



The CalPERS Portfolio and Fossil Fuel Reserve-related CO₂ Emissions 2004-2013

September 2014



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Introduction

Fossil Free IndexesSM tracks reported coal, oil and gas reserves held by public companies and calculates the reserves' potential carbon dioxide emissions. Reserves are the fossil fuels that companies have identified through exploration but have not yet extracted from the ground. The public companies are ranked based on the potential emissions from reserves with the 100 largest public coal companies globally, and the 100 largest public oil and gas companies globally comprising The Carbon Underground 200TM.

Based on the Intergovernmental Panel on Climate Change 2014 report and Fossil Free Indexes' research, reported reserves of the 200 public companies included in the Carbon Underground 200 at year end 2013 contain more than four times their allocated share of the carbon or CO₂ emissions budget that can be released into the atmosphere and still meet the goal of keeping global warming under 2° Celsius.¹ As a consequence, these firms are drawing increased attention from investors either in the context of divestment, shareholder activism, enhanced disclosure, or the risk of underperformance.

California Public Employees' Retirement System (CalPERS), an investment leader, is the nation's largest pension fund, at \$300 billion dollars. The size and influence of their fund makes this portfolio a desirable choice for study.

This report identifies and analyzes the publicly disclosed domestic (U.S.) and international equity and long term debt investments held by CalPERS in the Carbon Underground 200 at four points in time, June 30th 2013, June 30th 2010, June 30th 2007, and June 30th 2004. Each CalPERS position was allocated a portion of the issuer's total reserves-related potential CO₂ emissions using two different methodologies for financial firms to assess the carbon content of their portfolio holdings. We refer to these allocated emissions in this paper as "financed emissions" for convenience, recognizing the term is most often used to refer to emissions associated with far more than a firm's reported reserves.² Carbon emission potential was allocated by security position and aggregated by company. One methodology allocated potential emissions from reported reserves across both CalPERS debt and equity holdings, while the second allocated emissions from reported reserves solely based on CalPERS equity holdings. All "financed emissions" numbers reported in the text are based on the methodology allocating to both equity and debt holdings, the equity only methodology is only reported in footnotes and tables.

The level, trend and concentration, of the Carbon Underground positions, carbon emissions potential, and, to a limited degree for oil and gas, the underlying reserve characteristics are tracked over time.

Fossil Free Indexes did not undertake a detailed risk analysis of the individual holdings, which was beyond the scope of this research. However, in some cases the ratio of market value to book value of CalPERS equity and debt positions has been used to evidence areas of current stress in the coal portfolio. Further, two illustrations of potential approaches that could be used to supplement the analysis of the Carbon Underground holdings are presented - a proposed proprietary risk screening methodology and an example of using project-specific data to identify and assess higher risk capex investment.

This report does not assess the risk or return contribution of the fossil fuel companies held in the CalPERS portfolio, nor how the performance of the portfolio would have been impacted had CalPERS chosen to divest from fossil fuel companies during the previous decade. However, the report may serve as a cornerstone to better understand and assess both the role of CalPERS in financing reserves and reserve-based potential CO₂ emissions, and to prioritize action related to that financing both in terms of portfolio performance and in the context of climate risk.

Summary Findings

- CalPERS provides significant funding to the Carbon Underground 200 (CU200). Overall, CalPERS investments in the CU200 increased by all measures from June 30th, 2004 to June 30th, 2013.
- Fossil fuel reserve related CO₂ emissions from CalPERS debt and equity holdings in the CU200 grew to .5829 Gt CO₂ from .3016 Gt CO₂ over the time frame. The number of CU200 companies held grew to 149 from 90. Both the book value and market value of holdings grew as well, to \$10.64 billion, and \$10.59 billion from \$4.47 billion and \$7.07 billion respectively. The market value of the CU200 investments represented 7.3% of CalPERS equity and corporate debt portfolio in 2013, up from 5.9% in 2004.
- The emissions intensity of CalPERS holdings of CU200 companies increased as well rising 29% over the time reviewed, measured as potential carbon emissions financed by dollar of CU200 investment held, based on market value.
- Financed emissions related to reported reserves are overwhelmingly from equity holdings. Debt holdings accounted for just 6% of total emissions allocations to CalPERS in 2013.
- CalPERS CU200 holdings are increasingly international, resulting in a shift in financed CO₂ emissions. In 2013, the financed CO₂ emissions in the international coal portfolio are approximately 4 times those of the domestic holdings.
- CalPERS financed emissions in oil and gas reserves rose 67% from 2004 to 2013, reaching .2389 GtCO₂ of potential emissions in 2013. Reported reserves by the Carbon Underground 100 Oil and Gas companies expanded 18% over this same time period.
- If CalPERS directly held the fossil fuel reserves allocated to its 2013 equity and debt investments in the Carbon Underground Oil and Gas 100, it would rank #55 on the CU Oil and Gas 100 list, comparable to WPX Energy's level of reported reserves.
- The financed CO₂ emissions of CalPERS CU oil and gas portfolio is highly concentrated. Half of CalPERS CO₂ emissions are derived from 4 equity positions, while 80% is in 16 positions.
- CalPERS financed emissions in coal roughly doubled between 2004 and 2013, at higher levels than oil and gas, reaching .3440 Gt CO₂ of potential emissions in 2013.
- Financed emissions from the coal portfolio increased meaningfully from 2010 to 2013, and now account for the majority of financed emissions.
- If CalPERS directly held the coal reserves allocated to its 2013 equity and debt investments in the Carbon Underground Coal 100, it would rank at #88 on the list, between global coal mining companies Shanxi Lanhua and Fortune Minerals.
- The CalPERS portfolio showed significant declines in reported market value relative to book value in coal holdings between 2010 and 2013, with the erosion to below book highly concentrated in 9 holdings. Vulnerability in the coal sector persists, despite the deterioration which has already occurred.
- A partial review of the Carbon Underground company holdings from a risk perspective reveals a wide range of potential vulnerability to low carbon scenarios, suggesting at least a strong need for enhanced disclosure and stress testing for these portfolios.

Methodology

The Carbon Underground 200™

This report is based on the most recent public update of The Carbon Underground 200, which identified the top 200 public fossil fuel companies globally ranked by the carbon content of reported reserves, based on reserves as of November 28, 2013.

Fossil Free Indexes has used a reserves-based methodology to create The Carbon Underground 200, a listing of the top 100 public coal companies globally and the top 100 public oil and gas companies globally, ranked by the potential carbon emissions content of their reported reserves. This approach is largely consistent with the methodology reported to be the basis of the original list published by the Carbon Tracker Initiative in 2011 and used by the 350.org fossil fuel divestment campaign when it was launched in November 2012.

The core data underlying The Carbon Underground 200 is based on reported reserves. For coal, SNL Metals & Mining with its Raw Materials Data Coal Database was selected as the primary provider of reserves information. For oil and gas, Evaluate Energy with its Global Oil & Gas Database and CANOILS Database was selected as the primary provider of reserves information. In each case, data from these primary providers were checked against and in some cases supplemented during the analysis with data from publicly available primary sources and from other secondary data providers. The primary use of supplemental data was to provide support for estimating the kind of coal predominating in a mine.

Potential CO₂ emissions for reserves reported by each company are calculated based on the IPCC framework and the Potsdam Institute for Climate Impact Research formula $E = R \times V \times C \times F$, where E = emissions, R is reserves, V is net calorific value, C is carbon content. F is a conversion factor accounting for transforming carbon into carbon dioxide and converting grams to gigatons.

Identifying CalPERS CU 200 Holdings

For the identification of CalPERS equity and debt holdings in the top 200 public fossil fuel companies globally, Fossil Free Indexes used CalPERS Annual Investment Report as presented on the CalPERS website (calpers.ca.gov) screened against the Carbon Underground 200 as determined by FFI's research. Four years were reviewed for both, 2004, 2007, 2010, and 2013. The CalPERS Annual Investment Reports were presented as of June 30th for each year. The Carbon Underground 200 list was determined as of the year-end for 2004, 2007, 2010, and November 28 for 2013.

These same sources were used in the identification of trends in the nature of the fossil fuel holdings, rankings of the fossil fuel holdings, % of portfolio represented, and market value to book value comparisons.

From CU200 Holdings to CO₂ emissions embedded in reserves

Carbon emissions embedded in each of the holding's reported reserves were allocated to CalPERS based on the magnitude of CalPERS' holdings using two different methods, both variations of the "Financed Emissions" approach. One approach allocates carbon emissions based on both debt and equity positions. The second approach allocates the carbon emissions based solely on CalPERS equity positions. Both are based on the general principal that CalPERS allocation of the potential carbon emissions of each company held in their equity and debt portfolios, should be based on CalPERS respective proportional share of the equity or the equity and debt of the investee.

Although there is no definitive agreement about how to best calculate the carbon allocation for each holding within an investment portfolio, the approach incorporating both debt and equity has been used by a number of organizations with several financial institutions including these calculations in their regulatory filings.³ The second approach allocates carbon emissions solely based on CalPERS proportional share of equity outstanding. The methodologies produce slightly different results for CalPERS primarily due to CalPERS relatively modest share of debt financing to the CU 200, which moderates the emissions allocations.

In the world of greenhouse gas emissions accounting, the denominator for this type of calculation is generally Enterprise Value. As a proxy for Enterprise Value in the calculation looking at both equity and debt the summation of the current and long term portion of long term debt (debt issues) and market capitalization (outstanding shares * market price) was used. This calculation should be considered indicative only, as fiscal year ends vary amongst companies, accounting standards are not globally consistent, and the share class represented for the holdings in the CalPERS portfolios was not disclosed. As pricing is such that there should be no arbitrage in the global markets, it was determined that the share price was considered indicative. The proxy for Enterprise Value in the second allocation methodology was simply market capitalization.

To determine the overall fossil fuel firm percent allocation of potential carbon emissions to equity and to debt the calculations were as follows:

$(\text{market cap})/(\text{fossil fuel firm value}) = \% \text{ fossil fuel firm allocation to equity}$

$(\text{total long term debt})/(\text{fossil fuel firm value}) = \% \text{ fossil fuel firm allocation to debt}$

The total potential carbon emissions for the fossil fuel firm were split among debt and equity based on the percentages determined above.

For the equity only approach 100% of potential carbon emissions was allocated to equity.

These results are indicative only as the inputs and calculations were not precise in terms of detailed determination of enterprise value, aligning year-end timeframes, and detailed research of historical share prices.

Market Value/Book Value

Fossil Free Indexes did not conduct an analysis of the profit or loss contribution of the fossil fuel portfolios as that was beyond the scope of the project and publicly available information was insufficient to perform the analysis. However, the relative market value and book value of the CalPERS coal sector holdings for the time period (2004, 2007, 2010, 2013) were reviewed and used primarily to highlight the evident stress in the coal portfolio.

In order to illustrate the relative size of CU200 holdings as compared to CalPERS holdings generally, the CU200 holdings or a subset of those holdings are compared throughout this document to the "CalPERS Total Portfolio". The CalPERS Total Portfolio refers only to the asset classes screened against CU200 companies: domestic equity, international equity, corporate bond and international fixed income. Cash Equivalents, Real Estate Programs and Private Equity holdings are not included in this research. Within the Debt Securities category, Asset-Backed Securities, Sovereign Bonds, U.S. Treasuries & Agencies, Mortgage Loans, Derivatives and Mortgage-Backed Securities were not considered.

Data & Sources Used in CalPERS Review

Data	Source
CalPERS Investments by Asset Class	CalPERS Annual Investment Report for the years 2013, 2010, 2007 & 2004 as presented on the CalPERS website (calpers.ca.gov)
Potential CO ₂ emissions for Reported Reserves Held by Carbon Underground 200 companies	The Carbon Underground 200, Fossil Free Indexes
Equity Shares Outstanding, Current and Long Term Portions of Outstanding Debt	Audited Annual Reports supplemented by public regulatory filings
Equity share price 12/31/13 (oil and gas companies)	Google Finance, CalPERS market value/CalPERS shares held
Equity share price other years	CalPERS market value / CalPERS shares held

EXHIBIT 1

Portfolio CO₂ and Trends - Summary

Total CalPERS Portfolio Carbon Underground Investments⁴

Year	Total CalPERS Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU200 Book Value (\$Mil)	Invested CU200 Market Value (\$Mil)	Invested CU200 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (G)	Allocated Equity 100% CO ₂ (Gt)
2004	\$118,829.57	90	\$4,466.60	\$7,068.84	5.9%	0.3016	0.3545
2007	\$219,335.74	110	\$7,329.17	\$12,618.57	5.8%	0.3997	0.4813
2010	\$110,757.70	142	\$8,407.65	\$8,642.92	7.8%	0.4610	0.7104
2013	\$145,057.69	149	\$10,642.13	\$10,586.00	7.3%	0.5829	0.9516

EXHIBIT 2

CalPERS Carbon Underground 200 Investments 2013
Financed Emissions by Invested Company Headquarters

