiable targets relative the baseline year and timelines for the implementation of management strategies. The latter needs to be indicated over a rolling five-year framework and thus needs to be updated annually.

[3] *Each tonne of carbon credit has a unique serial number. Offsetting entails the registration of the serial numbers of the required number of credits within an appropriate registry, the credits are from then considered to be "retired" and can never be used again.*

Appendix

Appendix A - Climate Active Accreditation

The aim of the plan is to encourage investment in emissions reduction, rather than reliance on carbon credits.

- o Emissions management activities undertaken during the reporting period and progress toward meeting reduction objectives from the above plan.
- o Acquisition and retirement of acceptable carbon credits with related documentation.

Note that a baseline year needs to be accredited with Climate Active, but there is no requirement to offset the baseline year.

The notion of scope - Scope 1, 2 and 3 emissions - has been used extensively across emissions management in Australia and elsewhere. Climate Active allows the addition of labelling of activity data by scope, however they aren't employed as part of their reporting, which otherwise considers emissions relative to broader categories (see Appendix D).

Appendix B – National and international legislation and carbon neutral accreditation standards

The following is a list of the national and international standards and legislation to which Climate Active aims to align.

Australian Standard (AS) ISO 14064 series, including:

- AS ISO 14064.1:2006 – Greenhouse gases Part 1: Specification with guidance at the organisation level for the quantification and reporting of greenhouse gas emissions and removals.
- AS ISO 14064.2:2006 – Greenhouse gases Part 2: Specification with guidance at the project level for quantification and reporting of greenhouse gas emission reductions and removal enhancements.
- AS ISO 14064.3:2006 – Greenhouse gases Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions.

The National Greenhouse and Energy Reporting Act 2007 (NGER Act) and supporting legislation and documentation, including:

- National Greenhouse and Energy Reporting Regulations 2008
- National Greenhouse and Energy Reporting (Measurement) Determination 2008
- National Greenhouse and Energy Reporting (Audit) Determination 2009
- National Greenhouse and Energy Reporting Technical Guidelines
- National Greenhouse Accounts Factors

International standards include:

- ISO 14040:2006 – Environmental management – Life cycle assessment – Principles and frameworks
- ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines
- PAS 2050:2011 – Specification for the assessment of the life cycle greenhouse gas emissions of goods and services
- ISO 14065:2013 – Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation of other forms of recognition
- BSI's PAS 2060:2014 – Specification for the demonstration of carbon neutrality
- GHG Protocol – A Corporate Accounting and Reporting Standard (2004)
- The GHG Protocol for Project Accounting (2005)
- GHG Protocol – Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011)
- GHG Protocol – Product Life Cycle Accounting and Reporting Standard (2011)
- GHG Protocol – Scope 2 Guidance (2015)

