

Value Chain Footprint Report for Core Laboratories



S&P Dow Jones Indices
ESG Analysis

Financial Year 2016



June 2017

CONTENTS

INTRODUCTION	4
SCOPE	5
GHG OPERATIONAL FOOTPRINT	7
GHG VALUE CHAIN FOOTPRINT	10
SUPPLY CHAIN ANALYSIS	13
RECOMMENDATIONS & CONCLUSIONS	17
APPENDIX I – METHODOLOGY BY EMISSION CATEGORY	19
APPENDIX II – THE TRUCOST EEI-O MODEL	20
APPENDIX III – PRIMARY INFORMATION PROVIDED BY CORE LAB FOR EMISSION CALCULATIONS	21
APPENDIX IV – NATURAL CAPITAL VALUATION	22
DISCLAIMER	24
CONFIDENTIALITY & COPYRIGHT	24

In FY2016, Core Lab emitted 19,933tCO₂e of GHG emissions throughout its value chain

INTRODUCTION

Core Laboratories N.V. (“Core Lab” hereafter) engaged Trucost to assess its operational and value chain greenhouse gas (GHG) emissions in line with the WRI/WBCSD Corporate Standard (Scope 1 and 2) and Corporate Value Chain (Scope 3) Guidelines (GHG Protocol). The assessment will allow Core Lab to report its Scope 1, 2 and 3 GHG emissions in annual accounts and to the CDP Climate Change Questionnaire.

Core Lab has already been reporting its Scope 1 and 2 GHG emissions for its six Advance Technology Centers (ATCs) to the CDP since 2014. Currently, Core Lab uses estimates of its company-wide emissions based on its sector of operation and revenue for reporting purposes. Core Lab engaged Trucost to improve its operational (Scope 1 and 2) GHG emission quantification methodology by integrating primary data. Furthermore, Trucost quantified Core Lab’s Scope 3 GHG emissions according to the fifteen Scope 3 categories outlined in the Guidelines to help Core Lab understand and disclose its Scope 3 emissions. In addition, Core Lab engaged with Trucost for an in-depth analysis for its supply chain for the first time this year. This operational and value chain GHG emission footprint will focus on six ATCs located in the USA, UK, Netherlands, Canada, United Arab Emirates and Malaysia.

The following sections present the results and findings of the assessment of Core Lab’s operational and value chain GHG emissions for the 2016 financial year.

TABLE 1: SCOPE 1, 2 AND 3 GHG EMISSIONS (TONNES CO₂E)

IMPACT	SCOPE	FY2015	FY2016
Direct	Scope 1	5,462	2,122
Indirect	Scope 2 (location-based)	7,211	7,013
	Scope 2 (market-based) ¹	7,570	8,060
Value Chain	Scope 3, upstream	30,688	9,716
	Scope 3, downstream	1,132	1,081
TOTAL (LOCATION-BASED)		44,674	19,933

In FY2016, Core Lab emitted 19,933 tCO₂e of GHG emissions throughout its value chain. The total emissions have decreased by 55% compared to FY2015 mostly driven by the lower revenue and spend this year for the six ATCs, improvement in calculation methodology and data quality. Detailed analysis on each scope will be presented in the following sections. Trucost also prepared 9 tables as outlined in the 2017 CDP Climate Change Questionnaire in regards to Core Lab’s operational GHG emission footprint, which are included in the accompanying excel sheet.

¹ Market-based emission factors are only available for United States ATC, Netherlands ATC, and United Kingdom ATC. The rest of the ATCs adopts location-based emissions.

SCOPE

Trucost has assessed Core Lab's Scope 1, 2 and 3 GHG emissions in alignment with the GHG Protocol for its six ATCs – Netherlands ATC, Malaysia ATC, United States ATC, Canada ATC, Middle East ATC and United Kingdom ATC in the financial year (FY) 2016. Please refer to the box below for further definitions on each Scope.

Background

Greenhouse Gas Protocol, an international corporate accounting and reporting framework developed by the World Resources Institute and the World Business Council for Sustainable Development. The Greenhouse Gas Protocol differentiates between direct and indirect emissions using a classification system across 3 different Scopes:

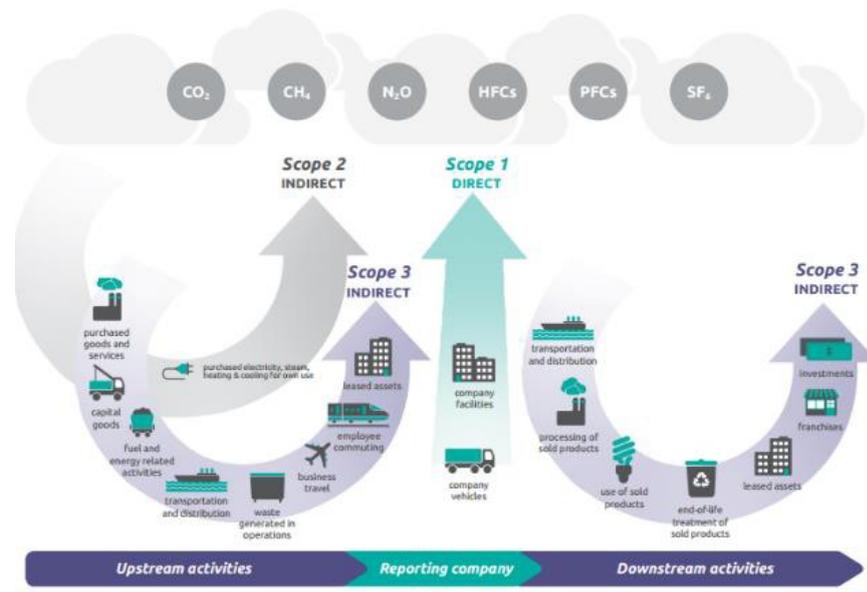
- **Scope 1** includes direct emissions from sources which a company owns or controls. This includes direct emissions from fuel combustion and industrial processes.
- **Scope 2** covers indirect emissions relating solely to the generation of purchased electricity that is consumed by the owned or controlled equipment or operations of the company.
 - **Location based:** Emissions associated with purchased electricity based on the site location only – i.e. grid emission factor. This does not reflect any renewable energy sourcing or supplier specific activity, but allows for recognition of efficiency improvements.
 - **Market based:** Emissions are calculated based on the contractual instruments used to procure electricity. This may include renewable tariffs, RECs, guarantees of origin or other such instruments. It does not only relate to renewables and can simply be a supplier disclosed emission factor.
- **Scope 3** covers other indirect emissions including third-party provided business travel.

