meridian

Greenhouse Gas Emissions Inventory Report

Inventory Scope: Meridian Group (all facilities)

Inventory Period: For the period 1 July 2015 to 30 June 2016

Version: Final

Audit Status: Final

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Final review by:	Approved by:
	
Kelvin Mason	Paul Chambers
Financial Controller	Chief Financial Officer

Disclaimer

Every effort has been made to ensure that the report is accurate. Meridian Energy Limited will not be liable in contract, tort, equity or otherwise, for any relation placed upon this report by any third party.

This work shall not be used for the purpose of obtaining emission units, allowances or carbon credits from two or more different sources in relation to the same emissions reductions, or for the purpose of offering for sale carbon credits which have been previously sold.

The consolidation approach chosen for the greenhouse gas inventory should not be used to make decisions related to the application of employment or taxation law.

Contents

ISO 14064-1, 7.3.1 (e)

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

Scope	Category	Meridian Electricity	Damwatch	Meridian Australia	Powershop	2015/16 tCO_2e
Direct Emissions (Scope 1)	Stationary combustion	-	-	-	-	-
	Mobile combustion	833	8	135	1	977
	Fugitive emissions*	103	nm	-	-	103
	Subtotal	**936**	**8**	**135**	**1**	**1,080**
Indirect Emissions (Scope 2	Electricity consumption (location based)	1,528	5	613	30	2,176
	*Electricity consumption (market based)***	*1,528*	*5*	-	*30*	*1,563*
	Subtotal (location based)	**1,528**	**5**	**613**	**30**	**2,176**
Indirect Emissions (Scope 3	Capital goods	261	-	-	-	261
	Fuel & energy related activities	201	2	9	3	215
	Upstream transportation & distribution	599	-	60	-	659
	Waste generated in operations***	7	0	-	-	7
	Business travel	1,354	175	136	206	1,871
	Subtotal	**2,422**	**177**	**205**	**209**	**3,013**
Total Emissions (S1, 2 & 3)		**4,886**	**190**	**953**	**240**	**6,269**

*Air-conditioning records unavailable at Damwatch

** Market based mechanisms are not available in New Zealand. Australia has market based mechanisms and Meridian Australia purchases its own National Carbon Offset Scheme (NCOS) certified carbon neutral retail electricity product for its own use.

***MEL office waste only

Table 2: Total greenhouse gas emissions by business activity and facility

Emissions Source	Meridian Electricity	Damwatch	Meridian Australia	Powershop	2015/16 tCO_2e
Corporate					
Air travel	1,331	174	101	205	1,811
Car travel	589	11	169	3	772
Boat travel	446	-	-	-	446
Electricity used in offices (incl. line losses)	272	5	84	32	393
HFCs	19	-	-	-	19
Office waste (parent company only)	7	nm	nm	nm	7
Subtotal	**2,664**	**190**	**354**	**240**	**3,448**
Generation / retail					
Fuel consumption for electricity generation	-	-	-	-	-
Electricity used in facilities	1,279	-	539	-	1,818
Generation contractor fuel	101	-	60	-	161
SF6 leakage	83	-	-	-	83
HFCs	n/a	n/a	n/a	n/a	n/a
Retail maintenance and meter reading	350	-	nm	nm	350
Subtotal	**1,813**	**-**	**599**	**-**	**2,412**
Construction					
Major materials used	261	-	-	-	261
Freight of major materials	53	-	-	-	53
Contractor fuel on site	95	-	-	-	95
Electricity consumption	0	-	-	-	0
Subtotal	**409**	**-**	**-**	**-**	**409**
Total	4,886	190	953	240	**6,269**

Table 3: Total greenhouse gas emissions by greenhouse gas

GHG Gas	Meridian Electricity	Damwatch	Meridian Australia	Powershop	2015/16 tCO_2e
CO_2	828	8	134	1	971
CH_4	-	-	-	-	-
N_20	6	-	1	-	7
HFCs	19	-	-	-	19
SF_6	83	-	-	-	83
Subtotal	**936**	**8**	**135**	**1**	**1,080**
CO_2	1,528	5	613	30	2,176
Subtotal	**1,528**	**5**	**613**	**30**	**2,176**
tCO_2e	2,422	177	205	209	3,013
Subtotal	**2,422**	**177**	**205**	**209**	**3,013**
Total	4,886	190	953	240	**6,269**

1 Introduction

Responding to the global issue of climate change caused by escalating greenhouse gas ("GHG") emissions presents opportunities for the Meridian Energy group of companies ("Meridian") as a renewable energy organisation. There is world-wide momentum among governments and other agencies to adopt a range of measures including economic incentives for industries and for consumers to reduce such emissions.

This report is the annual greenhouse gas (GHG) emissions[1] inventory report for the Meridian Group of companies. The inventory is a complete and accurate quantification of the amount of GHG emissions that can be directly attributed to the organisation's operations within the declared boundary and scope for the specified reporting period.

Our reporting processes and emissions classifications are consistent with international protocols and standards. This report has been written in accordance with Part 7.3.1 of the requirements of International Standards Organisation ISO 14064-1[2]. Where applicable discretionary information has been disclosed consistent with section 7.3.2 of the Standard. The inventory has also been prepared in accordance with the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (2004) (the GHG Protocol).

Meridian has calculated its own "carbon footprint" since 2001. From 2006 to 2010 the organisation certified its electricity product under the carboNZero^{CertTM} programme and in FY12 and FY13 met the requirements for CEMARS® certification. Whilst Meridian continues to manage and report on GHG in a similar manner to previous years, no external certification is sought.

For the purposes of this report "Meridian" and "Meridian Energy Ltd" refer to the organisation with no accounting or legal inference. "Meridian Group" is used to refer to all four facilities. For definitions of these facilities, and more information on the organisational and reporting boundaries refer to Section 6.

2 Statement of Intent

Meridian is intent on demonstrating consistency with best practice accounting for greenhouse gas emissions.

This report:

- relates specifically to the emissions of the Meridian Group;
- has been prepared following the requirements outlined in ISO 14064-1 and the GHG Protocol;
- has been prepared as part of an ongoing commitment to measure and manage emissions on a regular basis; and
- excludes future targets.

[1]Throughout this document "emissions" means "GHG emissions".
[2]International 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).

3 Description of Meridian

ISO 14064-1, 7.3.1 (a) and 7.3.2 (a)

Meridian is New Zealand's largest electricity generator. The Meridian Energy Group of companies is made up of:

- Meridian Energy Limited (the "Parent") and
- our subsidiaries (together the "Group") and
- the Group's interest in partnerships and joint ventures.

Meridian undertakes a variety of activities in the energy sector. Its primary activity is the renewable generation and retail of electricity. Other activities carried out by subsidiary or associate companies include:

- professional services relating to the upkeep of dams: and
- captive self-insurance services.

For further information about the organisation please refer to the Meridian Energy Limited 2015/2016 Annual Report which is available at www.meridianenergy.co.nz. For more information in regards to the facilities that comprise the Meridian Group see Section 6.

3.1 GHG and Sustainability Policies, Strategies and Programmes

Meridian Energy's Sustainability Framework sets an overarching goal to make "sound business decisions that recognise the interests of the environment, our communities and our customers". The framework focuses on the six areas where Meridian's core business activities have an impact on the external world and where we can influence the outcomes. These six areas are:

- Water Stewardship;
- Renewable Energy;
- Energy Services;
- Engaged Communities;
- Working Sustainably; and
- Financial Return

As part of 'working sustainably', a Greenhouse Gas Emissions Measurement and Management Guideline was approved by Meridian's Management Team in June 2009 and revised in January 2013 and June 2015. This guideline outlines how Meridian will measure and manage its greenhouse gas emissions with the objective of understanding, transparently disclosing and reducing the emission intensity of its operations.