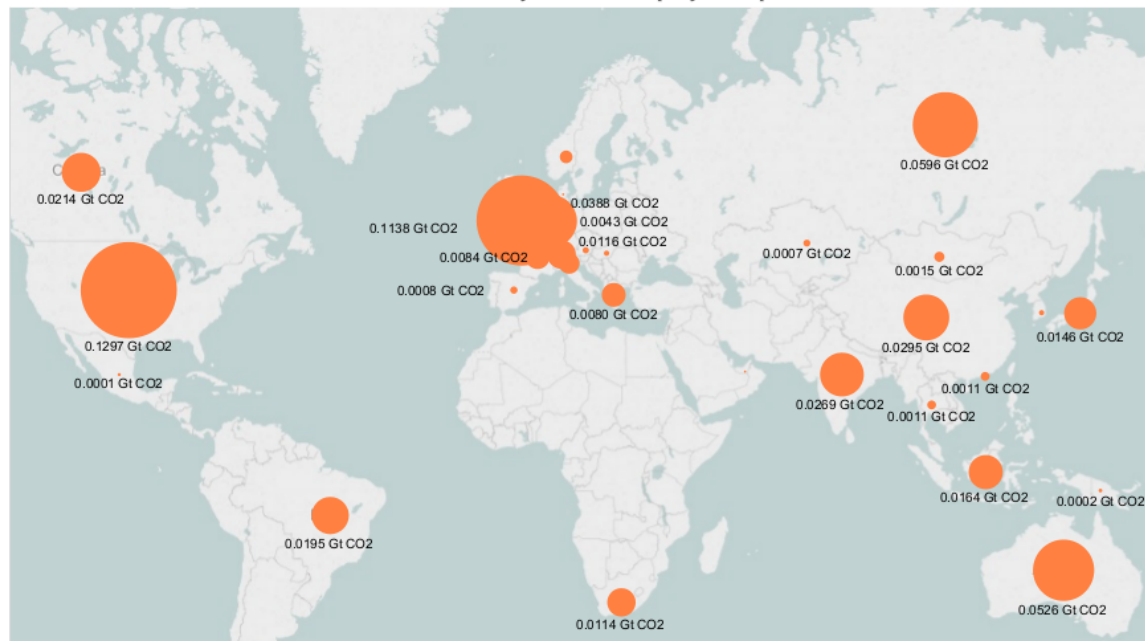


EXHIBIT 3

CalPERS investments in the Carbon Underground 200 increased from 2004 to 2013 across all metrics. The number of Carbon Underground companies held in the CalPERS portfolio grew to 149 from 90 over that time frame. Both the book value and market value of CU 200 investment increased to \$10.64 billion and \$10.59 billion from \$4.47 billion and \$7.07 billion respectively. As a consequence of both increasing investment and the increase in underlying fossil fuel reserves that occurred over the same time frame, CalPERS financed potential CO₂ emissions from reported reserves in their holdings nearly doubled, growing to .5829 GtCO₂ in 2013 from .3016 GtCO₂ in 2004.⁵

CalPERS Carbon Underground Investments & Financed Emissions

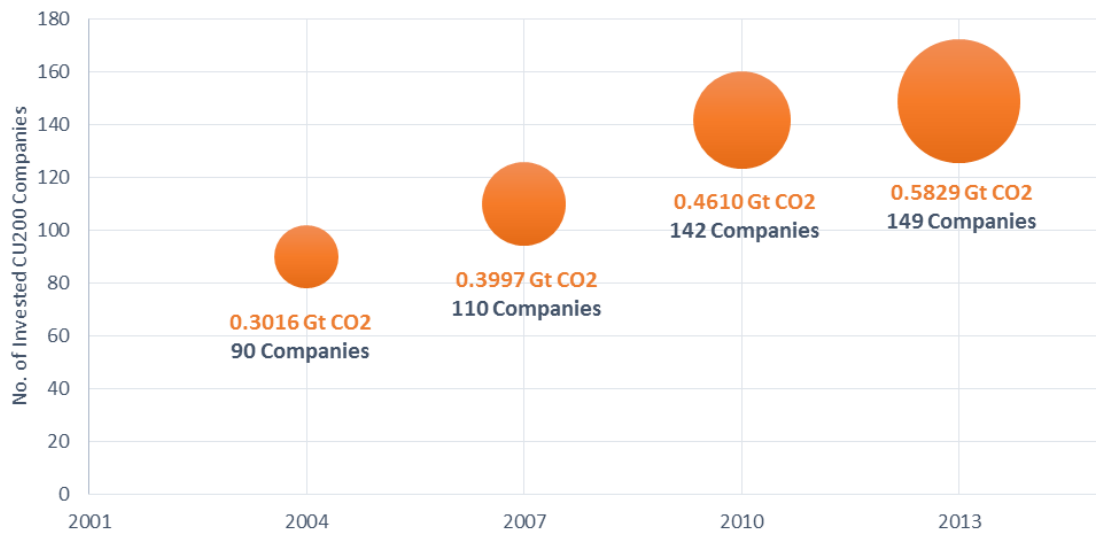


EXHIBIT 4

CalPERS Carbon Underground Market Value & Financed Emissions

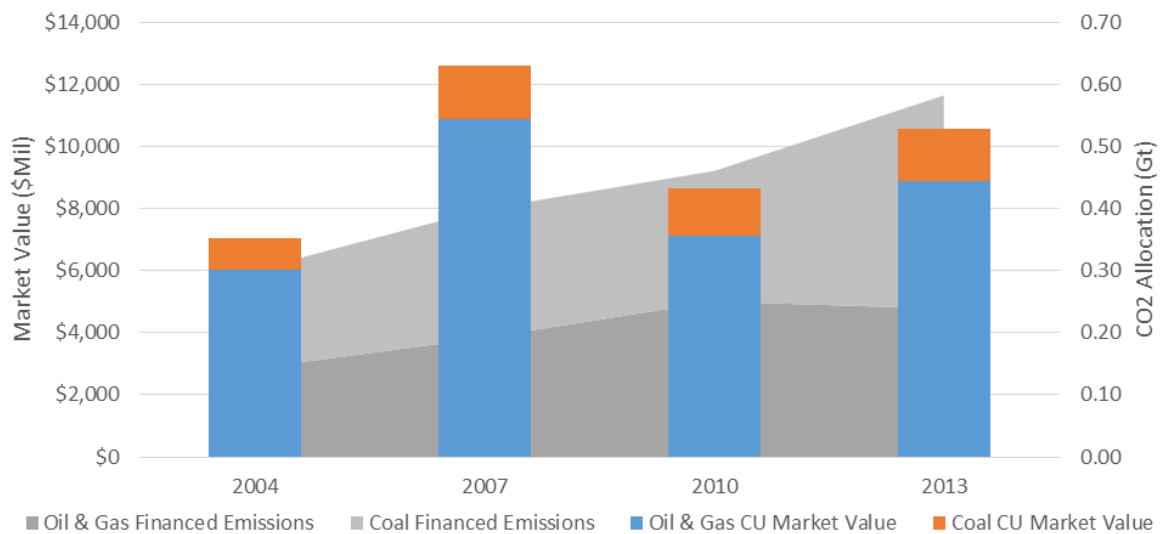


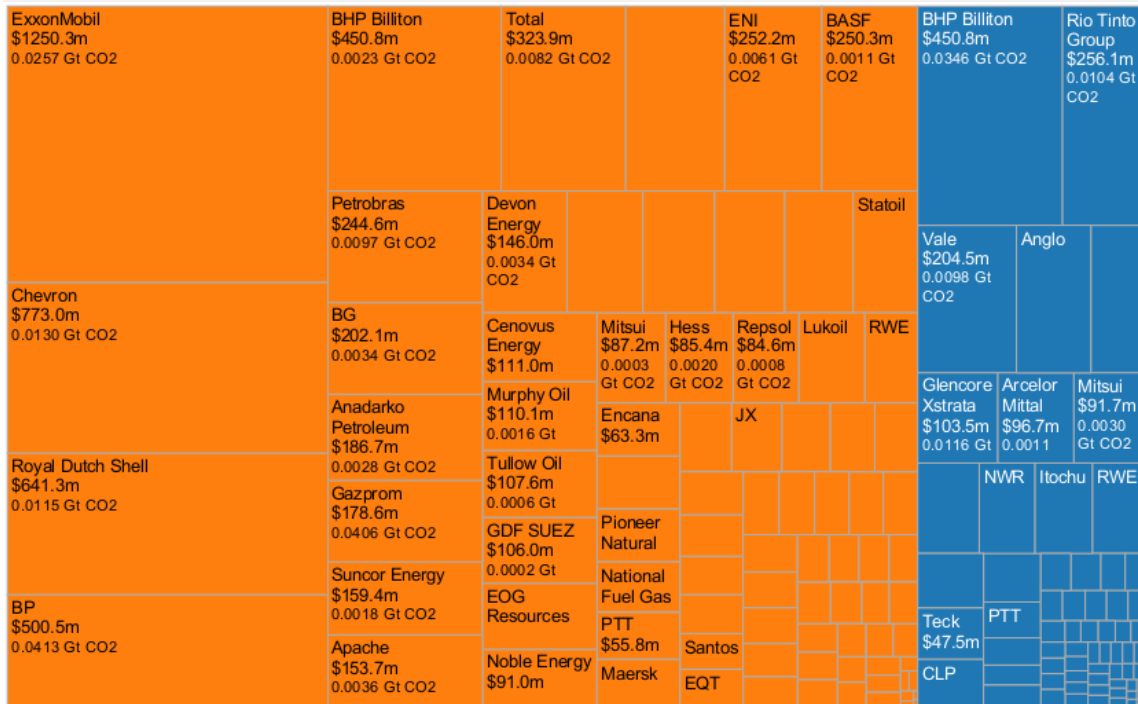
EXHIBIT 5

CalPERS holdings in the Carbon Underground represent 7.3% of CalPERS total portfolio at June 30th, 2013, based on market values, up from 5.9% in 2004.

Another way of looking at the trend is to look at “emissions intensity” measured as CO₂ emissions per dollar (market value) of CU200 investments held. For the total CalPERS portfolio, the potential emissions content per dollar has increased 29% from 2004 to 2013, indicating that over the time period studied CalPERS fossil fuel portfolio has grown more emissions intensive.

The emissions intensity is, on average, slightly higher than 4.5 times greater for coal investments than for oil and gas. While carbon intensity calculations are based on the market value of holdings, and thus influenced by changes in stock prices, the significant difference between carbon intensity of coal and oil and gas holdings evidence the significant potential to reduce the financing of potential emissions per dollar of investment in the coal portfolio.

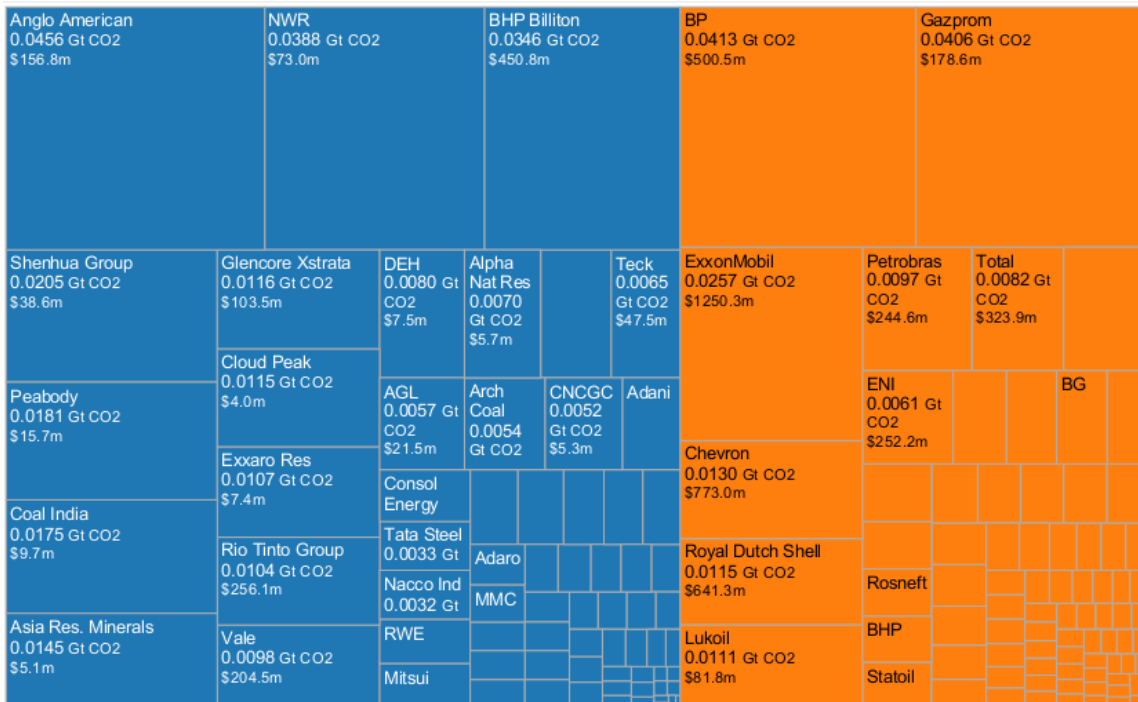
CalPERS Carbon Underground 2013 Investments Ranked by Market Value



Cu200
 Coal
 Oil & Gas

EXHIBIT 6

CalPERS Carbon Underground 2013 Investments Ranked by Financed Emissions



Cu200
 Coal
 Oil & Gas

EXHIBIT 7

CALPERS equity holdings in the CU 200 have consistently exceeded its debt holdings by factors of 5 to 10, and consequently nearly all financed emissions are derived from equity holdings. Still, CALPERS has steadily increased its CU 200 debt holdings from 2.6% of total corporate debt to 6.5% of corporate debt over the 10 years reviewed, while CU equity holdings concentration has moderated some to 7.4% of total equity holdings in 2013, all based on market values.

