



LowCO₂ AUDIT REPORT

Vega Colour Group

January 2011

Prepared by: Claudia Williams
Reviewed by: Phoenix Hua Fan

CARBON REDUCTION INSTITUTE

Carbon Reduction Institute Pty Ltd | Suite 210, Level 2, 69 Christie Street, St Leonards NSW 2065
P: +61 2 9439 9990 | F: +61 2 9439 5550 | W: www.noco2.com.au | ABN 26 122 969 233

Executive Summary

The Carbon Reduction Institute recently completed a re-audit of the greenhouse gas emissions produced from the operations of Vega Colour Group. Vega Colour Group obtained a carbon audit of its operations for compliance with the Carbon Reduction Institute's LowCO₂ standard. The base-year for this audit was 2006/2007. This Annual Audit examines Vega Colour Group's carbon footprint for the 2009/2010 financial year. The purpose of this audit is to determine Vega Colour Group's retrospective and future requirements in maintaining its LowCO₂ certification.

The Carbon Reduction Institute's audits follow the standards outlined by the World Business Council for Sustainable Development's Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GHG Protocol). The GHG Protocol gives guidance at the company/organisational level for the establishment of greenhouse gas inventories. The GHG inventory within this audit is prepared in accordance with the requirements of ISO 14064-1.

In calculating the emissions from Vega Colour Group's operations, the Carbon Reduction Institute applied a series of different published Life Cycle Emission factors to calculate the emissions impact of travel, electricity, fuel usage, waste water and waste. The emissions sources included in this study are shown in the table below.

Table 1: Emissions sources studied

Scope(s)	Source	Emissions Type
Scope 1 & 3	Fuel	*Direct and Indirect emissions from burning combustible fuels within onsite machinery and company owned vehicles
Scope 2 & 3	Electricity	*Indirect emissions from the burning of coal and gas at power plants to produce purchased electricity
Scope 3	Waste	*Methane emissions from the decomposition of waste in landfill, and from decomposition of organics in waste water
	Staff Ground and Air Transport	*Fuel combustion – Direct and indirect CO ₂ e emissions from car and air travel

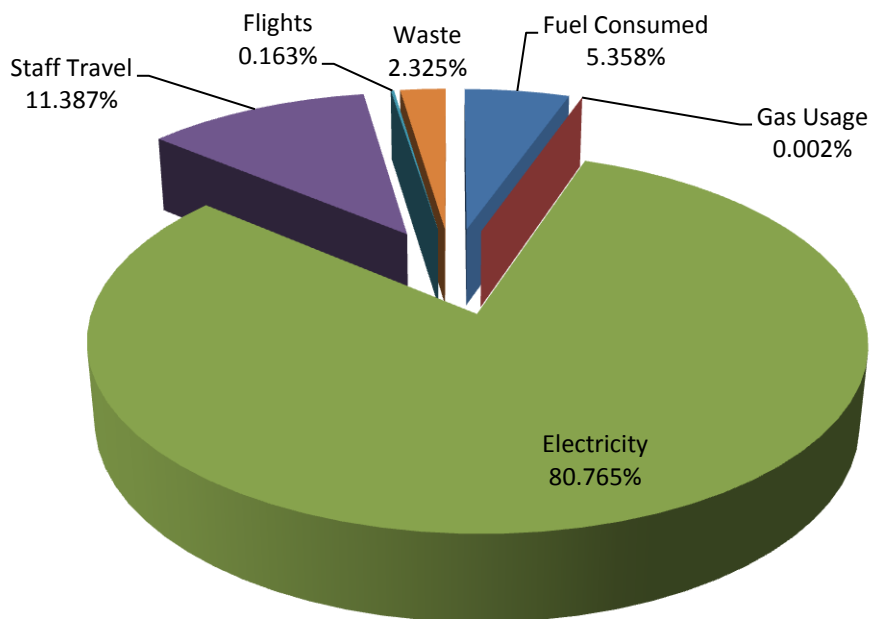
From this greenhouse emissions audit it is concluded that the operations of Vega Colour Group produced the equivalent of 2,624.32 tonnes of CO₂ equivalent greenhouse gas (CO₂-e) over 2009/2010 financial year from the above emissions sources. Table 2 and Figure 1 overleaf show a summary of the emissions produced from each source from the 2009/2010 financial year.

Table 2: Summary of Emissions by Source

Scope	Emission Source	Emissions (tCO ₂ e/year)
Scope 1	Fuel Consumed	130.50
	Gas Usage	0.0441
Scope 2	Electricity	1,902.40
Scope 3	Supply of Electricity	216.53
	Gas Usage	0.0034
	Staff Travel	298.74
	Fuel Consumed	10.07
	Flights	4.28
	Waste	61.00
	Waste Water	0.76
	Total	2,624.32

Figure 1: Breakdown of Emissions by Source (2009/2010)

Emissions by Source for Vega for 2009-2010



This audit found that Vega Colour Group had decreased its footprint from **2632.37 tonnes** in 2008/2009 by 8.05 tonnes to **2,624.32 tonnes** CO₂e in 2009/2010.

The main sources of emissions reductions were the waste, fuel consumed and staff travel. This year Vega Colour Group has reduced their waste by 11% from 68.26 tonnes to 61 tonnes of CO₂e. Similarly they reduced their fuel consumption by 5% from 148.09 to 140.57 tonnes CO₂e.

There was also a significant reduction in the emissions from waste water from 1.22 tonnes CO₂e to 0.76 tonnes CO₂e in the 2009-2010 financial year. This has been due to a significant reduction in waste water produced for which Vega Colour group should be congratulated.

This year the staff travel emissions were increased by 21% from 247.41 tonnes to 298.74 tonnes CO₂e in 2009/2010. This increase is mostly due to more accurate travel data.

Flights were also illustrated a increasing trend in emissions this financial year with a 25% increase from 2008/2009. This is due to an increased number of flights and updated emission factor.

This year Vega Colour Group reduced its electricity use by 80344.44 kWh compared to the year before. This year there has again been an increase in emissions factors as detailed by The Department of Climate Change's National Greenhouse Factors workbook. This year Vega Colour Group have achieved a further decrease in electricity, we recommend further pursuit of reduction by improved energy efficiency, demand management and improved staff behaviour.