A focus on GHG measurement and management, of which this GHG Inventory Report is a part, enables us to improve our workplace sustainability, and gives us case studies we can share with our customers and communities. Specifically, GHG management advances the following objectives:

- Reducing the company's overall environmental footprint by reducing, reusing and recycling resources;
- Encouraging our partners and suppliers to follow a sustainable development pathway and promoting leadership in this area.

Meridian also has a range of other policies supporting our sustainability policy.

4 Persons Responsible

ISO 14064-1, 7.3.1 (b)

This GHG inventory is ultimately the responsibility of the Board of Directors.

The person responsible for this GHG inventory is Paul Chambers, Chief Financial Officer.

In addition the GHG accounting and reporting team have provided background and supporting information. These team members are:

- Elizabeth Liddell, Systems Accountant;
- Maree Willetts, Sustainability Specialist;
- Ewan Gestro, Commercial Insight Manager (electricity generation, purchases and power station electricity data);
- Nick Robilliard, Corporate Procurement Manager (business travel data);
- Daniel Williamson, HR Analyst (HR data);
- Peter Harding, Management Accountant (office electricity consumption data);
- Numerous Markets & Production staff (one-time emissions sources, SF_6);
- Rebekah Ford, Broad Spectrum (office waste and air conditioning);
- Haiden Jones (Meridian Energy Australia Pty Ltd);
- Susan Whiteman, Office Administrator (Damwatch);
- Alpesh Soma, Office Manager (Powershop Limited).

5 Reporting Period Covered

ISO 14064-1, 7.3.1 (c)

This GHG inventory report covers the financial year 1 July 2015 to 30 June 2016.

6 Organisational Boundaries

ISO 14064-1, 7.3.1 (d)

The organisational boundary determines the parameters for GHG reporting in the Meridian Group GHG inventory. The boundaries were set with reference to the methodology described in the GHG Protocol and ISO14064-1 standards. The boundary encompasses the operations owned or controlled by Meridian, its subsidiaries, associate companies and joint ventures in the Meridian Group.

6.1 Consolidation approach

Meridian applies the operational control consolidation approach to the Meridian Group emissions inventory. This consolidation approach allows us to focus on those emissions sources over which we have control and can therefore implement management actions, consistent with Meridian's corporate responsibility objectives.

The table in Appendix 1 sets out how each entity in the Meridian Energy Group is treated. Appendix 2 contains a diagram of the Meridian Energy Group corporate structure as at 30 June 2016.

For further information about the organisation please refer to the Meridian Energy Limited 2015/2016 Annual Report which is available at www.meridianenergy.co.nz.

6.2 Defining Meridian "facilities"

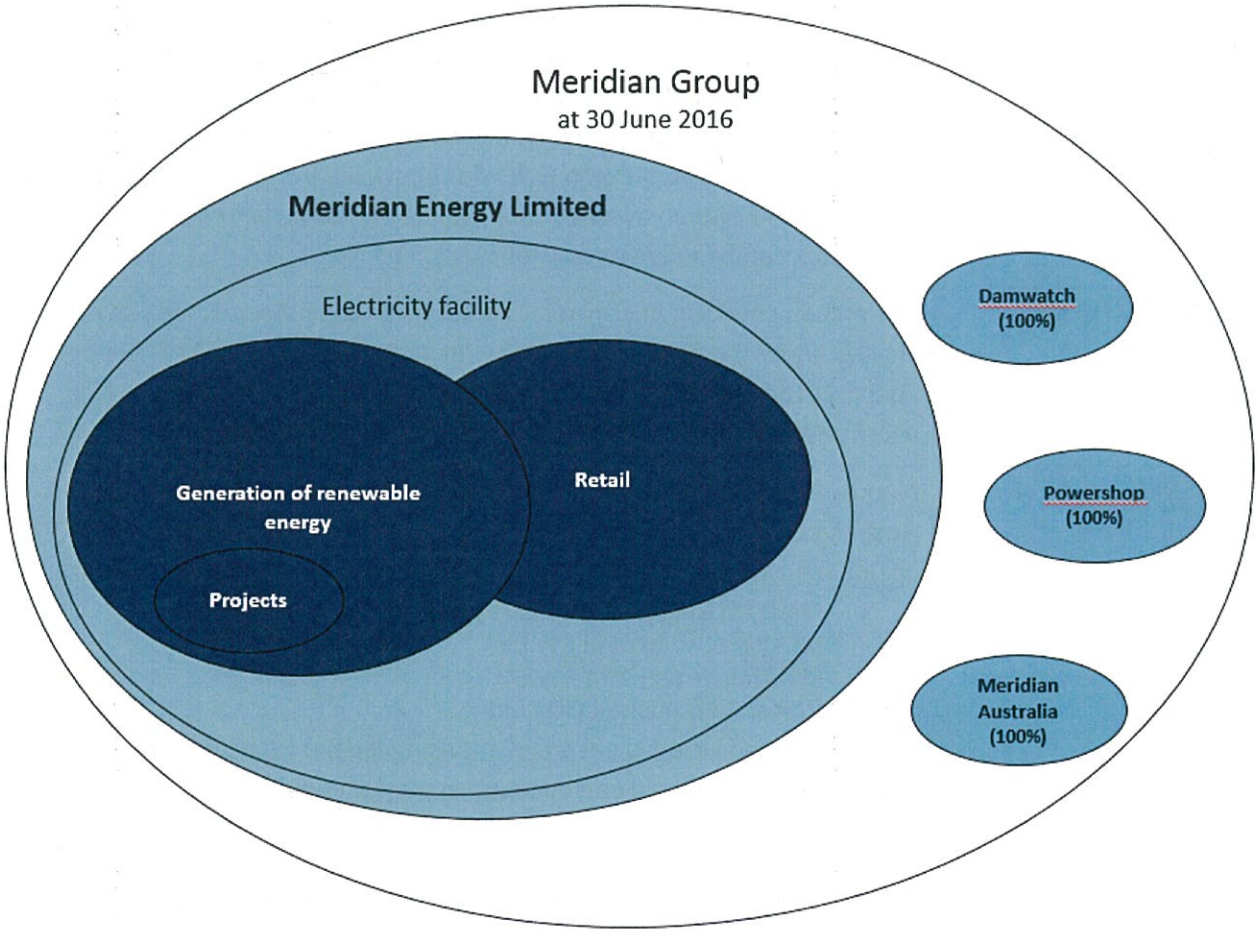
Meridian's diverse activities and resulting emissions are categorised into "facilities" in line with Annex A of ISO 14064-1 which requires that the data should be retained in its disaggregated form to aid transparency and to provide maximum flexibility in meeting a range of reporting requirements.

A facility is an operation which, by the nature of its processes or geography, can be separately accounted for. ISO 14064-1 defines a *Facility* as:

> *"a single installation, set of installations or production processes (stationary or mobile), which can be defined within a single geographical boundary, organizational unit or production process"* [3]

For the year ended 30 June 2016 these facilities are: Meridian Electricity, Damwatch, Powershop, and Meridian Australia as illustrated in the following diagram.

Figure 1: Facilities comprising the Meridian Group



[3] ISO 14064-1, section 2.21 p 3

6.3 Defining the Individual Facilities

A brief description of each of the facilities (including which legal entities are included within them) follows. See Appendix 2 for an organisational chart.