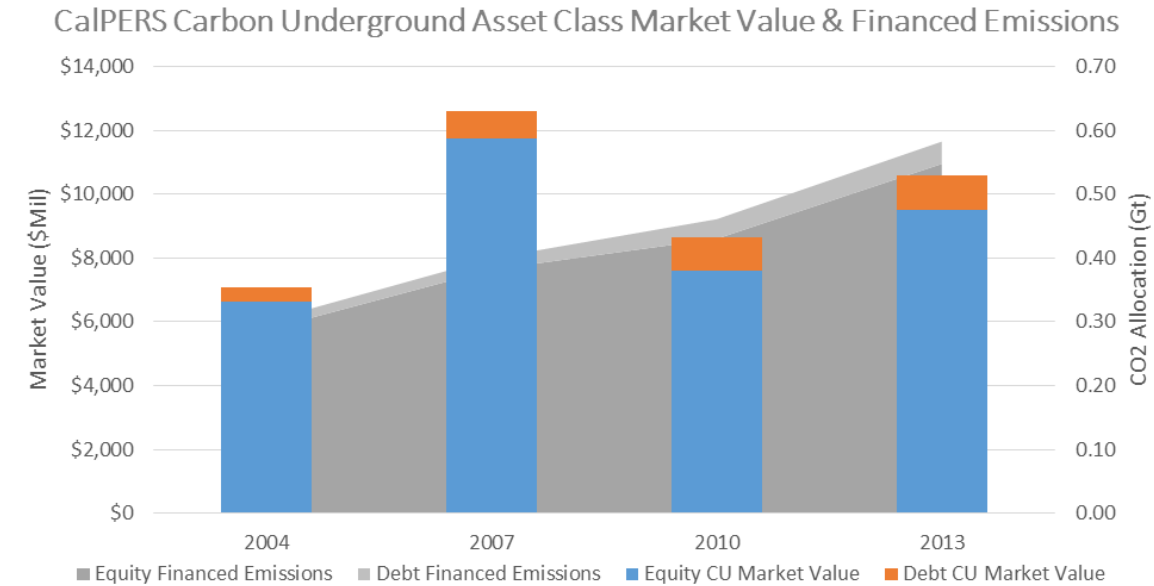


EXHIBIT 8

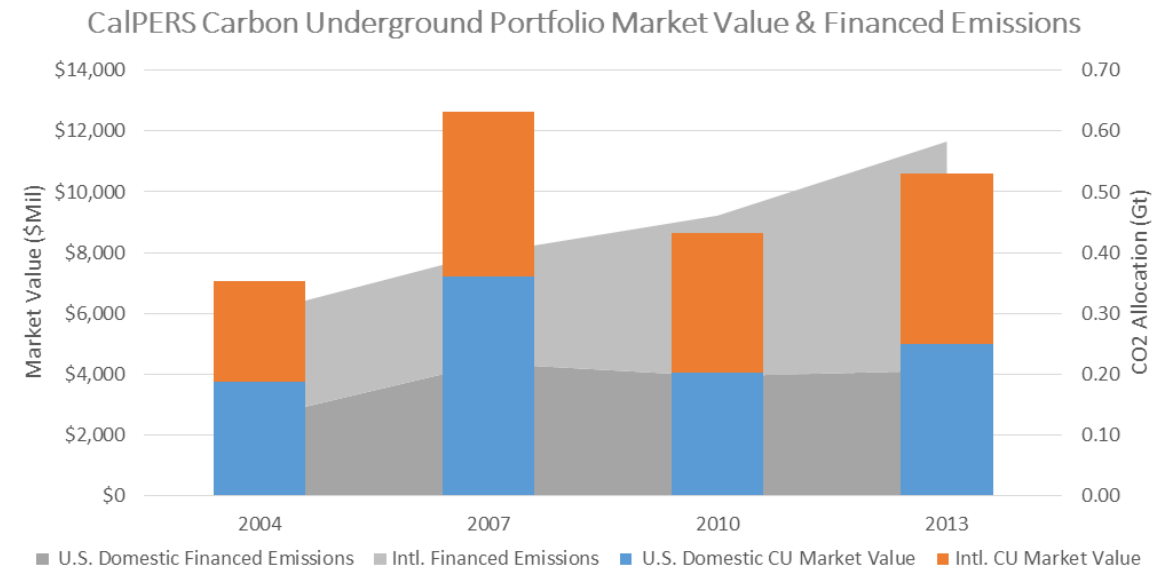


EXHIBIT 9

Consistent with the shifting mix of CALPERS overall equity portfolio over the 10 years reviewed, CALPERS holdings of the CU 200 have shifted from a tilt toward domestic investment based on the market value of holdings to a slightly greater allocation to international investment. The allocation based on book value evidences a more decided shift toward international holdings. This has resulted in a greater overall concentration in CU holdings in the international portfolio, and a shift in financed emissions. In 2013, international CU 200 holdings represented 8.2% of international holdings, while domestic CU holdings of the CU 200 were 6.5% of domestic holdings. Financed emissions has shifted from domestic to international, and 2013 financed emissions from international holdings were close to double that from domestic holdings.

CalPERS Total Carbon Underground Investments by Asset Class

Year - Asset Class - Total Portfolio	Total CalPERS Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU200 Book Value (\$Mil)	Invested CU200 Market Value (\$Mil)	Invested CU200 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
2004							
Equity	\$102,504.47	89	\$4,050.79	\$6,638.05	6.5%	0.2878	0.3545
Debt	\$16,325.11	22	\$415.82	\$430.78	2.6%	0.0139	
2004 Total	\$118,829.57	90	\$4,466.60	\$7,068.84	5.9%	0.3016	0.3545
2007							
Equity	\$201,494.62	109	\$6,426.73	\$11,732.87	5.8%	0.3821	0.4813
Debt	\$17,841.12	25	\$902.45	\$885.70	5.0%	0.0176	
2007 Total	\$219,335.74	110	\$7,329.17	\$12,618.57	5.8%	0.3997	0.4813
2010							
Equity	\$91,734.13	141	\$7,588.94	\$7,606.08	8.3%	0.4304	0.7104
Debt	\$19,023.57	41	\$818.71	\$1,036.84	5.5%	0.0306	
2010 Total	\$110,757.70	142	\$8,407.65	\$8,642.92	7.8%	0.4610	0.7104
2013							
Equity	\$128,326.34	146	\$9,532.23	\$9,499.66	7.4%	0.5478	0.9516
Debt	\$16,731.35	48	\$1,109.89	\$1,086.34	6.5%	0.0350	
2013 Total	\$145,057.69	149	\$10,642.13	\$10,586.00	7.3%	0.5829	0.9516

EXHIBIT 10

CalPERS Total Carbon Underground Investments by Portfolio

Year - Asset Class - Total Portfolio	Total CalPERS Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU200 Book Value (\$Mil)	Invested CU200 Market Value (\$Mil)	Invested CU200 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
2004							
Domestic	\$79,437.21	52	\$1,950.50	\$3,767.45	4.7%	0.1289	0.1350
International	\$39,392.36	41	\$2,516.11	\$3,301.38	8.4%	0.1727	0.2195
2004 Total	\$118,829.57	90	\$4,466.60	\$7,068.84	5.9%	0.3016	0.3545
2007							
Domestic	\$115,435.18	64	\$3,465.39	\$7,230.10	6.3%	0.2182	0.2386
International	\$103,900.56	54	\$3,863.79	\$5,388.47	5.2%	0.1815	0.2427
2007 Total	\$219,335.74	110	\$7,329.17	\$12,618.57	5.8%	0.3997	0.4813
2010							
Domestic	\$59,997.21	83	\$2,721.95	\$4,037.97	6.7%	0.1970	0.2069
International	\$50,760.48	76	\$5,685.71	\$4,604.95	9.1%	0.2640	0.5035
2010 Total	\$110,757.70	142	\$8,407.65	\$8,642.92	7.8%	0.4610	0.7104
2013							
Domestic	\$77,488.25	76	\$3,740.37	\$5,013.23	6.5%	0.2067	0.2696
International	\$67,569.44	90	\$6,901.76	\$5,572.77	8.2%	0.3761	0.6821
2013 Total	\$145,057.69	149	\$10,642.13	\$10,586.00	7.3%	0.5829	0.9516

EXHIBIT 11

Oil and Gas

The Current View

The CalPERS portfolios of domestic and international equities and domestic and international corporate bonds was reviewed for the years 2004, 2007, 2010 and 2013, and the holdings were compared against The Carbon Underground 200 for the same years.

Based on an allocation of emissions to CalPERS debt and equity holdings the 2013 CalPERS portfolio finances 0.2389 GtCO₂ of potential emissions from the reported reserves of oil and gas companies. As a point of reference, if CalPERS directly held the fossil fuel reserves associated with the 2013 investments considered here, it would rank #55 on the Carbon Underground Oil and Gas list, a position held in the April 2014 CU200 update by WPX Energy.⁶ The potential CO₂ emissions are comparable to WPX's current reported reserves of 210 million barrels of crude oil/natural gas liquids and 3459 billion cubic feet of natural gas. In terms of US consumption of petroleum products nationally, it's just over 35 days supply (based on the EIA's 2013 consumption rate of 18.9 mln bbl / day).

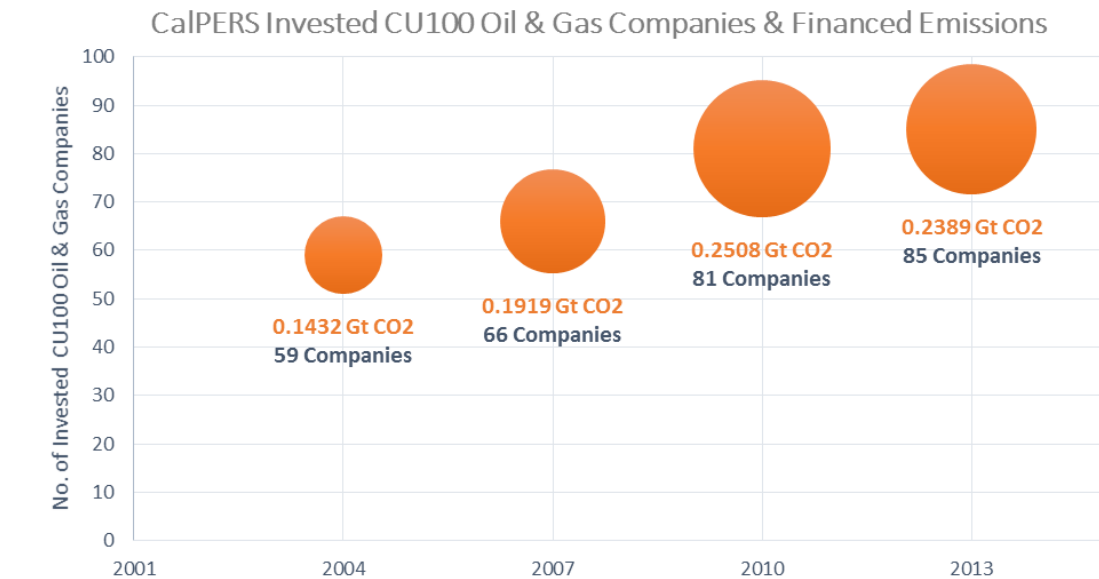


EXHIBIT 12

CalPERS Carbon Underground Oil & Gas Investments 2013
Financed Emissions by Invested Company Headquarters



EXHIBIT 13

The median holding analyzed (ranked by financed CO₂) is a position in Cabot Oil and Gas Corporation from the domestic equities portfolio at June 30th, 2013. CalPERS held 533,735 shares for a market value of \$37,905,894. For illustrative purposes the oil and gas reserves financed by this single position on a firm value basis, if extracted and burnt, will emit about the same amount of CO₂ as driving an average US car 500 million miles or 20,000 times around the earth.

CalPERS Carbon Underground Oil & Gas 100 Investments
Asset Class Market Value & Financed Emissions

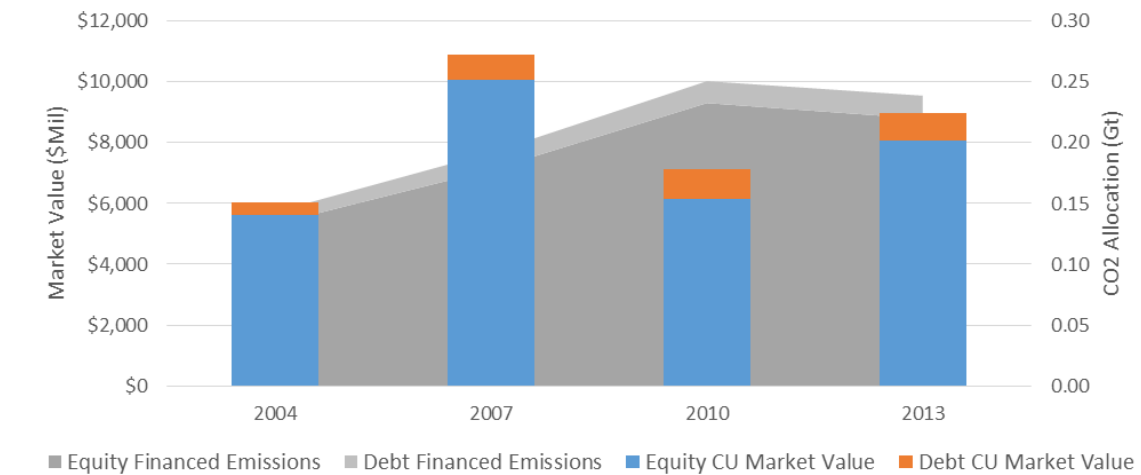


EXHIBIT 14

Domestic equities (both domestic companies and domestically listed ADRs) account for the largest portion of 2013 financed CO₂ (52% of total potential emissions), followed by international equities at 40%. Corporate debt accounts for 8% and international fixed income sums up to considerably less than one percent. Across all asset classes, CalPERS held 169 financial instruments issued by 85 of the 100 Carbon Underground Oil and Gas companies as of June 30th, 2013.