ISO 14064 Verification Statement

This report has been prepared in accordance with the requirements of ISO 14064.1. An independent third party (SGS Australia) verification statement is attached as an Appendix (Appendix A) which can be found at the end of this report. The independent verification statement should be read in conjunction with this report.

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1. Introduction

The Carbon Reduction Institute welcomed Vega Colour Group into the NoCO2 certification program in August 2008. In doing so, CRI undertook an audit of the greenhouse gas (GHG) emissions produced from the operations of Vega Colour Group for the purpose of reducing and offsetting these emissions.

The initial audit considered all GHG emissions sources within the boundaries outlined in the NoCO2 program over a one year period for the 2006/2007 financial year. Vega Colour Group then elected to attain LowCO2 certification instead.

As part of the recertification process, CRI monitors and audit the ongoing on the continuing emissions of Vega Colour Group, enabling Vega Colour Group to continue to maintain a carbon footprint in line with its certification.

The audit found that across the LowCO2 boundary Vega Colour Group's emissions have decreased from **2,632.37 tonnes of CO₂e** to **2,624.32 tonnes of CO₂e** from the 08/09 financial year to the 09/10 financial year.

2. Emissions Audit Methodology

In order for Vega Colour Group to manage the impact of its greenhouse gas emissions, it must first quantify them. The Carbon Reduction Institute (CRI) does this by conducting an emissions audit. The methodology underpinning this audit is identical to the methodology used in the calculation and reporting of Vega Colour Group's 2008/2009 GHG inventory. The methodology has been adapted from the World Business Council for Sustainable Development's (WBCSD) Greenhouse Gas (GHG) Accounting Protocol¹. The methodology is explained in detail in the sections below.

2.1 GHG Protocol

The protocol contains universally recognised accounting methods and boundaries that can be applied to different levels, sizes and types of organisations when creating their GHG inventory. This includes multinational organisations, energy intensive primary industry, as well as small to medium enterprises (SME). The protocol defines boundaries and emissions scopes to ensure that emissions do not become double counted when many companies start accounting for their emissions on a national, state or industry level. On an organisational level, emission scopes and boundaries are important when compiling a GHG inventory, as they give organisations consistency and clarity when charting their emissions liabilities.

2.1.1 Emissions Boundaries

There are two 'types' of boundary that must be set when compiling a GHG inventory; an organisational boundary and an operational boundary. *Organisational boundaries* allow an entity to distinguish between GHG emitting activities that are attributable to their organisation, and those that are not. *Operational boundaries* allow an entity to define the emissions that they own or control and categorise them into different scopes (as either direct or indirect). Dividing emissions up into different scopes allows an organisation to determine opportunities for emission reductions, as well as providing knowledge as to where their emissions are occurring along the value chain.

2.1.2 Organisational boundaries

When setting organisational boundaries, CRI applies a *control rationale*, which states that organisations/entities account for emissions generated from activities over which they have direct control, rather than an equity share.² Vega Colour Group has confirmed that it has direct control over activities at its Notting Hill site. Hence the organisational boundary is 274 Ferntree Gully Road, Notting Hill, Victoria 3168.

The GHG protocol prescribes 2 methods when defining control; operational and financial. CRI defines control using the operational control method. The GHG protocol defines:

Operational Control: 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.³

Operational control covers activities where an organisation has authority to directly alter its emissions patterns, be it through the implementation of policy (be it a purchasing policy, staff travel, OH&S, recruitment etc), technology choice or through direct authority.

CRI applies this rationale as it believes that the consumer (in this case Vega Colour Group) is responsible for the products and services that they consume, and that the purchase is an endorsement of the methods used to produce the goods and services consumed. This demarcation allows for easy verification for the majority of

¹WBCSD, WRI, (2004), *The Greenhouse Gas Protocol*, World Resources Institute and World Business Council for Sustainable Development, Conches-Geneva, Switzerland. Available online: <http://www.ghgprotocol.org>

² *ibid*, p17-18

³ *Ibid*, p 18

emission sources covered in this audit; for example, the bulk of this audit can be verified through Vega Colour Group's utility bills and expenditure.

In some instances however, Vega Colour Group will have elements of control over activities without there necessarily being evidence of a dollar spend within its financial accounts. A good example of such an instance is staff travel, where many organisations can encourage a greater use of public transport and carpooling systems by providing yearly public transport passes for staff, or linking employees that live close together for car-sharing. CRI includes staff travel because of this; and because of the educational benefit gained by staff by incorporating their travel behaviour into the audit.

The emissions accounting methodology described above are applied to all organisations audited within CRI's NoCO2 certification program. A homogenous and consistent approach in compiling greenhouse gas inventories allows for more meaningful comparisons across industries, as well as clarity for clients communicating their emission reduction strategies through the NoCO2 logo certification program.

2.1.3 Operational Boundaries

The main function of operational boundaries is to create different scopes for organisations to separate and define the emissions produced from their operations. The 3 scopes are described in detail below.

- **Scope 1: Direct GHG emissions** - Emissions that occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces and vehicles.⁴
- **Scope 2: Electricity indirect GHG emissions** - Emissions from the generation of purchased electricity consumed by the company.⁵
- **Scope 3: Other indirect GHG emissions** – Emissions that are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. These include emissions from waste, the extraction and production of purchased materials; transportation of purchased fuels and transportation of employees to and from work.⁶

The NoCO2 emissions chart below graphically depicts the three scopes of emissions.

⁴ WBCSD, WRI, (2004), *The Greenhouse Gas Protocol*, World Resources Institute and World Business Council for Sustainable Development, Conches-Geneva, Switzerland. Available online: <http://www.ghgprotocol.org> pp25-31