Facility	Description
Meridian Electricity	This includes emissions arising from Meridian's core activities associated with the generation and retail of electricity from renewable resources. Meridian Electricity supplies 218,694 customer connections as of 30 June 2016 and employed 607 FTEs on average during 2015/16. It includes the following legal entities: • Meridian Energy Limited • Meridian Energy Captive Insurance Limited • Meridian Limited (non-trading) • Meridian Energy International Limited (non-trading) • Meridian LTI Trustee Limited
Damwatch	Damwatch is a niche consultancy specialising in dam engineering, safety and surveillance. The Damwatch facility is responsible for emissions arising from consultancy services relating to dam safety and surveillance that take place in Damwatch Engineering Ltd. The facility also includes Damwatch Pty Limited (incorporated in Australia) because it is 100% owned by Damwatch Engineering Limited and performs the same type of activities. This facility has non-incorporated joint venture with GNS via Damwatch Projects Limited. Damwatch employed 34 FTEs on average during 2015/16. Further information about Damwatch can be found at www.damwatch.co.nz.
Powershop NZ	Powershop conducts energy retailing activities within Powershop New Zealand Limited under the Powershop brand. Powershop employed 167 FTEs on average during 2015/16 and supplies 56,226 customers as at June 2016. Further information about Powershop can be found at www.powershop.co.nz.
Meridian Australia	Meridian carries out generation development activities in Australia. Meridian Australia employed 46 FTEs on average during 2015/16 and supplies 77,970 customers as at June 2016. There are four companies trading in this group: • Meridian Energy Australia Pty Ltd • Mt Mercer Windfarm Pty Ltd • Mt Millar Wind Farm Pty Ltd • Powershop Australia Pty Ltd This facility also includes several non-trading legal entities. Further information about Meridian Australia can be found at www.meridianenergy.com.au.

7 Operational Boundaries and Information Management Procedures

ISO 14064-1, 7.3.2 (k) and 4.2

GHG emissions sources were identified with reference to the methodology described in the GHG Protocol and ISO 14064-1 standards and confirmed through personal communication with Meridian staff. Emission

sources identified were reviewed against expenditure records for this reporting period in order to identify the activities that may create emissions.

As adapted from the GHG Protocol and ISO (Annex), these emissions were classified into the following categories:

- Direct GHG emissions (Scope 1): GHG emissions that are operationally controlled by the company;
- Indirect GHG emissions (Scope 2): GHG emissions from the generation of purchased electricity, heat or steam consumed by the company;
- Indirect GHG emissions (Scope 3): GHG emissions that occur as a consequence of the activities of the company but from sources that are not owned or controlled by the company;
- Indirect GHG one-time emissions (Scope 3 one-time): GHG emissions that occur as a consequence of major construction activities undertaken by contractors on behalf of Meridian.

Meridian's recent review of the Greenhouse Gas Scope 2 Guidelines has resulted in changes to Meridian's Scope 2 and Scope 3 reporting. These pertain to Scope 2 electricity use in New Zealand and Australia and Meridian's treatment of electricity purchased and onsold in New Zealand (Scope 3).

Scope 2 reporting

Electricity use in New Zealand has been reported using the grid average emission factor for both location-based and market-based reporting as there are no retailer specific emission factors. Electricity use in Australia has been reported using the location based approach (state based grid emission factors) where Meridian uses electricity in its operations and the market-based approach (using the supplier specific emission factor of NCOS accredited carbon neutral Powershop).

Powershop Australia is NCOS certified and provides certified carbon neutral electricity to its customers. The NCOS standard is in line with the new Scope 2 Guidance and follows the market based approach. As a result, Powershop customers can report their Scope 2 emissions (in the market based approach) as 0t CO2e.

Total annual emissions (combined Scope 1 and 2) are reported using the location based approach as it is the only approach applicable to New Zealand based companies and is in line with Meridian's reporting to date.

Scope 3 reporting

Under both ISO 14064-1 and the GHG Protocol, reporting of Scope 3 emissions is optional. Meridian has elected to report some relevant Scope 3 emissions, particularly those relating to corporate travel and major project emissions.

Meridian has determined which emissions sources are relevant using criteria that have been developed to provide consistency and alignment with Meridian's wider sustainable development objectives. These criteria are that an emissions source is considered relevant if it is:

- relevant to Meridian's operations;
- large in relation to Meridian's Scope 1 and Scope 2 emissions;
- critical to key stakeholders; or
- able to potentially deliver significant emissions reductions that could be undertaken or influenced by Meridian

Until this inventory in FY16 Meridian used a netting off approach to Scope 3 electricity reporting. This approach reflected the NZ electricity market where generators sell all their electricity into a national wholesale market and purchase electricity to retail from the wholesale market. There is no national market mechanism to provide for renewable generation such as Meridian's. The total electricity reported was calculated by deducting electricity retailed by Meridian from electricity generated by Meridian. In the event of a very dry hydrological year, this could result in an excess of retailed electricity.

From FY16 Meridian will not report its Scope 3 electricity in this inventory[4]. Meridian is focussing our Scope 3 reporting on emission sources under our control. This is consistent with how we treat other Scope 3 emissions and will allow us to focus on the corporate emissions (where we have reduction plans and targets, which form the basis of our staff engagement and understanding of GHG reduction initiatives, and can make meaningful comparisons with others) and the construction emissions (an area of stakeholder interest in project emissions and where we can exert some control over the purchase of goods and services). This approach will also allow for greater consistency in our emissions inventory each year, irrespective of changes to contract terms or hydrology.

This is a change in our accounting practice. There is no change to our generation or retail practices. We continue to generate electricity from 100% renewable resources, producing almost a third of New Zealand's electricity supply.

Meridian has also included in its Scope 3 emissions any:

- Emissions associated with contractors co-located in Meridian office buildings (including IT and Telecommunications support staff, and casual employees), which are reported in power consumption and waste figures in the Meridian Electricity inventory; and
- Emissions associated with field services activities for Meridian Electricity.

Meridian seeks to work with its other suppliers, contractors, and other value-chain partners to identify opportunities to measure, manage and report additional significant emissions sources. This process is driven in part by Meridian's procurement process. Where these additional significant emissions sources can be measured reliably, and where Meridian can influence the emissions through working with its value-chain partners, they will be included in future emissions reporting.

7.1 Information Management and Monitoring Procedures

GHG Measurement and Management Guidelines were developed and approved 30 June 2009 and revised in January 2013 and June 2015. These documented measurement and reporting requirements for individual facilities and the group with the objective of understanding, transparently disclosing and reducing the emission intensity of operations.

Meridian has, for each facility, developed and maintained GHG information management procedures that ensure conformance with the principles of ISO 14064-1 and the GHG Protocol, ensure consistency with the intended use of the GHG inventory, provide routine and consistent checks to ensure completeness and accuracy, identify and address errors and omissions and manage and store documentation in a safe and accessible manner.

[4] This change pertains to Meridian's New Zealand operations. From 1 September 2014 Meridian Australia has formally offset their emissions from their full operations under the National Carbon Offset Standard (NCOS).

The key GHG information management procedures are as follows:

- Source data is collected directly from third party suppliers or from the Meridian financial system;
- The data is stored in the SoFi software database and reviewed by the GHG accounting team;
- Emissions factors and conversion factors in SoFi are maintained by thinkstep (formerly PE Australasia);
- The GHG inventory is compiled using activity data and emission factors;
- The report is independently audited by Deloitte;
- The report is reviewed to identify opportunities to reduce emissions and improve the information management process; and
- Senior management are informed of emissions management progress.

8 Summary of Emission Source Inclusions

SO 14064-1, 7.3.1 (l)

The emissions sources included in the GHG emissions inventory, and details in regards to data sources and uncertainties can be found in the following table.

