The Impact of Energy Investments on the Financial Value and the Emissions of Pension Funds

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Executive Summary

This report presents the results of analyses conducted on a group of pension funds that belong to the Climate Safe Pensions Network (CSPN). The funds' cumulative values with and without public equity energy investments have been analyzed for the time between 2013 and 2022. The analyses demonstrate that the cumulative value of the public company equity portfolio of pension funds would have been 13 percent higher on average if the funds had been divested from the energy sector ten years ago. Even during the last three years, the cumulative value of the ex-energy portfolios has been only 2 percent smaller than the value of the conventional portfolios. However, share prices in the energy sector increased recently. For the six funds analyzed using data obtained from the Bloomberg database, the total value of the ex-energy portfolios would have been $424.6 billion, while the total value of the reference portfolios was $402.8 billion. Hence, the difference is more than $20 billion. Furthermore, the carbon intensity of the original and ex-energy portfolios have been calculated based on the ratio of holdings compared to the total market values of the holdings. The carbon emissions difference between the original and ex-energy portfolios is 16.6 percent or 279 million metric tonnes. This is the equivalent of the energy use of 35 million homes per year. Overall, we could demonstrate that energy divestment makes sense from a financial, climate exposure, and climate impact perspective.

Introduction

This report presents the results of analyses conducted on a group of pension funds that belong to the Climate Safe Pensions Network (CSPN). The scope of the analyses includes the historical public equity investments of the funds and are based on data provided by either Bloomberg or Capital IQ. The analyses were conducted between 2013 and 2022 for the funds with publicly accessible data.

Data for eight of the CSPN funds were available, including:

- Alaska Permanent Fund Corporation (APFC)
- Alaska Retirement Management Board (ARMB)
- California Public Employees' Retirement System (CalPERS)
- California State Teachers' Retirement System (CalSTRS)
- Colorado Public Employees' Retirement Association (CoPERA)
- New York State Teachers' Retirement System (NYSTRS)
- Oregon Public Employees' Retirement Fund (OPERF)
- State of Wisconsin Investment Board (SWIB)

The report presents the following results:

- A review of the historical performance of the eight pension funds in the CSPN listed above for the last ten years, focusing on their public equity portfolios (stocks) with and without energy (GICS 10) investments. We mainly present the cumulative value (V_c) with and without energy stocks as presented in function 1;
- A review of the GHG emissions of the funds with and without energy investments; and
- A sound methodology for backtesting public equity portfolio performance for the CSPN pension funds with and without energy sector investments.

$$V_c = Original\ Value\ of\ Fund\ (100\%) + \frac{(Current\ Value\ of\ Fund) - (Original\ Value\ of\ Fund)}{Original\ Value\ of\ Fund}$$

Equation 1: Calculation of the Cumulative Value (V_c)

Results

The following section presents the results for the funds' public equity cumulative financial value (Vc) and GHG emissions for the reference and energy sector removed portfolios.

Cumulative value with and without energy investments

Figure 1 presents the cumulative value for the funds between 2013 and 2022. The average cumulative value is Vc = 261%, while Vc ex-energy is Vc_{ex} = 274%. The highest difference is 18%, while the lowest is 4%. However, the value of all the funds would have been higher if the funds had divested from energy holdings in 2013.

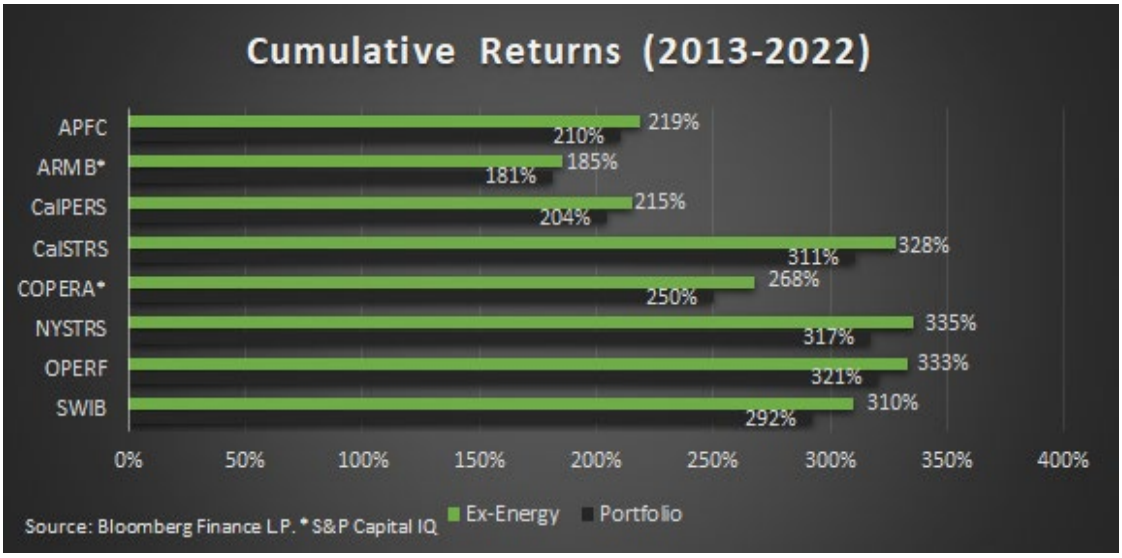


Figure 1: Cumulative fund values between 2013 and 2022

We also analyzed both scenarios between 2019 and 2022 to explore how recent changes in the performance of the energy sector due to major global events such as COVID-19 and the war in Ukraine influence the funds' public equity performance. The results are presented in Figure 2.

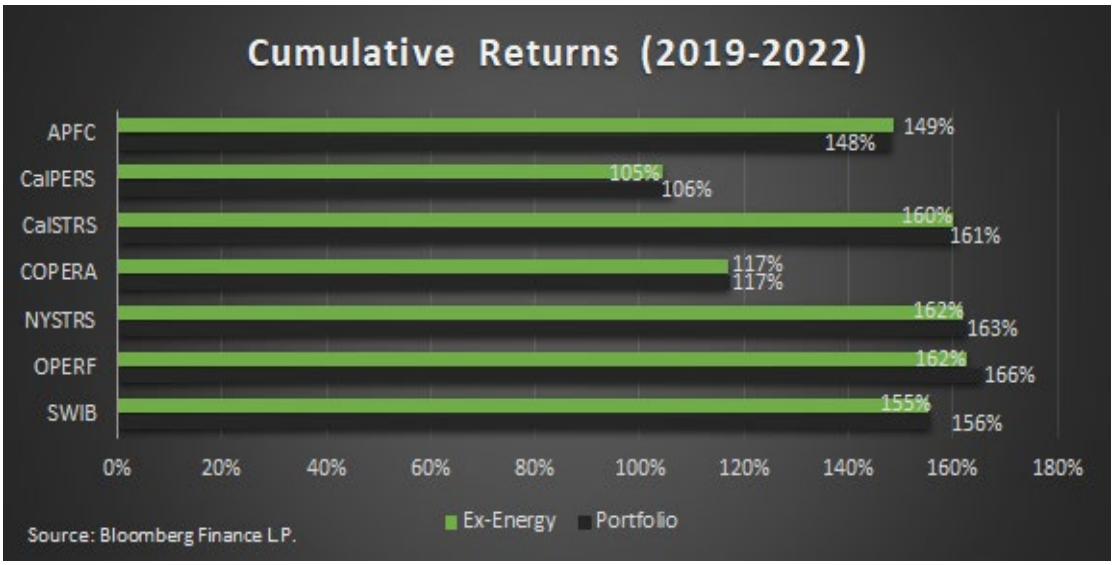


Figure 2: Cumulative fund values between 2019 and 2022

The differences between the reference portfolio and the ex-energy portfolio are smaller compared to the ten-year comparison. The average Vc = 144%, while the value without energy investments is Vc_{ex} = 142%. Broken down by funds, the differences are between 0% and 3%.

In addition to the cumulative value, we present a set of detailed portfolio statistics in Table 1. The table presents the average values for the funds analyzed through the Bloomberg database (AFPC, CalPERS, CalSTRS, NYSTRS, OPERF, SWIB). Red values represent lower return and higher risk values for the respective portfolio (ex-energy vs. the original portfolio).

The indicators for the individual funds can be found in the attached Excel file 'Fund Data Set for Annex'. Since the equity investments of the different funds are relatively similar, the results for the individual funds do not vary significantly.