⁵ Ibid

⁶ Ibid

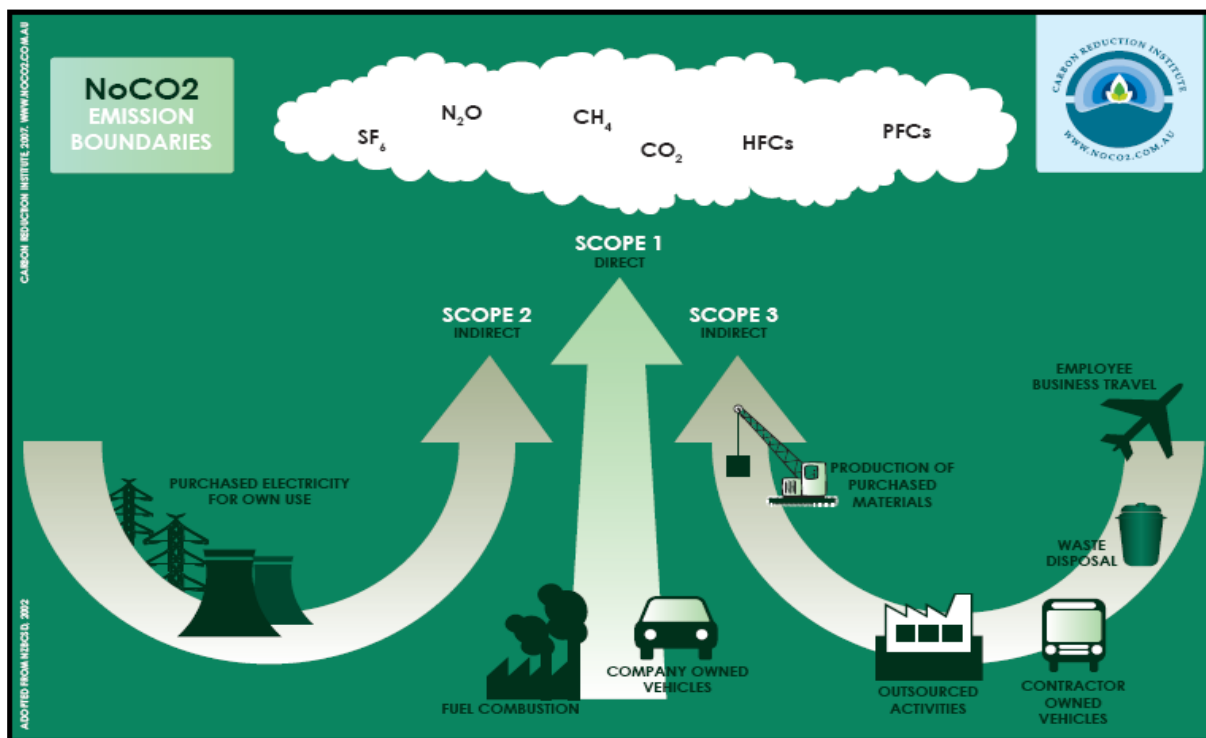


Figure 2: NoCO2 Emissions Chart

The GHG protocol describes Scopes 1 and 2 as mandatory reporting categories, and Scope 3 as a voluntary reporting category. Scopes 1 and 2 are defined within the protocol to ensure that 2 or more companies will not account for the same emissions under the same scope.⁷

2.2 NoCO2 Certification Program

The NoCO2 Certification program is a logo certification system that rewards organisations that take action against climate change. It contains 2 company certification levels: NoCO2 Certification and LowCO2 Certification.

NoCO2 Certification is awarded to organisations that force their carbon footprint to zero (otherwise known as carbon neutral) through internal emission reductions and through the purchase of carbon credits. ‘Carbon Neutrality’, as termed by the Carbon Reduction Institute and defined through its NoCO2 certification program, makes it mandatory for the organisation or entity being measured to include the embodied emissions within all products and services that they sell, as well the embodied emissions from all products and services used to deliver their service.

“Embodied emissions” refer to the emissions generated from the extraction of raw materials, to the manufacture and finally to the distribution of a product. All products and services require energy for production and distribution which is most commonly provided through the combustion of fossil fuels, which results in a greenhouse emissions impact. In order for a company to be NoCO2 certified, they must include the emissions embodied in their consumption of products and services.

The Carbon Reduction Institute has a second tier certification called LowCO2 which excludes the supply chain emissions impacts of an organisation’s operations. The emissions boundaries for LowCO2 certification are depicted below.

⁷ WBCSD, WRI, (2004), *The Greenhouse Gas Protocol*, World Resources Institute and World Business Council for Sustainable Development, Conches-Geneva, Switzerland. Available online: <http://www.ghgprotocol.org>, p 25

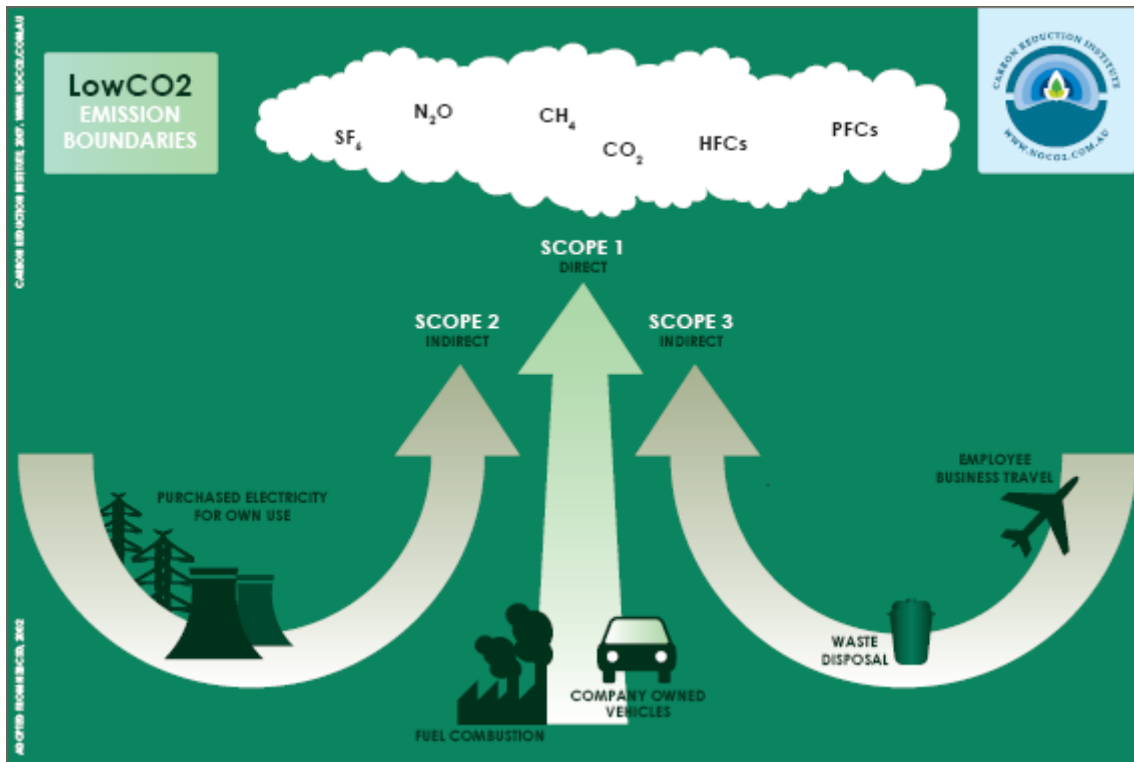


Figure 3: LowCO2 Emissions Boundaries

This audit is for Vega Colour Group’s LowCO2 certification and includes the emissions boundaries shown in the figure above.