Since 2015, dual reporting for Scope 2 GHG emissions (associated with purchased electricity) has been introduced and is required by the CDP in its CDP Climate Change Questionnaire. The dual reporting distinguishes between location based and market based Scope 2 emissions, which are further explained in the box to the right. The logic of dual reporting is to encourage consistency across reporting companies, but also to encourage a move towards renewable energy sources as 'business as usual' of market based Scope 2 GHG emissions will likely reflect an increasing emission factor as contractual obligations are gained for renewable energy types and the residual mix remains less 'green'. Trucost calculated both, market and location based Scope 2 GHG emissions. Location specific grid mix is available for United Kingdom ATC, United States ATC, and Netherlands ATC, which was used to calculate market-based Scope 2 emissions.

Each ATC collected and provided information regarding its stationary and mobile energy consumption and refrigerants (kg of refrigerant replacement was used as an approximation for the amount of gas leaked), required for the quantification of Scope 1 and 2 GHG emissions. Please refer to Appendix III for an overview of the data provided by each ATC.

Scope 3 GHG emissions refer to the emissions generated upstream and downstream from Core Lab's own operations. Figure 1 outlines the 15 upstream and downstream Scope 3 categories as described by the GHG Protocol. Trucost assessed the GHG emissions of each category using the Trucost Environmentally Extended Input-Output (EEI-O) model (Please see Appendix II for details on the EEI-O model) as well as primary data, where available, for all indirect upstream and downstream impact categories (Scope 3). Primary data refers to, among others, Core Lab's spend data that was used in combination with the EEI-O model to estimate impacts, and employee count by country. Please refer to Appendix III, for a full list of primary data points provided by each ATC and to Appendix I for more details on the methodology used to calculate the GHG emissions associated with each of the 15 Scope 3 categories.

FIGURE 1: SCOPE OF VALUE CHAIN GHG EMISSIONS FOOTPRINT



Source: GHG Protocol

Different GHGs have different Global Warming Potentials (GWP) or abilities to contribute to rising temperatures. Trucost standardizes data by converting the different greenhouse gases into their carbon dioxide equivalent according to the GWP index published by the Intergovernmental Panel on Climate Change (IPCC). The index identifies the radiative effects of different GHGs in the atmosphere relative to an equal mass of CO₂ over a 100-year timeframe. GWP enables all the GHGs to be expressed in terms of CO₂ equivalents, or CO₂e.

The total operational GHG emissions (Scope 1 and 2 location-based) are 9,135 tCO₂e

GHG OPERATIONAL FOOTPRINT

The operational footprint covers Core Lab's Scope 1 and 2 GHG emissions and includes emissions from the following:

- Purchased Electricity
- Direct Fuel Use from Vehicles (Gasoline and Diesel)
- Direct Fuel Use from Operations/Buildings (Natural Gas)
- Refrigerants (R407C, R410A and R22)

The total operational GHG emissions (Scope 1 and 2 location-based) are 9,135 tCO₂e. The table below shows the Scope 1 and 2 GHG emissions by source.

TABLE 2: SCOPE 1 AND 2 GHG EMISSIONS BY SOURCE (TCO₂E)

IMPACT	SCOPE	SOURCE	FY2015	FY2016
Direct	Scope 1	Natural gas heating (stationary energy)	1,968	1,549
		Vehicle fuel use (mobile transport)	44	128
		Refrigerants (fugitive emissions)	3,631	445
Indirect	Scope 2	Electricity (location-based)	7,211	7,013
		Electricity (market-based)	7,570	8,060
TOTAL OPERATIONAL FOOTPRINT (LOCATION-BASED)			12,853	9,135

The majority of operational GHG emissions stem from electricity consumption (Scope 2 emissions), contributing 77% to the operational GHG emissions, while Scope 1 emissions contribute 23%, of which 17% originates from natural gas heating. The total operational footprint reduced by 29% compared to FY2015, mainly driven by the significant reduction in refrigerant emissions from switching to less GHG-intensity refrigerants (e.g. from R22 to R407C and R410A).