Appendix

Appendix C – Glossary

Term or abbreviation	Definition
Carbon dioxide equivalents	Carbon dioxide is the most commonly known greenhouse but many other gases (e.g. methane, nitrous oxide, various fluorinated gases including sulphur hexafluoride - SF6) also contribute to the greenhouse effect. These gases are generally much more radiatively active (trap more heat) than carbon dioxide e.g. methane has a global warming potential in the order of 28-100 times that of carbon dioxide; the actual value varies according to the timeframe over which an assessment is made and thus different countries report the greenhouse gas intensity of methane differently. An emission of 1 tonne of methane (in Australia) is deemed to be the equivalent of an emission of 28 tonnes of CO2. Trellis undertakes all such calculations on the data from your inventory and reports it using the standard units of tonnes CO2-e.
Carbon intensity	The quantum of carbon emissions for a unit of activity.
CO2-e	See carbon dioxide equivalents
Data completeness	Data completeness is the proportion of data expected that has been received by Trellis and loaded to the system.
Data Coverage	The amount of data used to estimate cost, consumption and emissions. Less than 100% indicates some data had not yet been provided to Trellis (e.g. invoices had not yet been issued and/or received).
Emission sources	The type of resource being used that gives rise to a greenhouse gas (GHG) emission. In Trellis typical resource types (emission sources) include Electricity, Natural Gas, Transport Fuel, Waste, and Water.
Emissions	See Greenhouse gas emissions
Facility	A physical location (e.g. an office building or a works depot) or a virtual collection of infrastructure items (e.g. a vehicle fleet) where a number of different resource types may be consumed.
GHG	See Greenhouse gas emissions (below)
Greenhouse gas emissions	Typically related to greenhouse gases released through human activity that contribute to climate change, and are considered in respect of their carbon dioxide equivalents (see National Greenhouse Account Factors e.g. https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021, accessed August 2022): • carbon dioxide • methane • nitrous dioxide • a range of synthetic gasses
Resource type	See emission sources
Scope 1 emissions	Scope 1 (or Direct) emissions are those released to the atmosphere as a direct result of operations and would typically relate to the burning of fossil fuels (e.g. natural gas, transport fuels and stationary fuels: see National Greenhouse Account Factors e.g. https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021, accessed August 2022)
Scope 2 emissions	Scope 2 (or Indirect) emissions are those related to purchased energy, which in Australia comprises electricity. "Indirect" meaning that the emissions are produced by the electricity generator, not directly (on-site) by a consumer/user of the energy (see National Greenhouse Account Factors e.g. https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021, accessed August 2022).
Scope 3 emissions	Scope 3 greenhouse gas emissions are indirect emissions that are not Scope 2 and typically relate to purchased goods and services (see National Greenhouse Account Factors e.g. https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2021, accessed August 2022). Examples include (amongst others) flights, water use, staff commuting, and waste sent to landfill. Note that a Scope 3 source for one entity is a Scope 1 or 2 source for the provider – i.e. flights may be a Scope 3 source for local government, but are a Scope 1 source for the airline.
Tonne	1 metric tonne (1,000 kg).

Appendix

Appendix D – Emission sources required under Climate Active

The following is a list of the emission categories[4] that should be considered for inclusion under a typical Climate Active carbon neutral local government, based on an assessment of the common categories across accredited councils (see https://www.climateactive.org.au/buy-climate-active/certified-brands, accessed July 2022).

All stationary and transport related fuels as well as electricity need to be documented (see "Required" below).

Across the remainder, inclusion of a particular emission category is based on a set of criteria - if an emission source is relevant under two or more of those listed below, it must be included in the assessment:

- Size – the emissions are large relative to the mandatory sources
- Risk – the non-inclusion may expose the entity to regulatory, legal or reputational backlash
- Stakeholders – there is an expectation that the entity should include the source
- Influence – the entity has the capacity to influence reductions related to the source and
- Outsourcing – the emission source was related to activities that the entity has outsourced.

Required

- Electricity
- Stationary liquid fuels such as diesel used in generators
- Stationary gaseous fuels - typically piped natural gas
- Transport fuels used in vehicle fleets

May need to be assessed dependent upon the above criteria (potentially amongst others):

- Air transport
- Land and sea transport (over and above transport fuels, such as taxis and staff commuting)
- Accommodation and facilities
- Cleaning and chemicals
- Construction materials and services
- ICT services and equipment
- Office equipment and supplies
- Postage couriers and freight
- Professional services
- Products
- Working from home
- Food and catering
- Roads and landscape
- Machinery and vehicles
- Refrigerant gasses
- Waste
- Water
- Carbon neutral products and services and
- Horticulture and agriculture.

Note that these categories may include several specific emission sources.

Many emission estimates for sources within the above categories are derived from expenditure and are thus typically derived from general ledger or other finance system data on an annual basis.

[4] *Note that the Climate Active approach to the allocation and labelling of emission sources is subject to change.*

Government of South Australia

Green Industries SA

trellis

Trellis Technologies Pty Ltd
ABN 15 123 897 012
Marnirni-apinthi Building, Lot 14, North Terrace, Adelaide
SA 5000, Australia
T: 1300 775 410
E: info@yourtrellis.com
W: www.yourtrellis.com