Table 1: Summary statistics for all six funds from the Bloomberg database (Average of all funds, Risk and Return values in percent)

Portfolio Statistics	2022	2022	2021	2021	2020	2020	2019	2019	2018	2018	2017	2017	2016	2016	2015	2015	2014	2014	2013	2013	Median	Median
Return																						
Total Return	-17.56	-19.50	24.89	24.17	18.13	20.10	23.21	23.91	-6.44	-5.77	21.85	23.41	11.34	10.26	-0.42	1.54	10.89	13.20	30.76	31.70	11.34	12.27
Maximum Return	5.13	5.29	2.40	2.40	9.37	9.25	3.26	3.24	4.48	4.41	1.46	1.43	2.61	2.58	3.41	3.40	2.24	2.26	2.43	2.44	2.61	2.92
Minimum Return	-4.07	-4.13	-2.63	-2.64	-11.81	-11.76	-7.74	-7.88	-3.74	-3.73	-1.78	-1.83	-3.90	-3.90	-3.92	-3.82	-2.36	-2.42	-2.69	-2.66	-3.74	-3.78
Mean Return (Annualized)	-20.78	-23.31	38.16	37.03	36.68	39.64	37.29	38.48	-7.21	-6.27	32.31	34.70	17.64	16.00	0.98	3.73	16.61	20.02	48.65	50.22	17.64	18.83
Mean Excess Return (Annualized)																						
Risk																						
Standard Deviation (Annualized)	23.00	23.31	13.14	13.11	33.64	33.31	15.82	15.91	15.98	15.98	7.12	7.19	13.52	13.25	14.90	14.70	11.23	11.17	11.22	11.20	13.52	14.11
Downside Risk (Annualized)	16.06	16.21	9.64	9.62	25.38	25.08	13.08	13.19	12.07	12.08	5.04	5.10	9.95	9.78	10.75	10.64	8.42	8.40	8.36	8.32	9.95	10.30
Skewness	0.06	0.09	-0.33	-0.34	-0.75	-0.73	-2.67	-2.69	-0.44	-0.45	-0.26	-0.29	-0.48	-0.50	-0.27	-0.27	-0.43	-0.45	-0.51	-0.46	-0.43	-0.44
VaR 95% (ex-post)	-2.39	-2.41	-1.32	-1.32	-3.08	-3.04	-1.13	-1.09	-1.94	-1.88	-0.53	-0.53	-1.30	-1.28	-1.42	-1.44	-1.19	-1.17	-1.17	-1.14	-1.30	-1.31
Tracking Error (Annualized)																						
Risk/Return																						
Sharpe Ratio	-0.75	-0.82	1.96	1.91	0.73	0.80	1.96	2.03	-0.47	-0.43	2.96	3.15	0.88	0.81	0.03	0.17	1.00	1.22	2.90	3.00	0.88	0.85
Energy Weight	5.17		2.56		2.24		4.04		5.14		5.74		7.05		6.54		8.18		9.76		5.17	
Ex-Energy Performance Alpha		-1.95		-0.72		1.97		0.70		0.67		1.56		-1.07		1.96		2.32		0.95		0.70
Ex-Energy Risk Adjusted Performance Alpha		-0.07		-0.05		0.07		0.07		0.04		0.19		-0.07		0.13		0.21		0.09		0.07
Ex-Energy Standard Deviation Alpha		0.30		-0.03		-0.33		0.09		0.00		0.07		-0.27		-0.19		-0.06		-0.01		-0.03
Ex-Energy Downside Risk Alpha		0.15		-0.02		-0.29		0.11		0.01		0.06		-0.17		-0.10		-0.03		-0.04		-0.02

Black = reference portfolio; Green = ex-energy portfolio

The following figures (Figure 3 to Figure 10) present the cumulative values between 2013 and 2022 for the individual funds with and without energy investments. Overall, the development of the fund values over time looks very similar for the different funds. Also, the ex-energy portfolios outperform the reference portfolios of all funds.

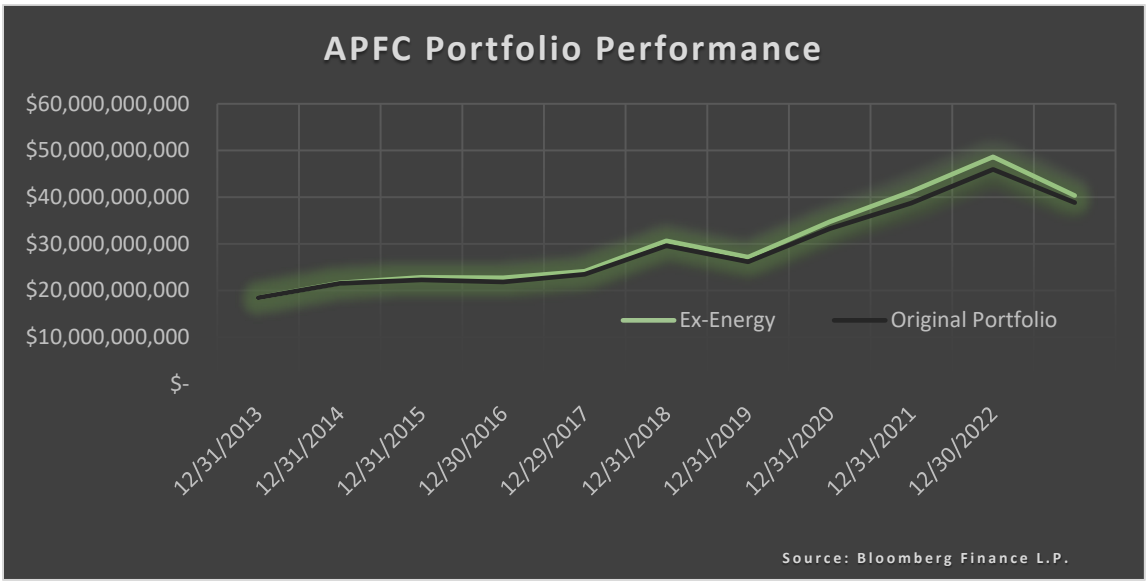


Figure 3: APFC financial performance with and without energy investments between 2013 and 2022

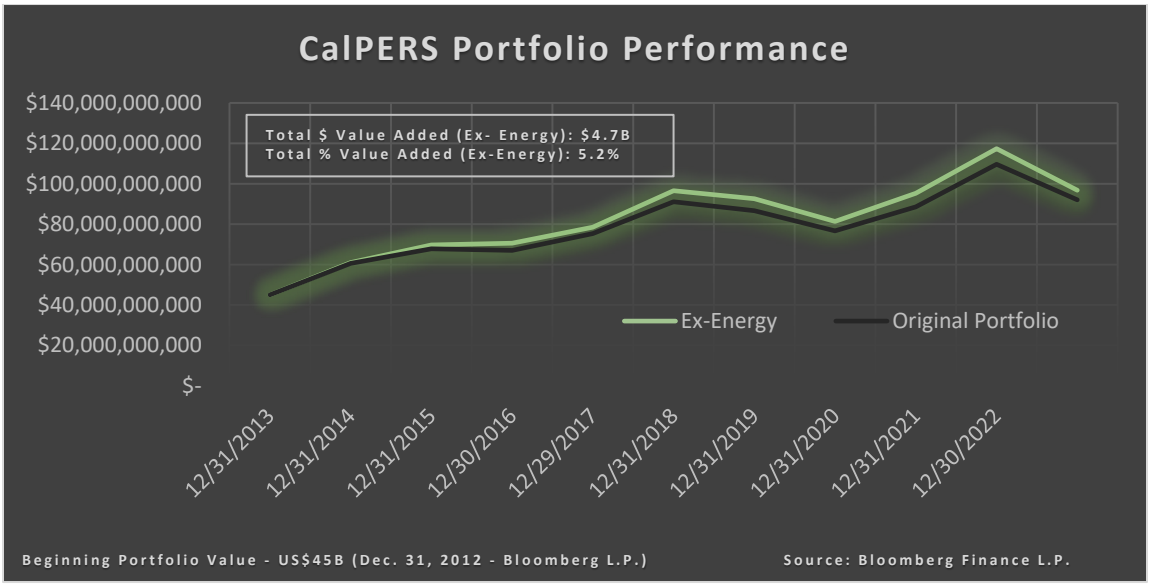


Figure 4: CalPERS financial performance with and without energy investments between 2013 and 2022