The LowCO2 certification model allows large companies with significant embedded emissions in their supply chain to effectively communicate their reduction strategy and the context through which it has been achieved. Many major corporations and banks are claiming to be carbon neutral without accounting for their supply chain impacts. This effectively demeans the term ‘carbon neutral’ and lowers the value for other organisations that have truly accounted for their emissions.

Through the use of operational control rationale, and through clear disclosure of the emissions sources included within each certification level (as shown on the above charts), communications and claims of carbon reduction that are made in association with the Carbon Reduction Institute are beyond criticism.

3. Vega Colour Group's Greenhouse Gas Emissions Inventory

Via email correspondence and the completion of surveys, CRI was able to collect information that enabled it to create a GHG Inventory for Vega Colour Group for the 2009/2010 financial year. In creating this GHG inventory, CRI endeavours to use the most relevant and accurate data sources available.

In calculating the emissions impact for Vega Colour Group, the Carbon Reduction Institute utilised a series of published life cycle emissions factors to calculate the emissions from electricity usage, gas and fuel combustion, transport, waste and waste water.

The emission amounts detailed in the calculations below are expressed in units of CO₂ equivalents (CO₂e). This unit scales the impact of the emission of all greenhouse gases, including CO₂ (carbon dioxide), CH₄ (Methane), N₂O (Nitrous Oxide), Sulphur Hexafluoride (SF₆) as well as fluorocarbons PFCs and HCFCs and expresses their varying global warming impacts in terms of a weighted CO₂ equivalent.

The greenhouse gas inventory for Vega Colour Group is prepared in accordance with the requirements of ISO 14064-1.

Table 3 below presents a summary of the services required, products consumed and the corresponding emissions that were the result of Vega Colour Group's operations.

Table 3: Services and products data provided to CRI

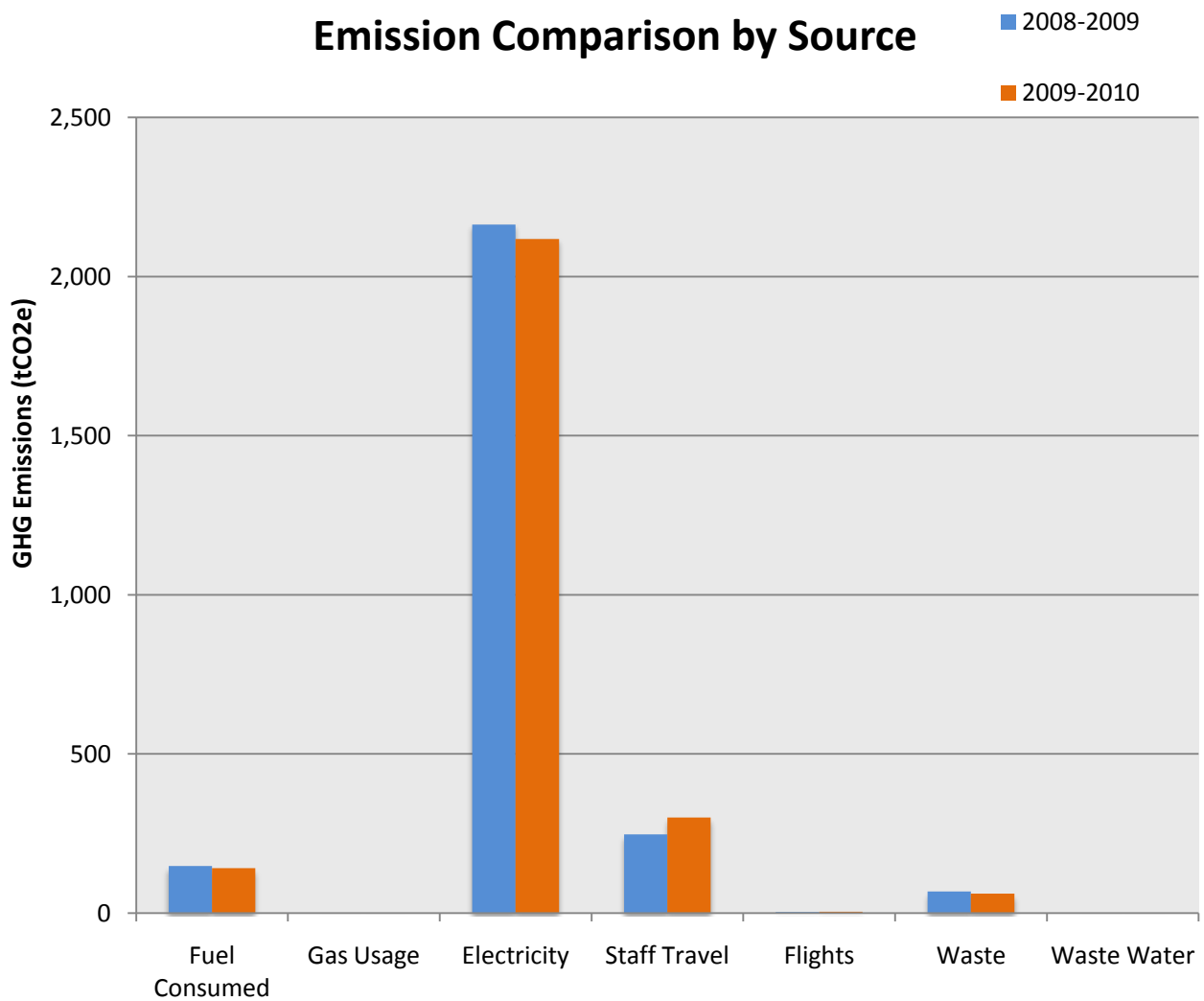
Scope(s)	Source	Emissions Type
Scope 1 & 3	Fuel & Gas	*Direct and Indirect emissions from burning combustible fuels within onsite machinery and company owned vehicles
Scope 2 & 3	Electricity	*Indirect emissions from the burning of coal and gas at power plants to produce purchased electricity
Scope 3	Waste	*Methane emissions from the decomposition of waste in landfill, and from decomposition of organics in waste water
	Staff Ground and Air Transport	*Fuel combustion – Direct and indirect CO ₂ e emissions from car and air travel

The greenhouse gas emissions were calculated for each category and service shown in the table above. A summary of the emissions from each source can be seen below. The carbon audit found that Vega Colour Group generated the equivalent of 2,624.32 tonnes of CO₂-e over the 12 month period assessed.

