Flinders + Co Carbon Audit Methodology:

Background:

Flinders + Co. is a food service meat distribution company. Flinders + Co commissioned a NoCO2 audit from CRI to measure their carbon footprint, through the determination of the Greenhouse Gas (GHG) emissions that resulted from their operations over the 2017 financial year (FY2017).

CRI's NoCO2 audit follows the standards outlined by the World Business Council for Sustainable Development's Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (1), in addition to the international standard ISO 14064.1 (2).

The emissions from Flinders + Co's operations were calculated through the application of numerous published life cycle emission factors along with the use of multi-regional input-output tables derived figures. Each emissions factor is scaled to a level of consumption for its impact area, for example a kilowatt-hour of electricity or a litre of fuel.

It has been determined that the total GHG emissions from Flinders + Co's relevant operations and activities, within the boundaries of the NoCO2 program, were 9,922.94 tonnes of CO2e (tCO2e) over the FY2017 period.

Audit Boundaries:

There are two 'types' of boundaries that need to be set when compiling a GHG inventory; an organisational boundary and an operational boundary. Organisational boundaries allow a business to distinguish between GHG emitting activities that are attributable to their organisation, and those that are not. Operational boundaries allow an organisation 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 emissions reduction, as well as knowing where their emissions are occurring along the value chain.

In order for Flinders + Co to negate the impact of its GHG emissions, it must first quantify them. CRI does this by conducting an emissions assessment and then applying the methodologies outlined within the World Business Council for Sustainable Development's (WBCSD) Greenhouse Gas Accounting 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). Boundaries are important when compiling a GHG inventory, as they give organisations consistency and scope when accounting for their emissions.

Organisational Boundaries:

When setting organisational boundaries, CRI applies a financial control rationale, which states that businesses account for emissions generated from activities over which they have financial control and derive the majority of financial benefits and/ or risks as a result of these activities. CRI uses this rationale as we believe that the consumer (in this case Flinders + Co) is responsible for the products and services that they consume, and that the purchase is an endorsement of the conditions under, and methods used to produce the goods and services consumed. This rationale is both comprehensive and simple; if you bought it, then the emissions produced and embodied within it are your responsibility. This straightforward demarcation will ensure the best outcome for Flinders + Co, and other certified businesses as consumers will have confidence in the authenticity of organisations certified with CRI.

Operational Boundaries:

Different scopes for organisations to separate and define the emissions produced from their operations. The three 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.

Scope 2: Electricity indirect GHG emissions - Emissions from the generation of purchased electricity consumed by the company.

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.

The GHG protocol describes scopes 1 and 2 as mandatory reporting categories, and scope 3 as a voluntary reporting category. Under CRI's NoCO2 certification program, it is mandatory for organisations to include scope 3 emissions. This is due to the large amount of embodied emissions associated with the sale, delivery and purchase of products and services of a company. "Embodied emissions" refer to the emissions generated in the manufacture and distribution of a product. All products require energy in production and distribution. This energy is most commonly provided through the use of fossil fuels, which have a greenhouse emissions impact. Embodied emissions are included due to the products and services that Flinders + Co has bought and used.

Scope 1 Emissions:

Note about Refrigerants:

Emissions of Hydrofluorocarbons (HFCs) may arise from leakage of these gases from refrigeration and air conditioning equipment. Although the amounts leaked are relatively small, these gases have commonly had very high global warming potentials. To calculate the emissions from this leakage, CRI makes use of published default leakage values for different types of equipment.

Additionally, where information regarding the refrigerant capacity of a refrigeration unit was unavailable, CRI estimates this amount using published statistical analyses that relate a units' rated operating power with its according refrigerant capacity. Using the information provided by Flinders + Co, the calculations where undertaken to calculate the final emissions impact.

Scope 3 Emissions

Note about Cost of Sales:

Using the profit and loss statements supplied, the embodied emissions from Flinders + Co's cost of sales were calculated.

