

GLOBAL 500 GREENHOUSE GASES PERFORMANCE 2010-2015

2016 REPORT ON TRENDS

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The authors would like to acknowledge the important contributions of Frank Schilder and Xin Shuai from Thomson Reuters Research & Development, Adam Baron from Thomson Reuters Content Analytics and Andre Chanavat from Thomson Reuters ESG. We would also like to thank the Resnick Sustainability Institute at Caltech for its ongoing consultation and insight while preparing this report.

INTRODUCTION

Are the 500 largest businesses in the world (Global 500) reducing their greenhouse gas (GHG) emissions at a rate that follows the global scientific consensus on the risks of climate change? As a group, they were not in our prior reports¹ covering performance from 2010 through 2013, and they are not now, according to the most recent data, current to the beginning of 2016.² However, the gap, or the difference, between actual performance and Intergovernmental Panel on Climate Change (IPCC) guidance is now improving slightly, offering some grounds for hope coming out of COP21.³

In addition to this updated gap analysis, this report will seek to engage with the Global 500 and their stakeholders by creating a new "sustainable growth view," which will provide insight into how companies are performing with respect to growing their businesses while at the same time reducing their emissions. This approach adopts the operating assumption coming out of COP21 that the world will and should continue to grow economically, but only by

decoupling that growth from GHG emissions and decreasing them in a manner consistent with warming less than 2° C. Finally, we will also provide an update on the latest planetary trends to put the private sector progress, or lack thereof, in a planetary frame of reference.

It is important to note that the underlying data landscape for GHG emissions is complex and dynamic. By reporting on recent greenhouse gas emissions trends using data reported by the companies themselves, this report seeks to catalyze engagement. We invite the business community and its stakeholders, be they customers, suppliers, employees, investors, local communities, governments or nongovernmental organizations (NGOs), to help find solutions to climate change through dialogue and inquiry. Rather than conclusive rankings or grades, the trends uncovered here represent opportunities to begin more detailed discussions around why an individual company is performing the way it is. We strongly encourage those inquiries.

Global 500 Greenhouse Gases Performance 2010-2013: 2014 Report http://thomsonreuters.com/content/dam/openweb/documents/pdf/corporate/Reports/global-500-greenhouse-gases-performance-trends-2010-2013.pdf

Carbon Pricing on the Horizon. From Volkswagen to Glencore to Shell: Carbon Risks Continue to Rise for the Global 500. http://reports.thomsonreuters.com/susty7/transparency/cost-avoiding-carbon-pricing

¹ Global 500 Greenhouse Gas Report: The Fossil Fuel Energy Sector http://thomsonreuters.com/content/dam/openweb/documents/pdf/corporate/Reports/ global-500-greenhouse-gas-report-fossil-fuel-energy-sector.pdf

² GHG data is reported by the companies themselves and is generally provided for a prior year's performance in an annual report. As such, the most current data available for some of the companies in this report is to the end of 2015, as reported in 2016 reports. As additional data is made available or estimates become possible, Thomson Reuters plans to continue to update this analysis.

³ United Nations Climate Change Conferences are yearly conferences held in the framework of the United Nations Framework Convention on Climate Change (UNFCCC). They serve as the formal meeting of the UNFCCC Parties (Conferences of the Parties, or COP) to assess progress in dealing with climate change and to establish legally binding obligations for developed countries to reduce their greenhouse gas emissions. https://en.wikipedia.org/wiki/United_Nations_Climate_Change_conference



ANALYSIS OF GLOBAL 500 GREENHOUSE GAS EMISSIONS

The world's 500 largest businesses collectively emitted over 5 gigatons (10% of global emissions) of $\rm CO_2e$ (carbon dioxide equivalents) through their operations and purchase of energy⁴ in the latest reported and estimated data. These businesses represent around 28% of global GDP and therefore reflect more broadly on how the broader economy is responding to the climate challenge.

For the Global 500 as a whole, greenhouse gas emissions increased by 1% from 2010 to the beginning of 2015, which is the latest date for which complete and comparable data is available. This differs from the 1.2 to 1.7% (median value 1.4%) average annual decrease between 2010 and 2050 required to have a likely chance of staying within a 2° C average increase in global temperature, as was set out in the 2013 UNEP Emissions Gap Report. In other words, the world's largest businesses' aggregated emissions increased when they should have decreased, with a consequent "gap" of 6.6% of emissions over the period from 2010 to 2014 (see Figure 1).

