Pangolin Associates

Sustainability, Energy & Carbon Management

Greenhouse Gas Assessment

for **Bower Architecture & Interiors**

FY 2019/20

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This assessment report has been prepared for Bower Architecture & Interiors.

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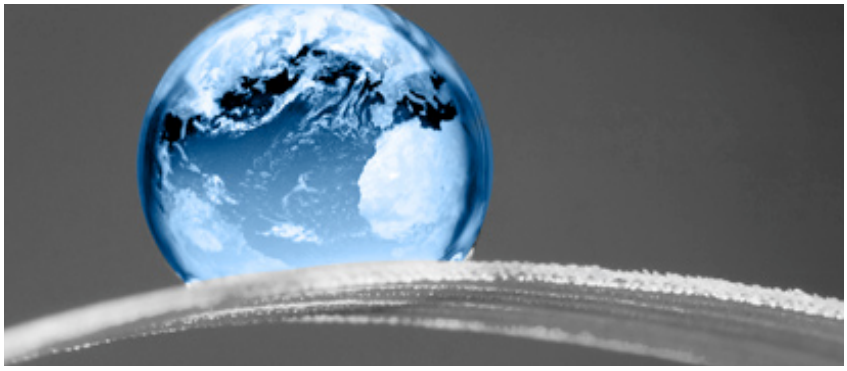
Executive Summary



Pangolin Associates Pty Ltd (Pangolin Associates) were commissioned to conduct a comprehensive assessment of the greenhouse gas (GHG) emissions accountable to the Australian operations of Bower Architecture & Interiors ('Bower') for the financial year (FY) 2019/20.

Based on best available data, the estimated net total carbon emissions for Bower was 23.8 tonnes of carbon dioxide equivalents (tCO_2-e). This total includes indirect contributions along the supply chain (scope 3 emissions) and renewable GreenPower purchases.

Bower's assessment results are summarised below.

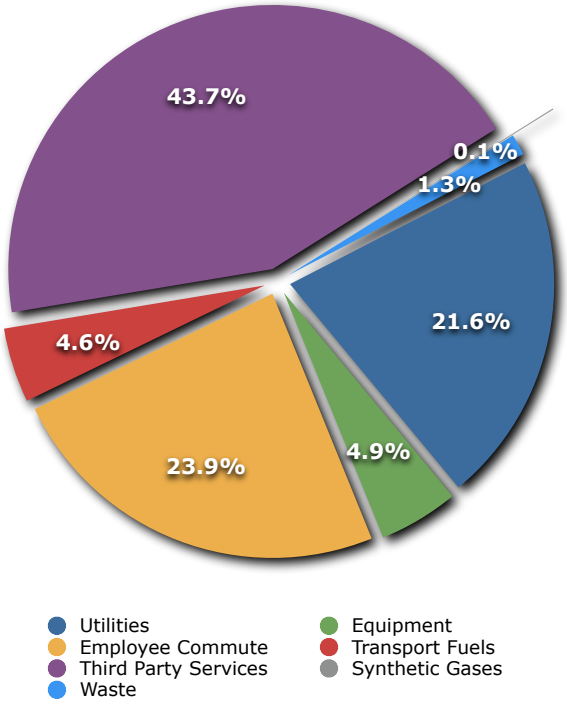
A comparison of the individual sector contributions to gross GHG emissions revealed that 'Third Party Services' was the largest contributor, at 10.4 tCO_2-e (43.7% of gross GHG Protocol emissions). The principal activity contributing to GHG emissions in this sector was 'ICT Services', from a total of $20,160 per annum (14.1% of gross GHG Protocol emissions).

Primary statement of GHG emissions & energy consumption for Bower		
Summary of GHG emissions for the FY 2019/20		
Operational Boundary	Associated Inventory/Service:	(tCO_2-e/yr)
Scope 1	Transport Fuels, Refrigerants	0.0
Scope 2	Purchased Electricity	3.5
Scope 3	Equipment, Employee Commute, Working From Home, Third Party Services, Off-site Waste Disposal, Transmission & Distribution losses, Fuel Extraction, Production & Distribution losses, Other Utilities,Base Building Services	20.2
Gross Total [1,2]		23.8
Credits [a]		0.0
Scope 1, 2 & 3 (Full Scope)	**Net Total** [1,2]	**23.8**
Scope 1 & 2 (S1&2)	**Net Total** [1,2]	**3.5**
(a) For GreenPower accounting description, please see Appendix B.		

1 Includes numerical rounding to one decimal point. Table columns and figure percentages may not sum due to rounding.
2 Scope 1 & 2 emissions are tabulated according to the Carbon Neutral Standard for the relevant reporting period.

The following Table and Figure provides a summary breakdown of GHG emissions by activity sector for Bower.

Figure I GHG emissions for Bower by activity sector



A summary of tCO_2-e emissions for Bower by activity sector		
Activity Sector	**TOTAL[1]**	**(%)**
Utilities	**5.1**	**21.6%**
Equipment	**1.2**	**4.9%**
Employee Commuting	**5.7**	**23.9%**
Transport Fuels-Private	**1.1**	**4.6%**
Third Party Services	**10.4**	**43.7%**
Synthetic Gases	**0.02**	**0.1%**
Waste	**0.3**	**1.3%**
Total[1]	**23.8**	**100.0%**

Activity values presented in this table may be a derived number expressed as the quantity unit for use with the NGA factors workbook on NGER (Measurement) Determination (whichever is relevant) as converted from raw data supplied. Please see Assumptions section where applicable, for derivations.

Contents

1 Introduction

1.1 Carbon Dioxide Equivalence

Within this assessment, greenhouse gases (GHGs) are measured in carbon dioxide equivalent (CO_2-e) and include the greenhouse gases covered by the Kyoto Protocol – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3) which are then multiplied by their relative Global Warming Potential (GWP).[3] The GWP is an index used to convert the Kyoto Protocol non-carbon dioxide gases to a carbon dioxide equivalent.

1.2 What Standards Apply?

The Guidelines used for GHG assessments are in accordance with The GHG Protocol: A Corporate Accounting and Reporting Standard (Revised Edition) and Corporate Value Chain (Scope 3) Standard[4] published by the World Resource Institute (WRI) and World Business Council for Sustainable Development (WBCSD) and with International Standards Organisation ISO 14064-1:2018 Greenhouse gases - Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals.

1.3 How is the Assessment Defined?

In order to conduct a GHG assessment, both the organisational and operational boundaries must be set. The GHG Protocol is the universally recognised standard in setting these boundaries. This gives organisations consistency when accounting for and setting the scope of their emission sources.

For setting organisational boundaries, two distinct approaches can be used to consolidate GHG emissions; the equity share and the control approaches:

- **Equity Approach**: an organisation accounts for GHG emissions from operations according to its share of equity in the operation.
- **Control Approach**: an organisation accounts for 100 percent of the GHG emissions from operations over which it has control. It does not account for GHG emissions from operations in which it owns an interest but has no control. Control can be defined in either financial or operational terms.

An organisation has financial control over the operation if the former has the ability to direct the financial and operating policies of the latter with a view to gaining economic benefits from its activities.

3 IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston, H.S., Buendia, L., Miwa, K., Nagara, T. and Tanabe, K. (eds). Published: IGES, Japan. Updated May 2019: https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/

4 http://ghgprotocol.org/standards

A company has operational control over an operation if the former or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation.

Setting the operational boundaries involves identifying emissions associated with its operations, categorising them as direct and indirect emissions, and choosing the scope of accounting and reporting for indirect emissions.

A GHG assessment separates emissions into three scope levels: scope 1, scope 2, and scope 3; and all are covered in the present assessment. The separation of scopes ensures that no double accounting occurs.

Further details are provided in Pangolin Associates' Methodology & References and only a brief summary is included within this document.

- Scope 1 emissions are those over which a company has direct control via ownership of activities.
- Scope 2 is purchased electricity, heat or steam.
- Scope 3 indirect emissions from activities or services purchased from other third party companies and include indirect emissions associated with scope 1 and 2 sources.

Scope 1 and scope 2 emissions are mandatory under regulations covered by reporting schemes such as the NGER Act. Typically, these are the emissions covered when organisations calculate a carbon footprint and develop plans to minimise their GHG impact.

A holistic GHG assessment, however, will also account for scope 3 sources. This includes upstream emissions embodied in the supply chain and the extraction, production and transport associated with the use of fuel, and transmission and distribution losses associated with electricity consumption. Scope 3 emission sources also account for downstream impacts such as the processing, transportation, distribution and end use of sold products, utility consumption in leased assets or franchises and emissions embedded in investments.

By taking this approach, on-site, first and second-order process data on environmental impacts are collected for the product or service system under review, while higher-order requirements (i.e. scope 3 emissions) are typically covered by input-output analysis.[5]

Unless otherwise stated, the calculation methodologies and emission factors used in this assessment are derived from the National Greenhouse Accounts (NGA) Factors[6] in accordance with "Method 1" from the National Greenhouse and Energy Reporting (Measurement) Determination 2008[7] and the National Greenhouse and Energy Reporting (Measurement) Technical Guidelines[8] for the relevant reporting period.

The National Greenhouse and Energy Reporting (Measurement) Determination 2008 describes four methods that can be used to estimate GHG emissions however for the purposes of this report, "Method 1" applies in all cases as it is directly related to the NGA Factors.

5 Using the multi-region input-output models within the Industrial Ecology Virtual Laboratory (IElab) https://ielab.info

6 http://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/tracking-emissions

7 National Greenhouse and Energy Reporting (Measurement) Determination http://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/nger/determination

8 http://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/nger/technical-guidelines

The purpose of this assessment was to identify the types and amounts of GHG emissions attributable to Bower's operations. The assessment may permit Bower to:

- partially or fully offset the effect of its emissions through the purchase of certified carbon credits
- establish operational GHG benchmarks
- identify business risks in dealing with climate change
- identify potential compliance/reporting obligations.

The assessment itself does not reduce or offset Bower's GHG emissions.

The assessment identified the key areas of Bower's operations that were responsible for significant contributions to its total GHG emissions. This assessment report solely reflects GHG emissions related to Bower's activities in the period of review and does not indicate future emissions levels.

A summary of the key reporting policies is set out in Table 1.1.

Table 1.1 A summary of GHG reporting policies for Bower

	Item	Note
1	**Greenhouse gases**	All GHG emissions figures are reported in tonnes of carbon dioxide equivalents (tCO_2-e)
2	**Organisational boundary**	Direct GHG emissions and indirect GHG emissions have been reported using the Operational Control Approach as defined by the GHG Protocol. 100% of emissions for entities within the organisational boundary have been reported.
3	**Operational boundary**	All scope 1 (direct GHG emissions) and scope 2 (indirect GHG emissions) have been reported for operations within the organisational boundary. The list of scope 3 emissions included within the organisational boundary are defined in Table 2.1
4	**Geographical scope**	Only GHG emissions that fall within the Australian operations of the organisational and operational boundaries have been reported.
5	**Conversion factors**	The GHG emissions associated with the activities noted in Table 2.1 have been determined on the basis of direct measurement, purchase invoices or estimations multiplied by relevant carbon conversion factors using Method 1 of the NGER Determination, unless otherwise stated.
6	**Baseline GHG Emissions**	Where applicable, the GHG baseline applies to operational boundary emissions as set out in Table 2.1 and has been prepared in accordance with the GHG reporting policies stated in this report. The baseline is adjusted when new sources of scope 3 emissions are reported. The baseline is adjusted to reflect acquisitions and divestments that result in a change to the baseline of more than 5% and for any significant changes in reporting policy.
7	**Prior year restatements**	Where information is available, prior year figures have been restated to comply with the reporting policies set for the current year. Where information is not available, estimates are made. The estimates and basis for the estimates are provided in the report. Where significant adjustments have been made a note detailing the adjustments is provided.
8	**Materiality**	Emissions from sources that contribute, in aggregate, less than 1% to overall GHG emissions can be excluded. Basis for exclusion is similar to conducting streamline life cycle analysis. Note: the materiality threshold for NGER is different.
9	**Crediting criteria**	All directly attributable offset measures (e.g. GreenPower, GreenGas, Flight offsets) are automatically accounted against the respective operational boundary. Any additional voluntary carbon credits are applied on a corporate total basis in a cascade hierarchy of: scope 1> scope 2> scope 3 GHG emissions. This ensures that all direct emissions are treated first, followed by indirect emissions within the organisational boundary. Landfill waste is treated last of any scope 3 emissions, when applicable.