Table 4: Summary of emissions by source

Scope	Emission Source	Emissions (tCO ₂ e/year)		% Difference
		2008-2009	2009-2010	
Scope 1 & 3	Fuel Consumed	148.09	140.57	-5%
	Gas Usage	0.0502	0.0476	-5%
Scope 2 & 3	Electricity	2,163.92	2,118.93	-2%
Scope 3	Staff Travel	247.41	298.74	21%
	Flights	3.43	4.28	25%
	Waste	68.26	61.00	-11%
	Waste Water	1.22	0.76	-38%
	Total	2,632.37	2,624.32	-0.3%

Figure 4: Comparison of Emissions Breakdown 08/09 vs 09/10



3.1 Scope 1 Emissions

Scope 1 emissions are those produced onsite from source owned or controlled by Vega Colour Group. This includes generators or gas used onsite and fuel in company owned vehicles.

3.1.1 Gas

The Department of Climate Change's *National Greenhouse Accounts Factors (2009)*⁸ states that each unit of gas consumed in Victoria leads to the emission of 51.33 kilograms of CO₂-e. Vega Colour Group was able to supply the readings for its gas meter showing the total consumption of gas to be 860 MJ. This reading covers the period from 4/05/09 to the 1/07/2010. From this data the emissions from gas usage was calculated to be **0.0476 t CO₂-e** for the year.

Equation 1: Emissions from Gas Usage

$$\text{Scope 1 Gas Emissions} = \text{N.O of Units (MJ) Consumed} \times \text{Emissions Factor} \left(\frac{\text{kgCO}_2\text{e}}{\text{MJ}} \right)$$

Table 5: Emissions from Gas Consumption

Address	State	Gas Type	Period Start Date	Period Finish Date	Gas Usage (MJ)	Scope 1 kgCO ₂ e /MJ	Scope 1 Emissions tCO ₂ e	Scope 3 kgCO ₂ e/MJ	Scope 3 Emissions tCO ₂ e	Total Emissions tCO ₂ e
274 Ferntree Gully Rd	Vic	Natural Gas	2/07/2009	1/07/2010	860.00	0.0513	0.0441	0.004	0.0034	0.0476
Total for Period							0.0441		0.0034	0.0476

Emission Source	Emissions (tCO ₂ e/year)	CO ₂ /year	CH ₄ /year	N ₂ O/year	SF ₆ /year
Gas Usage	0.0441	0.0441	0	0	0

3.1.2 Emissions from LPG, ULP and Diesel

The combustion of LPG in machinery onsite and through private vehicles owned by Vega Colour Group leads to scope 1 greenhouse gas emissions. The quantity of each of these fuels consumed was supplied by Vega Colour Group. Each litre of LPG has a scope 1 emissions impact of 1.61 kg CO₂-e, each litre of ULP has a scope 1 emissions impact of 2.37 kg CO₂-e and each litre of diesel has a scope 1 impact of 2.65 kg CO₂-e.⁹ The emissions impact from Vega Colour Group's use of ULP and LPG onsite is shown in the table below.

Table 6: Scope 1 Emissions from Combustion of LPG, ULP and Diesel

Fuel Consumed	% Staff Travel	Cost of fuel bought	Average Fuel Cost	Litres of fuel Per Year	Scope 1 Emission Factor (tCO ₂ e/kL)	Work Paid Scope 1 Emissions (Tonnes CO ₂ e)	Total Work Paid Emissions (Tonnes CO ₂ e)
Diesel	0.00%	13,696.00	\$1.11	12,373.00	2.65	32.79	35.32
Diesel	0.00%	1,023.00	\$1.14	897.00	2.65	2.38	2.56
LPG	0.00%	5,138.00	\$1.30	7,801.00	1.61	12.56	13.58
ULP	0.00%	40,603.00	\$1.16	34,928.00	2.37	82.78	89.11
						130.50	140.57

⁸ Department of Climate Change, (June 2009), National Greenhouse Accounting Factors p13

⁹ Factor sourced from "Guidance for Voluntary, Corporate Greenhouse Gas Reporting" This document is available on the Ministry for the Environment's website: www.mfe.govt.nz

Emission Source	Emissions (tCO ₂ e/year)	CO ₂ /year	CH ₄ /year	N ₂ O/year	SF ₆ /year
Fuel Consumed	130.50	128.75	0.62	1.13	0

3.2 Scope 2 Emissions

Scope 2 emissions are those indirectly emitted by Vega Colour Group through its electricity usage. Electricity generation is the world's largest source of greenhouse gas emissions, which is due to the global economy's heavy reliance upon cheap electricity from coal and gas reserves. Frameworks and data sets exist both within Australia and internationally that enable simple calculations of emissions electricity, which follow the formulae below:

Equation 2: Emissions from Electricity Usage

$$\text{Scope 2 Electricity Emissions} = \text{N.O of Units (kWh) Consumed} \times \text{Emissions Factor} \left(\frac{\text{kgCO}_2\text{e}}{\text{kWh}} \right)$$

The electricity consumption was calculated using the Scope 2 emissions factor from the Department of Climate Change, *National Greenhouse Accounting Factors* June 2010. For these calculations the Scope 2 emissions factor was 1.23 kgCO₂-e per kWh¹⁰.

The emissions factor in Victoria is around 20% higher than in NSW, SA, WA and QLD due to Victoria's use of brown coal.