Due to the size and relevance to Flinders + Co's carbon inventory, emissions associated with meat purchases were quantified using a more accurate and geographically relevant mass-based approach. Flinders + Co were able to provide the mass flows of their meat purchases and CRI applied life cycle analysis (LCA) derived emission factors specifying the CO2-e emissions per unit mass of meat. Where feasible CRI employed the use of geographically relevant figures, and in the case of beef emissions, the emission factor (EF) used was the median value of 8 Australian specific LCA's into beef production. For meats with low mass flows and a lack of relevant LCA's, CRI applied emission factors for differing, yet similar meats under the assumption that production system emissions would not vary too greatly e.g. squab mass flows (178.55kg, 0.65tCO2e) had an emission factor for chicken applied.

Note about Expenses:

Similarly, the embodied emissions from Flinders + Co's expenses were calculated.

Note about Assets:

CRI used Flinders + Co's depreciation schedule to calculate the embodied emissions attributed to current assets. When accounting for embodied emissions of assets, CRI scales the impact of an asset over the period in which it is depreciated for tax purposes. An asset depreciating at 50% per year, with total embodied emissions of 10 tCO2e, will register as 5 tCO2e each year of its two-year depreciable

lifetime. This method ensures Flinders + Co can update its emissions inventory with its tax reports. Written off assets are thus excluded from the assessment.

Emissions Analysis:

This audit found that Flinders + Co's total emissions footprint in FY2017 was 9,922.94 tCO2e and that the majority of these emissions were the result of Cost of Sales (>95%).

Cost of Sales, Expenses & Assets (Detailed):

To attain NoCO2 certification the embodied emissions in expense items (that is cost of sales, expenses and assets) must be accounted for and offset. Embodied emissions are premised on the basis that the end user is responsible for the impacts incurred in the life cycle of the products that they purchase. However, for some uses of products, services and trade between businesses, there is an issue of a shared responsibility for the emissions. As such, the Carbon Reduction Institute defines different purchase types:

- Wholly consumed (Scope 3 incl.): Where a product or service's life has been fully developed and/or purchased for the sole purpose of consumption by the end consumer. For these purchases, the responsibility of the complete life cycle emissions associated with the delivery of that good or service is ascribed to the purchaser and thus emissions up to and including the scope 3 boundary are attributed to the expense.
- Discretely consumed (Scope 2 incl.): Where a good or service has been provided by another business for discrete use by the organisation, and the use of that service incurs a direct emissions impact (from fuel use, electricity use or waste production). For these purchases, the responsibility of the purchaser is only for those emissions that result as a direct result of use of the good or service and thus emissions up to and including the scope 2 boundary are attributed to the expense.

Examples of either purchase types are shown in the following table:

Examples of Different Embodied Energy Emission Categories

Wholly Consumed (Scope 3)	Discretely Consumed (Scope 2)	Hired (Scope 2)
Food	Consultancy	Scaffold
Furniture	Repairs/Maintenance	Marque
Stationary	Fee for Service	Cutlery
Fuel	Accommodation	Leased Car
Appliances	Freight	Hire Equipment

Output tables from the carbon audit report presents GHG intensities per dollar spent in over 300 different industry sectors of the Australian economy. These emission intensity factors were developed for CRI's use by Eora through the use of multi-regional input-output databases (MRIO).

In addition, the use of Eora's MRIO database allows expenses to be categorised by their price layer, split between a basic and a full price layer. Where appropriate, this allows the exclusion of taxes, subsidies, trade, and transport price layers from the resultant emissions intensity factor per sector.

Input-output data from these tables is configured from 2012 census data and is presented in kgCO2-e per dollar spent in each relevant sector. As the dataset was created with 2012 data, the emissions intensity per dollar of GDP has dropped due to inflationary forces. To improve the fairness and accuracy of its calculations, CRI has adjusted the resultant MRIO emission factors by consumer price index rises as provided by the Reserve Bank of Australia.

Beef Greenhouse Gas Impact

It was indicated to CRI that Flinders + Co's beef supplier reared their cattle using rotational grazing practises and were exclusively fed grass. As this scenario was outside the norm for beef production systems this necessitated a review of existing literature in order to develop an emission factor most appropriate for accurately quantifying the emissions embodied within Flinders + Co's largest component of their carbon footprint. Literature was reviewed separately looking into the environmental impact of 100% grass fed beef production systems and the impact of rotational grazing systems upon the environmental performance of beef production.