1.4 Further Details

If an organisation wishes to certify specific products or services as carbon neutral, a comprehensive GHG Life Cycle Analysis (LCA) should be conducted and the measured emissions fully offset by approved Climate Active Carbon Neutral Standard abatements.[9]

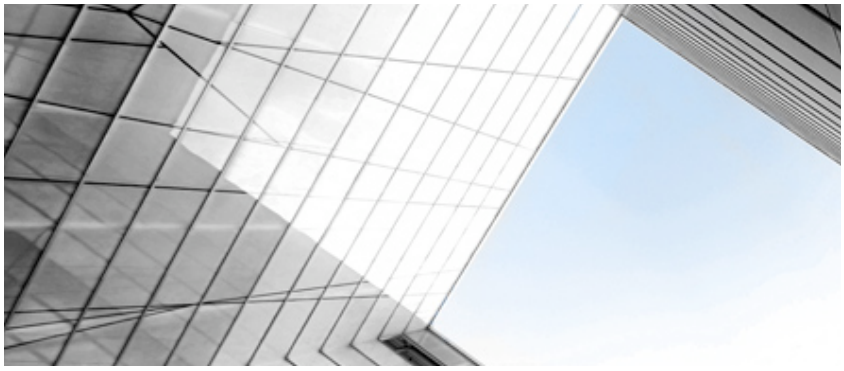
Under the present limitations to the scope boundary of this assessment, the results should not be misconstrued to represent a comprehensive LCA of Bower's product(s) or service(s). Any statement of claims around carbon management contrary to the limitations presented in this report needs to be assessed against the Trade Practices Act (TPA) 1974.

The marketing of claims about the environmental benefits of products and services, resulting in misleading and deceptive conduct to consumers, may lead to court action for breaches of the TPA.

Pangolin Associates' welcomes and supports any investigation by the Australian Competition and Consumer Commission (ACCC) into deceptive marketing claims as part of our commitment to providing transparency and the highest possible level of service to our customers.

9 https://www.environment.gov.au/system/files/pages/b6b73a02-1a6c-4d77-bb11-e12c44f759c4/files/guidance-offsets-eligible-offsets.pdf

2 Detailed Results



Pangolin Associates concluded that Bower produced a total of 23.8 tCO_2-e for FY 2019/20.

2.1 Organisational Boundary

The GHG assessment for Bower included the following locations and facilities:

2.2 Summary of Emissions

Utilising industry standard methodology to calculate the carbon footprint, Pangolin Associates concluded that Bower produced a total of 23.8 tCO_2-e.

This is presented in Table 2.1 and Figure 2.1, which displays all the sectors reviewed in this assessment boundary.

Table 2.1 Summary of tCO_2-e emissions for Bower

Activity Sector	Activity/Service	Activity Data	Units	Emissions (tCO_2-e/yr)	Percentage
Utilities	Grid Electricity	3,431.0	kWh	3.8	16.2%
	Renewable Electricity	3,431.0	kWh	0.0	0.0%
	Grid Electricity (Base Building)	403.7	kWh	0.5	1.9%
	Telecommunications	4,750.0	$	0.8	3.2%
	Water	0.1	ML	0.1	0.2%
	Sewage	0.03	ML	0.03	0.1%
Equipment	IT Equipment	1,545.0	$	0.3	1.2%
	Carbon Neutral Paper	127.0	kg	0.0	0.0%
	Stationery	1,221.0	$	0.9	3.7%
Employees	Employee Commute	48,122.6	passenger.km	3.9	16.6%
	Working From Home	4,830.0	h	1.8	7.4%
Transport Fuels-SCOPE 3	Privately owned/controlled	422.2	L	1.1	4.6%
Third Party Services	Cleaning Services	1,870.0	$	0.3	1.1%
	Printing	3,825.0	$	2.8	11.6%
	Accounting Services	9,600.0	$	1.5	6.5%
	Software	12,500.0	$	2.1	8.7%
	ICT Services	20,160.0	$	3.4	14.1%
	Membership & Registration Fees	5,600.0	$	0.4	1.7%
Synthetic Gases	Refrigerant	0.01	kg of Refrigerant	0.02	0.1%
Waste	Waste-landfill	0.3	t	0.3	1.3%
	Recycling	0.3	t	0.0	0.0%
Gross Total[1]		**23.8**			**100.0%**
Credits	Other	0.0	tCO_2-e	0.0	
Net Total[1]			**23.8**		

Activity values presented in this table may be a derived number expressed as the quantity unit for use with the NGA factors workbook or NGER (Measurement) Determination (whichever is relevant) as converted from raw data supplied. Please see Assumptions section where applicable for derivations.

A comparison of the individual sector contributions to GHG emissions revealed that 'Third Party Services' was the largest contributor, at 10.4 tCO_2-e (43.7% of GHG Protocol emissions). The principal activity contributing to GHG emissions in this sector was 'ICT Services', from a total of $20,160 per annum (14.1% of GHG Protocol emissions).

Figure 2.1 displays a waterfall graph of your GHG emissions and the percentage contribution by activity sector.

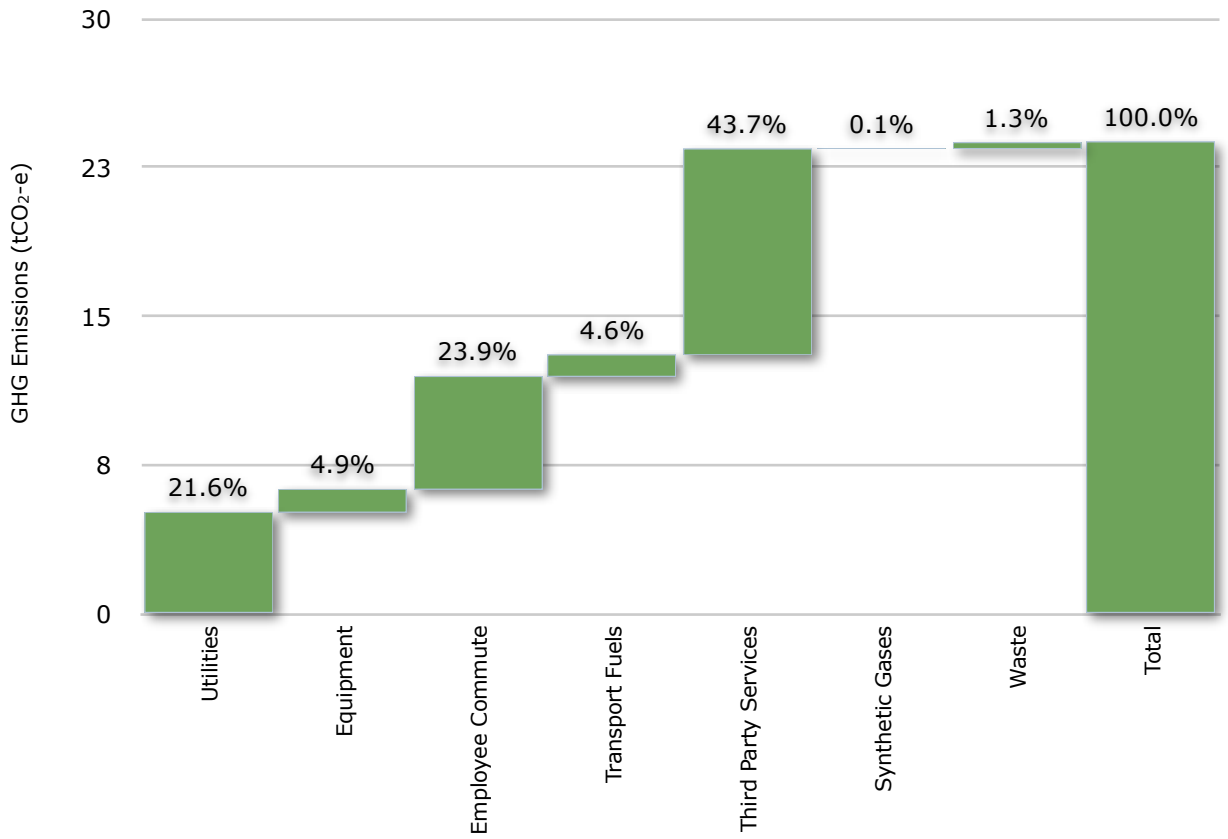


Figure 2.1 A summary of net GHG emissions for Bower by Activity Sector[1]

Figure 2.2 shows a breakdown of full scope GHG emissions and the net percentage contribution by operational boundary (scope type).

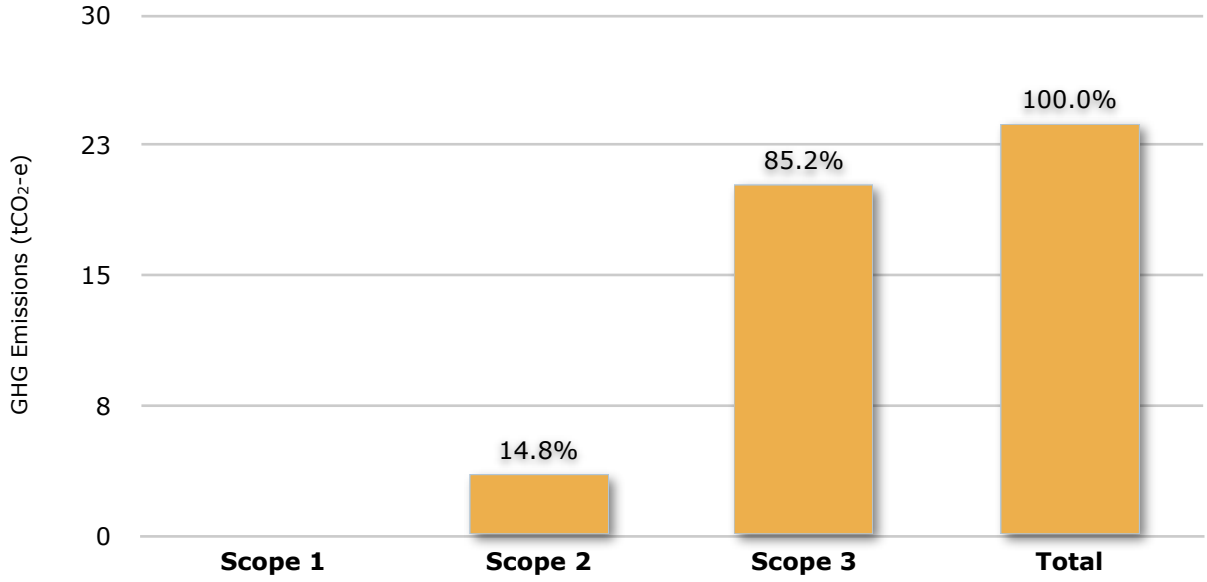


Figure 2.2 Summary of net GHG emissions by operational boundary for Bower[1]

Table 2.2 summarises the breakdown of GHG emissions by operational boundary and assessment type (Full Scope and S1 & 2).

Table 2.2 A summary of operational boundary emission sources for Bower

Emission Source	S1&2 (tCO_2-e/yr)	Full Scope (tCO_2-e/yr)
Scope 1	0.0	0.0
Scope 2	3.5	3.5
Scope 3	-	20.2
Total[1,2]	**3.5**	**23.8**

The largest individual emission source within the operational boundary for Bower was from Scope 3 - indirect GHG emissions.

Figure 2.3 shows a breakdown of GHG emissions by operational boundary (scope type) and the percentage contribution by each specific gas type.