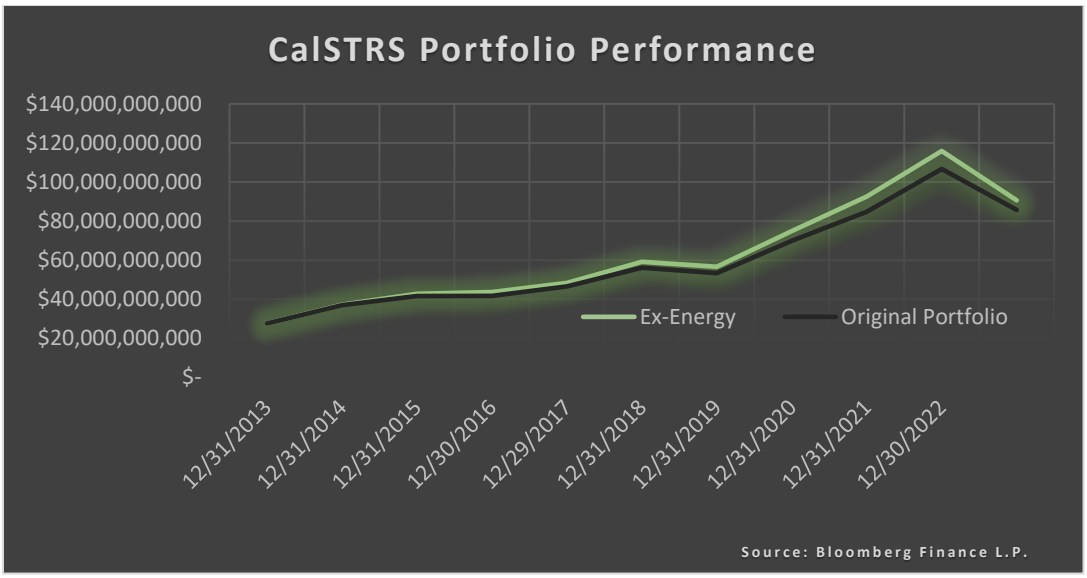


Figure 5: CalSTRS financial performance with and without energy investments between 2013 and 2022

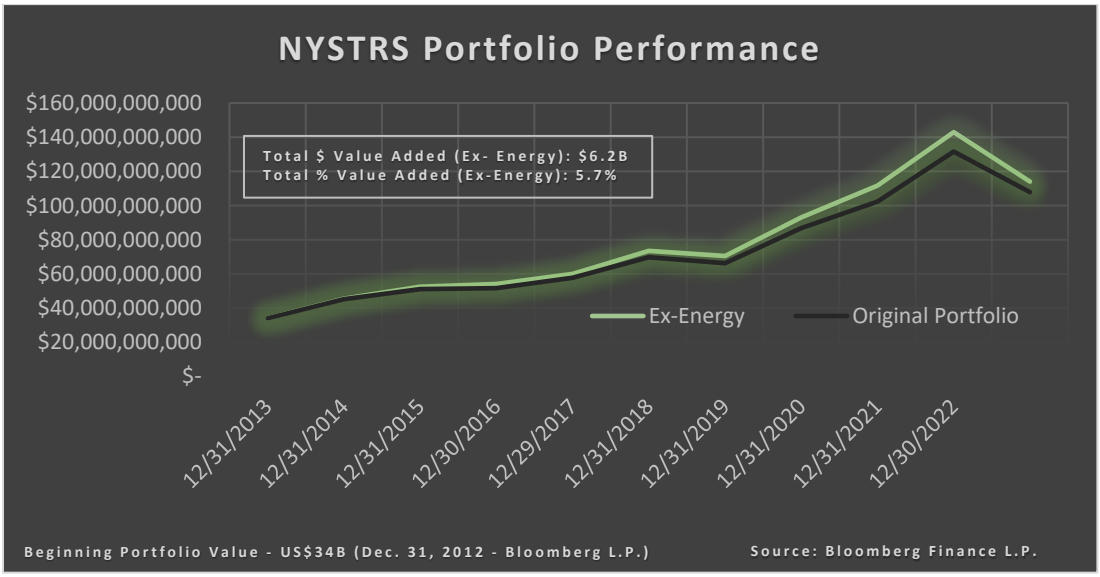


Figure 6: NYSTRS financial performance with and without energy investments between 2013 and 2022

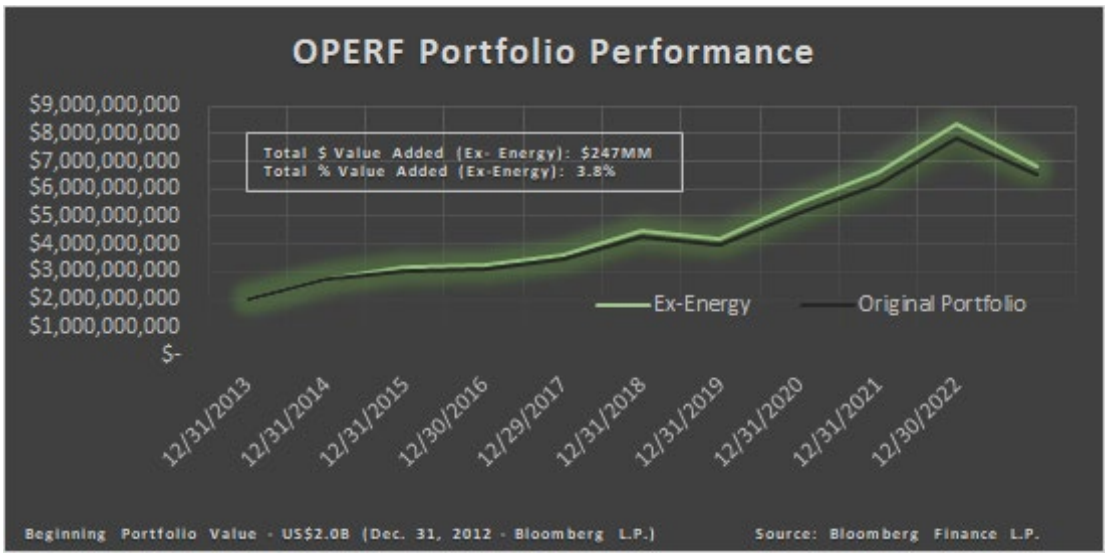


Figure 7: OPERF financial performance with and without energy investments between 2013 and 2022

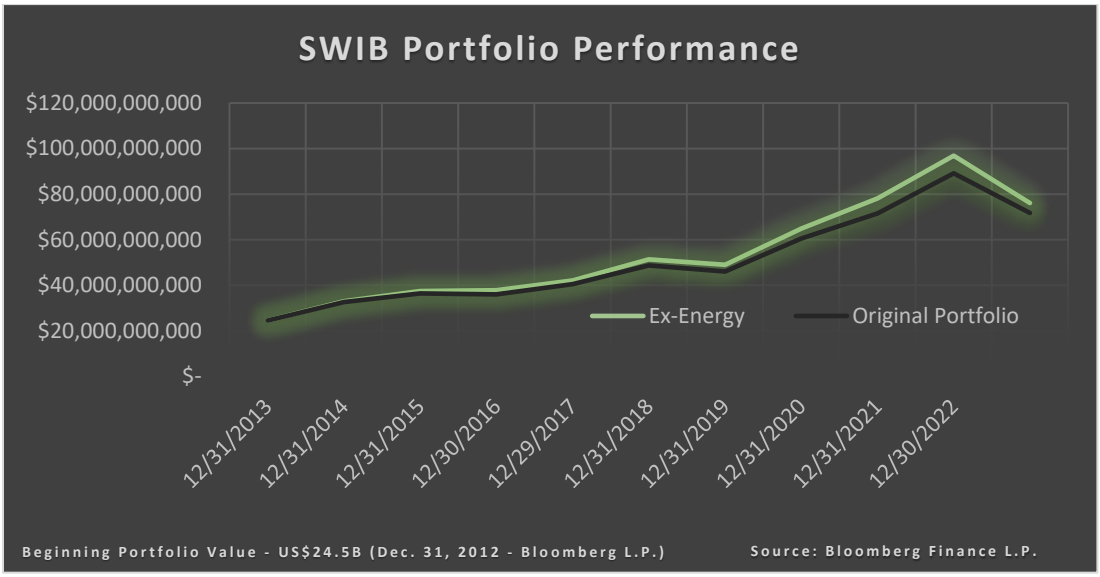


Figure 8: SWIB financial performance with and without energy investments between 2013 and 2022