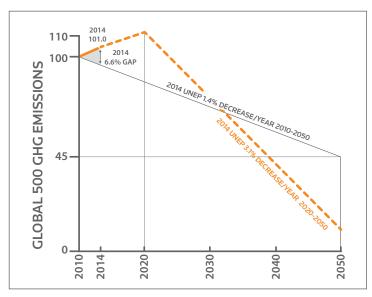


Figure 1. Global 500 GHG Emissions.

Note that as each year passes where emissions are not decreasing in line with science-based targets,⁷ we are increasing the rate at which we must eventually decline in order to stay within the 2° C scenario. One example scenario is represented by the sharply declining orange hashed line in Figure 1, corresponding to an approximate 3% required decline per year through 2050. This is a bit like saving for retirement. The longer you wait to start, the more severe the burden once you begin.

⁴ Scopes 1 & 2 aggregations with double counting included.

⁵ For this report's gap analysis, most recent reported figures were taken with over 80% falling in the four-year period 2010-2014 with a distribution as follows: reported figures FY2015 (52 companies), FY2014 (413 companies), FY2013 (32 companies), and FY2012 (1 company) compared to results four years previous to that: FY2011 (52 companies), FY2010 (413 companies), FY2009 (32 companies), and FY2008 (1 company). In other words, all companies' performance is for a four-year period.

⁶ http://www.unep.org/pdf/UNEPEmissionsGapReport2013.pdf

We recommend consulting WRI's Science Based Target Initiative for more detail on companies committing to such targets: http://www.wri.org/our-work/project/sciencebased-targets-initiative

GLOBAL 500 CORPORATIONS WITH GREATEST CHANGE IN GREENHOUSE GAS FOOTPRINT

Largest decreases

The emissions profile of the Global 500 varies significantly from one business to the next. Twenty-six businesses with a greenhouse gas footprint of over 10 million tons had emissions that decreased by more than 8% for the same time period. They are listed below in Figure 2, going from largest to smallest decreases, in percentage terms (indexed to 100 baseline year, whereby 100 = 0% decrease, 55 = 45% decrease, etc.). Again, it is important to use this list as a starting point for inquiry. What is driving the decrease? Divestiture?

USA

Innovation? Decline in business? On this last question, it can be instructive to look at whether businesses on the list below are also growing their top-line revenues over the same time period. Also instructive is to review whether these businesses are among the largest overall emitters, thereby obtaining a sense for the relative impact of the decrease. We explore the "sustainable growth view" and the top overall emitters in the last section of this report.

2014 versus 2010

CO, estimate

Reported

Estimated total

Scope 1 + Scope 2

Figure 2. Global 500 corporations with decreased emissions.

			emission in tons	Baseline 100	method
Company Name	Country	GCIS Sector	Estimated CO ₂ e MT	Index	Estimation method
SSE	United Kingdom	Utilities	14,323,000	55	Reported
Valero Energy Corporation	USA	Energy	18,187,684	57	CO2
Dominion Resources, Inc.	USA	Utilities	33,640,000	59	Reported
Surgutneftegas	Russia	Energy	144,871,000	61	Reported
Iberdrola SA	Spain	Utilities	31,749,649	69	Reported
Eni SpA	Italy	Energy	43,598,190	74	Reported
BP	United Kingdom	Energy	55,200,000	74	Reported
NextEra Energy, Inc.	USA	Utilities	39,559,896	76	Reported
E.ON SE	Germany	Utilities	101,800,000	77	Reported
Rio Tinto	United Kingdom	Materials	34,400,000	77	Reported
CEZ	Czech Republic	Utilities	28,776,000	77	Reported
EDF	France	Utilities	64,300,000	79	Reported
LyondellBasell Industries Cl A	Netherlands	Materials	19,000,000	79	Reported
Vale	Brazil	Materials	15,900,000	80	Reported
Exxon Mobil Corporation	USA	Energy	122,000,000	83	Reported
Chevron Corporation	USA	Energy	56,000,000	84	Reported
Total	France	Energy	48,100,000	84	Reported
Saint-Gobain	France	Industrials	15,800,000	84	Reported
The Southern Company	USA	Utilities	112,000,000	85	Reported
Duke Energy Corporation	USA	Utilities	137,555,000	86	Reported
BASFSE	Germany	Materials	22,361,000	87	Reported
Anglo American	United Kingdom	Materials	17,440,000	87	Reported
American Electric Power Company, Inc.	USA	Utilities	122,700,000	89	Reported
Lafarge S.A.	France	Materials	93,290,000	89	Reported
Sasol Limited	South Africa	Energy	67,484,000	90	Reported

Materials

"Twenty-six businesses with a greenhouse gas footprint of over 10 million tons had emissions that decreased by more than 8% for the same time period."