A breakdown of emissions per ATC as shown in the Table 3 provides more insights of the emission sources across Core Lab's operations. With 5,716 tCO₂e, United States ATC has the highest operational GHG emission footprint, contributing 63% to Core Lab's total operational footprint. This footprint is primarily driven by the electricity consumption at the United States ATC, responsible for 95% of United States ATC's operational footprint. The large footprint is relative to the number of employees, with United States ATC employing 453 employees, contributing 63% to Core Lab's total "ATC" operational footprint. Figure 2 and 3 show the impacts by Scope and ATC.

TABLE 3: SCOPE 1 AND 2 GHG EMISSIONS BY ATC

IMPACT	SCOPE	SOURCE	GHG EMISSIONS (TCO2E)					
			NETHERLANDS ATC	MALAYSIA ATC	UNITED STATES ATC	CANADA ATC	MIDDLE EAST ATC	UNITED KINGDOM ATC
Direct	Scope 1	Natural Gas Heating	10	-	214	1,147	-	178
		Vehicle fuel used	-	6	3	95	22	-
		Refrigerants	-	107	90	27	222	-
Indirect	Scope 2	Electricity (location-based)	138	453	5,716	440	57	209
		Electricity (market-based)	199	453	6,718	440	57	193
TOATL OPERATIONAL FOOTPRINT			148	565	6,024	1,708	302	389

FIGURE 2: SCOPE 1 GHG EMISSIONS BY ATC

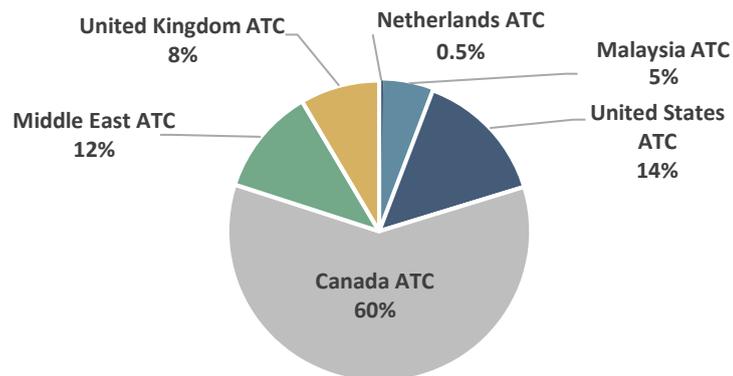
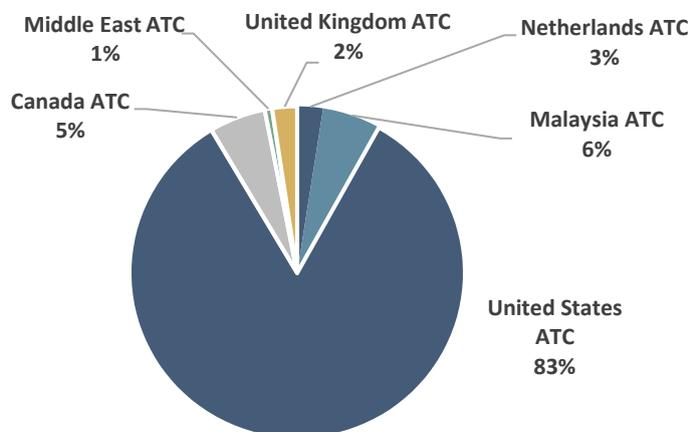


FIGURE 3: SCOPE 2



GHG EMISSIONS BY ATC

Overall, there are three sources driving the Scope 1 and 2 emission footprint: GHG emissions from purchased electricity at United States ATC (63%) and GHG emissions from natural gas consumption at Canada ATC (13%). Compared to FY2015, the total operational footprint decreased by 29% mainly due to the significant reduction in refrigerant emissions in Malaysia ATC and United States ATC as well as lower natural gas use in Canada ATC.

As explained above, with the highest number of employees, United States ATC is expected to have the highest electricity consumption across the ATCs. Core Lab's changes in refrigerants usage in FY2016 demonstrate significant contribution to emission reduction. While some locations are subject to higher refrigerant usage with warmer weather, GHG emissions could potentially be reduced by switching to less GHG-intensive refrigerants such as R407C and R410A in locations such as Malaysia ATC and Middle East ATC.

In order to gain a better understanding of efficiencies at each site, the table below considers GHG emissions per employee.

TABLE 4: SCOPE 1 AND 2 GHG EMISSIONS PER EMPLOYEE BY ATC

IMPACT	SCOPE	SOURCE	GHG EMISSIONS (TCO2E PER EMPLOYEE)					
			NETHERLANDS ATC	MALAYSIA ATC	UNITED STATES ATC	CANADA ATC	MIDDLE EAST ATC	UNITED KINGDOM ATC
Direct	Scope 1	Natural gas heating	0.3	-	0.5	16.6	-	1.6
		Vehicle fuel use	-	0.11	0.01	1.4	0.2	0.02
		Refrigerants	-	2.0	0.2	0.4	2.4	-
Indirect	Scope 2	Electricity	4.8	8.5	12.6	6.4	0.6	1.9
TOTAL OPERATIONAL FOOTPRINT			5.1	10.7	13.3	24.7	3.2	3.6

In 2016, Core Lab's value chain (Scope 3) was responsible for the emissions of 10,797 metric tons of GHG emissions (tCO₂e), about 54% of its total GHG inventory.