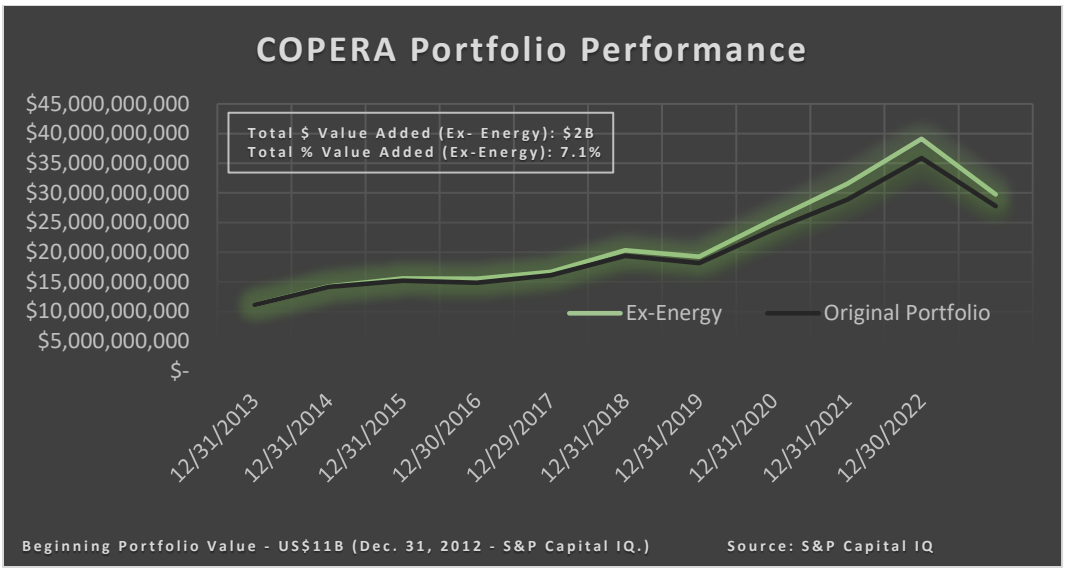


Figure 9: COPERA financial performance with and without energy investments between 2013 and 2022

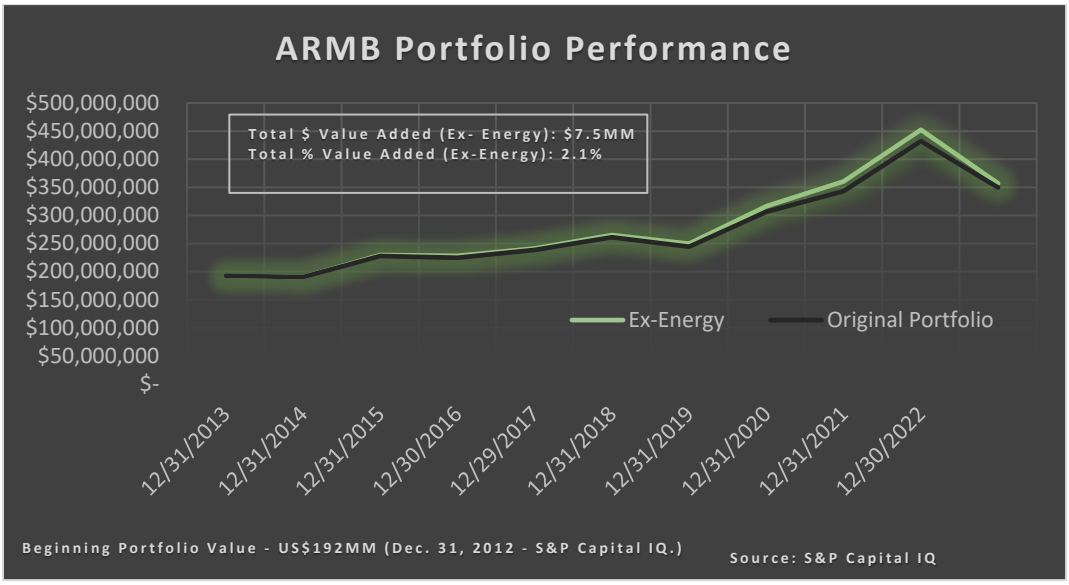
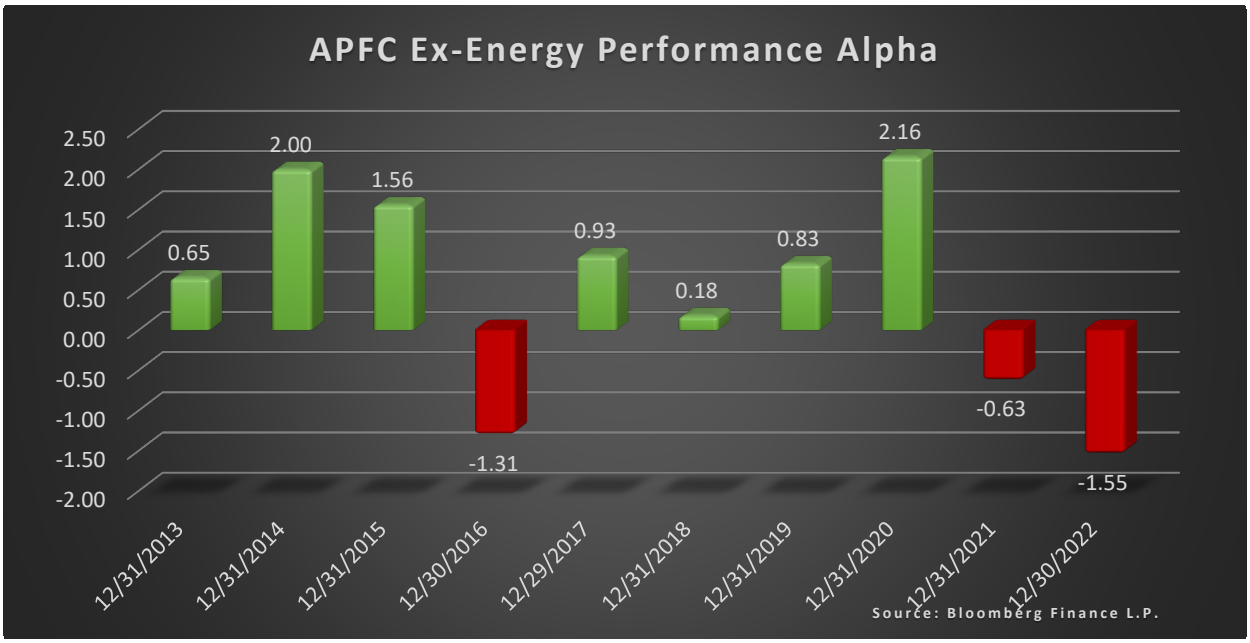


Figure 10: ARMB financial performance with and without energy investments between 2013 and 2022

The funds' ex-energy Performance and Risk Adjusted Performance (Sharpe) Alphas are presented in the following figures (Figure 11 to Figure 16).



