

Greenhouse Gas Inventory Summary

Meridian has calculated its 'carbon footprint' since 2001, and Meridian Energy Ltd is certified by Landcare Research's Certified Emissions Management and Reduction Scheme (CEMARS).

This document summarises the annual greenhouse gas (GHG) emissions¹ inventory report for the Meridian Group of companies for the period 1 July 2012 to 30 June 2013. Meridian's reporting processes and emissions classifications are consistent with international protocols and standards. This report has been written in accordance with Parts 7.3.1 of the requirements of International Standards Organisation ISO 14064-1², the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (2004), and the *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (2011)³. In addition, the inventory preparation was consistent with the inventory requirements of the CEMARS programme.

Organisational Boundary

The organisational boundary encompasses companies and sites under the operational control of Meridian, its subsidiaries, associate companies and joint ventures in the Meridian group. Meridian applies an operational control approach allowing the company to focus on those emissions sources over which we have control and can therefore implement management actions, consistent with Meridian's corporate responsibility objectives.

Scope 1 & 2 emissions for other operations (e.g., dairy farms, Macarthur wind farm) are not under operational control, although their Scope 1 & 2 emissions are captured under Scope 3 Category 15 Investments.

Operational Boundary

Meridian reports in conformance with the new Corporate Value Chain Standard. Meridian's change to this reporting in 2012 led to an additional 22% of emissions included in the operational boundary.

Facilities

This inventory is split into six "facilities" that represent different areas of business activity (see below for a description of each facility).

Meridian Electricity – Includes emissions arising from Meridian's core activities associated with renewable energy electricity generation and the retail of electricity.

Arc Innovations – Develops, deploys and manages Advanced Meter Management (AMM) technology and services.

Damwatch – Consultancy services relating to dam safety and surveillance that take place in Damwatch Services Limited and Damwatch Pty Limited (incorporated in Australia).

Powershop – Conducts energy retailing activities within Powershop New Zealand Limited under the Powershop brand.

Meridian Australia – Owns and develops renewable energy generation facilities and conducts electricity retail activities in Australia.

Meridian USA – Owns and develops renewable energy generation facilities in the USA.

¹Throughout this section "emissions" means "GHG emissions".

²International Standards Organisation *Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*, Reference number ISO 14064-1:2006 (E).

³Throughout this document 'GHG Protocol' means the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (2004) and 'Corporate Value Chain Standard' means the *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (2011)

Base Year

The base year is 1 July 2011 to 30 June 2012.

Methodologies and uncertainties

Meridian uses the software tool SoFi v5.0 from PE International to calculate GHG emissions. Emissions for Scope 1 and 2, and each Scope 3 category, have been quantified using the calculation method based on activity data multiplied by GHG emissions factors. Emissions factors have been supplied by or approved by Landcare Research as part of Meridian's participation in the CEMARS programme. To minimise uncertainties in the accuracy of this inventory, data has been sourced wherever possible from a verifiable source as detailed in the inclusions table.

Verification of GHG Inventory

Meridian's Chief Financial Officer is responsible for the contents of this inventory. A more detailed version of this report has been verified by Deloitte, a third party independent assurance provider and Landcare approved CEMARS verifier. A reasonable level of assurance has been given over the assertions and quantifications included here and in the more detailed GHG inventory report.

Deloitte is also the financial auditor of Meridian Energy Limited on behalf of the Office of the Auditor General.

Table 1: Greenhouse gas emissions inventory summary for the Meridian Group

Scope	Category	Meridian Electricity	Arc Innovations	Damwatch	Meridian USA	Meridian Australia	Powershop	2012/13 tCO ₂ e
Direct Emissions	S1 SC Stationary combustion	-	0.0	-	-	-	-	0
	S1 MC Mobile combustion	846.2	0.9	7.7	3.4	52.6	2.6	913
	S1 FE Fugitive emissions*	118.0	3.9	-	-	-	40.4	162
	Subtotal	964.3	4.9	7.7	3.4	52.6	42.9	1,076
Indirect Emissions (Scope 2)	Electricity consumption	2,408.4	67.0	12.4	33.8	45.6	20.0	2,587
	Subtotal	2,408.4	67.0	12.4	33.8	45.6	20.0	2,587
Indirect Emission	S3 C1 Purchased goods & services	6,988.8	159.3	112.7	119.0	305.6	195.4	7,881
	S3 C2 Capital goods	769.3	-	-	-	9,898.6	-	10,668
	S3 C3 Fuel & energy related activities	167.8	5.7	1.1	2.2	4.1	1.7	183
	S3 C4 Upstream transportation & distribution	1,924.8	70.5	-	10.2	1,899.4	-	3,905
	S3 C5 Waste generated in operations**	12.2	-	-	-	-	-	12
	S3 C6 Business travel	1,385.1	53.5	261.2	17.2	152.8	87.4	1,957
	S3 C7 Employee commuting	907.1	18.4	51.8	6.0	73.7	45.0	1,102
	S3 C13 Downstream leased assets	12,638.5	1,168.4	-	-	-	-	13,807
	S3 C15 Investments	3,410.5	-	-	-	1,535.3	-	4,946
Subtotal	28,204.0	1,475.8	426.7	154.5	13,869.5	329.4	44,460	
Total Emissions (S1, 2 & 3)		31,576.7	1,547.7	446.8	191.7	13,967.7	392.4	48,123.0