GHG VALUE CHAIN FOOTPRINT

In 2016, Core Lab's value chain (Scope 3) was responsible for the emissions of 10,797 metric tons of GHG emissions (tCO₂e), about 54% of its total GHG inventory. The majority of its value chain emissions came from upstream sources. The figure below shows the contribution of each Scope.

FIGURE 4: OPERATIONAL AND VALUE CHAIN GHG EMISSIONS BY SCOPE

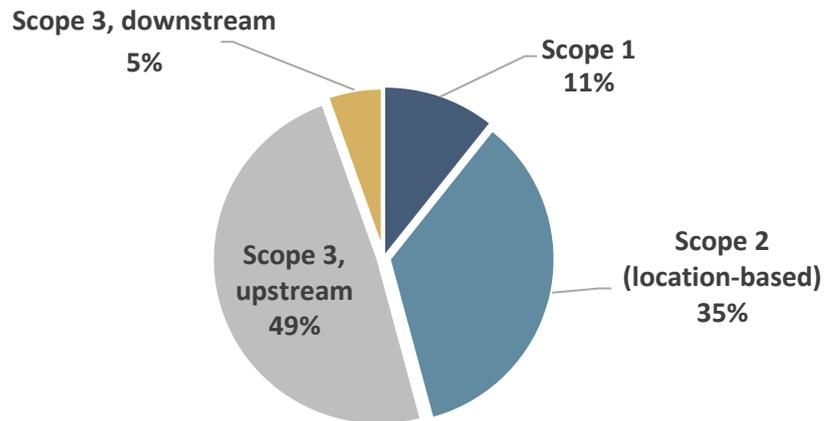


Table 5 and 6 below breaks down Core Lab's full value chain GHG emissions per Scope 3 category as well as ATC location, highlighting the most relevant categories for Core Lab². The majority of the value chain emissions occur upstream from purchased goods and fuel and energy related activities, accounting for the largest share with 26% of Scope 3 emissions and 14% of total emissions.

² Relevance is assessed by calculating % of Scope 3 GHG by category. Any category greater than 1% is considered relevant.

TABLE 5: VALUE CHAIN GHG EMISSIONS 2016

VALUE CHAIN (SCOPE 3) CATEGORY	GHG EMISSIONS (TCO2E)	SHARE %	RELEVANCE	GHG COST \$MILLION
1) Purchased goods and services	2,409	22%	Relevant, calculated	0.30
2) Capital goods	339	3%	Relevant, calculated	0.04
3) Fuel- and energy-related activities	2,856	26%	Relevant, calculated	0.35
4) Upstream transportation and distribution	1,777	16%	Relevant, calculated	0.22
5) Waste generated in operations	79	1%	Not relevant, calculated	0.01
6) Business travel	1,512	14%	Relevant, calculated	0.19
7) Employee commuting	455	4%	Relevant, calculated	0.06
8) Upstream leased assets	288	3%	Not relevant, calculated	0.04
9) Downstream transportation and distribution	N/A	0%	Not relevant, explanation provided	-
10) Processing of sold products	N/A	0%	Not relevant, explanation provided	-
11) Use of sold products	N/A	0%	Not relevant, explanation provided	-
12) End-of-life treatment of sold products	N/A	0%	Not relevant, explanation provided	-
13) Downstream leased assets	1,081	10%	Relevant, calculated	0.13
14) Franchises	N/A	0%	Not relevant, explanation provided	-
15) Investment	N/A	0%	Not relevant, explanation provided	-
TOTAL	10,797			1.33

Notes: The methodologies used for each emission category are provided in Appendix I. The colors indicate the ranking of category emissions from high (red) to low (green) within the value chain.

The table below shows Scope 3 emissions by category broken out by ATC.

TABLE 6: VALUE CHAIN GHG EMISSIONS BY ATC

SCOPE 3 CATEGORY	GHG EMISSIONS (TCO2E)					
	NETHERLANDS ATC	MALAYSIA ATC	UNITED STATES ATC	CANADA ATC	MIDDLE EAST ATC	UNITED KINGDOM ATC
1) Purchased goods and services	599	45	908	580	199	78
2) Capital goods	111	3	133	18	41	33
3) Fuel- and energy-related activities	132	190	1,659	14	451	409
4) Upstream transportation and distribution	20	174	1,151	34	257	142
5) Waste generated in operations	8	4	33	6	11	17
6) Business travel	2	122	1,079	13	80	216
7) Employee commuting	4	106	50	84	56	154
8) Upstream leased assets	1	33	199	37	9	10
9) Downstream transportation and distribution	-	-	-	-	-	-
10) Processing of sold products	-	-	-	-	-	-
11) Use of sold products	-	-	-	-	-	-
12) End-of-life treatment of sold products	-	-	-	-	-	-
13) Downstream leased assets	-	-	-	-	-	1,081
14) Franchises	-	-	-	-	-	-
15) Investment	-	-	-	-	-	-
TOTAL	876	677	5,213	787	1,105	2,139

Zero emissions indicate that the ATC does not have any spend with the corresponding Scope 3 category.

As seen from the table above, Core Lab's ATC in United States ATC contributes the largest share to the total value chain emissions with 48%. This could be due to the United States ATC having the highest revenue and most number of employees across the ATCs and hence larger operations. In nearly all Scope 3 categories analyzed, United States ATC is responsible for the highest impacts, except for

Based on the spend analysis, Core Lab's supply chain total emissions in FY2016 are 2,748 tCO₂e, with 88% coming from purchased goods & services.

employee commuting, where emissions are highest at the United Kingdom ATC, and downstream leased assets as United States ATC does not lease out any assets.