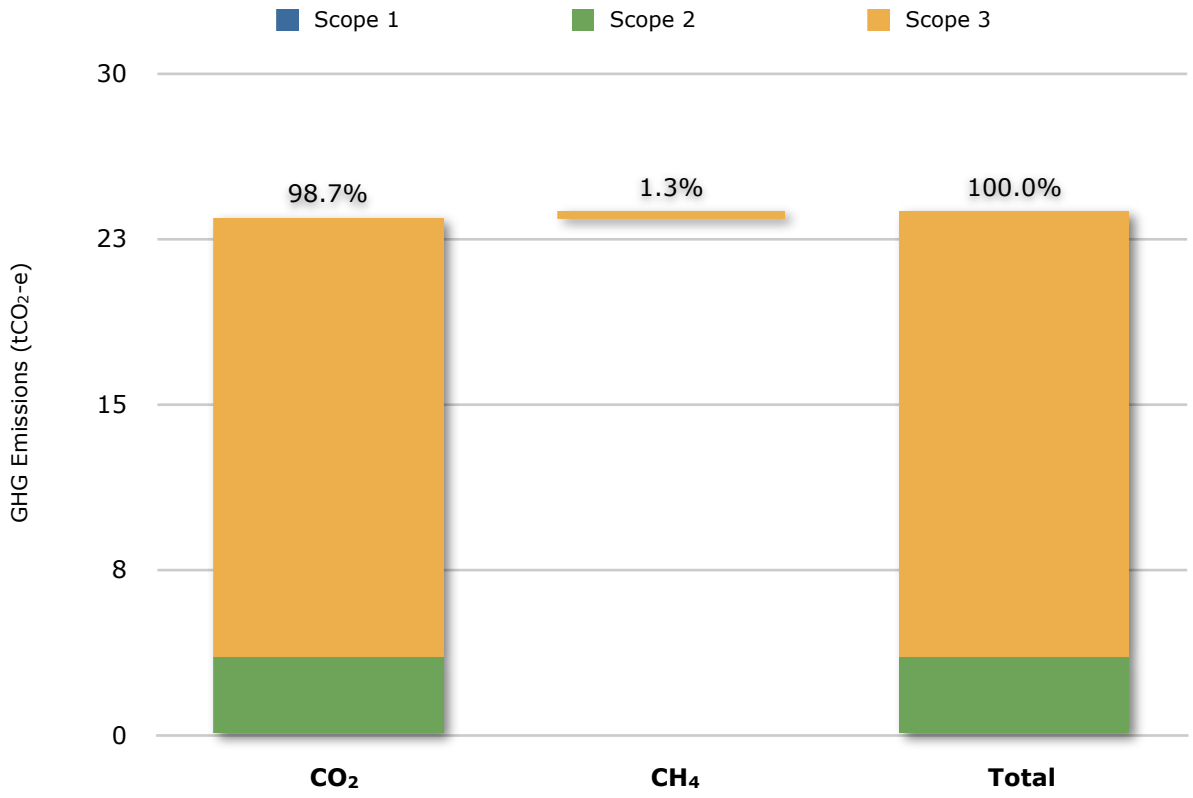


Figure 2.3 Summary of net emissions by specific gas type for Bower[1]

Table 2.3 summarises the breakdown of GHG emissions by operational boundary, specific gas type and assessment type (Full Scope and S1 & 2).

Table 2.3 A summary of scope type and specific gas type for Bower

Emission Source	CO_2 (tCO_2-e/yr)	CH_4 (tCO_2-e/yr)	Total[1,2]
Scope 1	0.0	0.0	0.0
Scope 2	3.5	0.0	3.5
Scope 3	19.9	0.3	20.2
Total [1,2]	**23.4**	**0.3**	**23.8**
S1&2 Total [1,2]	**3.5**	**0.0**	**3.5**

The largest individual GHG type emitted by Bower was CO_2, equating to a total of 23.4 tCO_2-e

Bower employees emitted a total of 3.9 tCO_2-e as a result of travelling approximately 48,123.0 passenger kilometres commuting to and from work.

Figures 2.4 to 2.8 show the results of the employee travel survey. The majority of respondents travelled by Train (64% of total passenger.km travelled).

However, Car travel accounted for the majority of the GHG emissions at 65.6%. Employees travelled on average approximately 7,686.3 km per annum, or 181.9 km per week. Each employee emitted 2.7 kg of CO_2-e per work day traveling to and from work.

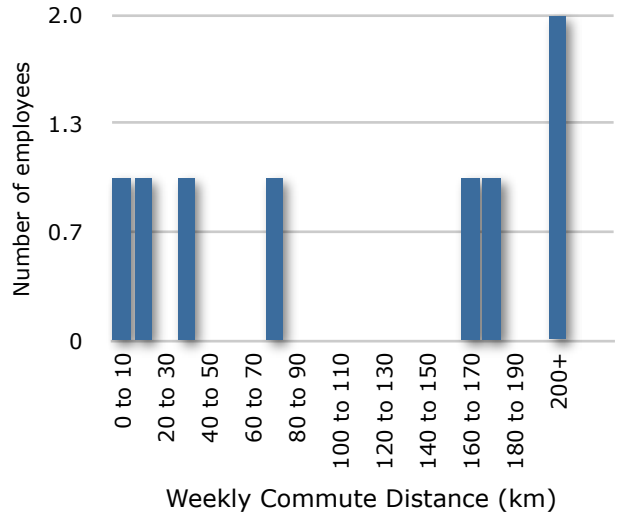


Figure 2.4 Weekly distance travelled by employees commuting to and from work for Bower.

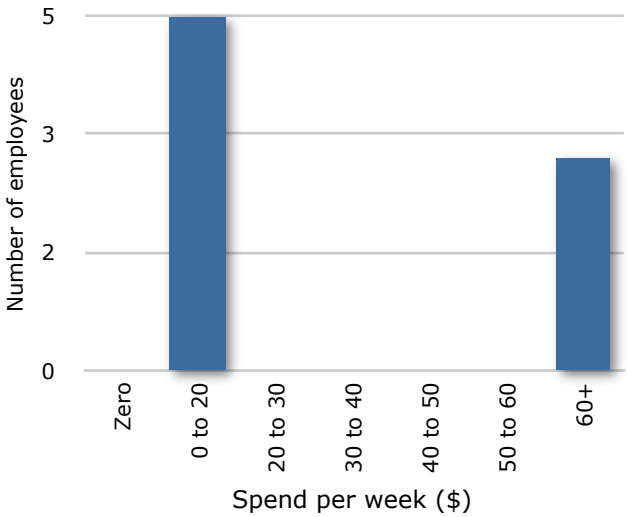


Figure 2.5 Cost per week for employees commuting to and from work for Bower.

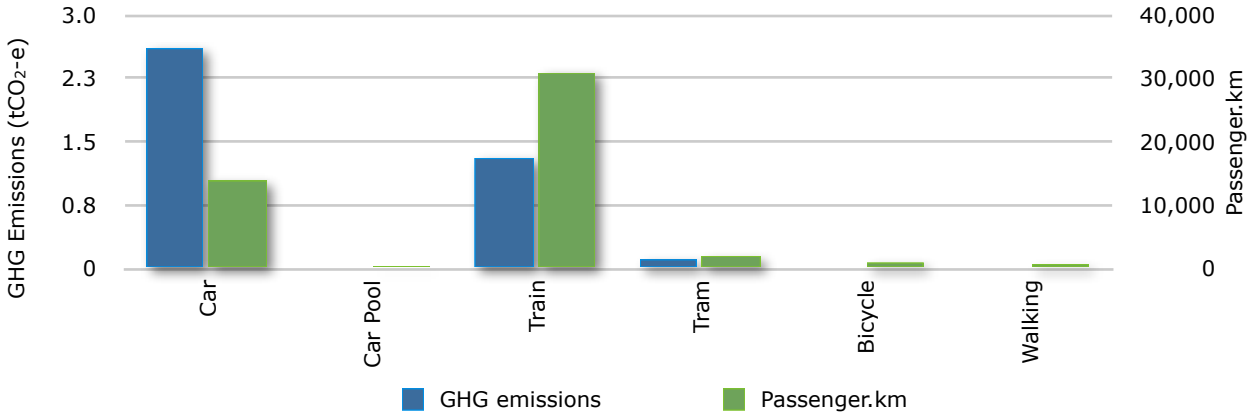


Figure 2.6 GHG emissions and passenger.km travelled to and from work by transport mode for Bower.

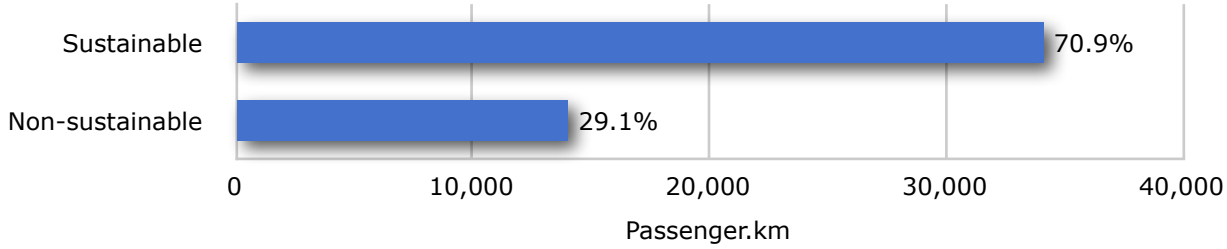


Figure 2.7 Total passenger kilometres by sustainable and non-sustainable transport modes for Bower

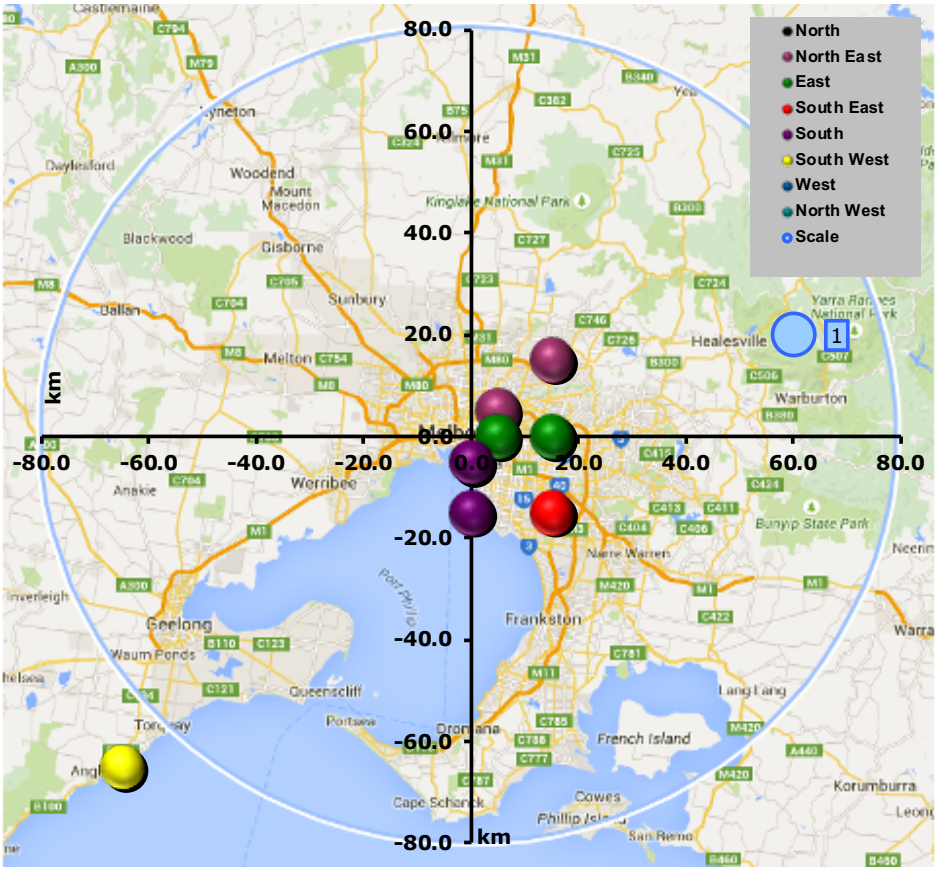


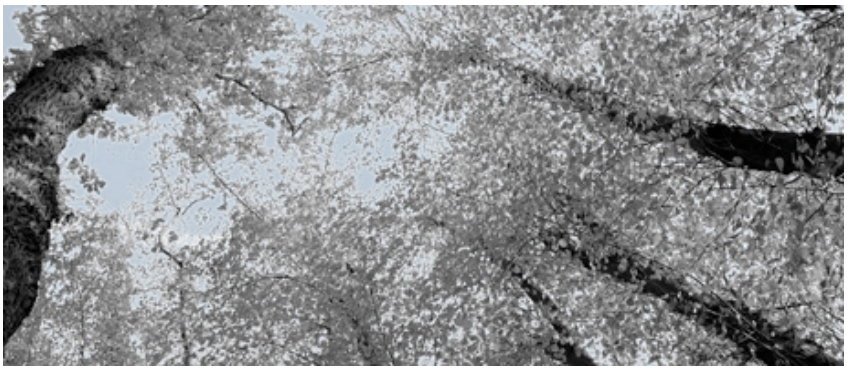
Figure 2.8 Count of employees by direction and distance from work based on home post codes for Bower Architecture & Interiors
Map Source: Google Maps

2.3 Assessment Assumptions

The following assumptions were made in this assessment regarding boundary, calculations and data collection:

- Electricity has been calculated using the first 6 months of 2020 (which falls within the FY2020) and multiplied by two to get the consumption for the whole of the financial year, assuming consumption is consistent
- Base building electricity has been calculated using the tenancy area (m2) occupied by Bower as a proportion of the total electricity consumption of the building
- Expenditure based activities were calculated using the input/output method and may be an overestimation of actual emissions form third-party services and equipment usage. As a top-down approach, these emission factors are inherently less accurate than a process based co-efficient, however do provide for a conservative and more accessible methodology.