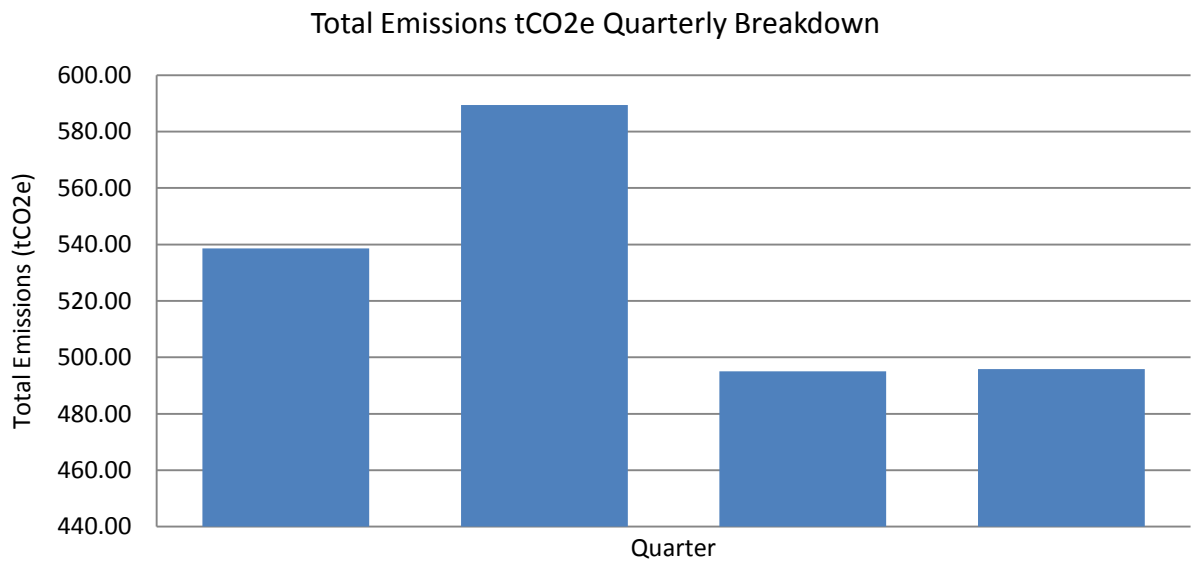
Vega Colour Group provided a summary of its monthly electricity consumption, and these figures and the final calculations are shown in the table below and a breakdown of the quarterly emissions due to electricity consumption can be seen in the graph overleaf.

Table 7: Electricity Used by Vega Colour Group in the 09-10 financial year

State	Period Start Date	Period Finish Date	No of Days	Electricity Usage (kWh)	Scope 2 kgCO ₂ e/kWh	Scope 2 Emissions tCO ₂ e	Total Emissions tCO ₂ e
VIC	1/07/2009	31/07/2009	31.00	128,057.21	1.23	157.51	175.44
VIC	1/08/2009	31/08/2009	31.00	122,288.94	1.23	150.42	167.54
VIC	1/09/2009	30/09/2009	30.00	142,834.67	1.23	175.69	195.68
VIC	1/10/2009	31/10/2009	31.00	159,673.95	1.23	196.40	218.75
VIC	1/11/2009	30/11/2009	30.00	143,757.59	1.23	176.82	196.95
VIC	1/12/2009	31/12/2009	31.00	126,779.98	1.23	155.94	173.69
VIC	1/01/2010	31/01/2010	31.00	105,789.06	1.23	130.12	144.93
VIC	1/02/2010	28/02/2010	28.00	123,336.64	1.23	151.70	168.97
VIC	1/03/2010	31/03/2010	31.00	132,248.42	1.23	162.67	181.18
VIC	1/04/2010	30/04/2010	30.00	106,852.62	1.23	131.43	146.39
VIC	1/05/2010	31/05/2010	31.00	128,938.30	1.23	158.59	176.65
VIC	1/06/2010	30/06/2010	30.00	126,106.29	1.23	155.11	172.77
			365.00	1,546,663.67		1,902.40	2,118.93

¹⁰ Department of Climate Change, National Greenhouse Account, July 2010

Figure 5: Electricity Emissions Quarterly Breakdown



3.3 Scope 3 Emissions

Scope 3 emissions are defined as indirect emissions that occur from sources offsite and include the emissions from extracting purchased fuel and electricity; waste and waste water; staff travel and the embodied emissions of all purchases.

Scope 3 emissions sources are assessed through the application of life-cycle emissions coefficients in the case of travel and waste. The emissions impact and the calculations behind all scope 3 sources are depicted below.

3.3.1 Scope 3 Emissions from Purchased Fuels and Electricity

The consumption of purchased fuels and electricity has a scope 3 emissions impact. This includes the transportation fuels and energy used to extract and refine purchased fuels. In the case of electricity, this impact includes the emissions from electricity lost in transmission and distribution. In the case of natural gas, this includes the emission of methane resulting from gas leaks. The scope 3 emissions from diesel, LPG and ULP are described in the table below.

Table 8: Scope 3 Emissions Purchased Fuels

Fuel Consumed	% Staff Travel	Cost of fuel bought	Average Fuel Cost	Litres of fuel Per Year	Scope 3 Emission Factor (tCO ₂ e/kL)	Work Paid Scope 3 Emissions (Tonnes CO ₂ e)	Total Work Paid Emissions (Tonnes CO ₂ e)
Diesel	0.00%	13,696.00	\$1.11	12,373.00	0.2046	2.53	35.32
Diesel	0.00%	1,023.00	\$1.14	897.00	0.2046	0.18	2.56
LPG	0.00%	5,138.00	\$1.30	7,801.00	0.1310	1.02	13.58
ULP	0.00%	40,603.00	\$1.16	34,928.00	0.1813	6.33	89.11
Total CO₂e:						10.07	140.57

The table below outlines the total electricity attributed to scope 3 emissions¹¹. Similar to the Scope 2 emissions factors the scope 3 emissions factors listed below are different due to an update in the Department of Climate Change's report.