A median value of 23.40 kgCO2e/ kg BFM was chosen for 100% grass fed beef production systems in the Australian context and a reduction of 2.67 kgCO2e/ kg BFM was chosen due to increases in soil organic content as a result of rotational grazing practices, as detailed in the below two tables. The combination of these two values gave the figure of 20.73 kgCO2e / kg BFM that was used to quantify the environmental impact of Flinders + Co's beef.

Environmental Performance of Grass Fed Beef Production Systems

Food counter	Food type	Sub-category	Region	Year of study	Report type	kg CO2-eq/kg BFM	Notes	Reference
Meat Counter	Beef	Ruminants	Australia	2014	Journal	27.00	North coast weaners, grass	(16)
Meat Counter	Beef	Ruminants	Australia	2014	Journal	21.64	Inland weaners, grass fattened	(16)
Meat Counter	Beef	Ruminants	Australia	2012	Journal	24.96	grass silage based dairy and beef production	(17)
Meat Counter	Beef	Ruminants	Australia	2014	Journal	21.84	Japanese ox e grass-fed steers 24e36 month old steers, 340 kg DW	(16)
					Median	23.40		

Soil Organic Content Fluxes from Rotational Grazing Practices:

Region	Previous Land Use	Grazing Program	Year of Study	Length of Study (Years)	SOC Sequestration (Mg C/ha)	SOC Sequestration Rate (Mg C/ha/yr)	Carbon Flux (kgCO2e/kg CW)	Carbon Flux (kgCO2e/kg BFM)	Reference
USA, Midwest	Continuous grazing	Adaptive Multi Paddock	2018	4		3.59	-16.27	-23.41	(18)
USA, South Eastern		Management Intensive Grazing	2003	20.5	8.4	0.41	-1.86	-2.67	(19)
USA, Northern Texas	Heavy continuous grazing	Management Intensive Grazing	2016	9	31.77	3.53	-16.00	-23.02	(20)

With regards to rotational grazing (Management-intensive grazing/adaptive multi paddock grazing): There was a wide range of reported values on soil carbon sequestration potential on the studies researched, ranging from -23.41 kgCO2e/kg BFM to -2.67. The highest values were seen for studies that were both the shortest in length and in those that the switch in grazing practices occurred at the commencement of the study. In order to maintain the validity of the claim to carbon neutrality CRI considered it most prudent to select the abatement with the lowest value.

Additional excerpts included below from referenced studies reinforce the notion that taking the lowest value in lieu of an LCA specific to the soil type, management practices, and past land use of Flinders + Co's beef supplier's production system is the safest option in terms of marketing claims made toward carbon neutrality.

- "The largest gains were generally found within the first 5 to 10 years with the rate of change diminishing to nearly 0 after 40 years." (Soil Carbon Sequestration Potential: A review for Australian agriculture, 2010, CSIRO Land and Water)
- However, we are unsure for how long this high rate of C sequestration may continue. Based on the 3.53 Mg C ha−1yr−1 of C sequestered over a 9-year period in Wang et al. (2015), we expect that our soils could continue to sequester at this rate for several years. However, because soils that are further from C saturation will accumulate C faster than soils near saturation, and because our estimated soil C sequestration rate is much greater than the 0.41 Mg C ha−1yr−1 indicated by Conant et al. (2003), we expect continued sequestration, likely to diminish over time (Minasny et al.,2017; Stewart et al., 2007). Therefore, we caution about extrapolating the reported rates for an extended period.
- The analysis did not take into account potential differences in carbon sequestration − soil organic carbon (SOC) that can be tied up in the soil under certain types of production. This is because, although there may be substantial gains in SOC following, for example, a change in land use from cultivation to pasture, over time (10-50 years) SOC levels tend towards new equilibrium conditions.

If you have any questions in relation to this document, please email Garth Mulholland, Environmental Programs Adviser of the Carbon Reduction Institute via email at garthm@noco2.com.au