3 Environmental Performance



3.1 Benchmarking Indicators

Stakeholders of organisations, governments and the general public are increasingly calling for greater corporate disclosure of GHG information.

A number of organisations prepare stakeholder reports containing information on GHG emissions, usually disclosed through corporate sustainability and annual reports.

The CDP is an independent not-for-profit organisation formed in response to the growing recognition of the need for quality public dialogue between shareholder value and commercial operations in the context of global climate change. Several thousand organisations across the globe measure and disclose their climate change data, supply chain management, water stewardship and sustainable forestry programs to CDP.

Table 3.1 lists other major organisations in various business sectors and summarises their emissions relative to total staff numbers. Note, please use caution when making comparisons as no two organisational and operational boundaries are the same.

Table 3.1 GHG benchmarks across industry sectors

Business Sector	ANZSIC# Division	S1&2 (tCO_2-e)	Total (tCO_2-e)	Highest Contributor (%)	FTE	S1&2/ FTE	Total/ FTE
Arts and Recreations	R	49,565	64,639	Utilities 85%	393	126.1	164.5
Telecommunications & ISP	J	1,467,285	1,758,695	Utilities 84%	32,485	45.2	54.1
Public Administration & Safety	O	26,194	38,302	Utilities 66%	837	31.3	45.8
Accommodation	H	59,919	91,340	Utilities 77%	2,299	26.1	39.7
Health Care & Social Assistance	Q	166,896	421,644	Utilities 47%	15,289	10.9	27.6
Other Services	S	2,019	4,007	Utilities 60%	155	13.0	25.8
Tertiary Education	P	347,730	504,189	Utilities 75%	24,040	14.5	21.0
Retail Trade	G	2,847,118	3,474,357	Utilities 71%	173,114	16.4	20.1
Road Transport	I	696,816	737,468	Transport Fuels 82%	37,411	18.6	19.7
Advertising	M	3,843	11,173	Utilities 40%	588	6.5	19.0
Rental Hiring & Real Estate	L	3,751	5,701	Utilities 35%	482	7.8	11.8
Legal & Accounting & Professional	M	27,263	101,271	Utilities 47%	9,396	2.9	10.8
Financial & Insurance Services	K	525,860	683,287	Utilities 77%	89,602	5.9	7.6
Bower Architecture & Interiors	M	3.5	23.8	Third Party Services 43.7%	9	0.4	2.6

Australian and New Zealand Standard Industrial Classification

Similarly, alternative ways of benchmarking may be to compare an activity from Bower against another organisation's published value. For example, Bower may benchmark against a major organisation such as ANZ Banking Corporation.[10]

10 https://www.anz.com/content/dam/anzcom/shareholder/au22289_anz_sustainability_review_2018_fa_online.pdf

3.2 GHG Performance Indicators

Greenhouse Performance Indicators (GPIs) record greenhouse intensity measurements and track changes in greenhouse emissions intensity over time. A GPI is used to relate greenhouse performance to a Business Measure (BM) category.

The primary purpose of a GPI is to help an organisation track its greenhouse performance and help organisations track their performance in specific areas more accurately. A selected list of environmental aspects and associated GPIs for ANZ are highlighted in Table 3.2 as an example.[11]

Table 3.2 Selected Greenhouse Performance Indicators for ANZ - Example Only

Value profile		
Number of FTE employees	42,787	
Environmental aspects		
Electricity (purchased)	212,299	MWh
Gas consumed	61,772	GJ
Transport fuel (scope 1&3)	16,472	tCO_2-e
Water consumed	128,270	kL
Total waste generated (to landfill)	924	tonnes
Total corporate travel (flights & accomodation)	35,324	tCO_2-e
Paper	2,823	tonnes
GHG emissions (Full Scope)	266,906	tCO_2-e
GHG emissions (S1&2)	171,012	tCO_2-e
GPI	**Per FTE**	
Energy intensity (GJ)	19.3	
Total waste intensity (kg waste)	21.6	
Total water intensity (kL)	3.0	
Corporate Travel (km)	0.8	
Paper (kg)	66.0	
GHG emission intensity (tCO_2-e) (Full Scope)	6.2	
GHG emission intensity (tCO_2-e) (S1&2)	4.0	

11 ibid.

Australia's GHG intensity ratio is defined as the amount of GHG produced per dollar of gross value added (GVA). The Australian Environmental-Economic Accounts show that the GHG intensity ratio of the economy have been steadily decreasing over time while energy and water intensity are relatively stable.[12]

The GPIs, value and environmental aspects for Bower are presented in Table 3.3.

Table 3.3 Greenhouse Performance Indicators for Bower

Company profile		
ANZSIC Division	M Professional, Scientific and Technical Services	
Duration of report	FY 2019/20	
Value profile		
Number of FTE employees	9	FTE
Environmental aspects		
Electricity (purchased)	24.7	GJ
Gas consumed	0.0	GJ
Water consumed	54	kL
Total waste generated	0.5	t
Total energy use	24.7	GJ
GHG emissions (Full Scope)	23.8	tCO_2-e
GHG emissions (S1&2)	3.5	tCO_2-e
GPI	**Per FTE**	
Energy intensity (GJ)	2.7	
Total waste intensity (kg waste)	56.7	
Total water intensity (kL)	6.0	
Corporate Travel (km)	505.4	
Paper (kg)	14.1	
GHG emission intensity (tCO_2-e) (Full Scope)	2.6	
GHG emission intensity (tCO_2-e) (S1&2)	0.4	

12 http://www.abs.gov.au/ausstats/abs@.nsf/mf/4655.0

3.3 What Does This All Mean?

Conceptualisation of what GHG emissions represent can be difficult. So how does your organisation's GHG emissions translate to more tangible measures? Figure 3.1 illustrates your results (includes credits) in equivalent measurement units for the following items:

- your electricity use in MWh expressed in terms of the number of tonnes of coal combusted[13]
- your transport and stationary energy consumption in GJ (excluding electricity and distributed mains natural gas) expressed in equivalent barrels of oil
- your total GHG emissions generated by the equivalent number of passenger vehicles that travelled the national average distance[14]
- the estimated total number of global hectares needed to produce the resources consumed and to absorb the waste generated by your organisation in a year (excl. RFI)[15,16]
- the estimated number of earth equivalents required to sustain your organisation's ecological footprint per FTE employee (excl. RFI)
- the estimated resultant global temperature rise from your total generated GHG emissions[17].

The ecological footprint is an indicator of environmental sustainability.[18,19] It should be noted that a carbon footprint assessment is not an ecological footprint. Bower is directed to visit one of the calculators available at the EPA Victoria web site to obtain a comprehensive assessment of your ecological footprint.

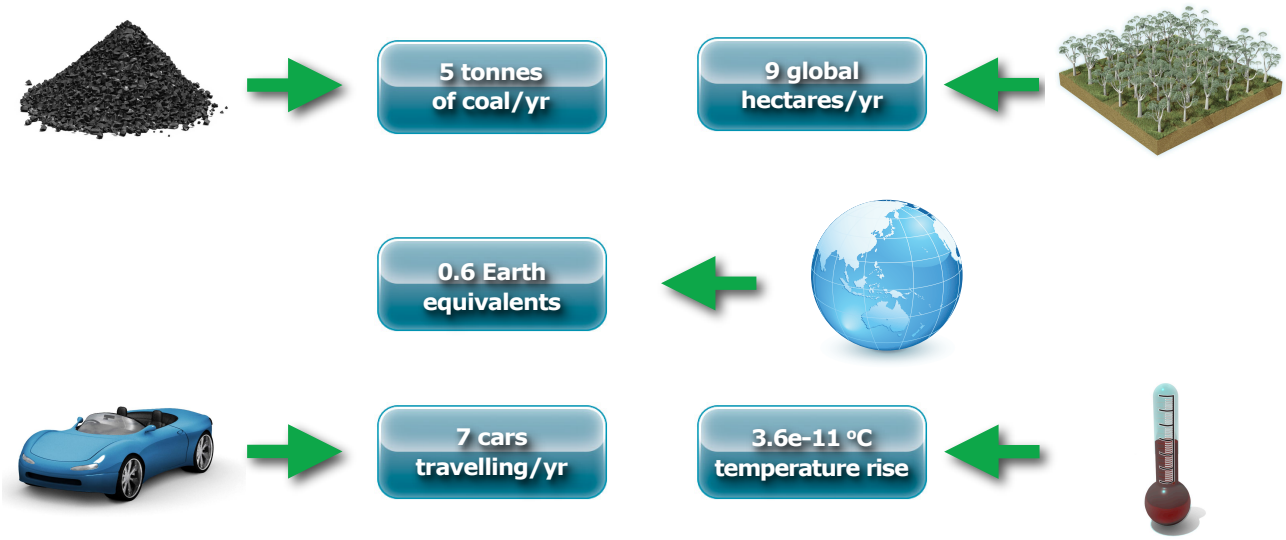


Figure 3.1 Equivalent measurement units for Bower[1]

13 Electricity use defined as= Total Purchased Consumption + Base Building - GreenPower. Tonnes of coal combusted can be a combination of black and brown coal based on national grid contributions. Victoria is treated as 100% brown coal.

14 ABS (2008). 9208.0 - Survey of Motor Vehicle Use, Australia, 12 months ended 31 October 2007, Australian Bureau of Statistics.

15 World-Wide Fund for Nature International (WWF) (2004). Living Planet Report 2004, Global Footprint Network, Gland, Switzerland.

16 The number represents an indicator only and not the actual ecological footprint of your organisation, It is a heuristic/pedagogical value only.

17 H. Damon Matthews, Nathan P. Gillett, Peter A. Stott & Kirsten Zickfeld, The proportionality of global warming to cumulative carbon emissions, Nature, Vol 459, June 2009

18 Wackernagel, M., Rees, W.E., Testemale, P. (1995). Our Ecological Footprint: Reducing Human Impact on the Earth, New Society Publishers, British Columbia, Canada.

19 Global Footprint Network and University of Sydney (2005). The ecological footprint of Victoria - Assessing Victoria's demand on nature. Prepared for EPA Victoria, Global Footprint Network and the University of Sydney, 91 pp.

3.4. Product stewardship

Product stewardship is a product-centred approach to environmental protection. Product stewardship calls on those in the product life cycle—growers, manufacturers, retailers, users and disposers—to share responsibility for reducing the environmental load of the products in question.

This holistic overview recognises that manufacturers of products must take on the responsibilities to reduce the environmental load of their products. However, it also requires that retailers, the waste management sector and most importantly the final consumer, to all play a part to achieve the best solutions.

A common example used by all of us is paper. The manufacture of paper requires the use of large quantities of natural resources; forests (wood), water and energy. Paper can be made from virgin wood (either directly from native forests or plantations), recycled and alternative fibres.

In Australia, Eucalyptus hardwoods are used to provide high quality printing and writing paper while softwoods like pine plantations provide low grade papers for newsprint, cardboard and wrapping paper.

The use of recycled paper has grown significantly in Australia. The pulp and paper sector is a significant sector in the Australian economy. Australia produced approximately 3.2 million tonnes of paper in 2006–07. Australia's paper consumption was 4.2 million tonnes, or about 180 kg per person.[20]

The following figure illustrates the associated upstream environmental impacts from your organisation's consumption of paper.[21] The type of paper you decide to purchase via your company procurement policy can have very large unforeseen consequences.

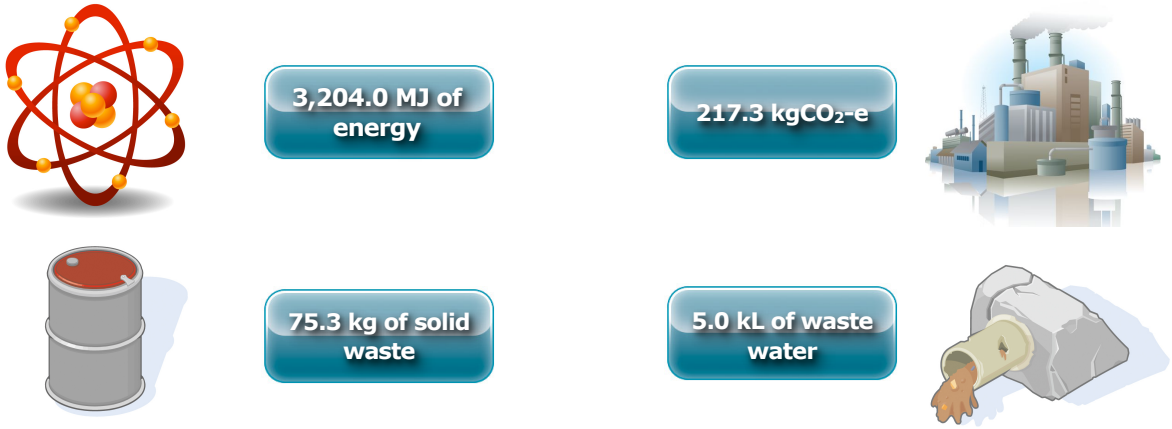


Figure 3.2 The hidden environmental impacts of paper consumption by Bower Architecture & Interiors

20 Australian Plantation Products & Paper Industry council 2008

21 Environmental impact estimates were made using the Environmental Defence Fund Paper Calculator v2 http://www.edf.org/papercalculator/

Externalities are environmental and social costs that are not accounted for in the market price of electricity.