Scope	Category	GHG emissions source	Facilities included	Data source	Data from supplier engagement	Data collection unit	Methodology, data quality, uncertainty (qualitative)
Scope 1 (& Biomass)	Stationary combustion	Fuel used for electricity generation	Meridian Electricity and Meridian Australia	No fuel consumed		n/a	There were no emissions from the 14,242GWh of electricity generated in the reporting period, as the fuel used to generate this electricity was water and wind
	Mobile combustion	Boat travel (Tug and staff transport boat at Lake Manapōuri)	Meridian Electricity	Fuel storage readings		Real Journeys	Accurate records of litres used
		Car travel (owned, leased, rented)	All facilities	Odometer readings, rental records		Vehicle operators Customfleet Rental suppliers	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	Meridian Electricity,	Maintenance records		Maintenance staff	Accurate records of storage cylinder weights[5] Records of 'top-ups'

[5] The emission factor has been sourced from the IPCC Second Assessment Report IPCC (2007) AR4 WG1 Chapter2 Table 2.14 http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

Scope	Category	GHG emissions source	Facilities included	Data source	Data from supplier engagement	Data collection unit	Methodology, data quality, uncertainty (qualitative)
			Meridian Australia				
		Fugitive emissions from air-conditioning systems	All facilities excluding Damwatch	Maintenance records		Transfield, maintenance contractors	Accurate record of 'top-ups'
Scope 2	Electricity	Electricity consumed in offices	Meridian Australia	Records from billing system		Meridian Australia finance team	Accurate records from the billing system Start and end of year are partially estimated
			Powershop	Billing system & landlord invoices		Powershop finance team	Accurate records from the billing system Start and end of year are partially estimated Calculated from the invoices
			Damwatch	Landlord invoices		Damwatch finance team	Calculated from the invoices
			Meridian Electricity	Records from billing system		Meridian Electricity finance team	Accurate records from the billing system Start and end of year are partially estimated

Scope	Category	GHG emissions source	Facilities included	Data source	Data from supplier engagement	Data collection unit	Methodology, data quality, uncertainty (qualitative)
		Electricity consumed in facilities[6]	Meridian Electricity	The electricity market reconciled consumption files		Meridian Electricity finance team	Accurate records of electricity consumed
Scope 3	Capital goods	Major construction and plant upgrade materials[7]	All facilities with relevant activity in reporting period	Project records from manufacturer or design specifications	100%	Project Managers	Records of weights or volumes of major materials used in construction projects
Scope 3	Fuel related emissions (not Scope 1 or 2)	Production & distribution of fuel	All facilities	Fuel invoices	0%	Finance teams	Calculated from amount of fuel consumed using emissions factors derived from LCA studies
Scope 3	Upstream transportation and distribution	Freight of major materials	All facilities with relevant activity in reporting period	Project records	30%	Meridian project managers	Estimates of major materials used Calculated from weight of materials x distance travelled Some information is provided by suppliers
		Contractor fuel (operational maintenance and construction)	All facilities with relevant activity in reporting period	Contractor records	50%	Project managers	Estimates of the amount of fuel used Some information is provided by suppliers

[6] Excludes Manapōuri Power Station – see exclusions table
[7] This includes projects from Meridian Electricity and Meridian Australia.

Scope	Category	GHG emissions source	Facilities included	Data source	Data from supplier engagement	Data collection unit	Methodology, data quality, uncertainty (qualitative)
		Contractor fuel for retail meter reading and maintenance	Meridian Electricity	Supplier estimates of distances Samples of jobs Samples of vehicle types used	100%	Retail Delta Datacol Group Arc Innovations	Calculated using a formula of estimated distance x estimated emissions factor • Contractors estimate distance and the average type of vehicle used • The emissions factor is a weighted average of the vehicle types, calculated from emission factors provided by Defra.
Scope 3	Waste	Office waste to landfill	Meridian Electricity	Actual weight of waste bins	100%	Transfield Services	Waste bins weighed on a monthly basis
Scope 3	Business Travel	Air travel (domestic and international)	All facilities	Purchase records (supplier data, internal purchasing systems)	100%	Meridian Electricity Procurement team Travel providers Finance teams	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[8]
		Car travel (taxis)	All facilities	Purchase records (internal purchasing systems)	0%	Meridian Electricity Procurement team Finance teams	Records of expenditure
		Car travel (private vehicles)	All facilities with relevant activity in the reporting period	Odometer readings	100%	Vehicle operators	Estimated from accurate records of distance travelled x average fuel efficiency of vehicle class (small, medium or large)

[8] www.gcmap.com

8.1 Other emissions - PFCs

No operations within the Meridian Energy Group use perfluorocarbons (PFCs) therefore no holdings of PFCs are reported and no emissions from these sources are included in this inventory

8.2 Other emissions - CO_2 Emissions from the Combustion of Biomass

ISO 14064-1, 7.3.1 (f) and 7.3.2 (b)

There was no combustion of biomass in the operations of the Meridian Electricity, Damwatch, Meridian Australia, and Powershop facilities during the reporting period.

9 GHG Emissions Source Exclusions

ISO 14064-1, 7.3.1 (h)

The emissions sources below have been identified and excluded from this GHG emissions inventory. These emissions sources are considered not material to stakeholders, not material in the context of the inventory, and/or not technically feasible nor cost effective to be quantified at the present time.

Scope	Category	GHG emissions source	Facilities	Reason for exclusion	Size of exclusion (based on FY11 data, tCO_2e)	% of total Scope 1 & 2 estimated inventory
Scope 1	Stationary combustion	Back-up generators	All facilities with relevant activity in reporting period	Estimated to be *de minimus*	94	1.50%
	Fugitive Emissions	Fugitive emissions from air-conditioning systems	Damwatch	Difficult to get data on leakage and holdings from office landlords	37	0.86%
		Fugitive emissions from fridges and vehicle AC systems	All facilities	Difficult to obtain the data, estimated to be *de minimis*	17	
Scope 2	Electricity	Electricity consumed at Manapōuri power station	Meridian Electricity	Estimated to be de minimis	163	2.60%
		Electricity consumed at Mt Millar and Mt Mercer wind farms	Meridian Australia	Estimated to be de minimis	0	
Total Scope 1 & 2					**311**	**4.96%**

Scope 3	Category	GHG emissions source	Facilities	Reason for exclusion
Scope 3	Upstream transportation and distribution	Freight - courier packages and minor materials	All facilities	Difficult to obtain the data, estimated to be *de minimis*
		Contractor fuel for retail meter reading and maintenance	Meridian Australia and Powershop NZ	
Scope 3	Waste	Office waste to landfill	All facilities other than Meridian Electricity	Difficult to obtain the data, estimated to be *de minimis*
		All other sources of waste	All facilities	Difficult to obtain the data, estimated to be *de minimis*
Scope 3	Business travel	Hotel accommodation	All facilities	Difficult to obtain the data, estimated to be *de minimis*
Scope 3	Upstream leased assets	Upstream leased assets	All facilities	Consolidation approach is operational control, so all upstream leased assets are included in Scope 1 and 2

10 Data collection, quantification and uncertainties

ISO 14064-1, 7.3.1 (m,n)

Section 8 provides an overview of how data was collected for each GHG emissions source, the source of the data, and any uncertainties or assumptions made. Collection of information was centralised in the finance teams of each facility, however much of the information is sourced from the procurement team, project teams, suppliers and relevant individuals throughout the business.

All data was calculated using SoFi 5.8.1. This software uses a calculation methodology for quantifying the GHG emissions inventory using emissions source activity data multiplied by GHG emissions factors.

Except as stated, emission factors used were sourced from Ministry for the Environment (MfE, New Zealand) or Department of Environment, Food and Rural Affairs (Defra, United Kingdom). These are expressed in terms of total tonnes of carbon dioxide equivalent. As such, all calculations in this report are expressed in total tonnes of carbon dioxide equivalent.

- The emission factors applied to electricity consumption in New Zealand are normally taken from the Ministry for the Environment's Guide to Voluntary Corporate GHG Emissions Reporting. This year the report has not been released yet, so equivalent electricity consumption emission factors have been calculated from the Ministry of Business, Innovation and Employment (MBIE) data.
- Emissions factors for electricity consumption in Australia have been sourced from NGA released by the Australian Government (Department of the Environment and Energy), August 2015[9]
- The emission factor applied to SF_6 leakage is sourced from the IPCC AR4.

11 Impact of Uncertainty

ISO 14064-1, 7.3.1 (o) and 7.3.2 (h)

There is some level of uncertainty associated with preparing a GHG inventory. To minimise this uncertainty source data has been selected from a verifiable source and any further uncertainty is detailed under sections 8, 9 & 10 and above. Where uncertainty exists in the data, a conservative estimation approach has been taken leading to over, rather than understating of emissions.