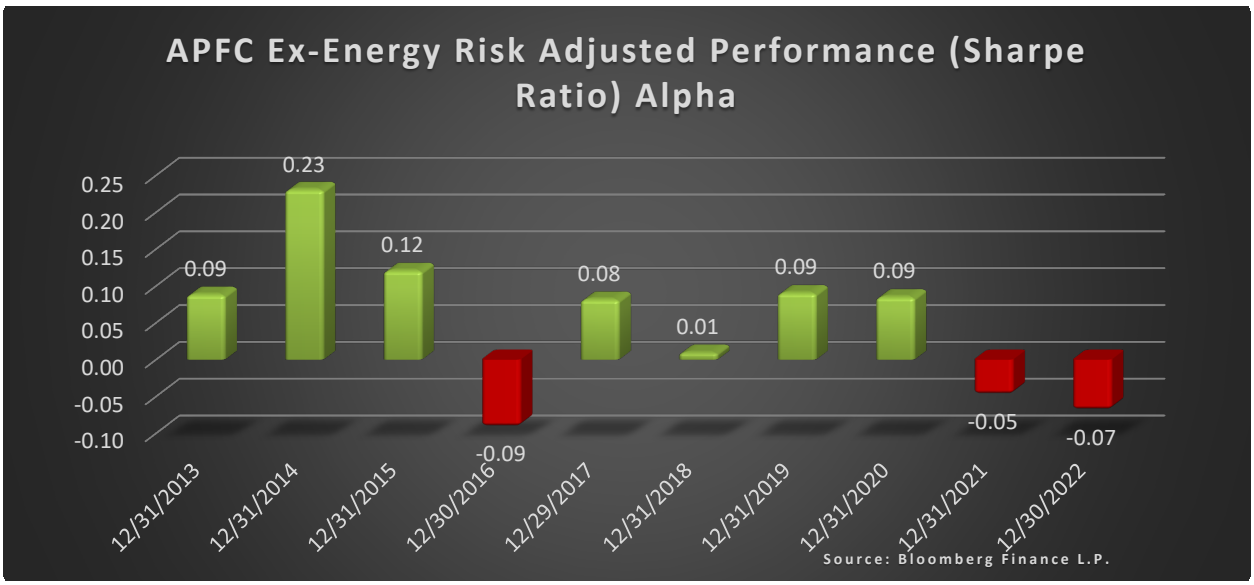
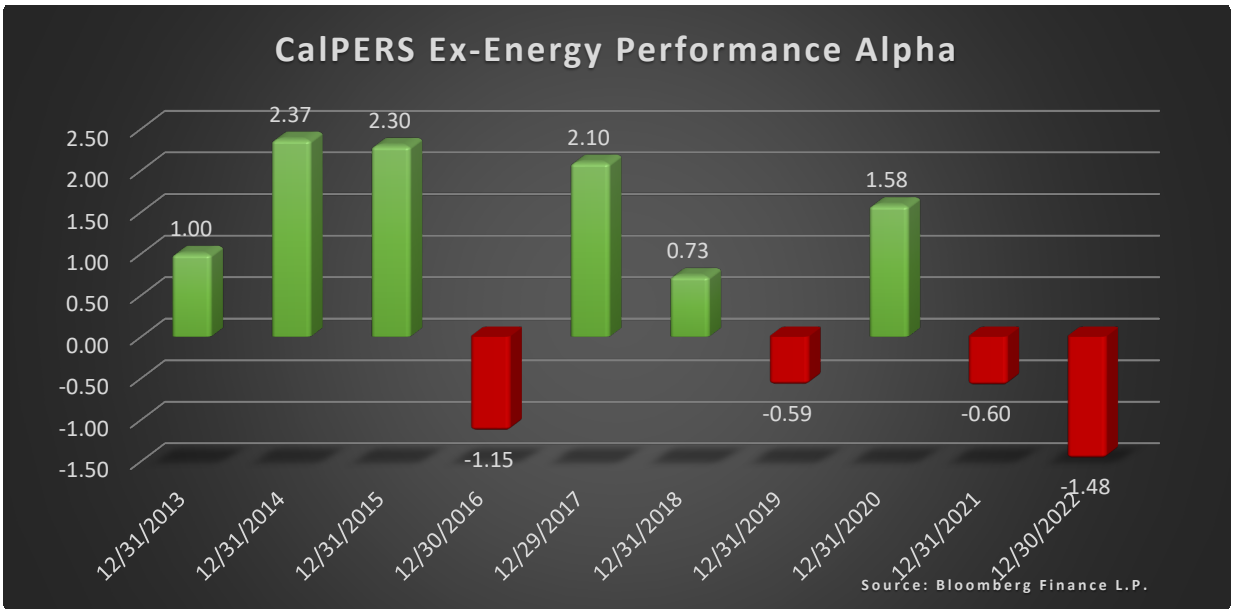


Figure 11: APFC ex-energy Performance and Risk Adjusted Performance Alpha between 2013 and 2022



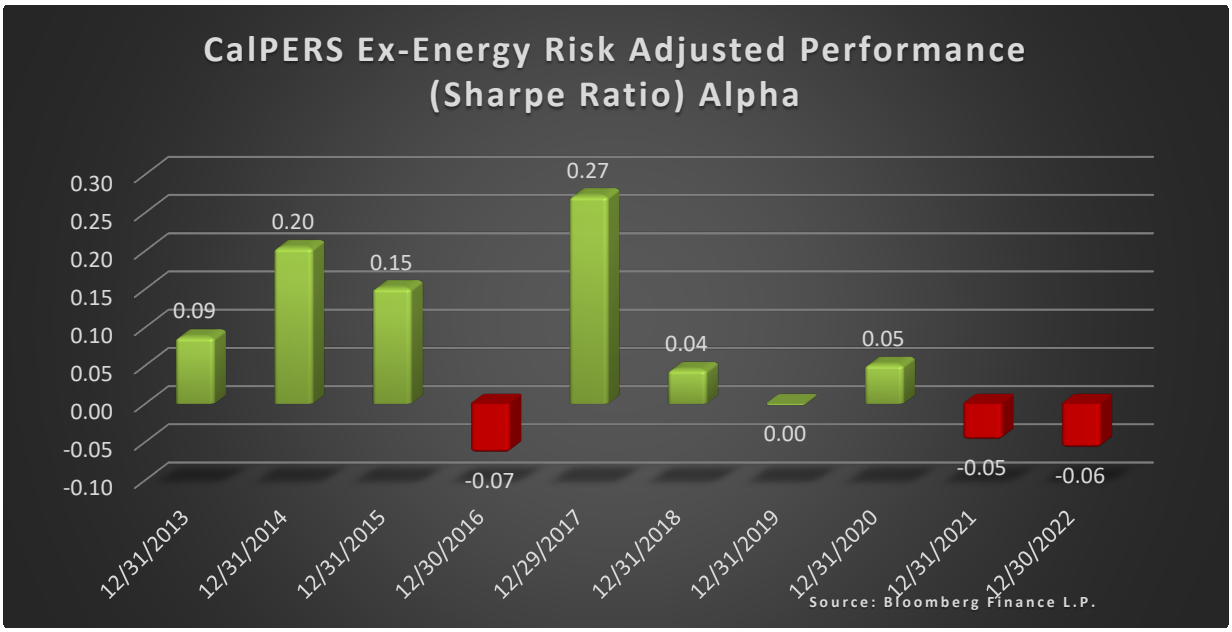
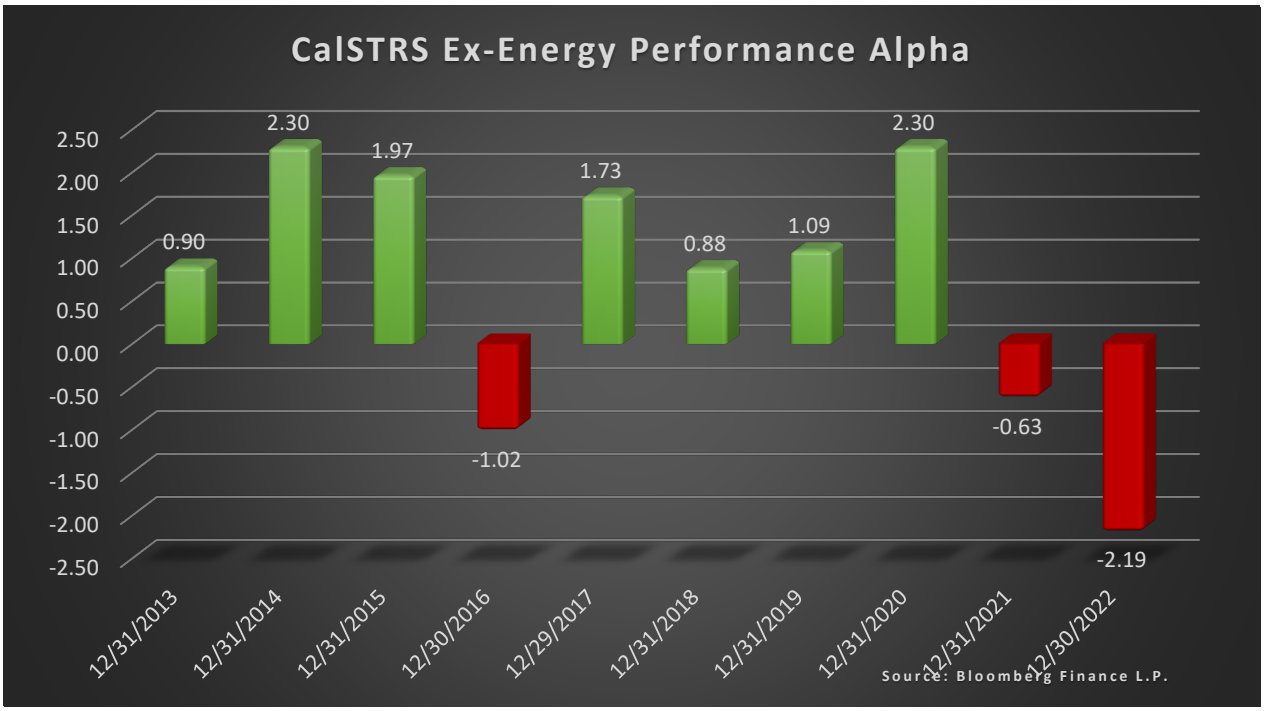