3.5 The Hidden Costs of Electricity

There are many displaced effects associated with using electricity, all concealed neatly behind the simple action of flicking the on/off switch. These impacts include but are not limited to; land disturbance, water use, wastewater discharge, resource depletion, emissions and health impacts.

A recent study addresses the external social and environmental costs – "the externalities" – that accompany all electricity generating technologies and particularly focusses on emissions.[22]

While there are numerous sources of emissions from fossil fuel combustion, only those few emissions that make the greatest contribution to external costs have been considered in any detail.[23] In relation to the externalities of Australian power generation it includes particulate material (PM_{10})[24] and combustion byproducts - carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrogen oxides (NO_X).

The main emissions to consider for health damage costs are PM_{10}, SO_2 and NO_X. Health damage costs are specific to a site. Regional weather variations and population density in the area around the site are the main determinants. These include notable health impacts that can affect the local incidence of respiratory and cardiovascular disease. With its lower population density, Australian health damage costs per unit of emission are much lower than other developed nations if the same health impacts were to be assumed. The aggregated national health burden for fossil fuel power generation is estimated at $A2.6 billion per annum.[20]

Any health exposure impact must acknowledge the high degree of uncertainty in determining a methodology. Often they are simply unknown or are very uncertain and the only properly established parameter is the threshold levels for zero or lowest observable health impacts.

This is then followed by estimating the monetary valuation of health impacts which aim to account for all costs, both 'market' and 'non-market'. This means, for example, that the valuation attributed to an asthma attack should include both the cost of treating the patient (market) and that patient's willingness to pay to avoid the attack and associated suffering (non-market). The damage costs of air pollution are dominated by non-market costs.

22 The Hidden Costs of Electricity: Externalities of Power Generation in Australia, Australian Academy of Technological Sciences and Engineering, 2009

23 Other components include ozone, longer-lived emission components such as potentially toxic metals (As, Cd, Cr, Hg, Ni and Pb), as well as certain organic pollutants, in particular dioxins. Health related costs are modelled to account for the movement of components through the soil, water and the food chain, up to the point where they are ingested or inhaled by humans.

24 The terms 'particulate material' or 'particulates' refer to the very small (or 'fine') solid particles that emerge from the combustion of coal and other fossil fuels. They are classified according to size, which is of the order of micrometres or millionths of a metre (µm). PM10 means particles smaller than 10 µm.

Establishing the 'unit damage cost' associated with CO_2 emissions is an equally difficult challenge and there is a wide range of estimates possible. It is a well publicised fact that Australia produces 1.5% of global carbon emissions.[25] It follows therefore that Australia contributes the same 1.5% to the global damage cost.[26]

Estimating the damage costs of climate change is a complex as well as controversial matter. The implied discount rate is a critical parameter in arriving at valuations. Therefore, a consensus global average of €19/ tCO_2-e is used.[27, 28] Based on an exchange rate of 1€ = $A1.25, the cost adopted was $A23.8/$tCO_2$-e.

Australian figures for quantities of various emissions per unit of electricity generated can be calculated from power station output statistics from various sources and emission data contained in the National Pollutant Inventory. For a sample of Australian coal-fired power stations in QLD, NSW and VIC the following national emission averages are: [20]

• PM_{10} emissions of 0.21 kg/MWh • SO_2 emissions of 3.2 kg/MWh • NO_X emissions of 2.5 kg/MWh

For natural gas fired power plants, as this fuel is cleaner burning, the national average emissions are:

• PM_{10} emissions of 0.022 kg/MWh • SO_2 emissions of 0.002 kg/MWh • NO_X emissions of 0.34 kg/MWh

Thus, the estimated health impact costs excluding CO_2 emissions for electricity generation from the national average black and brown coal and natural gas fired power station are determined as $10.10 and $0.60, respectively.

The report also examined the externalities of selected renewable energy technologies (wind; solar photovoltaic (PV); solar thermal; and geothermal) that are presently actively deployed or under development in Australia. As is well known, wind turbines themselves do not generate any GHG during their operation. However, there are still some external costs. Given that wind is the most mature of these technologies and represents the bulk of installed renewable capacity in Australia (excluding hydropower), the health and environmental costs have been estimated as:

• Noise (power generation) $0.08/MWh • Visual impact (power generation) $0.075/MWh

• Human health (other cycle stages) $0.39 /MWh • Climate impact (other cycle stages)$1.25 /MWh

25 Garnaut, R, 2008, Garnaut Climate Change Review, Final Report, Cambridge University Press, Melbourne, September, 634p.

26 Australia is generally considered to suffer disproportionately high damage costs due to climate change. This might constitute an argument for using a higher-than-global damage cost but this would lend to many practical problems (Garnaut, 2008)

27 ExternE-Pol, 2005, Externalities of energy: Extension of accounting framework and policy applications: New energy technologies, Final Report on Work Package 6, European Commission, 15 July, 76p. http://www.externe.info/expolwp6.pdf.

28 It has been well documented that given Australia's particular climate change vulnerability, it may warrant a separate damage cost to be evaluated.

Excluding climate impact, the net health and social cost is estimated at $0.50/MWh. The electricity and gas sector accounts for around 1.4 per cent of total water consumption in Australia. Around 65 per cent of the generating capacity in the National Electricity Market (NEM) currently depends on fresh water for hydro-electricity generation or cooling in coal or gas fired thermal generation.[29]

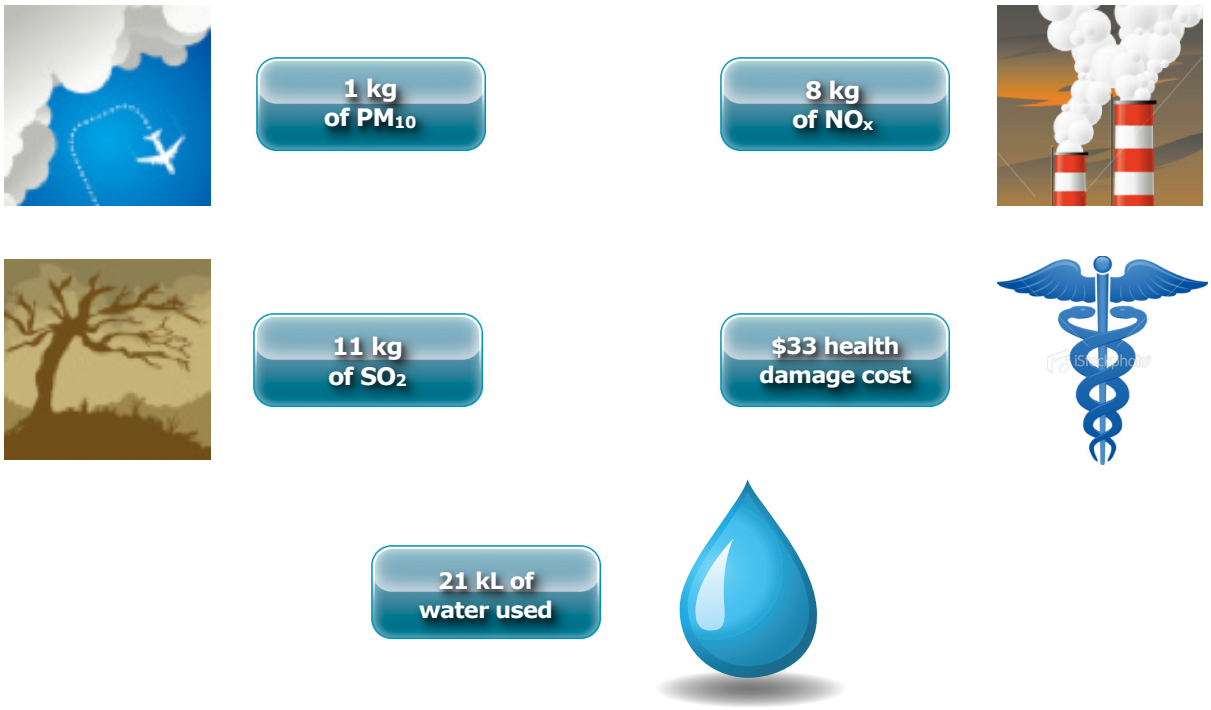
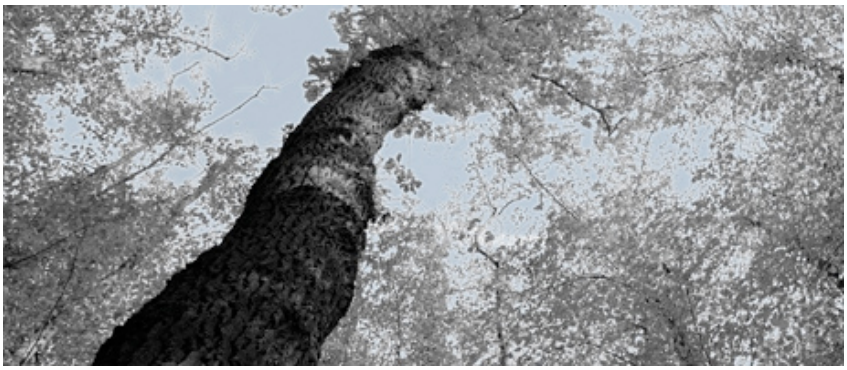


Figure 3.3 The hidden externalities from black grid based electricity consumption by Bower Architecture & Interiors

29 A. Smart and A Aspinall, Water and the electricity generation industry; Implications of use. Waterlines Report Series No.18, August 2009. National Water Commission.

4 Goals & Targets



4.1 Sustainable Development Goals

Through undertaking a comprehensive carbon assessment, Bower has made progress towards achieving some of the United Nations Sustainable Development Goals (SDGs). Investing in carbon offset projects, particularly those with a range of co-benefits will broaden the scope of goals Bower is on track to contribute towards.

The SDGs are a universal set of interconnected goals, targets, and indicators that constitute the global development agenda for 2015-2030. Adopted by 193 member states of the United Nations in 2015 as the successor to the Millennium Development Goals, the SDGs comprise of 169 targets categorised into 17 goals that focus on the five key elements of people, planet, prosperity, peace, and partnership.[30] Each goal advocates a general aim, which is supported by a set of primary targets that prescribe specific actions and timeframes (represented by a number, e.g: 1.1), and a set of secondary targets that are more flexible in their approach and open to interpretation (represented by a letter, e.g: 1.A). Together, the goals call for urgent action by all nation states to form a collective partnership to end poverty, improve health and education, reduce inequalities, boost economic growth, mitigate climate change, and preserve nature.[31]

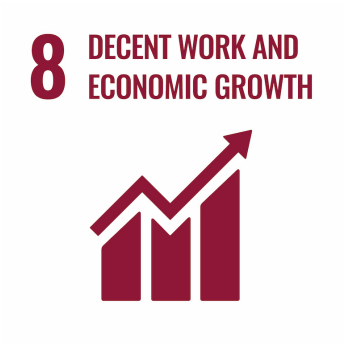
Depending on the industry sector and geographical location of the organisation, certain goals will have greater impacts and opportunities than others.

Prioritising which targets to focus on will be critical to making the business case for action on SDGs and sustainability in general.

As a starting point Bower may wish to investigate further options to either increase positive impacts or reduce negative ones on the targets described below.

7.3 - By 2030, double the global rate of improvement in energy efficiency

30 http://www.lse.ac.uk/GranthamInstitute/faqs/sustainable-development-goals-sdgs/
31 https://sustainabledevelopment.un.org/sdgs



8.4 - Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

9.4 - By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

12.2 - By 2030, achieve the sustainable management and efficient use of natural resources
12.5 - By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse
12.8 - By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

4.2 GHG Reduction Targets

Pangolin Associates advocates a three phase approach to carbon management for reducing future emissions and progressively transitioning towards complete carbon management.

The next steps for the organisation involve using this approach to begin implementation of a carbon reduction target, embedding carbon and energy management systems in the workplace, and reporting on progress.

Implementation of a three phase approach to carbon reduction strategies ensures a transparent, thorough process which filters through all levels of the organisation.