SUPPLY CHAIN ANALYSIS

This year, Trucost conducted in-depth GHG analysis of the two Scope 3 categories – purchased goods & services and capital goods, which represents the supply chain of Core Laboratories. Trucost accounts for natural capital in supply chains using several sources of information, including procurement information and supplier environmental performance data, supplemented by an econometric model that estimates environmental impacts.

Trucost uses supplier-specific data when available and if necessary supplements this information with secondary industry average impact data to fill any data gaps. This approach is in accordance with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard and provides a comprehensive overview of the life cycle based impacts embedded within a company's supply chain, from raw material sourcing through manufacturing (cradle to gate).

Trucost obtained Core Laboratories' purchase ledger for the FY 2016 for the six ATCs, cleaned the list of transactions and mapped each unique line of expenditure to the most appropriate primary sector. Trucost then used its patented environmentally extended Input-Output (EEIO) life cycle based model to quantify the environmental performance of Core Laboratories' supply chain. Trucost's EEIO life cycle model includes environmental profiles for over 500 different business activities based on the environmental impacts of each economic sector. These 500 environmental profiles are combined with company specific expenditure data and business segment analysis to calculate a supplier's environmental footprint across its direct operations and supply chain.

These modeled estimates are then refined using actual supplier data from the Trucost Environmental Register, a database of environmental disclosures from publicly listed global companies with which Trucost engages annually to collect environmental data disclosed publicly or directly to Trucost. Supplier impacts were apportioned from company-level environmental data disclosures based on Core Laboratories' expenditure in relation to each supplier's total revenue. For more information on Trucost's methodology on calculating supply chain impacts please refer to Appendix II.

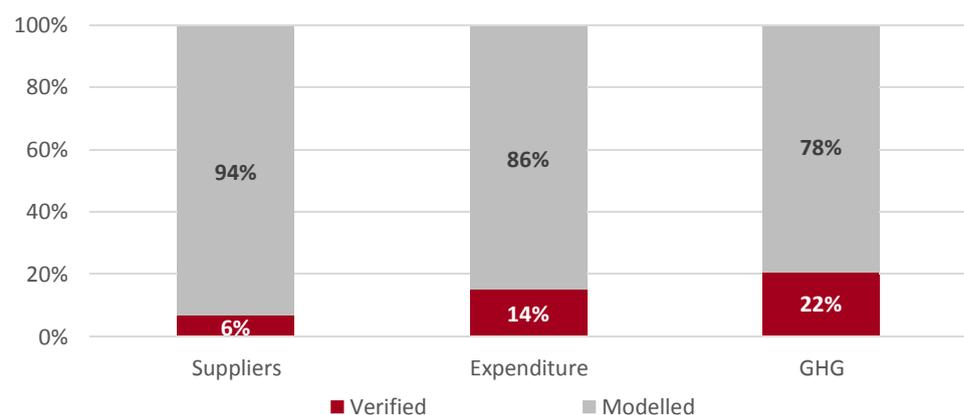
Core Laboratories provided Trucost with its purchase ledger, covering 2,430 companies and \$53million in expenditure for FY2016. Within the spend, some expenditure was excluded as determined being out of the scope for purchased goods and services and capital goods. Suppliers with relatively small expenditures were excluded because their environmental impact is immaterial. Trucost analyzed over 90% of the expenditure provided. The following table presents the number of suppliers and expenditure covered by the analysis.

TABLE 7: SCOPE OF SUPPLY CHAIN ANALYSIS, FY 2016

	SUPPLIERS	EXPENDITURE (\$MN)
Data provided	2,430	53
Data provided (after exclusion)	1,603	19
Data analyzed by Trucost	436	17
% expenditure analyzed	N/A	90%

Where possible, Trucost uses actual supplier environmental performance data in the Trucost Environmental Register to quantify supply chain footprints. For the GHG analysis, Trucost was able to incorporate actual supplier data for supplier companies representing 14% of Core Lab's expenditure, which accounts for 22% of the total supply chain GHG emissions (see Figure 5).

FIGURE 5: VERIFIED SUPPLIER DATA



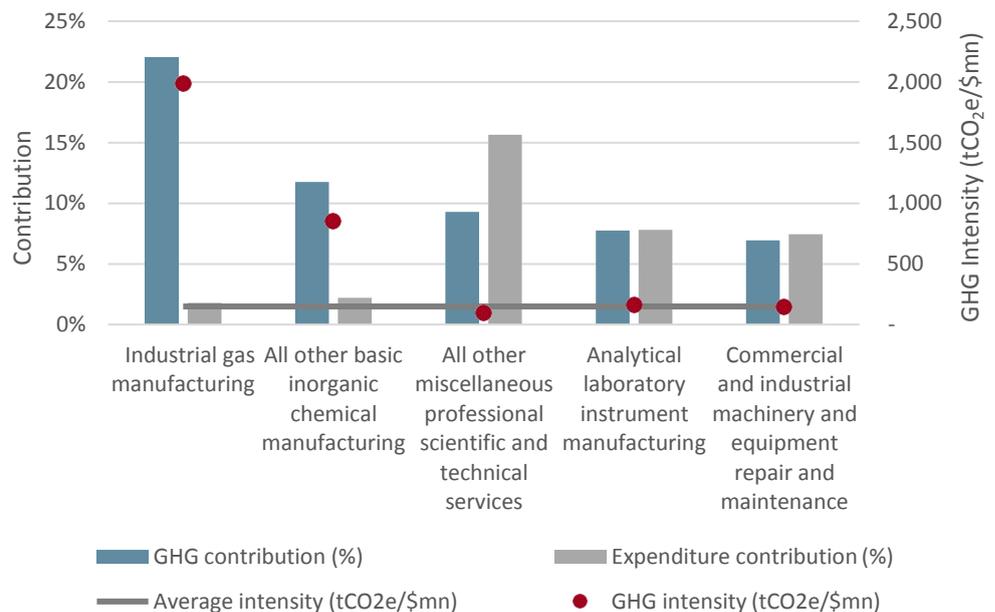
Based on the spend analysis, Core Lab's supply chain total emissions in FY2016 are 2,748 tCO₂e, with 88% coming from purchased goods & services. Table 8 summarizes the breakdown of GHG emissions and expenditure by the two supply chain categories.