Half of the CalPERS portfolio financed CO₂ is represented by four equity positions: Gazprom (ADR), ExxonMobil and Chevron in the domestic holdings and BP in the international. Looking across all asset classes considered, sixteen issuers represent 80% of the portfolio's financed CO₂: the four equity issuers listed above plus Royal Dutch Shell, Lukoil, Petrobras, Total, ConocoPhillips, ENI, Apache Corporation, Devon Energy, BG Group, Canadian Natural Resources, Anadarko Petroleum Corporation and Marathon Oil Corporation. The primary vehicle for these issuers is equity. A full list of CU100 Oil and Gas companies in which CalPERS held investments in 2013, ranked by financed emissions, can be found in the Appendix.

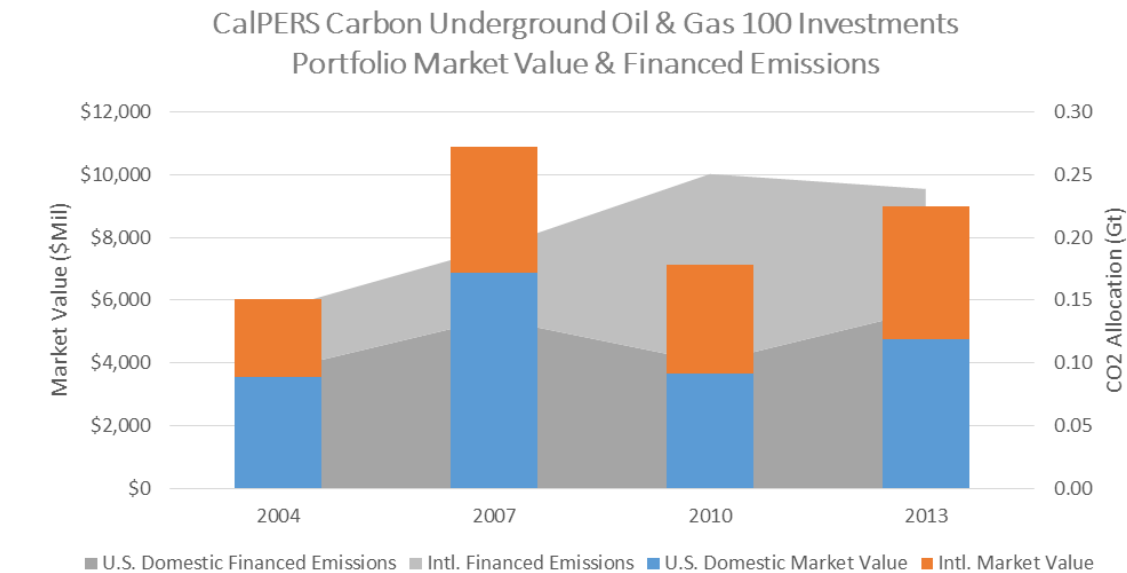


EXHIBIT 15

Historical Trends

CalPERS investment in Carbon Underground oil and gas companies grew to 6.2% of their total portfolio at June 30th, 2013, from 5.1% at June 30th, 2004, based on the market value of CalPERS CU oil and gas holdings as a percent of the total market value of the CalPERS portfolio. CalPERS financed emissions, the potential CO₂ emissions allocated to CalPERS CU Oil and Gas 100 holdings based solely on the reported reserves, increased by 67% over the ten year period reviewed. For a point of reference the underlying proven reserves of the public companies comprising the Carbon Underground Oil and Gas 100 increased their proven reserves 18% from 12/31/2004 to 12/31/2013.

In all the years examined, equity positions in the super majors (ExxonMobil, BP, Chevron, and Royal Dutch Shell) plus a handful of multinational integrated oil companies (Total, ENI, Gazprom and Lukoil) accounted for 50% or more of the total CO₂ emissions associated with the reported reserves financed by CalPERS investments. Equity positions contributed over 85% of the total market value of CalPERS investments in the Carbon Underground 100 Oil and Gas constituent issued instruments and over 90% of the financed potential CO₂ emissions.

In the growth period between June 30th, 2004 and June 30th, 2007, financed emissions rose to .1919 GtCO₂ from .1432 GtCO₂.

Between 2007 and 2010 financed emissions increased a further 31% despite a contracting stock market. The growth is attributable to an expansion of international equity positions, which increased from 31 in 2007 to 50 at in 2010. 2010 is the only year examined in which the majority of the financed emissions was not concentrated in four or fewer holdings. The fifty percent threshold in that year represented positions in BP, ExxonMobil, Total, Royal Dutch Shell, ENI and Chevron.

In three of the four years examined, the domestic equity portfolio accounted for the largest percentage of reserves-based CO₂ across all the holdings considered (averaging ~58%); the international portfolio led in 2010 with 60% of total. Comparing the 2013 and 2004 portfolios, the average market value of positions in all asset classes in CU 100 companies remained steady, but nearly doubled for domestic equities (\$43M in 2004 and \$84.4M in 2013). Summing all asset classes, the CO₂ associated with holdings grew by 34% between 2004 and 2007 and was notably the lowest at 0.1432 GtCO₂ in 2004. The years 2010 and 2013 held steady averaging .2448 GtCO₂.

Most oil and gas companies in the Carbon Underground 200 hold a mix of both oil and gas reported reserves. Over the 2004 to 2013 period, reported reserves held by public companies have remained evenly split between oil and gas. Overall, the mix of reserves attributable to CalPERS oil and gas investments have mirrored the reserve mix in the industry. The reserves attributable to domestic equity, however, were skewed toward oil in 2004, when it accounted for about 60% of potential emissions in reported reserves. The mix has moved steadily toward the industry average through 2013, largely attributable to positions in Gazprom and the growth of fracked gas deposits in the domestic energy industry. The increasing attribution toward gas in the underlying reserves of CalPERS holdings contributed to CalPERS modest reduction in overall financed potential CO₂ emissions between 2010 and 2013.

CalPERS Oil & Gas Investments in CU100 by Asset Class

Year - Asset Class	Total Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU100 Book Value (\$Mil)	Invested CU100 Market Value (\$Mil)	Invested CU100 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
2004							
Equity	\$102,504.47	59	\$3,343.75	\$5,639.47	5.5%	0.1333	0.1536
Debt	\$16,325.11	17	\$390.81	\$409.17	2.5%	0.0099	NA
2004 Total	\$118,829.57	59	\$3,734.56	\$6,048.64	5.1%	0.1432	0.1536
2007							
Equity	\$201,494.62	65	\$5,441.47	\$10,059.71	5.0%	0.1779	0.1985
Debt	\$17,841.12	21	\$841.19	\$825.19	4.6%	0.0140	NA
2007 Total	\$219,335.74	66	\$6,282.66	\$10,884.90	5.0%	0.1919	0.1985
2010							
Equity	\$91,734.13	80	\$6,060.75	\$6,138.13	6.7%	0.2328	0.4652
Debt	\$19,023.57	31	\$792.30	\$1,001.30	5.3%	0.0180	NA
2010 Total	\$110,757.70	81	\$6,853.04	\$7,139.43	6.4%	0.2508	0.4652
2013							
Equity	\$128,326.34	83	\$7,517.48	\$8,054.47	6.3%	0.2199	0.3529
Debt	\$16,731.35	41	\$944.92	\$934.14	5.6%	0.0190	NA
2013 Total	\$145,057.69	85	\$8,462.40	\$8,988.61	6.2%	0.2389	0.3529

EXHIBIT 16

CalPERS Oil & Gas Investments in CU100 by Portfolio

Year - Portfolio	Total Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU100 Book Value (\$Mil)	Invested CU100 Market Value (\$Mil)	Invested CU100 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
2004							
U.S. Domestic	\$79,437.21	41	\$1,834.31	\$3,556.76	4.5%	0.0942	0.0942
International	\$39,392.36	21	\$1,900.25	\$2,491.88	2.6%	0.0490	0.0594
2004 Total	\$118,829.57	58	\$3,734.56	\$6,048.64	5.1%	0.1432	0.1536
2007							
U.S. Domestic	\$115,435.18	47	\$3,283.01	\$6,875.22	6.4%	0.1354	0.1345
International	\$103,900.56	26	\$2,999.65	\$4,009.68	2.2%	0.0565	0.0640
2007 Total	\$219,335.74	66	\$6,282.66	\$10,884.90	5.0%	0.1919	0.1985
2010							
U.S. Domestic	\$59,997.21	54	\$2,409.52	\$3,673.70	7.9%	0.1002	0.0939
International	\$50,760.48	39	\$4,443.52	\$3,465.73	3.8%	0.1506	0.3712
2010 Total	\$110,757.70	81	\$6,853.04	\$7,139.43	6.4%	0.2508	0.4652
2013							
U.S. Domestic	\$77,488.25	56	\$3,383.67	\$4,752.10	7.8%	0.1422	0.1456
International	\$67,569.44	43	\$5,078.73	\$4,236.51	3.4%	0.0967	0.2073
2013 Total	\$145,057.69	85	\$8,462.40	\$8,988.61	6.2%	0.2389	0.3529

EXHIBIT 17

CalPERS Oil & Gas Investments in CU100 by Portfolio and Asset Class

Portfolio - Asset Class – Year	Total Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU100 Book Value (\$Mil)	Invested CU100 Market Value (\$Mil)	Invested CU100 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
U.S. Domestic							
Equity							
2004	\$67,890.98	39	\$1,452.31	\$3,158.21	4.7%	0.0844	0.0942
2007	\$103,268.26	41	\$2,469.24	\$6,080.36	5.9%	0.1215	0.1345
2010	\$43,491.19	47	\$1,621.52	\$2,676.67	6.2%	0.0822	0.0939
2013	\$66,046.31	44	\$2,442.34	\$3,821.29	5.8%	0.1232	0.1456
Debt							
2004	\$11,546.23	15	\$382.00	\$398.55	3.5%	0.0098	NA
2007	\$12,166.93	19	\$813.77	\$794.85	6.5%	0.0140	NA
2010	\$16,506.02	30	\$788.00	\$997.04	6.0%	0.0180	NA
2013	\$11,441.94	40	\$941.33	\$930.81	8.1%	0.0190	NA
International							
Equity							
2004	\$34,613.49	21	\$1,891.45	\$2,481.26	7.2%	0.0489	0.0594
2007	\$98,226.36	26	\$2,972.23	\$3,979.34	4.1%	0.0564	0.0640
2010	\$48,242.93	39	\$4,439.23	\$3,461.47	7.2%	0.1506	0.3712
2013	\$62,280.03	43	\$5,075.14	\$4,233.18	6.8%	0.0967	0.2073
Debt							
2004	\$4,778.87	2	\$8.81	\$10.62	0.2%	0.0001	NA
2007	\$5,674.19	3	\$27.42	\$30.34	0.5%	0.0001	NA
2010	\$2,517.55	1	\$4.29	\$4.26	0.2%	0.0000	NA
2013	\$5,289.41	2	\$3.59	\$3.33	0.1%	0.0000	NA

EXHIBIT 18

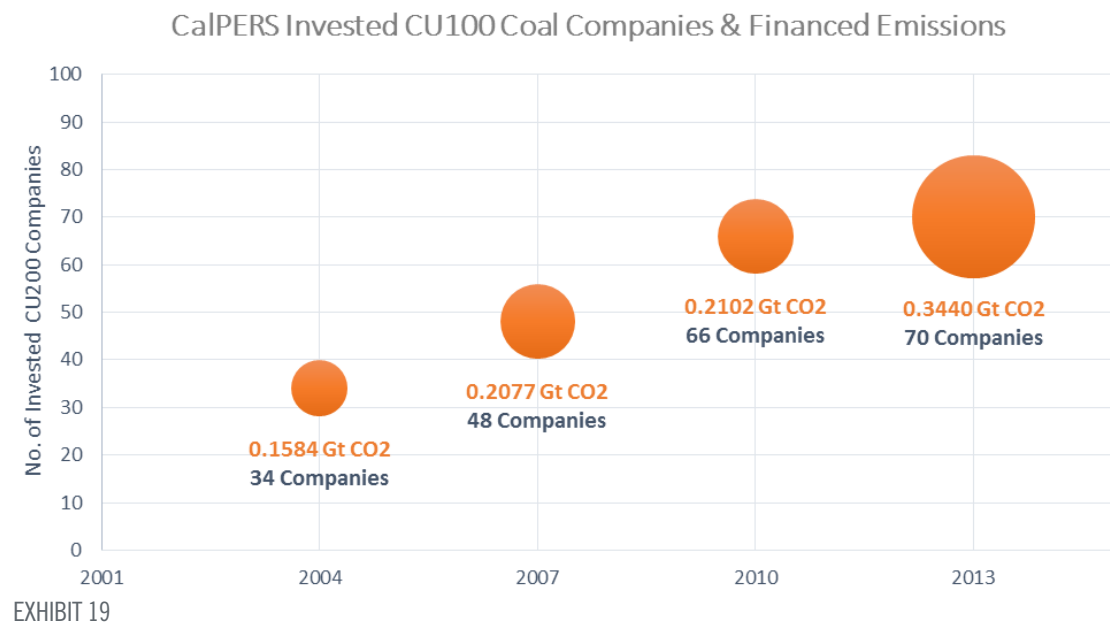
Coal

Overview

The CalPERS portfolios for domestic and international equities and domestic and international corporate bonds were reviewed for the years 2004, 2007, 2010 and 2013 and holdings were compared against the Carbon Underground 200 lists for the same years.

During the timeframes reviewed, the coal holdings demonstrate an active management strategy with companies being divested and other coal companies invested in on a regular basis. There are a total of 98 unique coal companies over the four periods that CalPERS has held either equity or bond investments in.