Table 2: Total greenhouse gas emissions by greenhouse gas

Scope	GHG Gas	Meridian Electricity	Arc Innovations	Damwatch	Meridian USA	Meridian Australia	Powershop	2012/13 tCO ₂ e
Scope 1								
	CO ₂	831.9	0.9	7.6	3.3	51.8	2.5	898
	CH ₄	1.4	0.0	0.0	0.0	0.1	0.0	2
	N ₂ O	13.0	0.0	0.1	0.0	0.8	0.0	14
	HFCs	35.6	3.9	-	-	-	40.4	80
	SF ₆	82.5	-	-	-	-	-	82
	Subtotal	964.3	4.9	7.7	3.4	52.6	42.9	1,076
Scope 2								
	CO ₂	2,408.4	67.0	12.4	33.8	45.6	20.0	2,587
	Subtotal	2,408.4	67.0	12.4	33.8	45.6	20.0	2,587
Scope 3								
	tCO ₂ e	28,204.0	1,475.8	426.7	154.5	13,869.5	329.4	44,460
	Subtotal	28,204.0	1,475.8	426.7	154.5	13,869.5	329.4	44,460
Total Emissions (S1, 2 &3)		31,576.7	1,547.7	446.8	191.7	13,967.7	392.4	48,123.0

Inclusions

Scope	Category	GHG emissions source	Data source	Percentage primary data (from supplier)	Methodology, data quality, uncertainty (qualitative)
Scope 1	Stationary combustion.	Fuel used for electricity generation.	No fuel consumed		There were no emissions from the 12,255 GWh of electricity generated in the reporting period, as the fuel used to generate this electricity was water and wind.
	Mobile combustion.	Boat travel (transport to Manapōuri hydro power station).	Fuel storage readings.		Accurate records of litres used.
		Car travel (owned, leased, rented).	Odometer readings, rental records.		Estimated from accurate records of distance travelled x average fuel efficiency of vehicle class (small, medium or large). Owned vehicles are calculated from litres of fuel consumed. Driver behaviour and individual engine performance are not taken into account.
	Fugitive emissions.	Fugitive emissions from SF ₆ and air-conditioning systems.	Maintenance records.		Accurate records of storage cylinder weights ⁴ Accurate record of 'top-ups.'
Scope 2	Electricity.	Electricity consumed in offices.	Records from Meridian's billing system, supplier invoices. USA office – records of size of offices.		Accurate records from the billing system and supplier invoices - start and end of year are partially estimated. USA office - estimated using average energy consumption per ft ² office space x office area ⁵ .
		Electricity consumed in facilities.	The electricity market reconciled consumption files, supplier invoices.		Accurate records of electricity consumed.

⁴ The emission factor has been sourced from the IPCC Second Assessment Report

⁵ www.eia.doe.gov

Scope	Category	GHG emissions source	Data source	Percentage primary data (from supplier)	Methodology, data quality, uncertainty (qualitative)
Scope 3 Category 1	Purchased goods & services	Professional services, IT services, maintenance services, production of smart meters ⁶ (manufactured goods).	Purchase records (vendor invoice records).	0%	Records of expenditure, emissions factors from DEFRA based on \$ spent.
Scope 3 Category 2	Capital goods	Major construction and plant upgrade materials ⁷	Project records from manufacturer or design specifications	0%	Records of weights or volumes of major materials used in construction projects
Scope 3 Category 3	Fuel related emissions (not Scope 1 or 2)	Electricity purchased and on-sold to end users ⁸	The electricity market reconciled consumption files. Internal records from site.	100%	Accurate records of sales and purchase information using Annual Netting Off methodology ⁹ In this reporting period, Meridian generated more electricity than was required to meet Meridian and Powershop customers' demand (including lines losses)
		Production & distribution of fuel.	Fuel invoices.	0%	Calculated from amount of fuel consumed using emissions factors derived from LCA studies.
Scope 3 Category 4	Upstream transportation and distribution	Freight of major materials.	Project records.	0%	Calculated from estimates of weight of materials x distance travelled.
		Contractor fuel (operational maintenance, construction, retail meter reading and meter maintenance).	Contractor records. Supplier estimates of distances. Samples of vehicle types used.		Estimates of the amount of fuel used or calculated using a formula of estimated distance x estimated emissions factor based on contractor information of the types of vehicles used. The emissions factor is a weighted average of the vehicle types.

⁶ Production of smart meters for Arc only

⁷ This includes projects from Meridian Electricity and Meridian Australia.

⁸ Financial instruments such as contracts for difference do not involve the physical supply of electricity. Agency relationships such as that between Meridian and its grid-connected customers with Market Services Agreements are retail activities within the boundaries of the Electricity facility but the electricity consumed by these customers is not sold by Meridian under these arrangements and is not reported. Meridian entered a contract for difference arrangement with NZ Aluminium Smelters (NZAS) in January 2013, consequently 6 months of FY13 is under a retail supply and 6 months under a contract for difference.