TABLE 8: SUPPLY CHAIN GHG EMISSIONS BY SCOPE 3 CATEGORY

	GHG EMISSIONS (TCO2E)	EXPENDITURE (\$MN)
Purchased goods & services	2,409	15
United Kingdom ATC	78	0.6
Middle East ATC	199	0.9
Canada ATC	580	1
United States ATC	908	8.9
Malaysia ATC	45	0.3
Netherlands ATC	599	3.4
Capital goods	339	2
United Kingdom ATC	33	0.2
Middle East ATC	41	0.2
Canada ATC	18	0.1
United States ATC	133	0.8
Malaysia ATC	3	0.03
Netherlands ATC	111	0.7
TOTAL SUPPLY CHAIN	2,748	17

The environmental footprint of a supply chain depends on two factors: the amount of expenditure with that supplier and the environmental intensity of the supplier’s business activity. The figures in the rest of this report section show the relationship between expenditure and overall contribution to the footprint. The top five sectors and their relative contributions to expenditure and GHG emissions are shown in the figures below. This information should be used to assist Core Lab’s procurement and sustainability teams in prioritizing which buyers should be engaging with their suppliers, and which types of companies to target with environmental initiatives.

FIGURE 6: TOP FIVE SPEND CATEGORIES FOR SUPPLY CHAIN GHG FOOTPRINT



The top five sectors accounts for 58% of Core Lab's supply chain emissions. Suppliers that contribute the most to the supply chain GHG footprint operate in the, "industrial gas manufacturing", "all other basic inorganic chemical manufacturing" and "all other miscellaneous professional scientific and technical services" sectors. These three sectors represent 20% of analyzed expenditure and 43% of the total supply chain GHG emissions. The "industrial gas manufacturing" sector contributes the most to the GHG footprint, accounting for nearly 22% of the total GHG emissions yet only 2% of total expenditure. This is because the sector has a relatively high GHG intensity – 13 times higher than the average (149 tCO₂e per \$ million) of other sectors Core Lab spent on.

While environmental impacts are highly concentrated in relatively few sectors, the same is typically true at a supplier level. The top 5 suppliers contributing to Core Lab's supply chain GHG emissions account for 34% of total GHG emissions and the top 25 contribute 59%. Figure 7 highlights the top ten suppliers that contribute the most to Core Lab's overall supply chain emissions.

The top ten suppliers account for around 46% of the total expenditure and 22% of the total supply chain GHG footprint. With environmental impacts highly concentrated in relatively few suppliers, Core Lab can more easily target supplier engagement activities. Engaging with the top 10 or top 15 suppliers to encourage measuring and disclosing environmental performance data and reduction activities can result in significant improvements to the supply chain footprints. Targeting suppliers in this way makes engagement more manageable than attempting to reach out to all companies from which Core Lab purchases.