At June 30th, 2013, CalPERS had 97 distinct debt and equity holdings in 70 of the Carbon Underground Coal 100 companies, up from 51 distinct holdings in 34 CU Coal 100 companies at June 30th, 2004. A full list of CU100 coal companies in which CalPERS held investments in 2013, ranked by financed emissions, can be found in the Appendix.



CalPERS Carbon Underground Coal Investments 2013
Financed Emissions by Invested Company Headquarters

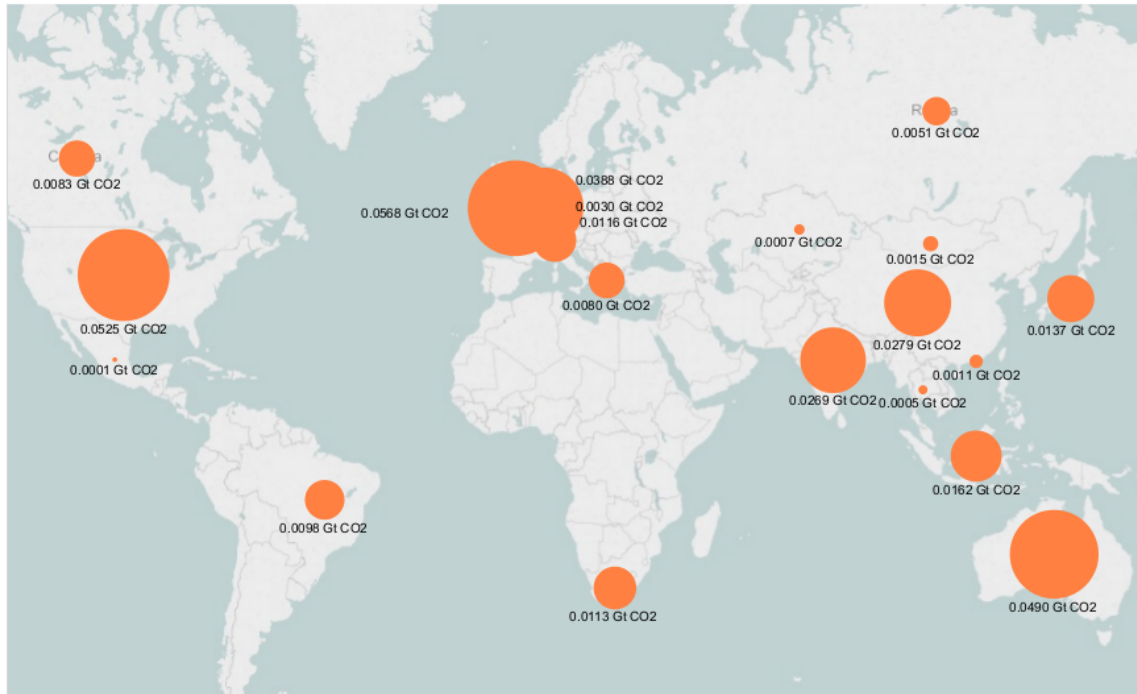


EXHIBIT 20

Similar to oil and gas, the preponderance of CalPERS financed emissions in coal stems from its equity portfolio, with debt accounting for only 5% of financed CO₂ emissions at June 30th, 2013, albeit the proportion financed by debt has increased over the ten years reviewed.

Based on the allocation methodology across both debt and equity, the potential CO₂ emissions allocations for the total coal holdings in the total CalPERS portfolio has more than doubled since 2004, from 0.1584 in 2004 to 0.3440 in 2013.

Even though the calculation to allocate carbon emissions is basic, the trend is clear, CalPERS has consistently increased its coal holdings from 2004, which has also corresponded to an increase in potential CO₂ emissions allocations. Given the size of the CalPERS total coal holdings, the total potential CO₂ emissions allocation would place them at a ranking of #88 in 2013, between global coal mining companies Shanxi Lanhua and Fortune Minerals.

There has been a decline in the potential CO₂ emissions when reviewing the CalPERS domestic equity portfolio from 0.0843 in 2010 to 0.0486 in 2013, or 42%.

However, there has been a significant increase in the allocation of potential CO₂ emissions in the CalPERS international equity portfolio, from 0.1212 in 2004 to 0.2794 in 2013, or 131%. This represents both the increase in holdings as well as an increase in exploration by individual companies over this timeframe, and investments by CalPERS in coal companies that have increased their reported reserves due to new acquisitions and/or exploration.

Due to the comparatively minimal coal bond holdings, the potential CO₂ emissions allocations by individual company were not significant in terms of the analysis. The greatest allocation occurred in 2013 totaling 0.0161 GtCO₂ spread amongst 9 companies. However, what may be significant is that the total allocations have greatly increased from 0.0036 in 2007 to 0.0161 in 2013.

Equity Portfolio

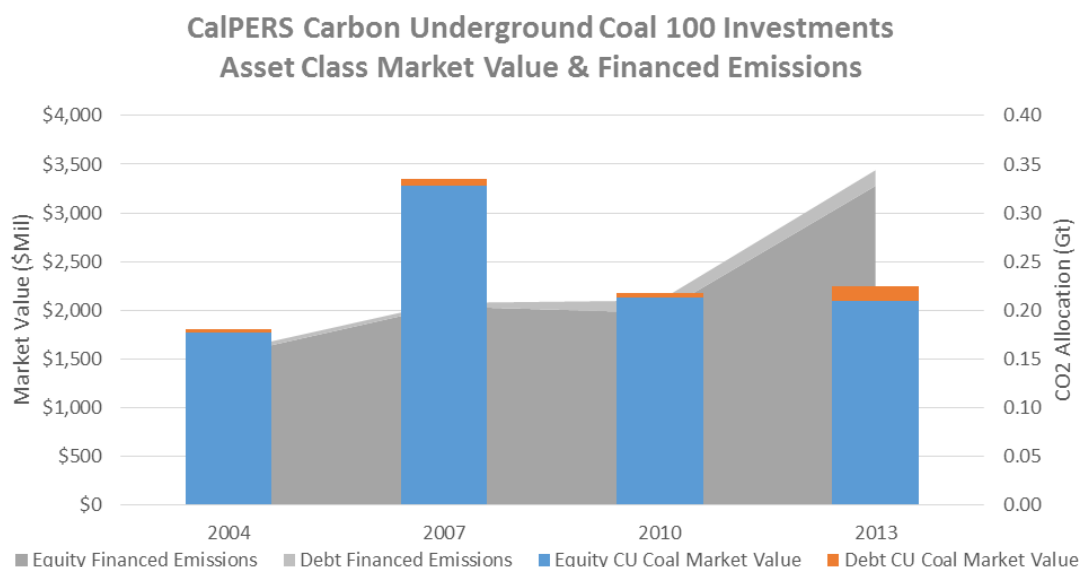


EXHIBIT 21

Highlights among the changes in CalPERS equity portfolio For the Carbon Underground Top 100 Coal Companies ("CU 100 for Coal"), were the expanding scope of investment, from 33 to 69 companies, the consequent increases in both book and market value, and erosion of market value to book value which reached - \$667mm at June 30th 2013. The market to book erosion in coal is in contrast with CalPERS entire equity portfolio, which at June 30th, 2013 carried a 22% appreciation over book. The erosion of market value to book value indicates stress in the coal holdings. Typically, an erosion of market value to book value indicates market skepticism about a firm's future earnings prospects or the values at which its assets are carried on the books.

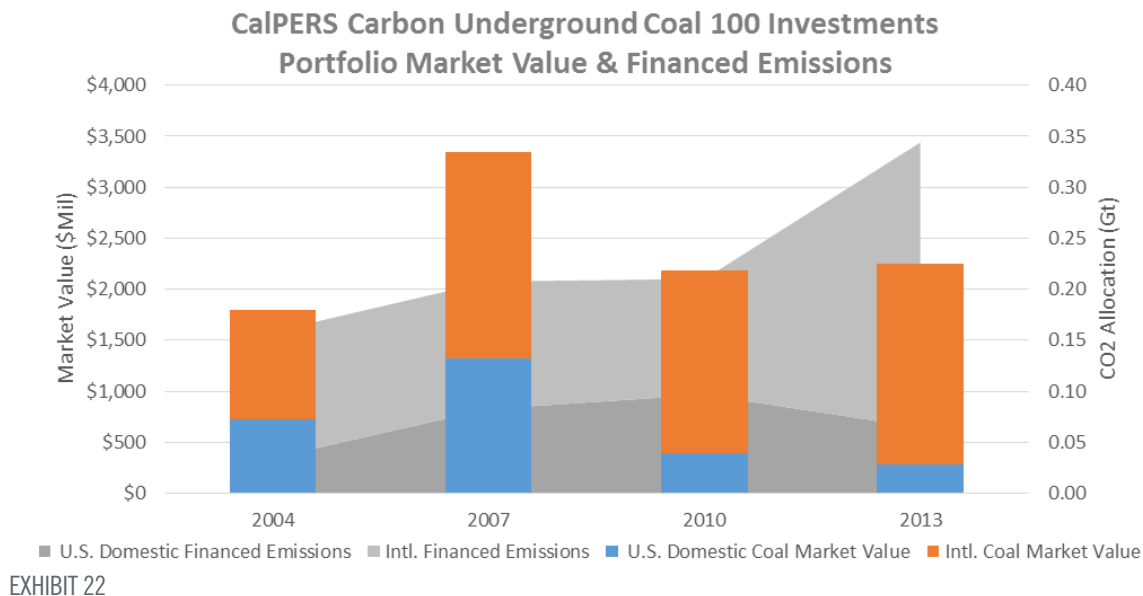
Market pressures likely contributed to a sharp reduction in CalPERS domestic coal portfolio. Despite an increase in companies held, book value was halved and market value sharply reduced over the 10 years reviewed. At the same time, the international portfolio was significantly expanded to 51 companies, tripling book value and nearly doubling market value.

CalPERS has maintained coal equity holdings in 19 companies over the entire timeframe from 2004 to 2013. Investment in these 19 companies has increased by 183% from 2004 to 2013 when looking at book value, and by 72% when looking at market value. Although these 19 companies accounted for 66% of the market value of the coal portfolio in 2013, they only accounted for 44% of the total market value vs. book value difference of - \$667 million in 2013. The majority of these holdings are large Australian and European energy firms and Japanese conglomerates. (See Appendix). A full list of these 19 coal companies can be found in the Appendix.

Bond Portfolios

CalPERS CU 100 Coal bond portfolio was much more modest, but grew five fold over the decade reviewed based on book value, substantially in domestic debt. While company holdings were trimmed in the later years, book and market value continued to grow, reaching \$169mm and \$156mm. While the market to book erosion is modest, it is also in contrast with CalPERS total bond portfolio, which carried 1.6% appreciation to book at June 30th, 2013.

The coal bond holdings in the CalPERS domestic bond portfolio showed an increase in number of companies from 4 to 8, and an increase in book value from \$22 million in 2004 to \$167 million in 2013 and a corresponding increase in market value from \$18 million in 2004 to \$155 million in 2013. Coal bond holdings in the CalPERS international bond portfolio showed a decrease in number of companies from 3 to 1 and a decrease in book value from \$12 million in 2004 to \$2 million in 2013 and a corresponding decrease in market value from \$15 million in 2004 to \$2 million in 2013.



Country Analysis

From 2004 to 2013, CalPERS has increased the number of Carbon Underground Coal 100 companies that they own equity positions in by 36. The majority of these have headquarters in India (7), China (6), Russia (6), Indonesia (4), and Australia (3).

CalPERS equity investments in the companies in these 5 countries amount to 35% of CalPERS total CU Coal 100 equity investment based on 2013 market values, but they represent 48% of the total potential CO₂ emissions allocated to CalPERS total CU Coal 100 equity holdings in 2013. A full list of these companies can be found in the Appendix.