12 The Base Year Selected

ISO 14064-1, 7.3.1 (j)

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

13 Changes to Historic Base Year

ISO 14064-1, 7.3.1 (k)

No change has occurred to the base year selected this year.

Any comparative statements in this report to previous inventory reporting periods are in discussion of specific emissions sources that have not changed in their calculation methodology.

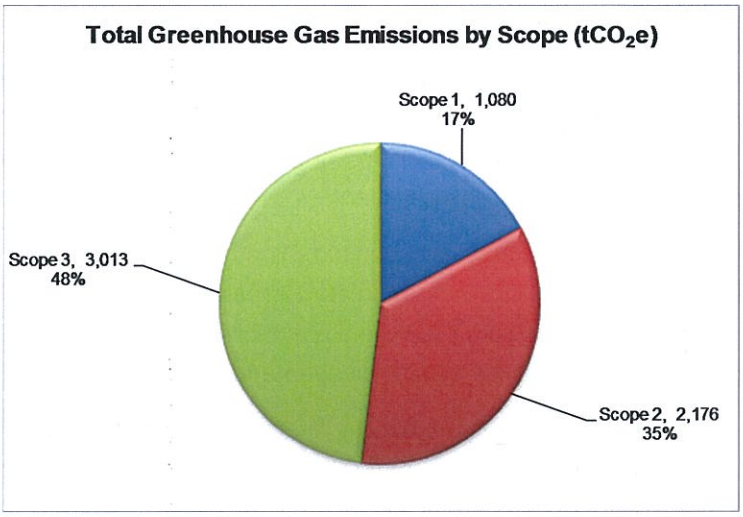
[9] https://www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/national-greenhouse-accounts-factors-aug-2015

14 GHG Emissions Calculations and Results

14.1 Total emissions by scope

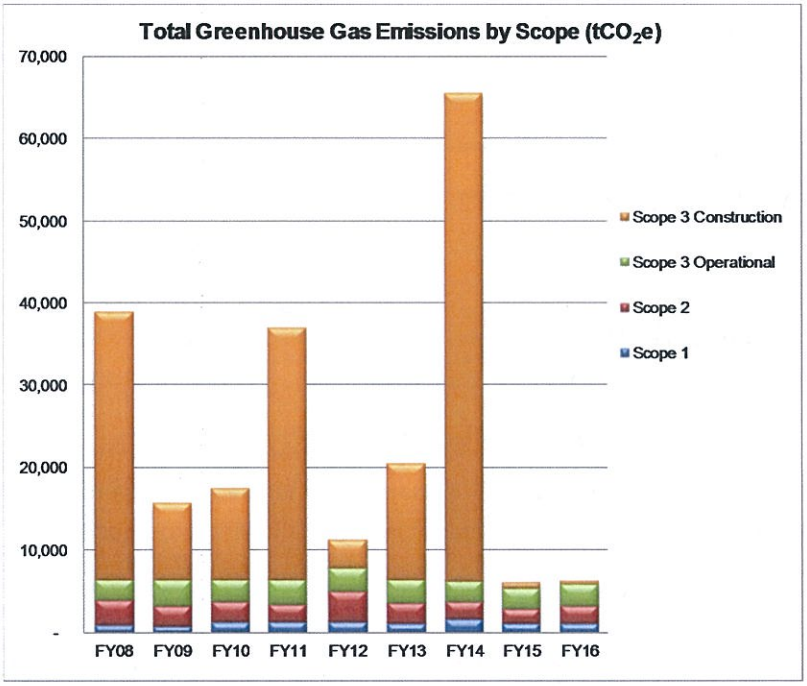
Total GHG emissions for Meridian Group were 6,269 tCO2e for the reporting period, shown by scope in the following graph.

Figure 2: Total Greenhouse Gas Emissions by Scope



While the generation of electricity is Meridian Electricity's core business, there are no Scope 1 emissions from the generation of electricity as fuel sources are wind and water. The majority of Scope 3 emissions are from business travel. The next most significant contributor is construction materials and freight costs relating to the new Twizel building, replacement Brooklyn wind turbine and hydro station maintenance projects.

Figure 3: Total Greenhouse Gas Emissions by Scope - Annual Comparison

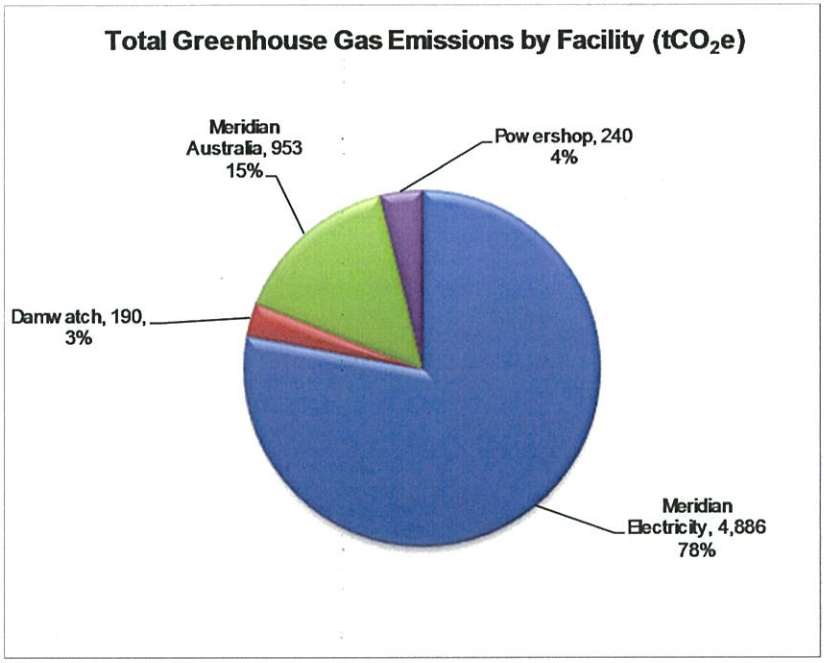


14.2 Total emissions by facility

The following graphs show the total GHG emissions (tCO_2e) by facility in the reporting period.

The majority of emissions are from the Meridian Electricity facility and related to business travel and construction.

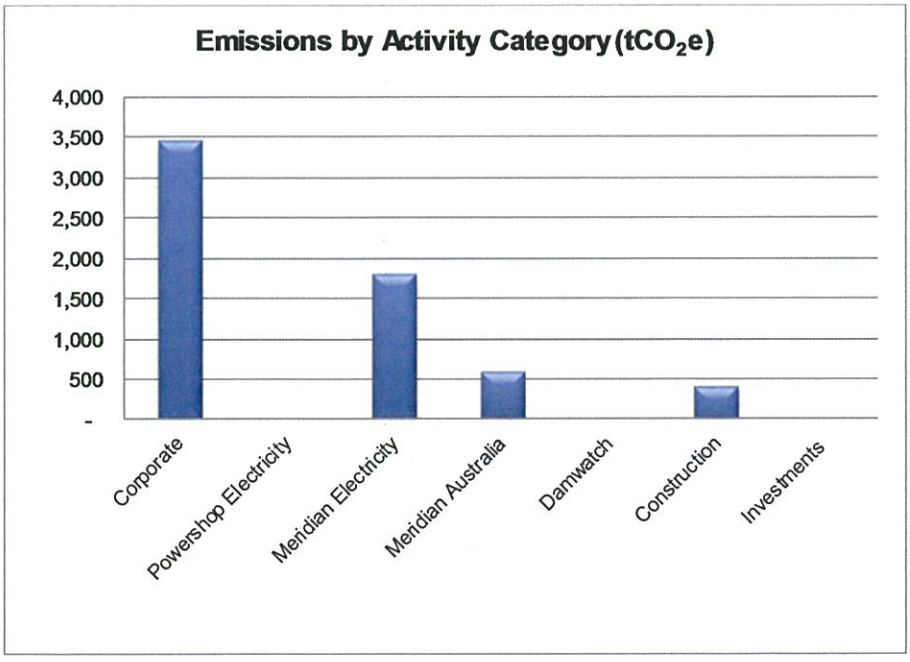
Figure 4 Total Greenhouse Gas Emissions by Facility