34,700,000

The Dow Chemical Company

Largest increases

NTPC Ltd

Conversely, of the Global 500 businesses with an annual greenhouse gas footprint of over 10 million tons, 29 businesses showed increases in greenhouse gas emissions of more than 8% over the most recently available four-year period. The largest increases in percent terms over this time period are listed below in Figure 3, ranked by largest percentage increase from a baseline of 100 that represents no

India

increase. Note that the reasons for increase can vary from rapidly growing a carbon-intensive business to acquiring a new carbonbased business over this time period. Whatever the reason, each company "owns" its own footprint and is responsible for managing it in line with global policy.

Figure 3. Global 500 corporations with increase	Estimated total Scope 1 + Scope 2 emission in tons	2014 versus 2010 Baseline 100	CO ₂ estimate method		
Company Name	Country	GCIS Sector	Estimated CO ₂ e MT	Index	Estimation method
Coal India	India	Energy	16,695,966	980	Energy
MMC Norilsk Nickel OSJC	Russia	Materials	51,955,941	480	Energy
Glencore Xstrata plc	Switzerland	Materials	36,567,000	326	Reported
Devon Energy Corporation	USA	Energy	13,970,234	248	CO2
Exelon Corporation	USA	Utilities	23,305,000	245	Reported
Rosneft	Russia	Energy	73,700,000	206	Reported
Canadian Natural Resources Limited	Canada	Energy	32,207,000	177	Reported
Linde AG	Germany	Materials	24,300,000	158	Reported
Oil & Natural Gas	India	Energy	12,960,000	157	Reported
Husky Energy Inc.	Canada	Energy	13,560,000	155	Reported
PTT	Thailand	Energy	34,182,568	144	Reported
Nippon Steel & Sumitomo Metal Corporation	Japan	Materials	96,000,000	137	Reported
Praxair, Inc.	USA	Materials	20,245,000	134	Reported
Petróleo Brasileiro SA - Petrobras	Brazil	Energy	80,800,000	132	Reported
Reliance Industries	India	Energy	26,858,749	130	Reported
CLP Holdings Limited	Hong Kong	Utilities	53,258,000	127	Reported
Air Liquide	France	Materials	22,974,000	126	Reported
POSCO	South Korea	Materials	89,154,000	124	Reported
Williams Companies, Inc.	USA	Energy	24,115,981	124	CO2
Woodside Petroleum	Australia	Energy	10,014,854	120	Reported
E.I. du Pont de Nemours and Company	USA	Materials	18,020,763	117	Reported
GDF Suez	France	Utilities	131,154,736	117	Reported
Air Products & Chemicals, Inc.	USA	Materials	27,450,000	116	Reported
Statoil ASA	Norway	Energy	16,600,000	115	Reported
Union Pacific Corporation	USA	Industrials	12,666,733	114	Reported
Siam Cement	Thailand	Materials	24,760,000	114	Reported
China Mobile	China	Telecommunication Services	13,110,000	111	Reported
Holcim Ltd	Switzerland	Materials	110,100,000	108	Reported
NTDCLLL		1.1.111.1	201 026 404	100	D

Utilities

"Of the Global 500 businesses with an annual greenhouse gas footprint of over 10 million tons, 29 businesses showed increases in greenhouse gas emissions of more than 8% over the most recently available four-year period."

108

Reported

201,036,494

GLOBAL 500 TOP 20 EMITTERS⁸

And finally, we arrive at the top 20 emitters in terms of most annual greenhouse gases emitted into the atmosphere in the latest year of the four-year period we examined (Figure 4). It should be kept in mind that these emission numbers include only direct and indirect emissions, and not scope 3 or supply/value chain emissions. When scope 3 emissions are included for many of the companies, emission numbers increase dramatically, to account, for example, for about 30% of global emissions from only 32 global fossil fuel companies.⁹

That said, it's important to put these companies in their social and economic context. Which important needs for energy are

being served? Is this a story about providing energy to places that previously have had no access to reliable electricity? How many lives have been positively affected by energy availability? A key question to ask of all these companies is whether they are providing their services while, at the same time, decreasing their greenhouse gas footprints in line with IPCC guidance. If the answer is "yes," then they are "running sustainably" in what is a fair definition of the term. The list is important therefore, not as a final determination for climate culpability, but rather as the place where it makes the most sense to start your inquiry on "sustainable growth."