Pangolin Associates has identified that the key phases involved in any GHG emissions reduction strategy are:

- Phase 1: measure (understand the key emission sources)
- Phase 2 and 3: manage and minimise (offset all or a proportion of your carbon emissions; and avoid and reduce whatever is practicable)

This assessment will help Bower to understand Phase 1 of the process: understanding key emission sources. Phases 2 and 3 involves managing emissions through offset purchases and reducing emissions.

The options presented in Figures 4.1 and 4.2 can be immediately implemented to offset the GHG emissions of the company. Options include 100%, 50% and 20% offsetting of GHG emissions using a mix of both GreenPower and carbon credits. GreenPower and carbon credits can have an immediate impact on a company's carbon emissions profile while the company engages in a carbon minimisation strategy.

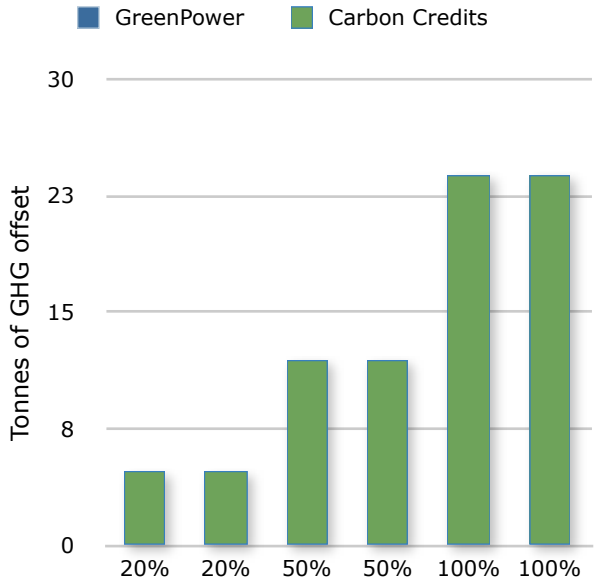


Figure 4.1 Greenhouse gas emissions offset target options - GreenPower and carbon credits

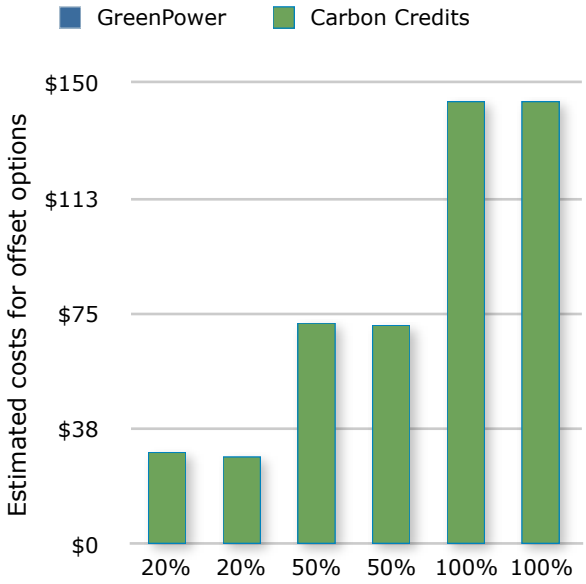
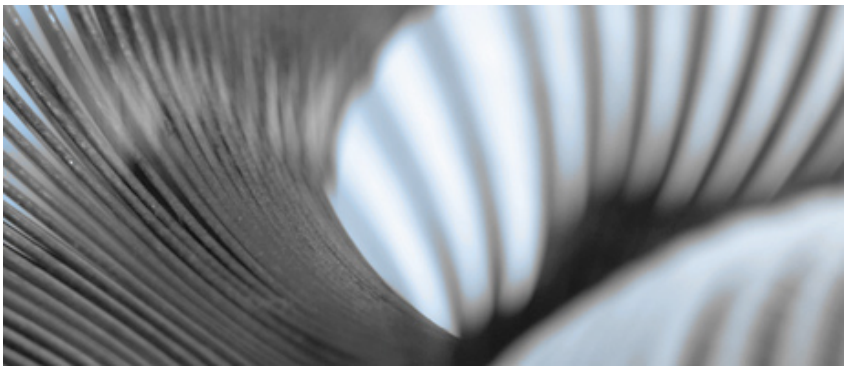


Figure 4.2 Greenhouse gas emissions offset target options - indicative costs in AUD$ based on $6.00 per carbon credit and $50 per REC. Prices exclude GST.

5 Minimising Carbon Emissions



Pangolin Associates suggests that Bower considers some of the following energy efficiency and greenhouse gas minimisation strategies for managing energy usage and GHG emissions. This will help with the minimisation phase of carbon management.

In getting into the nitty gritty of energy consumption, staff participation and engagement will be particularly important. The 'guiding coalition' may wish to use some of the following examples when developing policy recommendations and staff incentive programmes.

5.1 Minimising Emissions - Toolkits

There are several government and industry based toolkits designed specifically to assist organisations identify and assess, reduce and then manage their energy usage and GHG emissions.

These toolkits can assist with Phase 2 and 3 of the energy and GHG emissions reduction strategy, as outlined in the figure above.

Some toolkits that may assist are shown in Table 5.1. Not all may be applicable as they can be targeted at organisations of varying sizes.

5.2 Energy

Prevention of GHG emissions is always the first step to reducing impact on the environment. If not already using 100% GreenPower, Bower should investigate sourcing its electricity from accredited GreenPower suppliers, which is electricity generated from renewable sources. This would also serve to eliminate the need to purchase carbon credit offsets for electricity related emissions.

Bower could also examine energy efficiency options that could be implemented to reduce energy usage and save costs. Many lighting options do not require changing fixtures, provide an equivalent or better standard of lighting but result in much less heat loss (reducing cooling requirements) and produce immediate energy reductions of 20-30%.

An Energy Audit to Australian Standard 3598 (which can also be conducted by Pangolin Associates if required) will identify such lighting and other applicable energy efficiency options for a facility or work process. Energy efficiency recommendations are provided, with simple payback periods and cost savings estimates.

5.3 Transportation

Air travel is a carbon intensive process, contributing significantly to GHG emissions. A reduction in flights could be possible using the right technology for video-conferencing, however many organisations are

reluctant to engage with video-conferencing technology because of historically high price points, poor quality and the small scale of image for desktop options that makes it hard to workshop effectively.

Advances in video-conferencing now make it possible to have a conference with participants viewing each other in life-size High Definition (HD), which eliminates the challenges associated with using desktop equipment.

5.4 IT and Office Equipment

Policy should ensure all equipment procured carries the ENERGY STAR rating as developed by the Environmental Protection Agency (EPA).

Power Supply Units (PSUs) inside desktop computers and servers are typically very inefficient and can be replaced with 80 PLUS specified PSUs to cut energy consumption by 15-25%.

Gaining 80 Plus certification means manufacturers have to ensure the PSUs efficiently convert AC to DC voltage and that the PSU is capable of at least 80% efficiency with 20%, 50% and 100% power loads.

Existing equipment can be upgraded with an inexpensive 'drop-in' component so there is little expense involved and for computing equipment that must be left on continuously, payback is typically achieved within a year.

Reduced heat output and improvements in power quality not only mean a better functioning computer but also mean less strain on the HVAC component of energy consumption.

There may also be some benefits associated with outsourcing IT infrastructure entirely, selecting a Managed Service Provider with a well rated data centre, using technology sourced from members of the GreenGrid and providing options that allow you to offset emissions as part of the service to you.

5.5 Company Administration

A significant amount of paper and other resources, such as electricity, transport fuel and freight services, can be eliminated, or at least minimised, by opting to conduct company customer communications for billing/invoicing and bill payments online.

This also applies to managing office administration on the computer instead of filing various paper documents into folders. Currently, many banks can send account information via the internet, and so printed statements are not necessary. In addition, many companies use the internet and hence sending invoices electronically can also be encouraged.

For companies completely versed in computer technology, employing software packages like those offered by Atlassian can provide an alternate means of staff management that can drastically reduce other resource consumption.

The following criteria are suggested for the selection of paper.

- Purchase fully certified carbon neutral offset paper (e.g. ENVI), including best practice principles listed below.
- The higher the recycled fibre content, the better.
- The higher the post-consumer fibre content, the better.
- Preference goes to "processed-chlorine-free" (PCF) paper.
- If there is a need for virgin fibre content, it should be Forest Stewardship Certified (FSC).

- Preference is given to paper from paper mills with ISO 14001/EMAS or comparable Environmental Management System (EMS) certification.
- Look for use of renewable energy in the paper production process.

5.6 Staff Transportation

Transportation of staff to and from work is an indirect external contributor to GHG emissions. Your organisation is not directly responsible for these emissions, as evident by the fact that it is not claimable as a work expense for taxation purposes.

Nonetheless, being an environmentally concerned organisation, your organisation should still aim to reduce staff travel emissions by encouraging staff to opt to travel in the following ways.

- Select public transport. Introduce a discounted travel pass program for staff to encourage use of public transport.
- Walk or ride to work - while at work if short distance travel is necessary, consider setting up a bike rental or share program.
- Car pool if the above options are not possible.
- Pre-plan and group activities according to location to save overall travel distances.
- Adopt a vehicle policy for executives, which provide financial incentive to select fuel-efficient vehicles.

A log of the distances travelled by public transport or self-sufficient means, to determine the distances saved from using personal vehicles, can be a great incentive for staff to plan "greener" travel.

5.7 Consumer Selection

When seeking to purchase products with minimal environmental impact, the consumer needs to consider various factors such as the initial resources the product is made from, the production process, type of packaging, the resulting waste that is generated, and the distance which the product travels to reach the consumer.

Below are some specific aspects to consider.

- Select energy efficient appliances and products
- Buy local products, particularly fresh foods
- Opt for green friendly products
- Avoid excess packaging
- Avoid the purchase of disposable products such as paper plates and paper cups.
- Carry your own bag and avoid using plastic bags as much as possible
- Dispose of rubbish properly, i.e. use available recycling bins.

5.8 Applying a Green Office Policy

The best way to influence the behaviour of others is to set an example. A good policy is to encourage all staff members to think green by applying greener and more energy efficient methods in the workplace.

Furthermore, development of a company green office policy by creating environmental milestones and taking records or logs of energy savings, can be a great way to build incentive.

The Organisation for Economic Co-operation and Development (OECD, www.oecd.org) has quantified that Australia is among the highest producers of waste in the world. Paper typically represents more than 70% of the waste produced by offices. Aim to reduce the amount of office paper used and recycle waste paper.

The quantity of paper used can also be reduced by using e-mail, filing documents within your computer and making electronic backups instead of printing and filing paper copies. Other alternatives to reduce paper use and waste are by ensuring that printing estimates are correct, avoiding over-ordering printed materials and setting your printer to do double-sided printing. To further reduce emissions, investigate using recycled paper over virgin paper.

5.9 Get Started

Monitor consumption. Check bills for anomalies. If you have sub-meters, record and monitor their consumption monthly. Educate and involve staff, for example:

- Have an annual social event — paid for by the energy savings that year!
- Include an energy update in your staff newsletter
- Encourage staff to put forward initiatives
- Have a budget (say 5% of your annual energy expenditure) for ongoing improvements
- Include energy efficiency as part of equipment purchasing policy
- Provide logical labelling of light switches to encourage staff to switch ON only the areas they require.

Having a preventative maintenance program in place with a good service provider is essential to achieving ongoing energy savings, minimising risk of wastage and reducing overall costs.

Your service provider should be made aware of the organisation's commitment to energy reduction and encouraged to contribute initiatives where possible. This includes informing cleaning staff and involving them in the rewards of all staff.

Office equipment, such as personal computers, printers and faxes, accounts for around 10 - 20% of an office building's total energy consumption. Refrigerators and freezers consume relatively large amounts of energy, particularly as they are usually required to operate continuously throughout the year.

Some "common sense" approaches to the use of fridges and freezers in the workplace are:

- Do not oversize. A 400 litre fridge used to store a carton of milk is wasteful and expensive.
- Excess fridges should be switched OFF.
- Temperature set points should not be excessively low.
- De-frosting should be carried out regularly.
- Replace eroded seals so that doors close properly.

When purchasing new white goods, energy star ratings should be considered as part of the purchasing criteria.

Taking control of HVAC systems can keep energy use due to this factor down.

- Check thermostat settings and ensure winter warming and summer cooling temperatures are suitable.
- Use a zoning system to ensure only work areas are heated or cooled.

- Set or install timers for HVAC systems to prevent them from running when areas are unoccupied.
- Use economy cycles and night purges to make the best use of outside air when appropriate.