APPENDIX I – METHODOLOGY BY EMISSION CATEGORY

TABLE 9: TRUCOST METHODOLOGY BY EMISSION CATEGORY

EMISSION SOURCE	METHODOLOGY	TRUCOST CALCULATION STEPS	REFERENCE	REMARKS
Scope 3, Category 1: Purchased goods	Calculated using spend data, disclosed emission data and Trucost EEI-O model.	Detailed methodology provided in Appendix II	Core Lab 2016 spend data	
Scope 3, Category 2: Capital goods	Calculated using spend data, disclosed emission data and Trucost EEI-O model.	Detailed methodology provided in Appendix II	Core Lab 2016 spend data	
Scope 3, Category 3 Fuel & Energy Related Activities	Applied FY 2016 actual spend data provided by Core Lab into Trucost EEI-O model	<ol style="list-style-type: none"> 1. Categorized energy spend to the relevant sector within Trucost's EEIO. 2. Mapped spend on purchased electricity to the relevant sector with Trucost's EEI-O based on the primary energy source in the countries' grid mix 3. Calculated indirect emissions using the EEI-O 	Core Lab's energy use and cost	Purchased electricity allocated based on primary energy source in the countries' grid mix (renewable and non-renewable) in Trucost's EEI-O model
Scope 3, Category 4 Upstream transportation and distribution	Applied FY 2016 actual spend data provided by Core Lab into Trucost EEI-O model	<ol style="list-style-type: none"> 1. Consolidated Core Lab's spend on upstream transportation and distribution. 2. Applied the actual spend into Trucost's EEI-O model to estimate emissions 	Core Lab's spend on various modes of transportation	
Scope 3, Category 5 Waste generated in operations	Applied FY 2016 actual spend data provided by Core Lab into Trucost EEI-O model	<ol style="list-style-type: none"> 1. Consolidated Core Lab's spend on waste disposal and treatment 2. Applied the actual spend into Trucost's EEI-O model to estimate emissions 	Core Lab's spend on waste management	
Scope 3, Category 6 Business Travel	Applied FY 2016 actual spend data provided by Core Lab into Trucost EEI-O model	<ol style="list-style-type: none"> 1. Consolidated Core Lab's spend on business travel 2. Applied the actual spend into Trucost's EEI-O model to estimate emissions 	Core Lab's spend on various modes of business travel	
Scope 3, Category 7 Employee commuting	Estimated based on employee head count	<ol style="list-style-type: none"> 1. Based on OECD data and number of working days in each country, average commuting time spent in 2016 was calculated 2. Used information provided by Core Lab on number of employees by mode of transport; where unavailable, applied country-specific (if unavailable, average is applied) modal split to total commuting time of all employees in each country 3. Applied Defra emissions factors per transportation mode 	<ul style="list-style-type: none"> - OECD statistics on commuting time; - U.S. American Community Survey; - TEMS, EPOMM Modal Split Tool; - Defra 2016 	
Scope 3, Category 8 Upstream leased assets	Applied FY 2016 actual spend data provided by Core Lab into Trucost EEI-O model	Applied the actual spend on office rental and other leased assets into Trucost's EEI-O model to estimate emissions	Core Lab 2016 expenditure on leasing offices and other assets	
Scope 3, Category 10 Processing of sold products	N/A	N/A	N/A	
Scope 3, Category 13 Downstream leased assets	Applied FY 2016 actual revenue data provided by Core Lab into Trucost EEI-O model	Applied the actual revenue from leasing assets to other parties into Trucost's EEI-O model to estimate emissions	Core Lab 2016 revenue from leasing assets	
Scope 3, Category 14 Franchises	N/A	N/A	N/A	
Scope 3, Category 15 Investment	N/A	N/A	N/A	

APPENDIX II – THE TRUCOST EEI-O MODEL

Since its founding in 2000, Trucost developed an environmental economic input output (EEI-O) life cycle based model for quantifying environmental impacts. The EEI-O model uses an economic modelling technique based on extensive government census data to analyze the products used and produced by over 464 business activities or sectors. The model also describes the economic interactions between each sector.

Trucost has improved upon standard EEI-O models in several ways, resulting in what we believe is a best in class model for analyzing environmental performance. These improvements include the following:

- Trucost has integrated the use and emissions of over 700 environmental resources. By applying a price to each environmental resource, based on the environmental impact of that resource, the model is able to analyze, in financial terms, the economic and environmental performance of each sector. This environmental performance measure incorporates the indirect, supply chain impacts by using the information on the interactions between sectors.
- Trucost maintains and updates its model annually to reflect market commodity flows. We annually update our sector revenue for all sectors, producer prices and annual production quantities for all primary sectors in our model.
- Environmental intensities for all sectors are also reviewed annually against companies' public disclosures from our annual engagement programs. Trucost engages with more than 6,000 companies directly to obtain environmental performance metrics, which are then considered against sector environmental intensity.

APPENDIX III – PRIMARY INFORMATION PROVIDED BY CORE LAB FOR EMISSION CALCULATIONS

TABLE 10: DATA USED FOR CALCULATING VALUE CHAIN GHG EMISSIONS

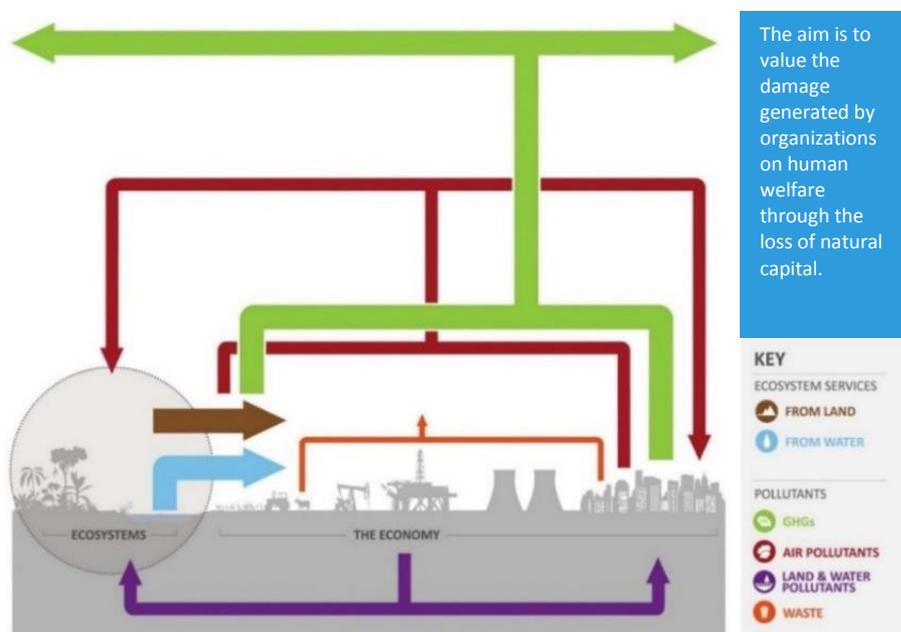
Emission Source	Unit	Netherlands ATC	Malaysia ATC	United States ATC	Canada ATC	Middle East ATC	United Kingdom ATC
Scope 2							
Electricity	kwh	340,901	656,710	11,150,525	2,613,773	95,156	507,861
Renewables	kwh	-	-	-	-	-	207,436
TOTAL electricity	kwh	340,901	656,710	11,150,525	2,613,773	95,156	715,297
Scope 1							
Natural gas heating	kwh	48,150	-	1,048,244	5,611,886	-	868,679
Gasoline purchased	km	-	13,970	15,450	492,603	116,258	-
Diesel purchased	km	-	16,524	-	-	-	11,054
Refrigerant R407C	kg	-	-	6	15	-	-
Refrigerant R410A	kg	-	-	15	-	-	-
Refrigerant R22	kg	-	59	27	-	123	-
Scope 3							
Business travel							
Air Domestic	USD	-	94,183	153,436	-	-	3,171
Air Short haul	USD	1,758	-	44,299	-	-	16,207
Air Long haul	USD	-	-	636,751	10,281	61,538	144,813
Car - diesel	USD	-	-	-	-	-	13,011
Employee commuting Miles/km							
a. car	km	20	628,100	262,645	521,740	-	937,697
c. bus public transport	km	-	-	-	-	30,671	68,064
e. Other Specify - private bus	km	-	-	-	-	78,250	19,449
Upstream leased assets	USD	5,237	299,615	1,897,836	349,414	31,930	94,868
Downstream leased assets	USD	-	-	-	-	-	6,699,200