2014 vareus 2010

CO estimate

Estimated total

Figure 4. Global 500 Top 20 emitters.

			Scope 1 + Scope 2 emission in tons	2014 versus 2010 Baseline 100	CO ₂ estimate method
Company Name	Country	GCIS Sector	Estimated CO ₂ e MT	Index	Estimation method
PETROCHINA Company Limited	China	Energy	325,974,176	108	Median
China Petroleum & Chemical Corporation	China	Energy	268,527,476	106	Median
NTPC Ltd	India	Utilities	201,036,494	108	Reported
Arcelor Mittal	Luxembourg	Materials	191,000,000	103	Reported
RWE AG	Germany	Utilities	158,000,000	93	Reported
Surgutneftegas	Russia	Energy	144,871,000	61	Reported
Duke Energy Corporation	USA	Utilities	137,555,000	86	Reported
GDF Suez	France	Utilities	131,154,736	117	Reported
American Electric Power Company, Inc.	USA	Utilities	122,700,000	89	Reported
Gazprom OAO	Russia	Energy	122,200,000	93	Reported
Exxon Mobil Corporation	USA	Energy	122,000,000	83	Reported
ENEL SpA	Italy	Utilities	116,116,000	100	Reported
The Southern Company	USA	Utilities	112,000,000	85	Reported
Holcim Ltd	Switzerland	Materials	110,100,000	108	Reported
E.ON SE	Germany	Utilities	101,800,000	77	Reported
Nippon Steel & Sumitomo Metal Corporation	Japan	Materials	96,000,000	137	Reported
Lafarge S.A.	France	Materials	93,290,000	89	Reported
POSCO	South Korea	Materials	89,154,000	124	Reported
Royal Dutch Shell	Netherlands	Energy	86,000,000	101	Reported
Petróleo Brasileiro SA - Petrobras	Brazil	Energy	80,800,000	132	Reported

Note that when a company has not reported its emissions, we use Thomson Reuters patented methodologies to estimate scope 1 and 2 using models that compare the nonreporting company with other similar companies; we strongly encourage all companies to report their data, and will replace an estimated value with a company-submitted figure that is qualitatively consistent with its peers.

"A key question to ask of all these companies is whether they are providing their services while, at the same time, decreasing their greenhouse gas footprints in line with IPCC guidance. If the answer is 'yes,' then they are 'running sustainably' in what is a fair definition of the term."

⁹ http://thomsonreuters.com/content/dam/openweb/documents/pdf/corporate/Reports/ global-500-greenhouse-gas-report-fossil-fuel-energy-sector.pdf

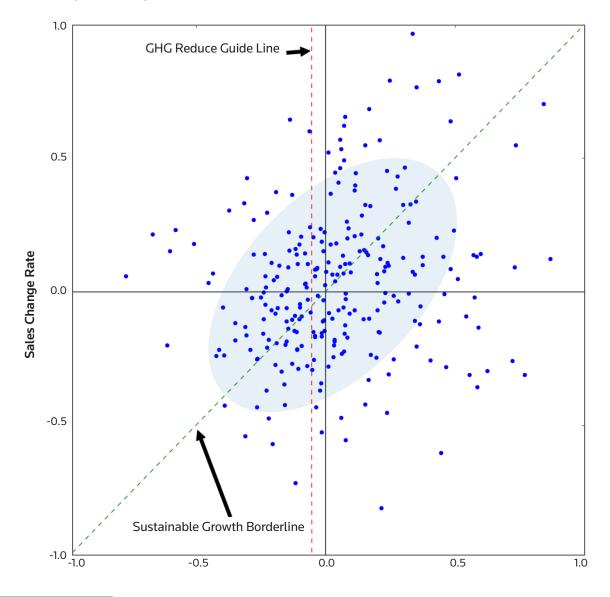
GLOBAL 500 REVENUE GROWTH COMPARED WITH GHG EMISSIONS GROWTH

In this last section of our report, we arrive at two different views of how the Global 500 is performing in terms of reducing its greenhouse gas footprint while running a business at the same time. The first scatter graph (Figure 5) represents a plot of the largest 300 emitters of the Global 500. All of the dots to the left of the "GHG Reduce Guide Line" represent companies that have reduced emissions over the four-year period examined in line with a 2° C decrease scenario (at least 1.4% per year). Additionally, all of the companies located above the slanted green line represent companies in which revenues are growing faster than emissions, suggesting decoupling of the two.