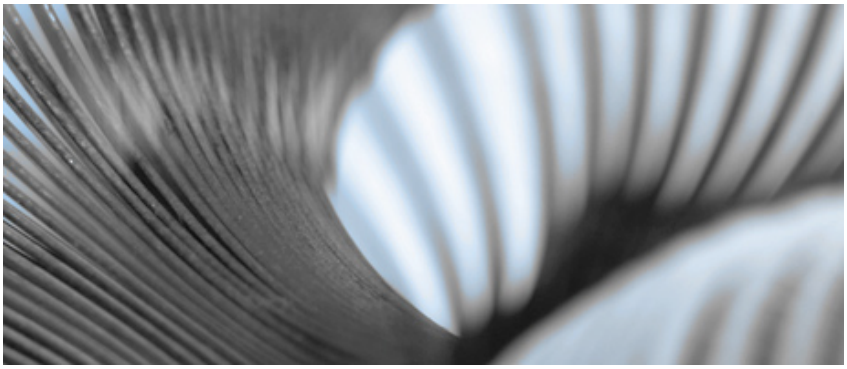
5.10 Did You Know?

- A computer and monitor left ON for a year generate the same amount of GHG as a car traveling from Sydney to Perth.
- Printers spend approximately 95% of their time sitting idle, though are usually left ON continuously.
- Fax machines are often left ON continuously, but their actual use time is less than 1 hour per day.
- Monitors account for around 30% of the energy consumption of a typical computer and monitor combination. Screen savers actually waste energy and money.
- Many office and household devices consume energy even when they are switched OFF. Switching OFF devices at the power point when not in use will typically save some 2 to 5% of energy consumption.

Table 5.1 Carbon and Energy management toolkits

Toolkit Name	Description	Link
VIC Energy Saver Program	The VIC Government's Energy Saver program offers tailored courses, management tools and training services for businesses working to reduce energy consumption, overheads and costs	https://www.victorianenergysaver.vic.gov.au/
Good Practice Guides	The Carbon Trust in the UK provides good practice guides on a range of topics from compressed air to refrigeration to combined heat and power.	http://www.carbontrust.com/resources/faqs/technology-and-energy-saving/good-practice-guides
Energy Audit	AS/NZS 3598 Energy audits. This standard sets out minimum requirements for commissioning and conducting energy audits, which identify opportunities for cost effective investments to improve efficiency and effectiveness in the use of energy. Pangolin Associates conducts energy audits to this standard. Contact your Pangolin Associates account manager for more details.	https://www.energy.gov.au/business
Green Building Council	The Green Building Council of Australia administers the Green Star program which is Australia's trusted mark of quality for the design, construction and operation of sustainable buildings, fitouts and communities.	http://new.gbca.org.au/
NABERS	NABERS is a performance-based star rating system for evaluating the energy, water, waste, and the indoor environment performance in existing office spaces, and hotels. Pangolin Associates has accredited NABERS assessors that can conduct these assessments.	www.nabers.com.au

6 Climate Scorecard



6.1 Commitment to change

Comparing companies on their commitment to tackling global warming is never easy given the broad diversification of our complex social and economic systems.

Pangolin Associates, in keeping with our sustainability philosophy of the "3Ms" - Measure, Manage & Minimise, have used the Climate Counts [32] criteria to rank your organisation's performance and compare it to some of the world's leading companies.

This system uses a 0-to-100 point scale (plotted against normalised revenue[33]) based on 22 criteria to determine if companies have:

- **Measured** their climate "footprint"
- **Reduced** their impact on global warming
- **Supported** (or suggest intent to block) progressive climate legislation
- Publicly **Disclosed** their climate actions clearly and comprehensively

So how did your organisation fare? See below:

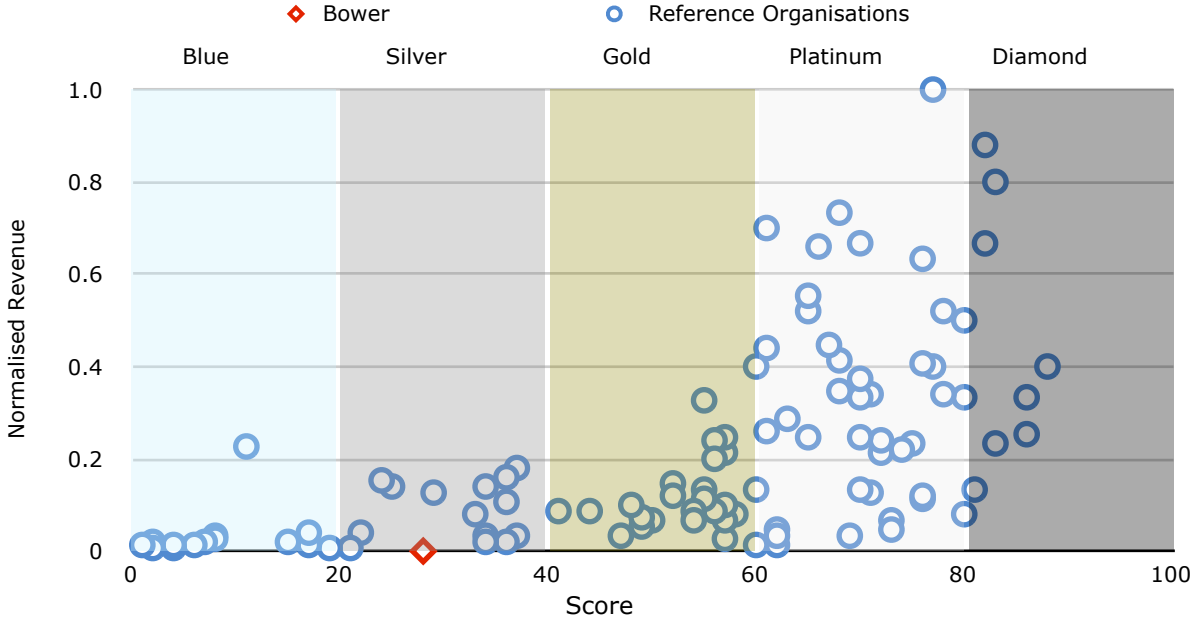


Figure 6.1 Climate Counts benchmarking for Bower

32 http://usgreenchamber.com/climate-counts/

33 Normalised revenue scales the respective data by dividing each value by the largest company revenue in order for the x-axis to scale a value between 0 and 1. If no company revenue data was provided, a value of zero was used.

6.2 Opportunities for Improvement

Based on the results of your organisations climate counts assessment, there are opportunities to develop more robust measurement, management and reduction practices in order to improve the overall score. Some suggestions are provided below:

- Car use was a significant component of the emissions associated with Employee Commute. Focusing on initiatives that support alternate modes of transport to and from work will help to reduce this component of Bower's emissions. Providing end-of-trip facilities to allow for staff to walk, run or cycle into work will help reduce this impact
- Electricity use another main emissions source for Bower. As you have now transitioned to 100% renewable energy this will reduce the FY2021 climate footprint
- Where possible use service providers and products that are Climate Active certified
- Provide incentives for staff to use more sustainable modes of transport when commuting to meetings if possible
- The above initiatives should form part of a broader emissions reduction strategy. Use this inventory to set an emissions reduction target and plan for future assessments to track progress
- Develop a risk based approach to minimise exposure to climate impacts and make decisions that align with long term objectives of a low emissions future
- Conduct a thorough analyses of all products and services to determine high impact areas and ways to reduce these. This may involve a full organisational Input-Output (I-O) GHG Life Cycle Assessment (LCA) to capture the full organisational boundary
- Educate employees, clients and trade partners in ways they can reduce their individual impacts
- Give preference to suppliers who are committed to taking action on climate change
- Conduct an independent verification audit by a qualified third-party not involved in developing the inventory

Appendix A

A.1 What is Climate Change?

Climate change is a generic term used to define any alteration in the global atmosphere that is in addition to the natural climate variability that already exists. The global atmosphere provides temperature stability near the earth's surface by balancing incoming solar energy with outgoing terrestrial infrared radiation. This is achieved primarily by the Greenhouse Effect, a natural phenomenon mediated by water vapour and particular trace gases in the atmosphere known as greenhouse gases (GHGs).

Global Warming (GW) relates to the enhanced Greenhouse Effect caused by increased concentrations of GHGs in the atmosphere because of human activities.

A.2 What are Carbon Credits?

A carbon credit, as defined by the Kyoto Protocol, certifies one metric tonne of carbon dioxide (CO_2) either removed from the atmosphere or saved from being emitted. To compensate for the other greenhouse gases, a carbon credit can be expressed in terms of tonnes of CO_2-e, which relates the effect of other greenhouse gases to an equivalent warming capacity of CO_2.

Pangolin Associates currently offers through our partnerships certified carbon credit retirement of Voluntary Carbon Units (VCUs) to offset your CO_2-e emissions, plus an optional tax deductible donation to fund a Trees For Land tree or shrub revegetation project.

This combination provides your organisation with a global action towards reducing GHG emissions through the VCU and local action to improve the environment in Australia through a donation to revegetation projects.

A.3 About Pangolin Associates

We work with businesses and government in Australia, New Zealand, and globally. **Our mission is clear: increase efficiencies and reduce carbon and other environmental impacts on our globe**. Our sustainability team has comprehensive experience in the environmental sector.

Climate change and an increasingly carbon restrained economy means businesses need education and a new set of tools to operate and prosper. We built Pangolin Associates expressly to provide these crucial services. Our approach is to work closely with businesses, smoothing the path to best practice, compliant sustainability.

Common Greenhouse Terms	
Carbon Credit	Carbon credits certify the removal of greenhouse gas from the air or the prevention of future greenhouse gas emissions. Each carbon credit is associated with a single tonne of carbon dioxide. There are many different kinds of carbon credits.
CO_2	Carbon dioxide. The increase in atmospheric concentrations from pre-industrial revolution are predominately as a result of the combustion of fossil fuels and the greatest contributor to human induced global warming.
CO_2-e	Carbon Dioxide equivalent. There are several different greenhouse gases (e.g. methane) as well as carbon dioxide, and each has a different strength of effect on global warming. However, the world needs a single dimension on which to measure greenhouse gas emissions, so emissions are expressed as CO_2-e emissions to provide a single unit of measurement for comparison purposes.
GHGs	Greenhouse gases are components of the atmosphere that contribute to the greenhouse effect. Without the greenhouse effect the Earth would be uninhabitable; in its absence, the mean temperature of the earth would be about -19 °C (-2 °F, 254 K) rather than the present mean temperature of about 15 °C (59 °F, 288 K). Greenhouse gases include, in order of relative abundance, water vapour, carbon dioxide, methane, nitrous oxide, and ozone. The majority of greenhouse gases come mostly from natural sources but are also contributed to by human activity.

A.4 Sustainability Certifications

As in most industries, sustainability also has regulatory bodies and industry watchdogs to ensure standards, such as the ACCC and ISO.

There are also many consumer advocate groups that investigate environmental claims and bring green labelling and reporting standards. Explained below are some of the more widely used and reliable sustainable certifications that will help you make better environmental purchasing decisions for your business.

- Fairtrade www.fairtrade.net Fair Trade Certification ensures that products have been produced and sold fairly. This ensures that producers, workers, and communities who are generally disadvantaged in the international market are paid fairly.
- Good Environmental Choice Australia label (GECA) www.geca.org.au GECA reviews a range of consumer, building and industrial products against standards of environmental performance and life cycle assessment.
- Energy Rating label www.energyrating.gov.au It is mandatory for many categories of electrical products offered for sale in Australia to carry an approved energy label. The Energy Rating label is a government endorsed label denoting the energy efficiency of an appliance.
- ENERGY STAR is an international standard for energy efficient electronic equipment. It was created by the US Environmental Protection Agency in 1992 and has now been adopted by several countries around the world, including Australia. Products that carry the ENERGY STAR label are energy efficient as they either automatically switch into a 'sleep' mode when not being used and/or reduce the amount power used when in 'standby' mode.
- GreenPower http://www.greenpower.gov.au/ GreenPower is a government accreditation program for renewable energy. GreenPower is generated from clean, renewable energy sources that are easily available and are found in naturally occurring sources such as water flows, energy from the sun, wind energy and waste. It is bought by your energy provider on your behalf.