APPENDIX IV – NATURAL CAPITAL VALUATION

Natural capital can be defined as the world's stocks of natural resources which make human life possible. Organizations rely on this natural capital to produce goods and deliver services. They depend on natural non-renewable resources (for example, fossil fuels and minerals) as well as natural renewable ecosystem goods and services (for example, freshwater and pollination). Organizations also rely on natural capital for its ability to absorb by-products of production, such as pollution and waste. This ability is finite and has already shown its limits, with climate change caused by GHG emissions. The interrelationship between impacts and dependencies is described in the figure below.

Business extraction and production activities can damage natural capital with long term economic and social consequences, which are more often paid by those affected rather than those responsible. The cost of natural capital is impacting organizations directly and through their supply chains. Organizations that fail to adapt in a world of increasingly scarce but historically free resources will lose competitiveness as their value is realized through tighter regulation.

Trucost relies on over 1,000 environmental valuations identified in peer-reviewed journals, as well as government studies to estimate the global average valuation of the six key performance indicator (KPIs) – GHG emissions, air pollution, water use, land and water pollution, and land use changes.



NOTICE

Copyright © 2017 S&P Trucost Limited (“Trucost”), an affiliate of S&P Dow Jones Indices LLC. All rights reserved. Trucost and EBoard are trademarks of Trucost. Redistribution or reproduction in whole or in part is prohibited without written permission. This document does not constitute an offer of services in jurisdictions where Trucost and its affiliates do not have the necessary licenses. All information provided by Trucost is impersonal and not tailored to the needs of any person, entity or group of persons.

DISCLAIMER

Copyright © 2017 S&P Trucost Limited (“Trucost”), an affiliate of S&P Dow Jones Indices LLC. All rights reserved. Trucost and EBoard are trademarks of Trucost.

This document does not constitute an offer of services in jurisdictions where Trucost and its affiliates do not have the necessary licenses. Trucost is not an investment advisor, and Trucost makes no representation regarding the advisability of investing in any investment fund or other investment vehicle. A decision to invest in any investment fund or other investment vehicle should not be made in reliance on any of the statements set forth in this document. Prospective investors are advised to make an investment in any fund or other vehicle only after carefully considering the risks associated with investing in such funds, as detailed in an offering memorandum or similar document that is prepared by or on behalf of the issuer of the investment fund or other investment product or vehicle.

The materials have been prepared solely for informational purposes only based upon information generally available to the public from sources believed to be reliable. No content contained in these materials (including credit-related analyses and data, research, valuation, models, software or other application or output therefrom) or any part thereof (“Content”) may be modified reverse-engineered, reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of Trucost. The Content shall not be used for any unlawful or unauthorized purposes. Trucost and its third-party data providers and licensors (collectively “Trucost Parties”) do not guarantee the accuracy, completeness, timeliness or availability of the Content. Trucost Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON AN “AS IS” BASIS. TRUCOST PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT’S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall Trucost Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs) in connection with any use of the Content even if advised of the possibility of such damages.

The Content does not constitute or form part of any offer, invitation to sell, offer to subscribe for or to purchase any shares or other securities and must not be relied upon in connection with any contract relating to any such matter. ‘Trucost’ is the trading name of S&P Trucost Limited a limited company registered in England company number 3929223 whose registered office is at 20 Canada Square, London E14 5HL, UK.

CONFIDENTIALITY & COPYRIGHT

The information contained in this report is confidential and is submitted by Trucost on the understanding that it will be used only by your staff and consultants. Where consultants are [self] employed, the use of this information is restricted to use in relation to your business. In particular, the contents of this report may not be disclosed in whole or in part to any other party without the prior written consent of Trucost.