14.3 Total emissions by business activity category

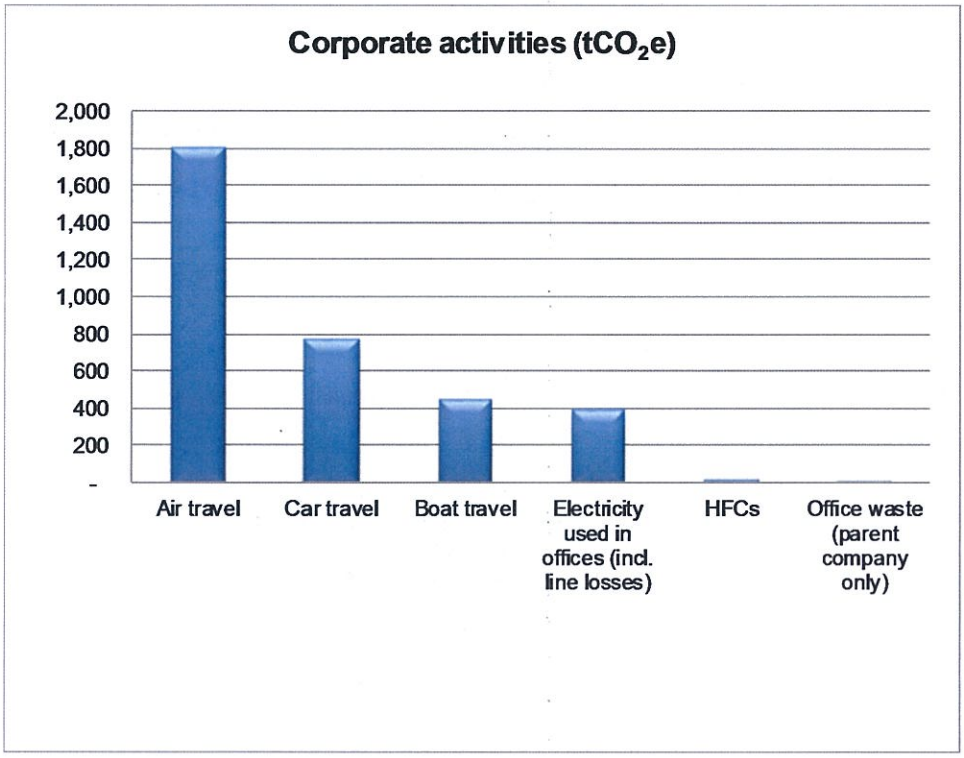
The majority of emissions this year result from Meridian Energy's business travel.

Figure 5: Emissions by Activity Category



Corporate emissions are primarily from business travel.

Figure 6: Emissions by Corporate Activity



15 GHG Removals and Reductions

ISO 14064-1, 7.3.1 (g) and 7.3.2 (c & d)

15.1 Removals

A greenhouse gas removal is defined by ISO 14064-1 as the "total mass of a greenhouse gas removed from the atmosphere over a specified period of time". There are no removals quantified for this reporting period.

15.2 Avoided Emissions

Meridian's Te Āpiti and White Hill Wind farms were allocated Kyoto compliant carbon credits under the Government's Projects to Reduce Emissions Scheme until FY13 when the first commitment period of the Kyoto Protocol ended.

15.3 Emission Reductions / Increases

This year total Group emissions are 6,269 tCO_2e, a 60% decrease on base year and a 3% increase on FY15. This year's increase across the Group is attributable to an increase in travel and office electricity from growing our Australian business. The following table shows a high level comparison of total emissions for each facility for the base year FY12, and the FY15 and FY16 years.

Total emissions by facility	2011/12 tCO_2e	2012/13 tCO2e	2013/14 tCO_2e	2014/15 tCO_2e	2015/16 tCO_2e	% change base year	% change last year	tCO_2e change base year	Variance Analysis
Meridian Electricity	10,391	7,720	30,749	5,350	4,886	-53%	-9%	(5,505)	FY12 has increased Scope 2 emissions due to increased electricity use in power stations in a dry year. FY14 had increased one time emissions from wind farm builds. FY16 had wind turbine replacement, hydro maintenance projects and a new office build in Twizel.
Damwatch	206	282	225	200	190	-8%	-5%	(16)	Any variances are largely due to changes in travel activity
Meridian Australia	5,136	13,589	34,471	376	953	-81%	153%	(4,183)	Emissions largely influenced by construction. FY14 Mt Mercer one-time emissions. Electricity and travel have increased in FY16
Powershop	101	152	100	173	240	137%	39%	139	Travel continues to increase
Group	**15,834**	**21,743**	**65,545**	**6,099**	**6,269**	**-60%**	**3%**	(9,565)	Construction and/or significant maintenance projects impact on the emissions profile. Subsidary growth provides less significant increases.

16 Liabilities – GHG Stocks Held

GHG holdings	Meridian Electricity	Damwatch	Meridian Australia	Powershop	2015/16 kg	2015/16 tCO_2e
HFC gas holdings [kg]	751 kg	nm	31 kg	120 kg	901	1,762
SF6 holdings [kg]	1,677 kg	n/a	161 kg	0 kg	1,838	41,905

Meridian's Electricity facility has a holding of sulphur hexafluoride (SF_6) gas. The bulk of the gas is held in 220kV circuit breakers and current transformers with small amounts being held in 110kV, 33KV and 22kV switchgear. No SF_6 is known to be held in fire extinguishing systems. Meridian's current management practices in relation to SF_6 are well aligned with best practice as defined by the Cigré and IEC publications[10]. SF_6 is also present in switchgear in Meridian Australia. Tops were required in FY16.

It has not been possible to obtain data on HFC holdings in air conditioning systems from Damwatch. For all other facilities liabilities from HFCs from refrigerators have been estimated to be well below the *de minimus* threshold of 1% and their liabilities are not reported here.

[10] *SF6 Recycling Guide Re-Use of SF6 Gas in Electrical Power Equipment and Final Disposal*' Cigré Task Force 23.10.01 G Mauthe et al, August 1997
IEC 1634 Technical Report Type 2 '*High-Voltage Switchgear and Controlgear – Use and Handling of SF6 in High Voltage Switchgear and Control Gear*', 1995
IEC 480 '*Guide to the Checking of Sulphur Hexafluoride (SF6) Taken from Electrical Equipment*', 1976

17 Compliance with ISO 14064-1

ISO 14064-1, 7.3.1 (p)

This GHG inventory report for the year ending 30 June 2016 has been prepared in accordance with ISO 14064-1. A reporting index is provided in Appendix Three.

18 Audit of the GHG Inventory

ISO 14064-1, 7.3.1 (q)

This GHG inventory report has been audited by Deloitte, a third party independent assurance provider. A reasonable level of assurance has been given over the assertions and quantification included in this report. Deloitte is also the financial auditor of Meridian Energy Limited on behalf of the Office of the Auditor General.

19 Description of Additional Indicators

ISO 14064-1, 7.3.2 (i)

No additional indicators have been presented in this GHG inventory.

20 Assessment of Performance against Relevant Benchmarks

ISO 14064-1, 7.3.2 (j)

No assessment of performance against relevant benchmarks is presented in this GHG inventory.