Figure 12: CalPERS ex-energy Performance and Risk Adjusted Performance Alpha between 2013 and 2022



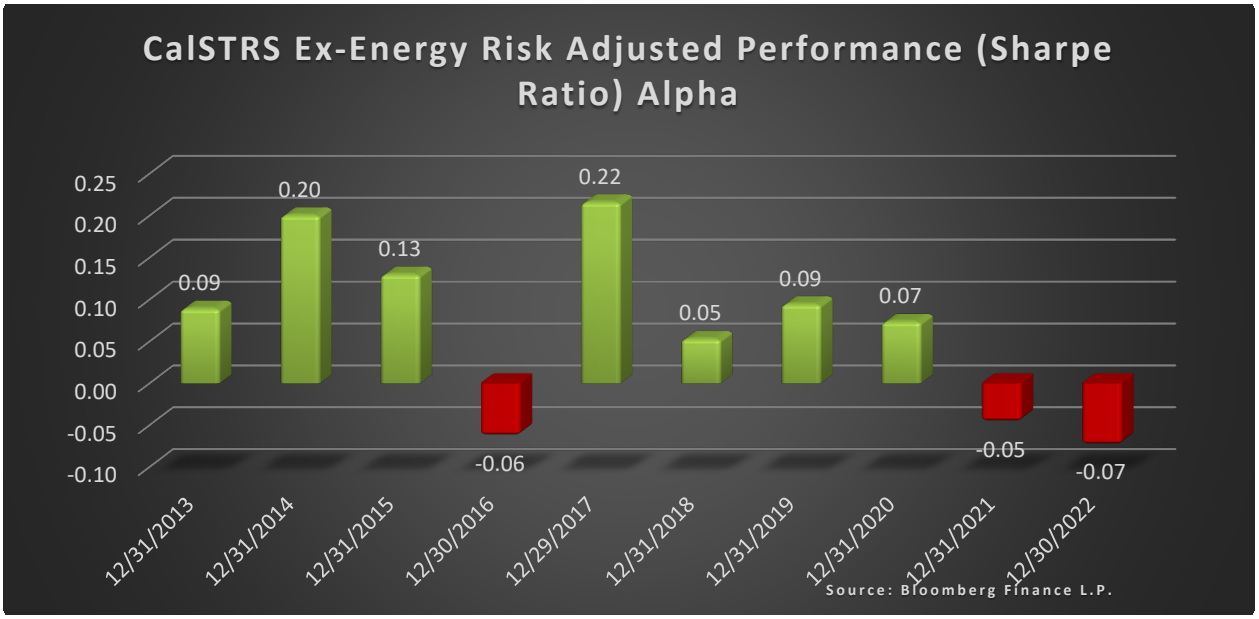
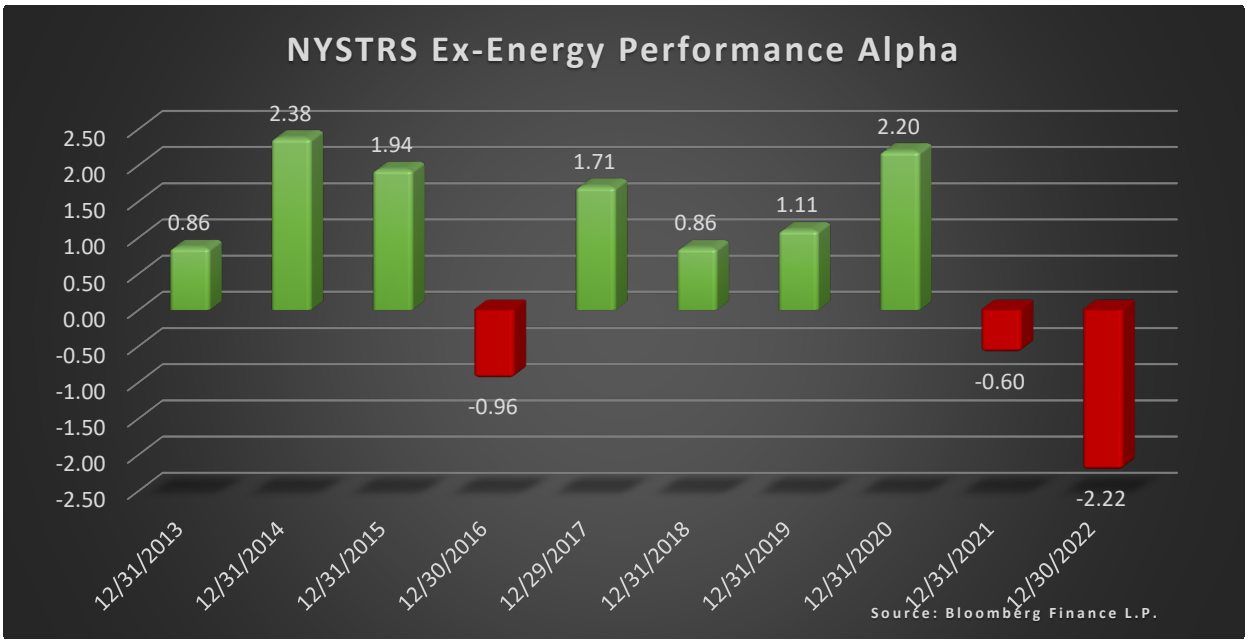


Figure 13: CalSTRS ex-energy Performance and Risk Adjusted Performance Alpha between 2013 and 2022