Table 9: Scope 3 Emissions from Electricity

State	Period Start Date	Period Finish Date	No of Days	Electricity Usage (kWh)	Scope 3 kgCO ₂ e/kWh	Scope 3 Emissions tCO ₂ e	Total Emissions tCO ₂ e
VIC	1/07/2009	31/07/2009	31.00	128,057.21	0.14	17.93	175.44
VIC	1/08/2009	31/08/2009	31.00	122,288.94	0.14	17.12	167.54
VIC	1/09/2009	30/09/2009	30.00	142,834.67	0.14	20.00	195.68
VIC	1/10/2009	31/10/2009	31.00	159,673.95	0.14	22.35	218.75
VIC	1/11/2009	30/11/2009	30.00	143,757.59	0.14	20.13	196.95
VIC	1/12/2009	31/12/2009	31.00	126,779.98	0.14	17.75	173.69
VIC	1/01/2010	31/01/2010	31.00	105,789.06	0.14	14.81	144.93
VIC	1/02/2010	28/02/2010	28.00	123,336.64	0.14	17.27	168.97
VIC	1/03/2010	31/03/2010	31.00	132,248.42	0.14	18.51	181.18
VIC	1/04/2010	30/04/2010	30.00	106,852.62	0.14	14.96	146.39
VIC	1/05/2010	31/05/2010	31.00	128,938.30	0.14	18.05	176.65
VIC	1/06/2010	30/06/2010	30.00	126,106.29	0.14	17.65	172.77
Total			365.00	1,546,663.67		216.53	2,118.93

¹¹ Department of Climate Change, National Greenhouse Account, July 2010.

Hence, the total scope 1 and scope 3 emissions from purchased fuels was:

- **89.11 Tonnes of CO₂-e** for ULP
- **37.88 Tonnes of CO₂-e** for Diesel
- **13.58 Tonnes of CO₂-e** for LPG

The total scope 2 and 3 emissions impact from electricity was **2118.93 tonnes of CO₂-e**.

3.3.2 Emissions from waste

Methane gas is emitted when organic matter decomposes in landfill. As Vega Colour Group has control over its waste habits, then the emissions impact that is caused from the land-filling of its waste must be accounted for. The Carbon Reduction Institute collected the net waste data from Vega Colour Group in terms of the amount of cubic meters of waste sent to landfill each week.¹² *The National Greenhouse Accounting Factors* workbook provides conversion factors to calculate the impact from sending a tonne of each type of waste to landfill and this factor was applied to convert the volume of waste into a weight.¹³ The waste breakdown provided by Vega Colour Group showed a mix of general office waste, and so the DECC emission factor for the decomposition of municipal solid waste was applied.¹⁴ These figures and the final waste calculations are shown in the table below.

Table 10: Waste Calculations

Total Volume of Waste per Year (m ³)	Type of Waste	Conversion Factor from m ³ to tonnes	Total Tonnes of waste	Type of Waste	Tonnes CO ₂ e/tonne waste	Tonnes CO ₂ e
417.00	Co-Mingled	0.125	52.13	Municipal Solid Waste	1.00	52.13
71.00	Co-Mingled	0.125	8.88	Municipal Solid Waste	1.00	8.88
488.00			61.00			61.00

3.3 Emissions from Waste and Waste Water

The decomposition of organic matter in Vega Colour Group's waste water incurs a greenhouse gas emissions impact. Melbourne Water's greenhouse and energy data projected that in 2009, each kilolitre of water that is delivered by Melbourne Water leads to an average emissions impact of 0.642 kilograms of CO₂-e.¹⁵ Emissions from waste water were calculated through applying this emissions factor to the amount of litres water consumed.

Table 11: Emissions impact from decomposition of waste water heavily treated

Period Start	Period End	Waste Water (kL)	CO ₂ EF (kg/kL)	N ₂ O ₂ EF (kg/kL)	CH ₄ EF (kg/kL)	Total EF (kg/CO ₂ e/kL)	Emissions (tCO ₂ e)
1/07/2009	30/06/2010	14.6	0.3391 ¹⁶	0.00025 ¹⁷	0.0037 ¹⁸	0.4943	0.0072

¹² Private Communication, Rob Nugent, May 2010

¹³ Department of Climate Change, National Greenhouse Accounting Factors (June 2009), p53

¹⁴ Ibid, p63

¹⁵ Melbourne Water (2009). Online resource, accessed on the 15th October. Available at:

http://www.melbournewater.com.au/applications/annual_report_2008/envdata/env_energy.htm

¹⁶ IPCC 1996 Source/Sink Category: Waste (6) -> Wastewater Handling (6B) -> Domestic and Commercial Wastewater (6B2)

¹⁷ Ibid

¹⁸ Ibid

Table 12: Emissions impact from decomposition of wastewater direct to sewage

Period Start	Period End	Water Supplied (kL)	EF (kg/CO ₂ e/kL) Emission in terms of water supplied	Emissions (tCO ₂ e)
1/07/2009	30/06/2010	1177	0.642 ¹⁹	0.76

Melbourne water published carbon dioxide emission factor in terms of water supplied and takes into consideration of all the stages of treatment. As seen above the total emissions from waste and waste water was a total of **61.76 tonne CO₂e**.

3.3.3 Emissions from Staff Travel

Staff travel includes all flights and private car travel incurred due to the existence of Vega Colour Group's operations. Consumption of public transport incurred by Vega Colour Group and its staff are not attributed to Vega Colour Group' as the emissions created from its consumption of public transport cannot be affected by Vega Colour Group' through policy, technology or through direct authority.

3.3.4.1 Emissions from Staff Ground Travel

In the 08/09 financial year the majority of the Vega Colour Group staff were unable to access a computer to complete the survey. In the 09/10 year however Vega Colour Group distributed hard copies of the travel surveying allowing for a more complete data set than the year before. This meant that 47 of 87 staff supplied their travel data. This data was used to calculate an emission's estimate which was then averaged against the total number of employees in each department. This can be seen the tables below.

Table 13: Emissions Attributed to commuting to and from work

Department	Number of Responses	Total Number in Department	Total tCO ₂ e	Weighted Adjusted tCO ₂ e
Sales	6	8	56.35	75.13
Office	7	14	32.98	75.03
Pressroom	11	24	21.99	47.97
Bindery	16	28	55.92	86.62
Other Factory	7	13	22.40	41.60
			Total tCO₂e	326.36

Vega Colour group also informed CRI that 30% of ULP purchased was used for commuting. As these emissions were calculated from ULP combustion in 3.3.1.2 then the final calculations needed to reflect this as shown in the table below.

¹⁹ Energy and greenhouse data, melbournewater, available online.

http://www.melbournewater.com.au/applications/annual_report_2008/envdata/env_energy.htm

Table 14: Final Emission Calculations from Commuting

	Scope 1 and 3 (tCO ₂ e)
Total Emissions	326.36
ULP paid for by Vega	26.84
Diesel paid for by Vega	0.78
Balance	298.74

Hence, the final emissions from Ground Travel taking into account fuel paid for by Vega Colour group and scope 1 and scope 3 emission source **298.74 tonnes of CO₂e**.