References:

Cigré Task Force, SF_6 Recycling Guide Re-Use of SF_6 Gas in Electrical Power Equipment and Final Disposal' 23.10.01 G Mauthe et al, August 1997

IEC 1634 Technical Report Type 2 'High-Voltage Switchgear and Controlgear – Use and Handling of SF6 in High Voltage Switchgear and Control Gear', 1995

IEC 480 'Guide to the Checking of Sulphur Hexafluoride (SF6) Taken from Electrical Equipment', 1976

International Standards Organisation, *ISO 14064-1:2006 (E)*

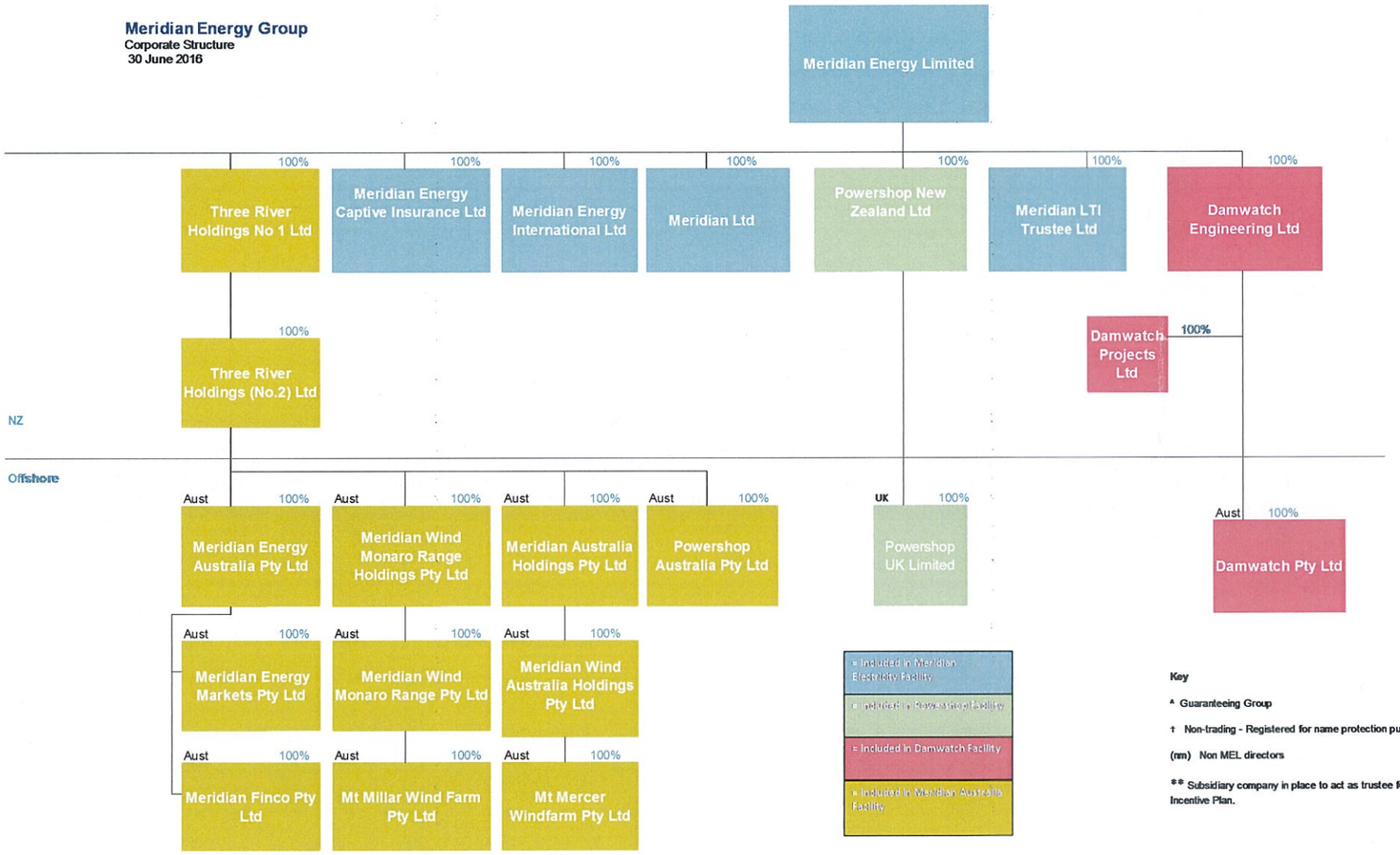
Ministry for the Environment, Guidance for Voluntary, Corporate Greenhouse Gas Reporting. Data and methods for the 2007 calendar year, September 2008.

Appendix 1 – Meridian Group treatment of emissions

Meridian Energy treatment of emissions from subsidiaries, associates, joint ventures and investments as at 30 June 2016.

Company Name	Emissions source?	Legal structure and partners	Economic interest held by MEL		Country	Operational control	Comment
Meridian Energy Limited (MEL)	Yes	Parent company	100%		NZ	Yes	Included in Meridian Electricity facility.
Tonga solar plant	Yes	Finance lease	0%		NZ	No	Excluded from the Meridian Electricity facility
Mill Creek Transmission Line	Yes	Finance lease	0%		NZ	Yes	Excluded from the Meridian Electricity facility
Meridian Energy Captive Insurance Limited	No (non-trading entity)	Group companies / subsidiaries	100%		NZ	Yes	No activity, therefore no emissions.
Meridian LTI Trustee Limited	No (non-trading entity)	Group companies / subsidiaries	100%		NZ	Yes	No activity, therefore no emissions.
Meridian Energy International Limited	No (non-trading entity)	Group companies / subsidiaries	100%		NZ	Yes	No activity, therefore no emissions.
Meridian Limited	No (non-trading entity)	Group companies / subsidiaries	100%		NZ	No	No activity, therefore no emissions.
Damwatch Services Limited	Yes	Group companies / subsidiaries	100%		NZ	Yes	Included in Damwatch facility (NZ operations)
Damwatch Projects Ltd	No (holding company)	Group companies / subsidiaries	100%	via Damwatch Services Ltd	NZ	Yes	No activity, therefore no emissions.
GNS Joint Venture	Yes	Non-incorporated joint venture	33%	via Damwatch Projects Ltd	NZ	No	Included in Damwatch facility (NZ operations)
Damwatch Pty Limited	Yes	Group companies / subsidiaries	100%	via Damwatch Services Ltd	AUS	Yes	Included in Damwatch facility (AUS operations)
Three River Holdings (No 1) Limited	No (holding company)	Group companies / subsidiaries	100%		NZ	Yes	No activity, therefore no emissions.
Three River Holdings (No 2) Limited	No (holding company)	Group companies / subsidiaries	100%	via Three River Holdings (No 1) Ltd	NZ	Yes	No activity, therefore no emissions.
Meridian Energy Australia Pty Ltd	Yes	Group companies / subsidiaries	100%	via Three River Holdings (No 2) Ltd	AUS	Yes	Included in Meridian Australia facility.
Meridian Finco Pty Ltd	No (non-trading entity)	Group companies / subsidiaries	100%	via MEL Meridian Australia Partnership	AUS	Yes	No activity, therefore no emissions.
Meridian Australia Holdings Pty Limited	No (holding company)	Group companies / subsidiaries	100%	via Three River Holdings (No 2) Ltd	AUS	Yes	No activity, therefore no emissions.
Meridian Wind Australia Holdings Pty Ltd	No (holding company)	Group companies / subsidiaries	100%	via Meridian Australia Holdings Pty Ltd	AUS	Yes	No activity, therefore no emissions.
Meridian Energy Markets Pty Ltd	No (holding company)	Group companies / subsidiaries	100%	via Meridian Wind Australia Holdings Pty Ltd	AUS	Yes	No activity, therefore no emissions (holds our trading licences)
Mt Mercer Windfarm Pty Limited	Yes	Group companies / subsidiaries	100%	via Meridian Energy Markets Pty Ltd	AUS	Yes	Included in Meridian Australia facility (Mt Mercer wind farm)
Meridian Wind Monaro Range Holdings Pty Limited	No (holding company)	Group companies / subsidiaries	100%	via Three River Holdings (No 2) Ltd	AUS	Yes	No activity, therefore no emissions.
Meridian Wind Monaro Range Pty Limited	No (non-trading entity)	Group companies / subsidiaries	100%	via Meridian Wind Monaro Range Holdings Pty Limited	AUS	Yes	No activity, therefore no emissions.
Mt Millar Wind Farm Pty Ltd	Yes	Group companies / subsidiaries	100%	via Meridian Wind Monaro Range Pty Limited	AUS	Yes	Included in Meridian Australia facility
Mt Mercer Transmission Line	Yes	Finance lease	0%		AUS	Yes	Excluded from the Meridian Australia facility
Powershop Australia Pty Ltd	Yes	Group companies / subsidiaries	100%	via Three River Holdings (No 2) Ltd	AUS	Yes	Included in Meridian Australia facility
Powershop New Zealand Limited	Yes	Group companies / subsidiaries	100%		NZ	Yes	Included in Powershop facility.
Powershop UK Limited	No	Group companies / subsidiaries	100%	via Powershop New Zealand Ltd	UK	Yes	No activity, therefore no emissions.