Two observations from this plot include:

- As indicated by the blue-shaded oval, there are more companies clustering slightly above the Sustainable Growth Borderline than below. In fact, Global 500 revenues as a whole grew by 5% compared with a growth rate in emissions of 1%, which suggests decoupling.¹⁰
- The data sets (including from our previous report) suggest that
 the decline in emissions growth is relatively recent (in the last two
 years), and it will be important to observe how the data points
 continue to migrate to the left as more years of data become
 available.

Figure 5. GHG emissions change rates of the largest 300 emitters of the Global 500.



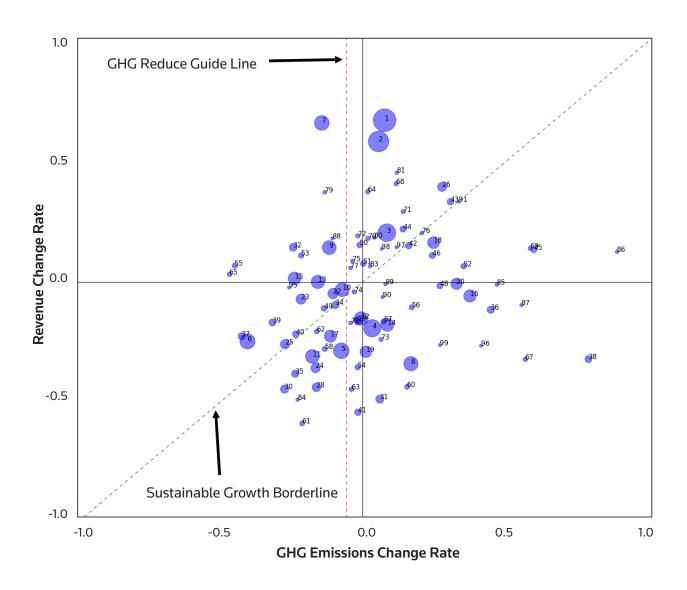
¹⁰ Both Figure 5 and Figure 6 exclude those points that are outside of the range of [-1, 1] in both x- and y-axis. Those points are considered "outliers;" the number of "outliers" is quite small compared to the whole data sets.

However, when we focus on the 100 companies with the largest GHG footprints (see list in Appendix 1) represented by the size of the datapoint in Figure 6,¹¹ the story is quite different. For this grouping, total revenues are decreasing by 7.5%, while total emissions are increasing by 1.1%. Similarly, a majority are also below the green Sustainable Growth Borderline, indicating emissions are growing faster than revenues (see Figure 6).

There are many possible interpretations of this data. Is this partially a reflection of the decline in fossil fuel prices (led by oil) and consequent impact on revenues (for those producing fossil fuels)?

Are these firms taking advantage of cheap energy to compete with each other at the expense of the environment? Are some of them demonstrating real leadership despite these factors? Do they operate in an intensive regulatory environment, or are they planning on growing their businesses in such an environment? Is important innovation happening in some of the companies that are moving most quickly towards the upper left? Perhaps most significantly, in which direction are these individual firms moving?

Figure 6. GHG emissions vs. revenue change rates for the 100 Global 500 companies with the largest GHG footprints.



 $^{^{11}}$ #1 corresponds to the largest emitter, #2 second largest, etc., as listed in Appendix 1.

CONCLUSION

All of the questions posed above are meant to be starting points for further inquiry. This data provides an additional catalyst for investors, regulators, consumers and stakeholders of all stripes to begin to ask key questions about the viability of a business going into a post-COP21 world. Above all else, we suggest asking three questions:

- 1. Are you operating your business, whatever it is, in a manner consistent with IPCC guidance on reducing emissions over time?
- 2. If the answer is "yes," then ask about the plan to keep doing so. Is it about technological innovation, divestment, business model transformation, etc.?
- 3. If the answer is "no," then ask if there is a plan to reconsider in light of steadily increasing transparency around performance and stakeholder scrutiny for business as usual. The planet is changing (see planetary status snapshot at right), and what will be your role in that change?



STATE OF THE CLIMATE 2016

CLIMATE CHANGE BY THE NUMBERS

Warmer winters. Out-of-season blooms and new birds in your backyard. Live coverage of the latest extreme weather event on CNN. Yet another "warmest year on record" globally.

There are many ways we observe and experience climate change. But climate change can seem like an abstract, hazy concept at times. What does the latest climate science tell us about the current state of earth's climate by the numbers?