CalPERS Coal Investments in CU100 by Asset Class

Year - Asset Class	Total CalPERS Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU200 Book Value (\$Mil)	Invested CU200 Market Value (\$Mil)	Invested CU200 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
2004							
Equity	\$102,504.47	33	\$1,189.41	\$1,769.68	1.7%	0.15444	0.20084
Debt	\$16,325.11	7	\$33.81	\$32.23	0.2%	0.00398	
2004 Total	\$118,829.57	34	\$1,223.23	\$1,801.91	1.5%	0.15842	0.20084
2007							
Equity	\$201,494.62	48	\$1,820.18	\$3,276.77	1.6%	0.20418	0.28276
Debt	\$17,841.12	6	\$72.73	\$71.74	0.4%	0.00356	
2007 Total	\$219,335.74	48	\$1,892.90	\$3,348.51	1.5%	0.20774	0.28276
2010							
Equity	\$91,734.13	66	\$2,178.67	\$2,133.17	2.3%	0.19766	0.24520
Debt	\$19,023.57	12	\$38.55	\$48.71	0.3%	0.01255	
2010 Total	\$110,757.70	66	\$2,217.22	\$2,181.88	2.0%	0.21022	0.24520
2013							
Equity	\$128,326.34	69	\$2,760.81	\$2,094.12	1.6%	0.32793	0.59875
Debt	\$16,731.35	9	\$169.11	\$156.18	0.9%	0.01606	
2013 Total	\$145,057.69	70	\$2,929.92	\$2,250.30	1.6%	0.34399	0.59875

EXHIBIT 23

CalPERS Coal Investments in CU100 by Portfolio

Year - Portfolio	Total CalPERS Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU200 Book Value (\$Mil)	Invested CU200 Market Value (\$Mil)	Invested CU200 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
2004							
Domestic	\$79,437.21	12	\$420.95	\$725.65	0.9%	0.03471	0.04079
International	\$39,392.36	22	\$802.27	\$1,076.26	2.7%	0.12371	0.16004
2004 Total	\$118,829.57	34	\$1,223.23	\$1,801.91	1.5%	0.15842	0.20084
2007							
Domestic	\$115,435.18	18	\$621.82	\$1,324.87	1.1%	0.08274	0.10405
International	\$103,900.56	31	\$1,271.09	\$2,023.64	1.9%	0.12499	0.17871
2007 Total	\$219,335.74	48	\$1,892.90	\$3,348.51	1.5%	0.20774	0.28276
2010							
Domestic	\$59,997.21	31	\$333.96	\$390.54	0.7%	0.09679	0.11295
International	\$50,760.48	41	\$1,883.26	\$1,791.34	3.5%	0.11342	0.13226
2010 Total	\$110,757.70	66	\$2,217.22	\$2,181.88	2.0%	0.21022	0.24520
2013							
Domestic	\$77,488.25	22	\$376.92	\$279.86	0.4%	0.06457	0.12394
International	\$67,569.44	51	\$2,553.00	\$1,970.44	2.9%	0.27942	0.47480
2013 Total	\$145,057.69	70	\$2,929.92	\$2,250.30	1.6%	0.34399	0.59875

EXHIBIT 24

CalPERS Oil & Gas Investments in CU100 by Portfolio and Asset Class

Year - Portfolio	Total CalPERS Portfolio Market Value (\$Mil)	No. of Invested CU200 Companies	Invested CU200 Book Value (\$Mil)	Invested CU200 Market Value (\$Mil)	Invested CU200 MV / Total Portfolio MV	Allocated Equity / Debt CO ₂ (Gt)	Allocated Equity 100% CO ₂ (Gt)
U.S. Domestic							
Equity							
2004	\$67,890.98	11	\$399.16	\$708.06	1.0%	0.03323	0.04079
2007	\$103,268.26	17	\$571.89	\$1,278.20	1.2%	0.08225	0.10405
2010	\$43,491.19	28	\$299.71	\$346.09	0.8%	0.08429	0.11295
2013	\$66,046.31	19	\$209.60	\$125.22	0.2%	0.04855	0.12394
Debt							
2004	\$11,546.23	4	\$21.80	\$17.59	0.2%	0.00148	
2007	\$12,166.93	3	\$49.92	\$46.67	0.4%	0.00049	
2010	\$16,506.02	11	\$34.25	\$44.45	0.3%	0.01250	
2013	\$11,441.94	8	\$167.32	\$154.64	1.4%	0.01602	
International							
Equity							
2004	\$34,613.49	22	\$790.26	\$1,061.62	3.1%	0.12121	0.16004
2007	\$98,226.36	31	\$1,248.29	\$1,998.57	2.0%	0.12193	0.17871
2010	\$48,242.93	41	\$1,878.96	\$1,787.08	3.7%	0.11337	0.13226
2013	\$62,280.03	51	\$2,551.21	\$1,968.89	3.2%	0.27938	0.47480
Debt							
2004	\$4,778.87	3	\$12.02	\$14.64	0.3%	0.00250	
2007	\$5,674.19	3	\$22.80	\$25.07	0.4%	0.00307	
2010	\$2,517.55	1	\$4.29	\$4.26	0.2%	0.00005	
2013	\$5,289.41	1	\$1.79	\$1.55	0.0%	0.00004	

EXHIBIT 25

Risks in CalPERS Holdings of The Carbon Underground 200

Consistent with emerging practices, institutional investors are expanding their efforts to hold the Carbon Underground 200 accountable for assessing the implications of potential low carbon scenarios. Advocacy of shareholder resolutions concerning climate change, greenhouse gas emissions, and divestment, organized requests for enhanced disclosure and efforts to build climate science expertise into the board governance structure, are among the tactical efforts underway. The divestment movement is working to persuade an expanding number of asset owners globally to begin considering divestment, and, once the consideration process has begun, to act. Here Fossil Free Indexes identifies some simple potential research efforts that could be expanded and deployed to identify the relative risk in CalPERS oil and gas holdings and help shape appropriate actions going forward.

Oil and Gas

The petroleum extraction industry varies widely in terms of structure and emphasis. The majors embrace the full range of industry sectors while wildcats focus on very geographically specific exploration. Either end of the spectrum is exposed to quantifiable risks in the transition to a low carbon economy. This section will outline a process for measuring relative risk of substantial stranded assets based on operational data revealed in regulatory reporting.

Fossil Free Indexes Production Risk Index™

Any specific field or project has an associated lifting cost, the production cost per barrel of product extracted. Specific lifting costs are not typically revealed, but firm-wide production numbers and associated production costs allow for geographically segmented or global calculations. The values vary widely between firms operating in different environments. A natural gas dominant independent such as WPX Energy currently reports lifting costs of \$5.92/barrel of oil equivalent where an integrated major like Royal Dutch Shell reports lifting costs of \$20.50. Royal Dutch Shell's relatively high lifting costs are tempered by its portfolio of retail (downstream), refining (midstream) and production (upstream) businesses, whereas WPX's pure exploration and production focus is more exposed to energy price shifts. Factors such as oil/gas production and upstream/downstream business mix can be used to ferret out a firm's exposure to costly projects likely to be impacted by increased energy prices (e.g., from regulatory restrictions or carbon taxes), reduced demand for fossil fuels or politically imposed production restrictions (similar to those put in place at Groningen in the Netherlands).

The following table outlines these principles as applied to a selection of CalPERS holdings chosen to illustrate a wide range of business models. Operational data is calculated based on the most recent regulatory filings, Globally Blended Realized Price is a calculation based on trading hub prices prorated to each company's geographic segments and oil/gas production mix. The Fossil Free Indexes Production Risk Index™⁷ is a tool for identifying companies whose involvement in high cost projects poses a risk to the company's overall financial health. It incorporates the factors discussed into a relative ranking. The impact of changes in energy prices, demand and production restrictions to downstream revenue is quantified; secondary impacts on the refining and marketing businesses are not considered in this analysis.

Fossil Free Indexes Production Index Values for some CalPERS CU 100 Oil & Gas Holdings

Company	Lifting Cost (\$/BOE)	% Production Gas	% Production Oil	% Revenue Upstream	Globally Blended Realized Price (\$/BOE)	Fossil Free Indexes Production Risk Index
Denbury	\$34.84	6%	94%	99%	\$103.72	0.500
Forest	\$8.23	62%	38%	100%	\$55.28	0.175
Cimarex	\$9.48	50%	50%	98%	\$65.82	0.164
WPX	\$5.92	80%	20%	68%	\$39.79	0.119
Chevron	\$18.64	33%	67%	36%	\$90.24	0.093
Chesapeake	\$5.68	75%	25%	40%	\$44.16	0.059
BP	\$23.06	37%	63%	19%	\$89.20	0.048
MOL	\$9.47	63%	37%	12%	\$54.48	0.021
Shell	\$20.50	51%	49%	10%	\$70.34	0.016
Conoco Phillips	\$17.20	44%	56%	100%	\$77.48	0.003

EXHIBIT 26

Denbury Resources' combination of oil dominated production, high lifting costs and upstream focus makes it particularly vulnerable to large-scale energy price movements. ConocoPhillips is similarly focused on upstream activities (with its recent divestiture of midstream and downstream businesses), but less reliant on oil products as well as being diversified into global markets.

Measuring risk associated with low carbon economy scenarios must incorporate a variety of approaches to account for advent of carbon taxes, production restrictions or demand growth revisions. The profit margin realized per barrel of oil equivalent for Cimarex Energy is about the same as MOL (~\$45.00/BOE). However, MOL's portfolio of petrochemical production, natural gas transmission and retail business reduces exposure to carbon related price shocks.

Capex analysis from Carbon Tracker

Another approach to assessing the potential vulnerability in the oil and gas portfolio is to review the higher risk projects supported by capital expenditures. Capital expenditures (commonly referred to as capex) are the funds a company devotes to the acquisition and upgrade of physical property and equipment. In this context, capex is used to build the infrastructure for extracting fossil fuels. In its recent research paper, "Carbon Supply Cost Curves: Evaluating Financial Risk To Oil Capital Expenditures" 2014, Carbon Tracker (CT) teams up with research house Rystad Energy to propose a stress testing framework to assess global oil projects. CT uses a 900 GTCO₂⁸ carbon budget implied by the 2° C temperature increase constraint to estimate a global carbon emissions for oil budget of 360 GTCO₂ to 2050 based on the IEA's WEO 2013 estimate that oil represents about 40% global reported reserves. CT further estimates that the oil budget can be exhausted entirely through production with a breakeven market oil price of \$75/bbl.

The research identifies global oil projects most at risk due to high production costs using two bands of breakeven prices: \$75/bbl to \$95/bbl and above \$95/bbl. These projects, dubbed high cost/risk, require global oil prices above the designated bands to remain profitable. The current spot market price for crude oil is \$98/bbl down from \$106/bbl in August 2013. If oil prices drop below the designated bands, the high cost/risk projects will likely operate at loss.

Utilizing the Rystad database of oil projects, CT estimates that investable oil companies, including the majors, have the largest percentage, 41%, of potential production through 2050, in projects requiring a market oil price of \$95/bbl or over, compared to a much more modest potential among OPEC providers and state owned oil companies, both at 16%.

Twenty of the CU Oil and Gas 100 companies held by CalPERS were discussed by CT. These companies were identified as having either the highest absolute levels of capex to sustain or initiate new projects with a break even market oil price of \$95/bbl, or having a percentage of capex in this risk band that is greater than 50% of total capex. Collectively, these 20 have \$793.617 billion in capex through 2025 in high cost/risk projects. They represent 25% of the total \$3,134 trillion of capex planned to 2025, ranging from a high of 62% for MEG Energy and Cenovus to a low of 18% for BP and Petrobras. Highlighted companies exceed 50% of their total capex in high cost/risk projects.

CalPERS Holdings Studied by CT with the Highest Absolute or Relative Capex

Firm	High Cost/Risk Total (\$mm)	Total Company CAPEX (\$mm)	% High Risk
Petrobras	\$83,452	\$454,317	18%
Exxon	\$73,346	\$290,012	25%
Rosneft	\$69,686	\$264,661	26%
Shell	\$63,392	\$314,551	20%
Total	\$56,193	\$197,674	28%
Chevron	\$55,774	\$247,093	23%
BP	\$46,014	\$253,066	18%
Gazprom	\$44,724	\$111,881	40%
Statoil	\$38,634	\$218,578	18%
CNRL	\$38,555	\$74,917	51%
ENI	\$36,235	\$173,426	21%
Suncor	\$34,679	\$70,995	49%
Lukoil	\$29,006	\$132,497	22%
Cenovus	\$28,855	\$46,805	62%
Conoco Phillips	\$26,150	\$140,085	19%
BG	\$25,267	\$55,775	45%
Repsol	\$19,079	\$47,030	41%
MEG	\$12,278	\$19,803	62%
Denbury	\$9,656	\$16,940	57%
Forest	\$2,642	\$4,331	61%
All Firms	\$793,617	\$3,134,438	25%

EXHIBIT 27

For most of these companies the higher cost/risk projects are related to arctic, deep water, ultra-deep water or oil sands extraction or development. Gazprom, Rosneft and Lukoil's higher cost/risk projects are primarily conventional projects in geographically isolated and environmentally challenging locations. Denbury Resources' conventional projects involve enhanced oil recovery. CT research identifies an additional six companies held by CalPERS which exceed 50% of total capex in high cost/risk projects but these are not in the Carbon Underground Oil and Gas 100.

The table below shows the magnitude of the risky capex relative to the 2013 EBITDA and the current market capitalization to illustrate the relative degree of risky projects.

High Risk Capex Relative to Market Cap and EBITDA

Firm	2013 EBITDA (\$B)	2013 EBITDA / High Risk CAPEX	Market Cap(\$B)	Market Cap / High Risk CAPEX
Exxon Mobil	\$61.40	0.83	\$422.90	5.76
Chevron	\$40.80	0.73	\$240.00	4.30
Shell	\$48.50	0.76	\$258.70	4.08
Conoco Phillips	\$22.30	0.85	\$99.20	3.79
BP	\$32.40	0.58	\$147.40	3.20
Gazprom	\$51.00	0.88	\$100.40	2.24
Suncor	\$12.10	0.35	\$57.40	1.65
Lukoil	\$18.60	0.64	\$47.20	1.63
Rosneft	\$28.80	0.41	\$73.00	1.05

EXHIBIT 28

While merely illustrative, Suncor Energy's and Rosneft's higher concentration of capex in riskier projects compared to both its earnings and market capitalization, may pose greater risk. Suncor's high risk/cost projects are mostly Canadian oil sands but also include arctic drilling, while Rosneft's, as mentioned above, are conventional but in geographically and environmentally challenging locations.

Risk analyses based on capex or production costs are only two facets of the challenges facing investors in energy companies. Investor-led efforts to drive enhanced disclosure are helping market participants to better assess these and other risks, but only modestly. Regulatory disclosure requirements are slow to adapt. With the increasing probabilities of the occurrence of low carbon scenarios, stressing the earnings models and balance sheets of the oil and gas sector will become increasingly critical over time

Coal

The risks to the coal holdings within the CalPERS portfolios include a potential for decline in global coal prices, leveling of coal energy demands, increased environmental regulations, and a decrease in cost and build times for alternative energy, all of which create the potential for stranded assets.

Companies that are particularly vulnerable to these risks are ones that have increased debt, capex expenditures, mine purchases, and/or an overabundance of reserves or mines that are not yet operational, have a customer base where demand is either leveling off or declining, and operate where coal prices are suppressed.