- Australian Certified Organic (ACO) www.ofa.org.au Australia is one of the few countries with a developed organic sector that does not have a national organic logo/mark. However, there is an Australian Standard for Organic and Biodynamic Products and products can be certified organic through a range of bodies, the largest of which being theAustralian Certified Organic (ACO) label.
- The Forest Stewardship Council (FSC) www.fsc.org The Forest Stewardship Council (FSC) is an international body that promotes responsible management of the world's forests. As with recycled content, you can get varying percentages of FSC certified content , the higher the FSC percentage the better.
- Planet Ark endorsed www.products.planetark.org/paproducts Planet Ark supports a limited range of 'greener' products. Planet Ark supports these products because they have met with certain environmental standards. They must offer a more environmentally responsible alternative to the commonly used products that are on the market, while still being a quality product.
- National Australian Built Environment Rating System (NABERS) www.nabers.com.au Although NABERS is a voluntary environmental rating system for office premises, it is widely recognised. NABERS is a performance–based rating system for existing buildings. NABERS rates a building on the basis of its measured operational impacts on the environment.
- Green Star www.gbca.org.au Green Star is an environmental rating system for commercial buildings, and is administered by the Green Building Council Australia (GBCA). Green Star rating tools range from 4 Star Green Star Rating (Best Practice) to 6 Star Green Star Rating (World Leadership).
- Climate Active Carbon Neutral Program. Climate Active is a voluntary scheme which certifies events, products, services, business operations, buildings or precincts as carbon neutral. The program is administered by the Australian Government . It replaced the Greenhouse Friendly program which ended on 30 June 2010. https://www.climateactive.org.au.

Appendix B

B.1 Tenant Electricity

The current approach to NGER accounting applies a "control over energy billing" rationale as a proxy for operational control. The basic principles set out in the guidelines to determine whether the building owner or tenant is deemed in operational control (and therefore responsible for reporting energy use), are as follows:[34]

(i) Subject to principles (ii) and (iii), the party that receives and pays the energy bill ('Party A') will be deemed to have operational control.

(ii) Where separate meters have been installed and Party A on-sells energy to another party ('Party B') based on the actual consumption of Party B as shown on the meter, then Party B will be the energy user of that on-sold energy and deemed to have operational control.

(iii) Where energy is not separately measured and Party A requires Party B to pay the cost of operational energy on another basis (e.g. as a flat fee or on a basis that is not directly related to actual energy use of Party B, i.e. per square metre, or as a flat percentage of the total energy bill), Party A will be the energy user of all of the energy and deemed to have operational control.

B.2 Market-based electricity factors

There has been a recent shift in the way electricity related emissions are accounted for to more accurately reflect the impact of renewable fuel sources. This is known as the market-based method as described in the scope 2 guidance amendment to the GHG Protocol.[35]

The current location-based method of carbon accounting remains relevant. In fact, if you aim to report emissions in accordance with the GHG Protocol you must report using both the location-based and market based methods.

If your organisation is targeting lower or zero emissions, the market-based method is designed to demonstrate more accurately the actions you've taken to reduce your footprint. When the location-based method is applied to the Protocol, it is blind to the contractual arrangements in the procurement of renewable electricity.

Carbon accounting to date has presented the risk of double counting, or not counting the impact of renewable energy at all. As electricity is the major component for many organisations' carbon footprint, renewable electricity is the most sustainable response. Getting the accounting right for renewable energy is imperative.

34 NGERS, Regulations Policy Paper, Department of Climate Change, 2008 p.25.
35 https://ghgprotocol.org/scope_2_guidance

This accounting method focuses first on the source of electricity, renewable or non renewable, and then guides the creation of the emissions inventory. It allows organisations to recognise the acquisition of renewable electricity via the grid. Australia's robust Renewable Energy Certificate (REC) system, introduced with the Renewable Energy Target (RET), is the perfect mechanism for electricity consumers to demonstrate their purchase of renewable energy, and to make a unique, robust claim over each MWh of zero emissions electricity.

For most Australian electricity consumers, those connected to the national grid, around 20% of electricity consumed is from renewable energy supplied to satisfy the RET.

Some organisations have electricity generated on site from renewable systems. This metered electricity can be included in the inventory. Other organisations purchase GreenPower, so have renewable electricity delivered via the grid, which can be counted. Finally, there may be a remaining amount of electricity, a residual of non renewable energy that completes the electricity inventory.

An emission factor of zero is applied to each of the renewable energy sources, while a new factor, the residual mix factor, is applied to the remaining or residual amount. The residual mix factor is the emissions factor after taking all of the certificate-based renewable energy out of the equation.

When it comes to creating the electricity source inventory, it is fair that all organisations are able to recognise their contribution to the national RET in the same way. It is also fair that a national residual mix factor reflecting the carbon intensity of the entire grid is applied. State based factors are still used to create a location-based emissions inventory.

Organisations claiming zero emissions or carbon neutral operations need to be able to make robust and defendable claims, so the accounting must withstand any challenge. Aligning with a global standard, the GHG Protocol, is a valuable part of grounding the accounting. It helps organisations that have global operations, or are part of international programs like the CDP (formerly Carbon Disclosure Project), RE100, or World Green Building Council – Advancing Net Zero Challenge.

B.3 Refrigerants

Refrigerants are used in HVAC systems as the system working fluid. They have a significant Global Warming Potential (GWP) and therefore contribute to climate change. For refrigerants to be included and counted into NGERS, the sources must be one of the listed items shown below:[36]

(iv) commercial air conditioning

(v) commercial refrigeration

(vi) industrial refrigeration.

In addition, the NGER Determination specifies that reporting of these types of equipment must occur when:

(i) the refrigerant charge is greater than 100 kg per unit and the global warming potential of the refrigerant is greater than 1000, and;

(ii) the ANSZIC industry classifications meet for Subdivisions 11 or 12, Divisions G, F or L, Number 530.

36 National Greenhouse and Energy Reporting Regulations 2008, Section 4.16 (1) (a), Federal Register of Legislative Instruments F2008L02230, Australian Government.

B.4 Waste and Water

For any facility where individual waste and/or water data were not provided, Pangolin Associates may use at its discretion, market averaged data for leased Class 5 commercial tenancy space.[37] The factors applied are shown in Table B.4.1. Alternatively, if a NABERS waste or water rating is available, this will be used in preference.

Table B.4.1 Factors applied for leased commercial tenancy

Activity	Value
Waste to landfill	3.7 kg/m^2
Water use	0.9 kL/m^2

B.5 Transport

When an activity or series of activities is attributable to a specified transport industry sector, different criteria apply. In these cases, rather than the transport facility being attributed to a single address, it must be attributed to a state or territory. This is because of the non-stationary nature of transport.

In order to be classified as a transport activity that can be reported by state and territory using the location of fuel purchases, the activity or series of activities must be the principle activity as defined in r. 2.19 (4) of the Act. In this regulation, principal activity in relation to a series of activities means the activity in the series of activities that:

(a) results in the production of a product or service that is produced for sale on the market; and

(b) produces the most value for the series out of any activities in the series.

Given the potential extensive use of contractors on both an ongoing and ad hoc basis, it may be difficult in some circumstances to determine which entity should have responsibility for reporting the fuel consumed by those transport activities.

In the case of a facility under a transport industry sector, it is proposed that for fuels where a company claims fuel tax credits (FTCs) an organisation can use this data to help identify the amount of fuel it has consumed. Fuels not eligible for FTCs will need to be identified through other methods, such as purchase invoices. Where a company claims FTCs, on behalf of other entities under the provisions of the Fuel Tax Act 2006, this may also be used as a proxy for operational control over the transport activities in which that fuel is used. A company would thus have operational control over all activities that consume fuel for transport purposes for which it claims FTCs.

37 Precious, B. and Brown, M. (2008). Building Sustainable Solutions with NABERS, Jones Lang LaSalle and The GPT Group.

Appendix C

C.1 Overall Uncertainty

The NGER (Measurement) Determination 2008 ('Determination') describes four methods that can be used to estimate GHG emissions. Often, Method 1 is used because it is derived directly from the NGA Factors. Calculation of GHG emissions using Method 1 - where an activity is multiplied by the emission factor, means that a quality assurance of data is the most appropriate way of managing uncertainty. This differs from the approach that would be taken if one were using data based on direct measurement of emissions, where the major sources of error are human error and statistical uncertainty.

GHG emissions from scope 2 electricity consumption are included in the GHG Protocol uncertainty analysis but are omitted under NGER uncertainty reporting.

Although scope 2 uncertainty is not specified in the NGER (Measurement) Determination, uncertainty surrounding emission factors for coal and natural gas fired electricity generation sources have been used to derive downstream scope 2 and 3 uncertainty values for electricity consumption by Pangolin Associates.

The uncertainty interval provides a higher and lower emission estimate range, such that the reported estimate is encompassed within this range with a 95% confidence limit (i.e. the probability of observing a value outside of this area is less than 5%). In general, the uncertainty limits will increase with the inclusion of additional scope 3 activities from the supply chain.

Figure C.1 graphically displays the uncertainty intervals applying to GHG emissions by activity sector, including scope 3 emissions for this assessment. The estimated uncertainty in the GHG Protocol total emissions for Bower was 22.7% (this excludes uncertainty applicable to the RFI range between 1.0 and 3.2). The Utilities activity sector includes any GreenPower and GreenGas credits. The final GHG Protocol total includes any other additional voluntary carbon credit purchases.

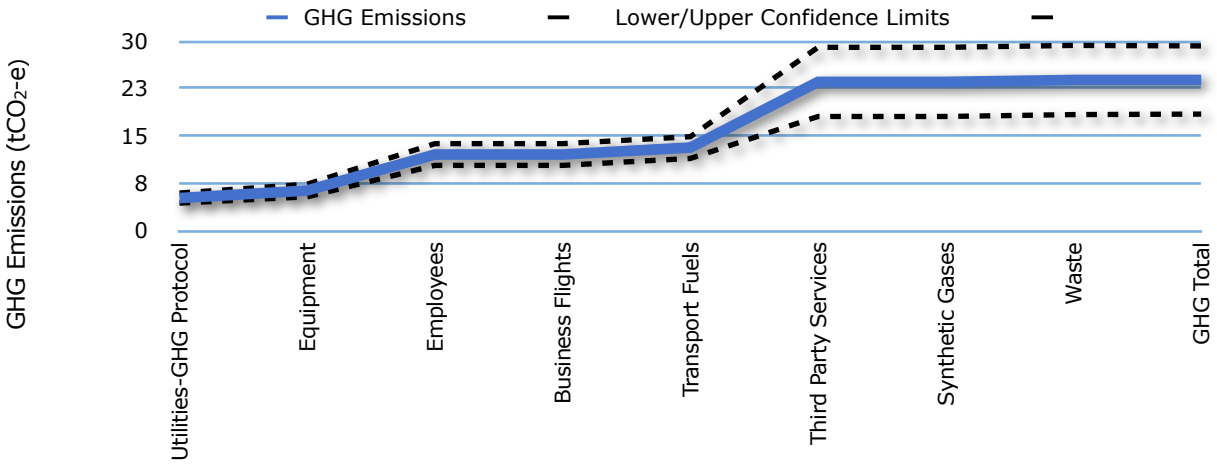
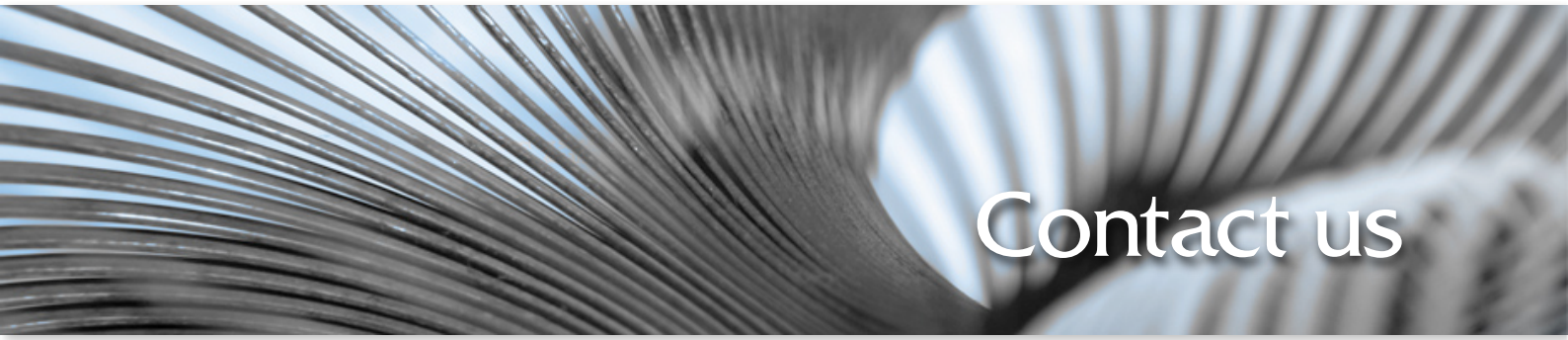


Figure C.1 Cumulative uncertainty in net GHG emissions by activity sector for Bower[1]



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