⁹ In dry years, Meridian and Powershop may need to purchase electricity from the grid to supply to its retail customers in excess of the renewable electricity supplied by Meridian to the grid. This difference is calculated on an annual basis (Annual Netting Off) at financial year end only. The annual netting off approach has been approved by carboNZero Holdings and conforms to green energy programme precedents in the US (Green-e), Australia (Greenpower), and Europe (Eugene). This calculation includes an allowance for transmission losses in the national grid and is based on the amount purchased at the entry point for local network distribution thereby taking into account losses due to distribution. Powershop is included in this calculation as Powershop's retail activities are reported in the Retail segment of the Meridian Groups annual accounts.

Scope	Category	GHG emissions source	Data source	Percentage primary data (from supplier)	Methodology, data quality, uncertainty (qualitative)
Scope 3 Category 5	Waste.	Office waste to landfill (Meridian Electricity only).	Waste audit.	100%	Actual weight of waste to landfill measured at corporate sites excluding Twizel (estimated).
Scope 3 Category 6	Business Travel.	Air travel (domestic & international).	Purchase records (supplier data, internal purchasing systems).	100%	Supplier records of flights taken, manually processed by finance teams and Procurement Team. Calculated using the distances travelled by sector. Distances are calculated using Great Circle Mapper ¹⁰ .
		Car travel (taxis).	Purchase records (internal purchasing systems).		Records of expenditure.
		Car travel (private vehicles).	Odometer readings.	100%	Estimated from accurate records of distance travelled x average fuel efficiency of vehicle class (small, medium or large).
Scope 3 Category 7	Employee commuting.	Employee commuting.	Employee survey.	100%	Estimated from survey results, distance travelled x type of transport used.
Scope 3 Category 13	Downstream leased assets.	Electricity consumed in smart meters.	Design parameters of smart meter product.		Estimate of number of meters installed x typical annual electricity consumption per meter.
		Leased land – farms.	Land register.		Land areas from lease documents.
Scope 3 Category 15	Investments	Dairy farms - Livestock (Scope 1 & 2).	Farm report. Supplier invoices.	100%	Livestock and fertiliser emissions calculated using the Lincoln University Carbon Calculator for New Zealand Agriculture and Horticulture ¹¹ based on livestock numbers and estimates of the amount of fertiliser applied. Fuel use estimated by farm manager. Electricity consumption from supplier invoices.

¹⁰ www.gcmap.com

¹¹ (<http://www.lincoln.ac.nz/carboncalculator/>) This is a free web-based carbon footprint calculator, built by AgriLINK NZ and Lincoln University's Agribusiness and Economics Research Unit (AERU). It was made specifically for NZ's primary industry and uses life cycle assessment methodologies.

Exclusions

The following exclusions are estimated to be approximately 2.5% of the Meridian Group's total GHG emissions.

Scope	Category	GHG emissions source	Facilities	Reason for exclusion
Scope 1	Stationary combustion.	Back-up generators.	All facilities with relevant activity in reporting period.	Estimated to be <i>de minimis</i> .
	Fugitive emissions.	Fugitive emissions from SF ₆ .	Meridian USA.	Sealed equipment (doesn't need topping up).
		Fugitive emissions from air-conditioning systems.	Damwatch and Meridian USA.	Difficult to get data on leakage from office landlords.
		Fugitive emissions from fridges and vehicle AC systems.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
Scope 2	Electricity.	Electricity consumed at Manapōuri power station.	Meridian Electricity.	Not metered, estimated to be <i>de minimis</i> .
Scope 3 Category 1	Purchased goods & services.	Water.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
		Stationary and print.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
		Furniture.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
		IT hardware.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
Scope 3 Category 4	Upstream transportation and distribution.	Freight - courier packages and minor materials.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
Scope 3 Category 5	Waste.	Office waste to landfill.	All facilities other than Meridian Electricity.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
		All other sources of waste.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
Scope 3 Category 6	Business travel.	Hotel accommodation.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i> .
Scope 3 Category 8	Upstream leased assets	N/A		Consolidation approach is operational control, so all upstream leased assets are included in Scope 1 and 2.

Scope 3 Category 9	Transportation and distribution of sold products	N/A		Distribution of electricity accounted for in Scope 3 Category 3.
Scope 3 Category 10	Processing of sold products	N/A		N/A
Scope 3 Category 11	Use of sold products	N/A		N/A
Scope 3 Category 12	End of life treatment of sold products	Disposal of bills and newsletters.	All facilities.	Difficult to obtain the data, estimated to be <i>de minimis</i>
Scope 3 Category 13	Franchises	N/A		No franchises
Scope 3 Category 15	Investments	Dairy farms milk vat refrigeration.	Meridian Electricity.	Difficult to obtain the data, estimated to be <i>de minimis</i>
		Four small investments.	Meridian Electricity.	Difficult to obtain the data, estimated to be <i>de minimis</i>