As evidenced by the total CalPERS coal equity portfolio, the current decline in coal prices coupled with an oversupply of coal in the marketplace has put downward pressure on the share prices of coal companies and is also reflected in the overall earnings of coal companies. This pressure on profit margins continues to make coal companies particularly vulnerable to changes in the marketplace.

In addition, some of the holdings in the CalPERS coal equity portfolio depend upon China remaining a growing and significant coal power source, India expanding with industrial and infrastructure activity that would use coal as its power source, and increased demand from Indonesia.

Emerging new environmental policies by the U.S., European Union, and China to ensure the 2° C target remains viable serve to put these holdings at risk. In many areas there is already evidence of a shift towards the development of an alternative energy infrastructure that has resulted in the stranding of some coal reserves and the idling or closure of coal power plants.

The current pressures in the coal market have been reflected in CalPERS coal holdings. When reviewing the companies that comprise 80% of the CalPERS potential carbon emissions allocation from its holdings of the CU Coal 100, Anglo American, BHP Billiton, GlencoreXstrata, Rio Tinto and Vale have all steadily increased their long term debt from 2004 to 2013, and have accounted for a loss of \$315 million in 2013 in comparing market value of equity to book value of equity. This represents approximately 47% of the total coal company loss in the CalPERS portfolio in 2013 comparing market value to book value.

Larger 2013 additions to the CalPERS coal portfolio are Adani Enterprises (India), AGL Energy (Australia), Coal of India, and PTT plc (Thailand). These four companies represent an investment of \$66 million with an approximate loss of \$5 million in 2013 when comparing market value to book value, or 3% of the total coal equity market value at June 30th 2013, and total allocated potential carbon emissions of 0.0230 GtCO₂ or approximately 11% of the total equity allocation for 2013.

Despite the looming issues related to a low carbon environment, and the expected shift, albeit slowly, from coal to alternative energy sources, these companies remain strategically committed to further development of coal reserves. Adani Enterprise has been criticized for plans to develop the Carmichael Coal Mine in Australia, AGL Energy has just received approval for fracking for coal seam gas in Australia and owns a large coal mine in Australia, PTT has made recent acquisitions (Sakari) and continues to develop coal mines, and Coal of India is continuing with business as usual.

Nine companies account for 82% of the difference between market value and book value of CalPERS equity coal portfolio in 2013: Anglo American (England), ArcelorMittal (Luxembourg, mainly steel), Vale (Brazil), Rio Tinto (England), RWE (Germany), New World Resources (Netherlands), GlencoreXstrata (Switzerland), Mitsubishi (Japan), and China Shenhua Energy (China). Recent examples of stress in these companies include:

- March 2014, Australian Mining article: Anglo American pulls out of plans to fund the expansion of Abbot Point in Australia as Rio Tinto and BHP Billiton had previously confirmed they would not need the extra capacity. In Anglo American's December 2013 results, metallurgical coal operating profit fell 89%, and thermal coal profits fell 32% as a result of lower prices.¹⁰
- May 2014: Vale announced plans to close the Integra coal mine complex in Hunter Valley, Australia to an approximate cost of \$63 million. Vale warned that ten years after investing in Mozambique's coal fields, it is rethinking the profitability of Mozambican coal.¹¹
- July 2014: Rio Tinto announced the sale of its Riversdale Mining coal project in Mozambique for \$53 million – a project in which they had invested \$3.9 billion. However, Rio Tinto has announced in August 2014 that the previously shelved Mount Pleasant thermal coalmine in Australia may be a contender for future capital spending.¹²

- November 2013: RWE announced that it will shutdown some of its gas and coal-fired power stations due to an increase in renewable energy, such as solar power, which meant many of its power stations were no longer profitable. In January 2014, RWE announced plans to convert its power station in Northumberland, England from coal to biomass.¹³
- August 2014: New World Resources filed for bankruptcy protection in a U.S. court. The company has struggled to profit amid depressed global coal prices, and is approximately \$1.1 billion in debt.¹⁴
- March 2014: GlencoreXstrata announced plans to close its Ravensworth underground coal mine in Australia.¹⁵
- February 2014: Mitsubishi Corp and BHP Billiton (who run a half dozen coal operations jointly in Australia under Billiton Mitsubishi Alliance (BMA)) announced a reduction in workforce due to a slowdown in the pace of demand, decline in coal prices, and increase in mine production costs.¹⁶
- August 2014: China Shenhua Energy, China's top coal miner, announced that it is raising coal prices after two months of cuts and prices at 6 year lows in an attempt to offer some relief to the coal industry. However, the coal industry has also been urged to cut production and reduce inventories. The price hike comes as more than 70% of China's coal firms are already making losses in the first half due to falling demand growth, worsening supply glut, increased concerns over smog, and China's newly revised Environmental Protection Law.¹⁷

Given its high carbon emissions intensity the risks to the coal sector in most low carbon scenarios are both greater and nearer than those to oil, and certainly, to gas. Despite its dominance as an energy source in the world's largest emerging markets, coal is increasingly targeted in strategic efforts to curtail usage, infrastructure, and development, albeit much of this moderation has been in developed countries. It is noteworthy as well that early divestors have targeted coal as the primary target for reducing holdings.

Final Thoughts

The data and approaches provided and outlined in this report provide a starting point for assessing the financed emissions content of institutional portfolios, and its potential implications, within the context of climate risk, and a risk/return context as well. The research on financed emissions within a portfolio, coupled with research that differentiates firms based on their vulnerability to low carbon scenarios, are emerging tools to help balance the increasingly compelling responsibilities of ESG influence in investing and the competitive and fiduciary needs regarding performance and investment policy.

The analysis can be used to target ESG related shareholder actions, including divestment. With the emergence of broad market indexes that are fossil free, institutional investors, whether or not they currently have ESG disciplines, can begin to assess the comparative risk and return of their portfolios with and without their current significant exposures to the fossil fuel sector.

The research presented here offers a cautionary example of the extent of financed emissions in large institutional portfolios and the consequent obligation of fiduciaries to bring their influence to bear on climate risk.

Footnotes

¹ The Carbon Underground, Fossil Free Indexes, 2014, p.4

² The financed emissions approach used in this report is a variant of the GHG Protocol Guidance on Scope 3 Investments. The approach allocated the potential emissions related to reported reserves across debt and equity holdings of CalPERS in the Carbon Underground 200. A similar methodology was used allocating the potential emissions from reported reserves only to CalPERS equity holdings in the CU 200. For details on this approach see <http://www.ghgprotocol.org/files/ghgp/Chapter 15.pdf>

³ Example of financed emissions in regulatory filing

<http://www.sec.gov/divisions/corpfin/cf-noaction/14a-8.shtml> SEC response to PNC shareholder resolution, February 13, 2013. Wri.org, "RELEASE: New Guidance Will Help Financial Institutions Measure Emissions from Lending and Investment Portfolios", October 29, 2013

⁴ In order to illustrate the relative size of CU200 holdings as compared to CalPERS holdings generally, the CU200 holdings or a subset of those holdings are compared throughout this document to the "CalPERS Total Portfolio". The CalPERS Total Portfolio refers only to the asset classes screened against CU200 companies: domestic equity, international equity, corporate bond and international fixed income. Cash Equivalents, Real Estate Programs and Private Equity holdings are not included in this research. Within the Debt Securities category, Asset-Backed Securities, Sovereign Bonds, U.S. Treasuries & Agencies, Mortgage Loans, Derivatives and Mortgage-Backed Securities were not considered.

⁵ See Exhibit 2, Total CalPERS Portfolio Table for financed CO₂ emissions volumes using the 100% equity methodology. These peak at .6578 GtCO₂ in 2010, before declining slightly to .5460 GtCO₂ in 2013. The relatively higher allocations resulting from the equity only methodology reflects the fact that CalPERS CU 200 equity holdings represent a relatively higher proportion of invested CU firms total equity, while CalPERS CU 200 debt holdings represent a relatively low proportion of invested CU companies total long term debt. As a consequence, when allocation is based solely on equity holding, CalPERS receives a relatively higher proportion on the CU firm's total potential CO₂ emissions.

⁶ The equity only emissions allocation approach for oil and gas is shown in Exhibit 3, CalPERS Oil & Gas Investments in CU100 by Asset Class last column to the right, at .3529 GtCO₂ in 2013, equivalent to #45 on the CU Oil and Gas 100 in that year.

⁷ Index value = (exploration and production revenue as a percent of total revenue / ROI production) where ROI production = ((company specific globally adjusted BOE price – BOE lifting cost/BOE lifting cost)). Globally adjusted BOE price = (((% oil production of total production * Brent crude spot price)+(% gas production of total production * Henry Hub spot price BOE))* % US production of world production)+ (((% oil production of total production * Brent crude spot price)+(% gas production of total production * Heren spot price BOE))* % non-US production of world production).

⁸ Unburnable carbon 2013: Wasted capital and stranded assets, April 2013, Carbon Tracker.

⁹ Carbon Supply Cost Curves: Evaluating Financial Risk to Oil Capital Expenditures May 2014. Carbon Tracker.

¹⁰ MiningAustralia.com.au, "Anglo American pulls out of Abbot Point coal expansion", March 10, 2014

¹¹ BDLive.co.za, "Vale sounds 'alert' over Mozambique coal sector", May 24, 2014; MiningAustralia.com.au, "Vale faces a \$63 million price tag to close Integra coal complex: union", June 2, 2014; Reuters.com, "Vale to shut money-losing Integra coal mine in Australia", May 18, 2014.

¹² Ft.com, "Rio Tinto closes dire chapter with \$50m Mozambique coal sale", July 30, 2014. TheAustralian.com.au, "Rio mine expansion is back on the cards", August 9, 2014.

¹³ Bbc.com, "RWE to close or idle power plants", November 14, 2013. Platts.com, "Germany's RWE 'very positive' about UK Lynemouth coal-to-biomass conversion", January 17, 2014.

¹⁴ Blogs.wsj.com, "The Daily Docket: New World Resources Enters Bankruptcy", August 1, 2014.

¹⁵ Bloomberg.com, "Glencore to Suspend Ravensworth Coal Mine as Prices Slump", March 27, 2014.

¹⁶ Online.wsj.com, "BHP Billiton, Mitsubishi Cut Jobs at Australian Coal Mine", February 6, 2014.

¹⁷ Uk.reuters.com, "Top China coal miner Shenhua hikes August prices – trade", August 5, 2014.

Appendix

CalPERS 2013 Carbon Underground Coal 100 Investments

2013 CalPERS Ranking	2013 CU Coal 100 Ranking	Company	2013 Market Value (\$Mil)	2013 EQ / Debt Total CO ₂	2013 Equity 100% CO ₂
1	6	Anglo American	\$156.81	0.04555	0.07583
2	62	NWR	\$73.01	0.03877	0.09934
3	5	BHP Billiton	\$450.78	0.03458	0.04166
4	2	Shenhua Group	\$38.58	0.02046	0.02395
5	10	Peabody	\$15.69	0.01810	0.03578
6	1	Coal India	\$9.73	0.01747	0.01747
7	25	Asia Res. Minerals (Bumi)	\$5.12	0.01449	0.01449
8	11	Glencore Xstrata	\$103.47	0.01164	0.01997
9	29	Cloud Peak	\$4.01	0.01151	0.01151
10	15	Exxaro Res	\$7.43	0.01067	0.01244
11	22	Rio Tinto Group	\$256.06	0.01035	0.01412
12	21	Vale	\$204.47	0.00979	0.00965
13	14	DEH	\$7.54	0.00803	0.03384
14	19	Alpha Nat Res	\$5.68	0.00703	0.01838
15	20	Mitsubishi	\$78.39	0.00659	0.01318
16	34	Teck	\$47.53	0.00645	0.00632
17	32	AGL	\$21.53	0.00574	0.00792
18	18	Arch Coal	\$4.53	0.00536	0.01839
19	9	CNCGC	\$5.34	0.00518	0.00929
20	3	Adani	\$1.86	0.00391	0.01241
21	41	Consol Energy	\$16.55	0.00342	0.00441
22	33	Tata Steel	\$5.49	0.00329	0.00329
23	48	Nacco Ind	\$1.26	0.00321	0.00435
24	40	RWE	\$67.50	0.00297	0.00635
25	53	Mitsui	\$91.68	0.00296	0.00678
26	57	Wesfarmers	\$111.82	0.00259	0.00291
27	38	Whitehaven Coal	\$3.26	0.00252	0.00311
28	17	Mechel	\$3.25	0.00222	0.01827
29	52	Coalspur	\$0.36	0.00211	0.00294
30	64	Itochu	\$72.65	0.00204	0.00350
31	47	Adaro	\$3.58	0.00161	0.00207
32	63	MMC	\$2.54	0.00146	0.00334
33	60	Sherritt	\$3.65	0.00119	0.00336
34	79	Arcelor Mittal	\$96.70	0.00114	0.00120
35	98	Marubeni	\$50.43	0.00114	0.00115
36	72	CLP Holdings	\$42.79	0.00111	0.00146
37	36	Polyus Gold	\$4.83	0.00108	0.00119
38	8	Datang Int	\$2.43	0.00105	0.00551