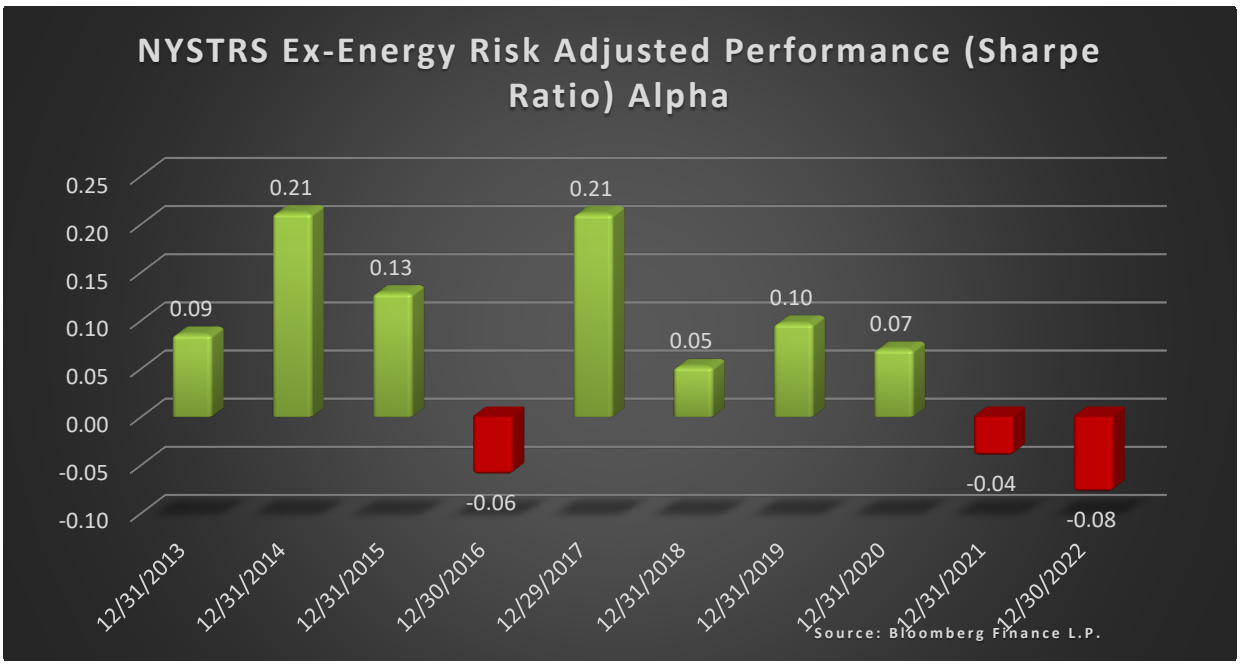
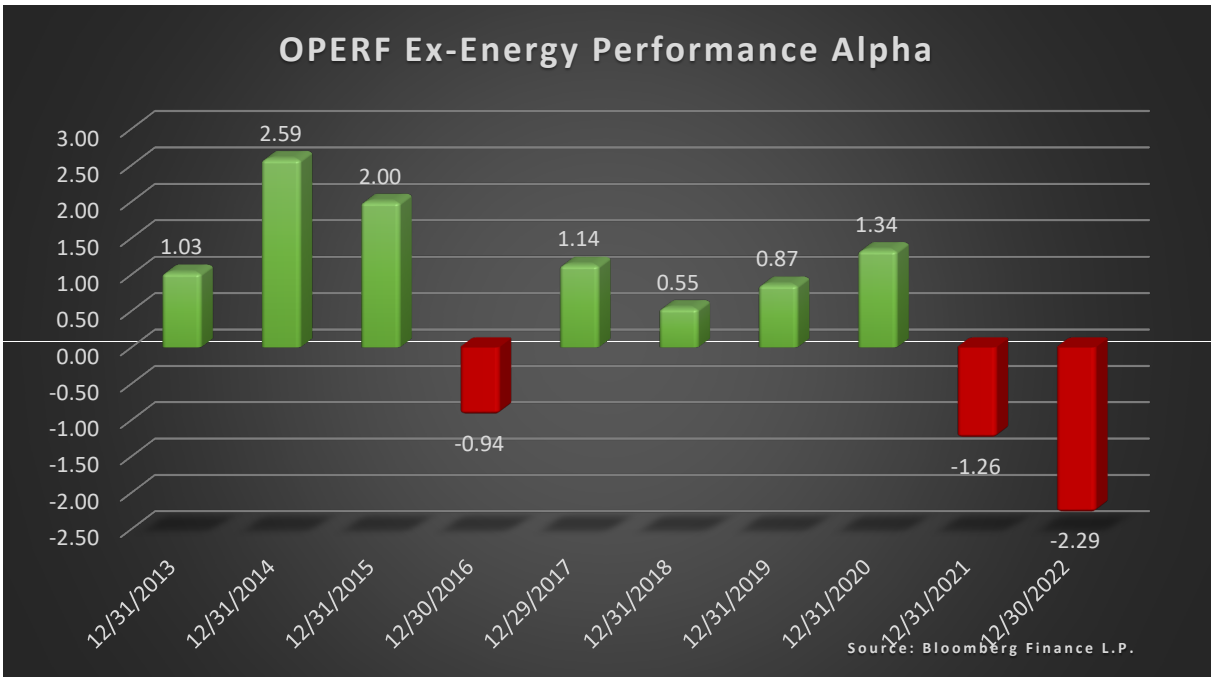


Figure 14: NYSTRS ex-energy Performance and Risk Adjusted Performance Alpha between 2013 and 2022



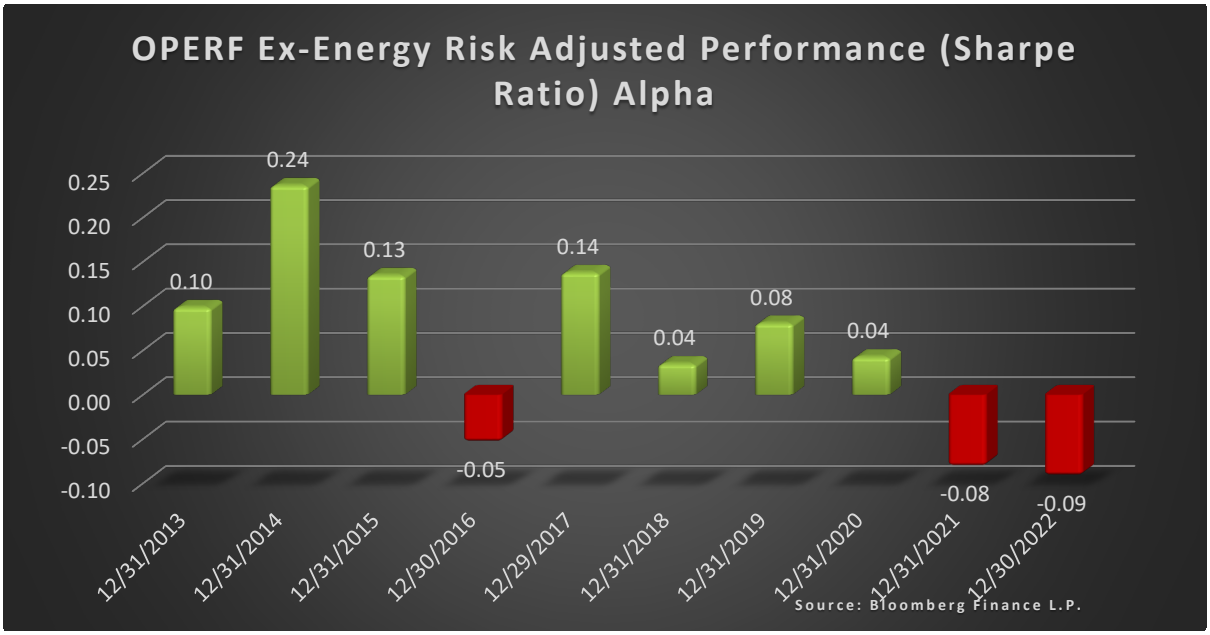
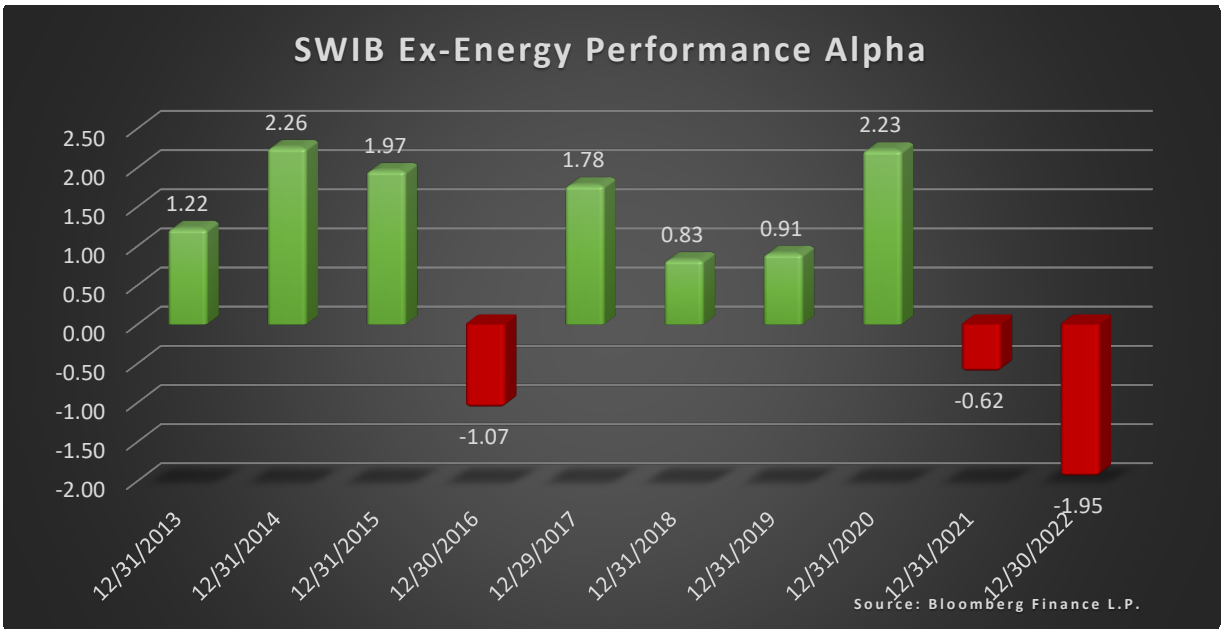