400 ppm – global average atmospheric CO2 levels as of March 2015

22 to 44 cm IPCC projected sea level rise by 2100

2015 – warmest year on record globally since 1880

2014 – previous warmest year on record globally since 1880

15 of 16 warmest years on record globally have occurred since 2000

1 in 27 million odds that string of hottest years globally since 2000 occurred naturally

31 years – since the last cooler than average month globally in February 1985

40 years – since the last cooler than average year globally in 1976

+1C – global temperature rise as of 2015 vs. pre-industrial time

+2C - 2015 Paris COP goal for limiting global temperature rise by 2100

94% of glaciers losing ice worldwide

12% per decade – rate of Arctic Sea ice decline

Contributed by Minnesota Public Radio Chief Meteorologist Paul Huttner, http://www.theguardian.com/environment/climate-consensus-97-per-cent/2014/aug/21/scientist-in-focus-meteorologist-paul-huttner

Like the transition to a less carbon-intensive economy, this type of reporting is a work in progress. We will continue to provide updated guidance using this type of methodology, which will only improve as more data becomes available and additional views become possible. In the meantime, we invite your engagement. Begin your inquiry, keeping in mind that many of these companies have and can continue to play a crucial role in our collective prosperity as long as they demonstrate how they contribute to an ever lower carbon economy.

Appendix 1. Companies ranked in order of size of GHG footprint (Scope 1 & 2).

1	PETROCHINA Company Limited	26 CLP Holdings Limited	52 Praxair, Inc.	77 Spectra Energy Corp
2	China Petroleum & Chemical	27 MMC Norilsk Nickel OSJC	53 LyondellBasell Industries Cl A	78 Freeport-McMoRan Copper & Gold Inc.
	Corporation	28 Total	54 Suncor Energy Inc.	
3	NTPC Ltd	29 BHP Billiton	55 Valero Energy Corporation	79 Samsung Electronics
4	Arcelor Mittal	30 Eni SpA	56 E.I. du Pont de Nemours and	80 AT&T Inc.
5	RWE AG	31 Endesa	Company	81 Volkswagen AG
6	Surgutneftegas	32 NextEra Energy, Inc.	57 Occidental Petroleum Corporation	82 Halliburton Company
7	Duke Energy Corporation	33 Glencore Xstrata plc	58 Anglo American	83 Bayer AG
8	GDF Suez	34 The Dow Chemical Company	59 Coal India	84 Apache Corporation
9	American Electric Power Company, Inc.	35 Rio Tinto	60 Statoil ASA	85 LG Chem
10	Gazprom OAO	36 PTT	61 Vale	86 General Motors Company
	·	37 Dominion Resources, Inc.	62 Saint-Gobain	87 Astra International
11	Exxon Mobil Corporation	38 Canadian Natural Resources		88 BG Group
12	ENEL SpA	Limited	63 Repsol	89 Toyota Motor Corporation
13	The Southern Company	39 Iberdrola SA	64 FedEx Corporation	90 Nestlé
14	Holcim Ltd	40 CEZ	65 SSE	91 Ecopetrol Sa
15	E.ON SE	41 ConocoPhillips	66 Devon Energy Corporation	92 Honeywell International Inc.
16	Nippon Steel & Sumitomo Metal Corporation	42 Air Products & Chemicals, Inc.	67 Husky Energy Inc.	93 Grupo Mexico S.A.B. de CV
17	Lafarge S.A.	43 Reliance Industries	68 China Mobile	94 Anadarko Petroleum
18	POSCO	44 Siam Cement	69 Oil & Natural Gas	Corporation
19	Royal Dutch Shell	45 Linde AG	70 UPS	95 National Grid
20	Petróleo Brasileiro SA – Petrobras	46 Williams Companies, Inc.	71 Union Pacific Corporation	96 Cenovus Energy Inc.
21	Rosneft	47 Exelon Corporation	72 TransCanada Corporation	97 3M Company
22	Sasol Limited	58 Air Liquide	73 Imperial Oil	98 Formosa Petrochemical
23	EDF	49 BASF SE	74 Potash Corporation of Saskatchewan Inc.	99 EOG Resources, Inc.
		50 Wal-Mart Stores, Inc.		100 Taiwan Semiconductor
24	Chevron Corporation	51 Gas Natural SDG SA	75 Carnival Corporation 76 Woodside Petroleum	Manufacturing
25	BP	JI Gas Naturat 3DO 3A	76 Woodside Petroleum	

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