3.3.4.2. Emissions from Staff Air Travel

The emissions from flights taken by the Vega Colour Group were calculated with respect to the distance between the airports, the emissions factor associated with passenger flights, the Radiative Forcing Index factor and the Greater Circle Flight factor.

This is shown in the equation below:

Equation 3: Scope 3 Air Travel Emissions Formula

$$GHG \text{ Emissions} = \text{Distance} \times \text{Emissions Factor} \times RFI \text{ Factor} \times GCF \text{ Factor}$$

The emissions factor for air travel is taken from the Department for Environment, Food and Rural Affairs (DEFRA UK)'s data for the air passenger emission factors per passenger kilometre, and are scaled for domestic flights, short haul flights and long haul flights in correspondence to Table 4. These figures are influenced by the technical performance of the aircraft fleet and the occupancy/load factor of the flight.

Table 15: Kilograms of CO₂e per passenger.km²⁰

Description	Distance (km)	Emissions factor (kg-CO ₂ e/km)
Domestic Flights	0-463	0.20515
Short Haul Flights	464-1108	0.11600
Long Haul Flights	>1109	0.13535

This figure is multiplied by 2.7 to take into account the average extra global warming impact from flying that occurs when greenhouse gases are released directly into the upper atmosphere. This increases their apparent lifetime in the stratosphere, and hence their ability to accelerate global warming. This factor (2.7) is known as the radiative forcing index²¹.

Finally it is then multiplied by 1.1 which takes into account the uncertainties of air travel distances between airports such as indirect flight paths and delays resulting in aircraft circling airports in a holding pattern. This factor is known as the Greater Circle Flight Factor.

Vega Colour Group undertook a small number of flights over the reporting period, producing emissions of **3.63 tCO₂e**. The full breakdown of the emissions from flights is shown below.

²⁰ Department of Environment, Food and Rural Affairs, *2010 Guidelines to Defra's GHG Conversion Factors: Methodology Paper for Transport Emissions Factors*, available online at:

<http://www.defra.gov.uk/environment/business/reporting/pdf/101006-guidelines-ghg-conversion-factors.pdf>

²¹ Intergovernmental Panel on Climate Change (IPCC). "Climate Change 2001: The Scientific Basis, "Aviation and the Global Atmosphere – Chapter 6.6.5." 2001. <http://www.grida.no/climate/ipcc/aviation/086.htm> (accessed March 2009).

Table 16: Air Travel Emissions Summary

Flights for Vega for 2009-2010							
Flight	From	Destination 1	Date	Return (Y/N)	Number of Passengers	tCO ₂ e of one trip (one way) Destination 1	Total CO ₂ e (Tonnes)
1	Melbourne	Maroochydore	Aug-09	Y	1	0.58	1.17
2	Melbourne	Sydney	16/02/2010	Y	1	0.24	0.49
3	Melbourne	Gold Coast	28/02/2010	Y	1	0.53	1.07
4	Melbourne	Gold Coast	28/02/2010	Y	1	0.53	1.07
5	Melbourne	Sydney	13/05/2010	Y	1	0.24	0.49
Total							4.28

3.4 Uncertainty Assessment of GHG Emissions and Removals

The quality of the GHG inventories depends heavily on the integrity of the science justifying the methodologies and the procedures for acquiring the data. To provide credible and consistent GHG information, CRI have employed good practice by neither over nor underestimating GHG estimates and minimising the uncertainties involved in these estimates as far as practicable.

Due to the absence of GHG sinks, this section excludes an uncertainty assessment of GHG removals. Table 10 describes emissions by scopes and sources, and discusses the uncertainties that exist in the data, calculations and sources used to create Vega Colour Group’s GHG emissions inventory.

Table 17: Uncertainties in GHG Emissions inventory

Scope	Source	Uncertainties
1 & 3	Direct Fuel Use	<p>Vega Colour Group provided a summary of payments which indicated the total dollar value of the unleaded petrol, LPG fuel and diesel consumption over the 2009/2010 financial year. The data in this section have not been verified by CRI but Vega Colour Group is subject to random audits as outlined by the terms and conditions of their LowCO₂ Certification Agreement to ensure that they are providing accurate information.</p> <p>Data about emission factors for fuel combustion and delivery from The Department of Climate Change’s National Greenhouse Accounts Factors²². CRI uses the most recent National Greenhouse Accounts Factors where possible. The Department of Climate Change employs best practice to manage uncertainty in its National Greenhouse Gas Inventories.</p>
1 & 3	Gas Usage	<p>Data on the gas consumption of Vega Colour Group was provided in the form of the bills from the beginning of the financial year and the end of the financial year showing the first and final reading of the meter.</p> <p>Data about emission factors for gas production and delivery comes from the Department of Climate Change’s <i>National Greenhouse Accounts Factors</i>.</p>
3	Staff Private Travel	<p>Staff answered distributed hard copies of the travel survey, only a part of the employees participate in this activity, the number was scaled to the total number of employees. The results have not been verified by CRI. Assumptions were made for vehicle fuel efficiency for staff travel as described in section 3.3.3.</p>

²² Department of Climate Change (2009) *National Greenhouse Accounts Factors*, Australian Government, available online at <http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx>

		The data in this section have not been verified by CRI but Vega Colour Group is subject to random audits as outlined by the terms and conditions of their LowCO2 Certification Agreement to ensure that they are providing accurate information.
	Waste to Landfill	The annual amount of waste sent to landfill were estimated by ensuring Vega Group reports the annual cubic meters of waste sent to landfill. Data on the volume of waste produced was supplied by Vega Colour Group and has not been verified by the Carbon Reduction Institute. Data about emission factors for waste production and delivery comes from the Department of Climate Change's <i>National Greenhouse Accounts Factors</i> ²³ . Therefore, the uncertainties are significantly reduced because of the use of government sources.

²³ Department of Climate Change (2009) *National Greenhouse Accounts Factors*, Australian Government, available online at <http://www.climatechange.gov.au/publications/greenhouse-acctg/national-greenhouse-factors.aspx>

4. Result

This audit found that Vega Colour Group were responsible for the emission of **2,624.32 tonnes of CO₂ equivalent** greenhouse gas for the 2009/2010 financial year.

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Appendix A

Verification statement will be attached here