2013 CalPERS Ranking	2013 CU Coal 100 Ranking	Company	2013 Market Value (\$Mil)	2013 EQ / Debt Total CO ₂	2013 Equity 100% CO ₂
39	71	Allete	\$4.42	0.00101	0.00155
40	42	Severstal	\$3.40	0.00098	0.00174
41	58	Tata Power	\$3.30	0.00098	0.00098
42	23	Evrast Group	\$2.20	0.00093	0.00431
43	50	ARLP	\$3.82	0.00093	0.00108
44	49	Idemitsu	\$10.47	0.00091	0.00130
45	94	Shougang Fushan	\$5.44	0.00079	0.00079
46	93	JSPL	\$8.98	0.00079	0.00079
47	66	Cockatoo Ltd	\$0.06	0.00078	0.00189
48	61	Kazakhmys	\$3.05	0.00069	0.00169
49	75	Aquila Res	\$0.72	0.00066	0.00067
50	65	Westmoreland C	\$0.38	0.00064	0.00198
51	81	Black Hills	\$5.14	0.00062	0.00102
52	86	Capital Power	\$5.12	0.00062	0.00119
53	26	Rusal	\$2.91	0.00057	0.00153
54	84	ARM	\$4.61	0.00049	0.00054
55	77	China Resources	\$16.17	0.00040	0.00080
56	39	Banpu	\$3.40	0.00030	0.00033
57	80	FirstEnergy	\$16.10	0.00030	
58	92	SAIL	\$3.22	0.00028	0.00028
59	74	Walter Energy	\$1.42	0.00027	0.00140
60	87	PTT	\$28.67	0.00023	0.00033
61	42	Sasol	\$2.18	0.00019	0.00021
62	56	NLMK	\$9.36	0.00015	0.00015
63	83	Grupo Mexico	\$9.44	0.00014	0.00018
64	99	Cliffs Natural Resources	\$3.18	0.00014	0.00031
65	46	NTPC	\$0.52	0.00013	0.00013
66	100	NSSMC	\$12.28	0.00008	0.00013
67	78	Indika Inti	\$0.13	0.00005	0.00016
68	59	MMK OJSC	\$1.67	0.00005	0.00005
69	13	Yanzhou Coal	\$0.15	0.00003	0.00004
70	44	PT Bayan Res	\$0.05	0.00003	0.00004
Coal Total			\$2,250.30	0.34399	0.59875

EXHIBIT A1

CalPERS 2013 Carbon Underground Oil & Gas 100 Investments

2013 CalPERS Ranking	2013 CU Oil & Gas 100 Ranking	Company	2013 Market Value (\$Mil)	2013 EQ / Debt Total CO ₂	2013 Equity 100% CO ₂
2	1	Gazprom	\$178.62	0.04062	0.04995
17	2	Rosneft	\$34.72	0.00232	0.00311
3	4	ExxonMobil	\$1,250.34	0.02565	0.02612
6	5	Lukoil	\$81.83	0.01114	0.01160
1	6	BP	\$500.52	0.04132	0.12843
7	7	Petrobras	\$244.58	0.00968	0.00819
5	8	Royal Dutch Shell	\$641.26	0.01149	0.01397
4	9	Chevron	\$773.03	0.01300	0.01369
8	10	Total	\$323.93	0.00820	0.01117
48	11	Novatek	\$42.79	0.00044	0.00045
9	12	ConocoPhillips	\$259.34	0.00764	0.00955
10	14	ENI	\$252.21	0.00608	0.00869
19	16	Statoil	\$111.79	0.00228	0.00225
85	18	CNOOC	\$0.35	0.00000	
13	19	BG	\$202.15	0.00337	0.00440
11	21	Apache	\$153.70	0.00363	0.00316
14	22	Canadian Natural Resources	\$124.11	0.00286	0.00291
15	23	Anadarko Petroleum	\$186.73	0.00283	0.00284
18	24	BHP Billiton	\$450.78	0.00230	0.00277
12	25	Devon Energy	\$146.00	0.00342	0.00271
24	26	Chesapeake Energy	\$51.84	0.00183	0.00247
83	28	Inpex	\$43.11	0.00001	0.00001
34	30	EOG Resources	\$105.77	0.00085	0.00096
22	31	Suncor Energy	\$159.36	0.00184	0.00201
16	32	Marathon Oil	\$122.13	0.00242	0.00254
20	33	Hess	\$85.37	0.00198	0.00240
47	34	Imperial Oil	\$27.56	0.00044	0.00050
23	35	Encana	\$63.28	0.00184	0.00208
70	36	Energi Mega Persada	\$0.45	0.00023	0.00047
30	37	BASF	\$250.28	0.00112	0.00138
35	38	Repsol	\$84.56	0.00075	0.00265
43	39	OMV	\$31.09	0.00057	0.00087
28	40	Noble Energy	\$90.96	0.00133	0.00109
33	41	Woodside Petroleum	\$62.79	0.00085	0.00093
31	42	Pioneer Natural Resources	\$62.15	0.00103	0.00095
44	42	Freeport-McMoRan	\$129.75	0.00051	0.00057
67	43	Linn Energy	\$19.37	0.00026	0.00038
27	44	Cenovus Energy	\$111.05	0.00156	0.00129
39	46	Range Resources	\$30.18	0.00068	0.00076

2013 CalPERS Ranking	2013 CU Oil & Gas 100 Ranking	Company	2013 Market Value (\$Mil)	2013 EQ / Debt Total CO ₂	2013 Equity 100% CO ₂
42	47	PTT	\$55.84	0.00058	0.00127
61	48	Husky Energy	\$30.62	0.00031	0.00028
36	49	EQT	\$31.94	0.00074	0.00087
52	50	Continental Resources	\$27.18	0.00039	0.00030
21	51	Talisman Energy	\$116.26	0.00191	0.00101
26	53	Sinopec	\$2.69	0.00159	0.00172
41	53	JX Holdings	\$49.07	0.00060	0.00110
32	54	WPX Energy	\$20.15	0.00092	0.00116
45	55	Santos	\$32.15	0.00047	0.00068
51	56	SK Innovation	\$19.92	0.00039	0.00041
46	57	QEP Resources	\$15.96	0.00045	0.00062
37	58	Southwestern Energy	\$48.47	0.00070	0.00051
49	59	Consol Energy	\$16.55	0.00041	0.00049
68	60	Cabot Oil & Gas	\$37.91	0.00025	0.00027
56	61	SandRidge Energy	\$8.53	0.00035	0.00048
29	62	Newfield Exploration	\$37.65	0.00114	0.00032
25	63	Murphy Oil	\$110.14	0.00164	0.00077
81	66	Maersk Group	\$53.85	0.00006	0.00006
55	67	Concho Resources	\$25.16	0.00035	0.00036
58	68	Ultra Petroleum	\$10.48	0.00034	0.00059
60	69	Denbury Resources	\$19.37	0.00033	0.00043
77	70	GDF SUEZ	\$106.03	0.00018	0.00036
74	71	MEG Energy	\$12.34	0.00019	0.00029
54	72	Whiting Petroleum	\$18.67	0.00037	0.00046
69	73	RWE	\$67.50	0.00023	0.00050
50	74	MOL	\$31.69	0.00040	0.00059
59	75	Crescent Point Energy	\$34.31	0.00033	0.00037
65	77	Mitsui	\$87.22	0.00027	0.00054
64	78	Penn West Petroleum	\$15.40	0.00029	0.00042
53	79	Pacific Rubiales Energy	\$29.55	0.00039	0.00068
57	81	Cimarex Energy	\$16.72	0.00035	0.00038
62	82	Energen	\$11.27	0.00029	0.00038
84	83	TAQA	\$0.71	0.00000	
75	84	Oil Search	\$22.25	0.00019	0.00027
66	85	ARC Resources	\$21.58	0.00026	0.00029
63	86	Canadian Oil Sands	\$28.01	0.00029	0.00034
78	87	Genel Energy	\$6.23	0.00017	0.00017
79	88	SM Energy Company	\$8.27	0.00014	0.00012
82	89	Sasol	\$2.18	0.00001	0.00001
38	90	National Fuel Gas	\$58.53	0.00069	0.00025
40	91	Tullow Oil	\$107.60	0.00060	0.00069

2013 CalPERS Ranking	2013 CU Oil & Gas 100 Ranking	Company	2013 Market Value (\$Mil)	2013 EQ / Debt Total CO ₂	2013 Equity 100% CO ₂
72	92	Pengrowth Energy	\$9.51	0.00020	0.00033
73	94	Vermilion Energy	\$14.54	0.00020	0.00024
71	95	Peyto E&D	\$13.47	0.00021	0.00025
80	96	Quicksilver Resources	\$1.85	0.00010	0.00043
76	98	Forest Oil	\$3.45	0.00019	0.00053
Oil & Gas Total			\$8,988.61	0.23886	0.35288

EXHIBIT A2

New CU 100 Coal Investments in India, China, Russia, Indonesia and Australia 2004-2013

	Book Value (\$Mil) 2013	Market Value (\$Mil) 2013	Equity / Debt CO ₂ 2013	Equity 100% CO ₂ 2013
Australia				
AGL Energy Limited	\$20.76	\$21.53	0.00574	0.00792
Aquila Resources Limited	\$3.42	\$0.72	0.00066	0.00067
Coalspur Mines Ltd	\$2.35	\$0.36	0.00211	0.00294
Cockatoo Coal Limited	\$1.06	\$0.06	0.00078	0.00189
Whitehaven Coal Ltd	\$8.87	\$3.26	0.00252	0.00311
China				
China Coal Energy Co	\$11.10	\$5.34	0.00518	0.00929
China Resources Power Holdings Co Ltd	\$16.87	\$16.17	0.00040	0.00080
China Shenhua Energy Co Ltd	\$62.04	\$38.58	0.02046	0.02395
Datang Intl Power Generation Co Ltd	\$2.65	\$2.43	0.00105	0.00551
Shougang Fushan Resources Group Ltd	\$8.44	\$5.44	0.00079	0.00079
Yanzhou Coal Mining Company	\$0.25	\$0.15	0.00003	0.00004
India				
Adani Enterprises Ltd	\$4.57	\$1.86	0.00391	0.01241
Coal India	\$12.96	\$9.73	0.01747	0.01747
Jindal Steel & Power	\$21.92	\$8.98	0.00079	0.00079
NTPC	\$3.86	\$0.52	0.00013	0.00013
Steel Authority of India	\$7.34	\$3.22	0.00028	0.00028
Tata Power Company	\$4.52	\$3.30	0.00098	0.00098
Tata Steel	\$10.61	\$5.49	0.00329	0.00329
Indonesia				
Adaro Energy Tbk PT	\$8.31	\$3.58	0.00161	0.00207
Bayan Resources Tbk	\$0.11	\$0.05	0.00003	0.00004
Asia Resources Minerals (Bumi)	\$13.98	\$5.12	0.01449	0.01449
Indika Energy Tbk	\$0.26	\$0.13	0.00005	0.00016
Russia				
Magnitogorsk Iron & Steel Works OJSC	\$3.88	\$1.67	0.00005	0.00005
Mechel OAO	\$6.37	\$3.25	0.00222	0.01827
Novolipetsk Iron & Steel Corp	\$13.87	\$9.36	0.00015	0.00015
Polyus Gold Intl Ltd	\$5.08	\$4.83	0.00108	0.00119

	Book Value (\$Mil) 2013	Market Value (\$Mil) 2013	Equity / Debt CO ₂ 2013	Equity 100% CO ₂ 2013
Severstal	\$5.86	\$3.40	0.00098	0.00174
United Company RUSAL Plc	\$4.66	\$2.91	0.00057	0.00153

EXHIBIT A3

CalPERS Carbon Underground Coal Investments Appearing All Years

Company	CU Market Value (\$Mil) 2013	EQ / Debt Total CO ₂ 2013
Anglo American Plc	\$156.81	0.04555
BHP Billiton	\$450.78	0.03458
Peabody Energy	\$12.34	0.01421
Rio Tinto	\$256.06	0.01035
Public Power Corporation SA	\$7.54	0.00803
Mitsubishi Corp	\$78.39	0.00659
Mitsui & Co Ltd	\$91.68	0.00296
Consol Energy Inc	\$14.11	0.00294
RWE AG	\$65.95	0.00293
Wesfarmers Limited	\$111.82	0.00259
Arch Coal Inc	\$2.26	0.00248
Itochu Corp	\$72.65	0.00204
CLP Holdings Ltd	\$42.79	0.00111
Allete Inc	\$4.42	0.00101
Alliance Resource Partners LP	\$3.82	0.00093
Westmoreland Coal Company	\$0.38	0.00064
Walter Energy Inc	\$1.42	0.00027
Sasol Limited	\$2.18	0.00019
Nippon Steel & Sumitomo Metal Corporation	\$12.28	0.00008

EXHIBIT A4

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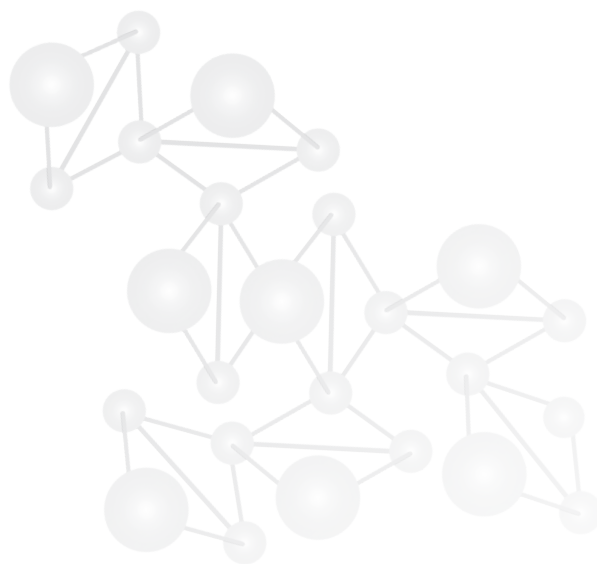
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