Appendix 2 – Meridian Energy Group Structure



Key

^ Guaranteeing Group

† Non-trading - Registered for name protection purposes

(nm) Non MEL directors

** Subsidiary company in place to act as trustee for the Long Term Incentive Plan.

Alternate Directors:

Three River Holdings No. 1:
Jason Stein for Mark Binns
Kelvin Mason for Paul Chambers
Three River Holdings No. 2:
Jason Stein for Mark Binns
Kelvin Mason for Paul Chambers
Meridian Energy Captive Insurance:
Jason Stein for Paul Chambers
Meridian Energy International:
Jason Stein for Paul Chambers
Meridian Limited:
Jason Stein for Paul Chambers
Powershop NZ Limited:
Gillian Blythe for Paul Chambers

Appendix 3 – ISO 14064-1 Reporting Index

ISO 14064-1 Reporting Index

ISO Reporting	Section in this report	ISO Reporting	Section in this report
7.3.1 (a)	Section 3	7.3.1 (j)	Section 12
7.3.1 (b)	Section 4	7.3.1 (k)	Section 13
7.3.1 (c)	Section 5	7.3.1 (l)	Section 8
7.3.1 (d)	Section 6	7.3.1 (m)	Section 10
7.3.1 (e)	Table 4	7.3.1 (n)	Section 10
7.3.1 (f)	Section 8	7.3.1 (o)	Section 11
7.3.1 (g)	Section 15	7.3.1 (p)	Section 17
7.3.1 (h)	Section 9	7.3.1 (q)	Section 18
7.3.1 (i)	Table 1		
7.3.2 (a)	Section 3	7.3.2 (h)	Section11
7.3.2 (b)	Section 8	7.3.2 (i)	Section 19
7.3.2 (c)	Section 15	7.3.2 (j)	Section 20
7.3.2 (d)	Section 15	7.3.2 (k)	Section 7
7.3.2 (e)	not applicable		
7.3.2 (g)	Table 1		
4.2	Section 7		

Deloitte.

INDEPENDENT ASSURANCE REPORT ON THE MERIDIAN ENERGY GROUP 2016 GREENHOUSE GAS EMISSIONS INVENTORY REPORT TO THE BOARD OF DIRECTORS OF MERIDIAN ENERGY LIMITED

Report on Greenhouse Gas Emissions Inventory Report

We have undertaken a reasonable assurance engagement relating to the Greenhouse Gas Emissions Inventory Report (the "Inventory Report") of the Meridian Energy Group ("Meridian", the "Group" or the "Company") for the year ended 30 June 2016, comprising the Inventory Report and explanatory notes set out on pages 1 to 30.

The Inventory Report provides information about the greenhouse gas emissions of the Meridian Group for the year ended 30 June 2016 and is based on historical information. This information is stated in accordance with the requirements of International Standard ISO 14064-1 Greenhouse gases – Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals ("ISO 14064-1:2006") and the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004) ("the GHG Protocol").

Board of Directors' Responsibility

The Board of Directors are responsible for the preparation of the Inventory Report, in accordance with ISO 14064-1:2006 and the GHG Protocol. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation of an inventory report that is free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on the Inventory Report based on the evidence we have obtained. We conducted our reasonable assurance engagement in accordance with International Standard on Assurance Engagements (New Zealand) 3410, *Assurance Engagements on Greenhouse Gas Statements* (ISAE (NZ) 3410), issued by the New Zealand Auditing and Assurance Standards Board. That standard requires that we plan and perform this engagement to obtain reasonable assurance about whether the Inventory Report is free from material misstatement.

A reasonable assurance engagement in accordance with ISAE (NZ) 3410 involves performing procedures to obtain evidence about the quantification of emissions and related information in the Inventory Report. The nature, timing and extent of procedures selected depend on the assurance practitioner's judgement, including the assessment of the risks of material misstatement, whether due to fraud or error, in the Inventory Report. In making those risk assessments; we considered internal control relevant to the Group's preparation of the Inventory Report. A reasonable assurance engagement also includes:

- Assessing the suitability in the circumstances of the Group's use of ISO 14064-1:2006 and the GHG Protocol as the basis for preparing the Inventory Report;
- Evaluating the appropriateness of quantification methods and reporting policies used, and the reasonableness of estimates made by the Group; and
- Evaluating the overall presentation of the Inventory Report.

We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Deloitte.

Inherent Limitations

GHG quantification is subject to inherent uncertainty because of incomplete scientific knowledge used to determine emissions factors and the values needed to combine emissions of different gases.

Our Independence and Quality Control

We have complied with the independence and other ethical requirements of Professional and Ethical Standard 1 (Revised): *Code of Ethics for Assurance Practitioners* issued by the New Zealand Auditing and Assurance Standards Board, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

Other than in our capacity as independent auditor on behalf of the Office of the Auditor General, we have no relationship with or interests in the Company or any of its subsidiaries, except that partners and employees of our firm deal with the Group on normal terms within the ordinary course of trading activities of the business of the Group.

The firm applies Professional and Ethical Standard 3 (Amended): *Quality Control for Firms that Perform Audits and Reviews of Financial Statements, and Other Assurance Engagements* issued by the New Zealand Auditing and Assurance Standards Board, and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Use of Report

This report is provided solely for your exclusive use and solely for the purpose of attaching this report to your Inventory Report. Our report is not to be used for any other purpose, recited or referred to in any document, copied or made available (in whole or in part) to any other person without our prior written express consent. We accept or assume no duty, responsibility or liability to any other party in connection with the report or this engagement including without limitation, liability for negligence in relation to the opinion expressed in this report.

Opinion

In our opinion, the Inventory Report of the Group for the year ended 30 June 2016 has been prepared, in all material respects, in accordance with the requirements of ISO 14064-1:2006 and the GHG Protocol.

Deloitte

22 August 2016
CHARTERED ACCOUNTANTS
DUNEDIN, NEW ZEALAND

This reasonable assurance report relates to the Greenhouse Gas Emissions Inventory Report of the Meridian Energy Limited Group for the year ended 30 June 2016 included on Meridian Energy Ltd's website. The Board of Directors is responsible for the maintenance and integrity of Meridian's website. We have not been engaged to report on the integrity of Meridian's website. We accept no responsibility for any changes that may have occurred to the 2016 Greenhouse Gas Emissions Inventory Report since it was initially presented on the website. The reasonable assurance report refers only to the Inventory Report named above. It does not provide an opinion on any other information which may have been hyperlinked to/from this Inventory Report. If readers of this report are concerned with the inherent risks arising from electronic data communication they should refer to the published hard copy of the 2016 Greenhouse Gas Emissions Inventory Report and related reasonable assurance report dated 22 August 2016 to confirm the information included in the Inventory Report presented on this website.