Figure 15: OPERF ex-energy Performance and Risk Adjusted Performance Alpha between 2013 and 2022



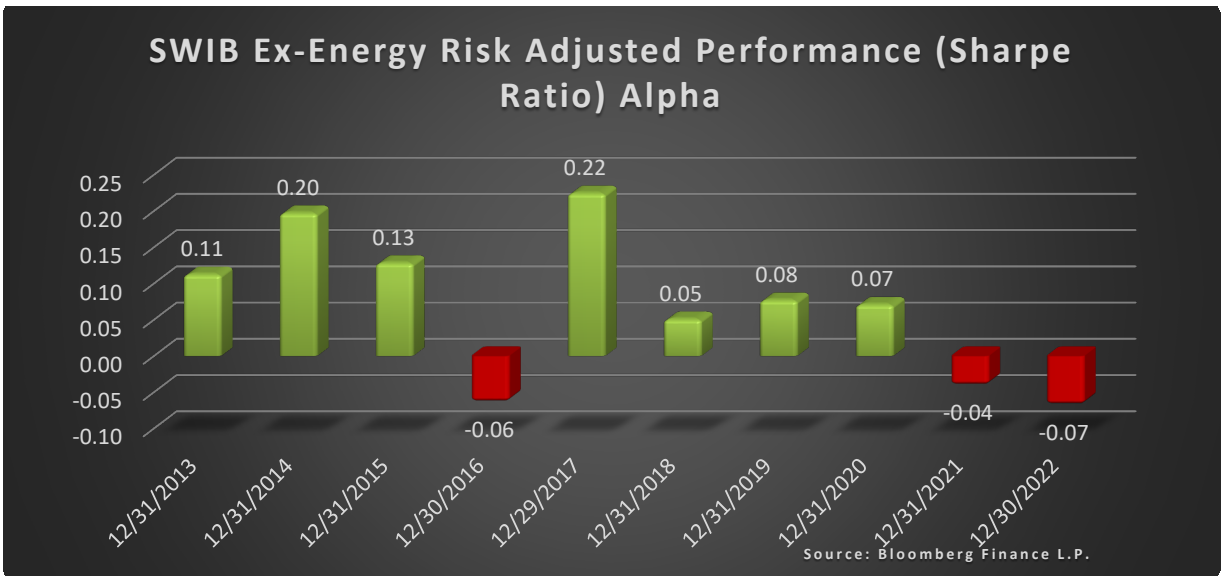


Figure 16: SWIB ex-energy Performance and Risk Adjusted Performance Alpha between 2013 and 2022

For COPERA and ARMB, Risk Adjusted Performance (Sharpe ratio) Alpha were unavailable. Therefore, we only present the ex-energy Performance Alpha in Figure 17 and Figure 18.

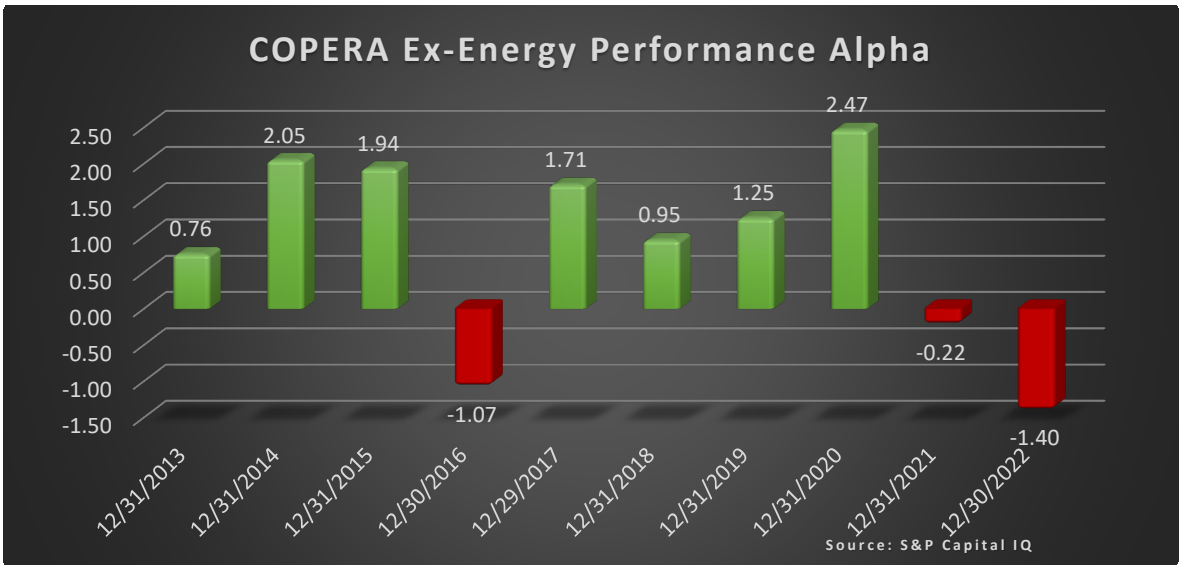


Figure 17: COPERA ex-energy Performance Alpha between 2013 and 2022

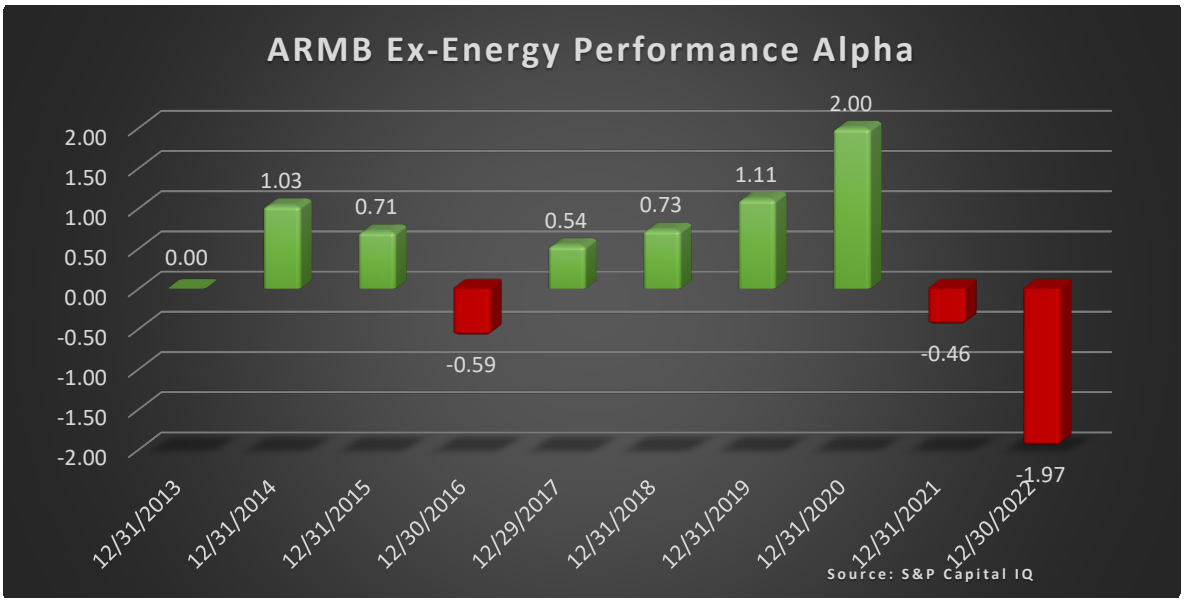


Figure 18: ARMB ex-energy Performance Alpha between 2013 and 2022

Overall the results suggest that Return Alpha and Risk-adjusted Return Alpha are positive for most of the analyzed years. As expected, the ex-energy alphas were negative for the last two years,

Energy Weight

Concerning the energy weight in the portfolios, we see an interesting development presented in Figure 19. While the energy weight across all funds decreased between 2012 and 2020, it increased again since 2020. This increase can probably be allocated to rising share prices in the sector because of geopolitical issues.

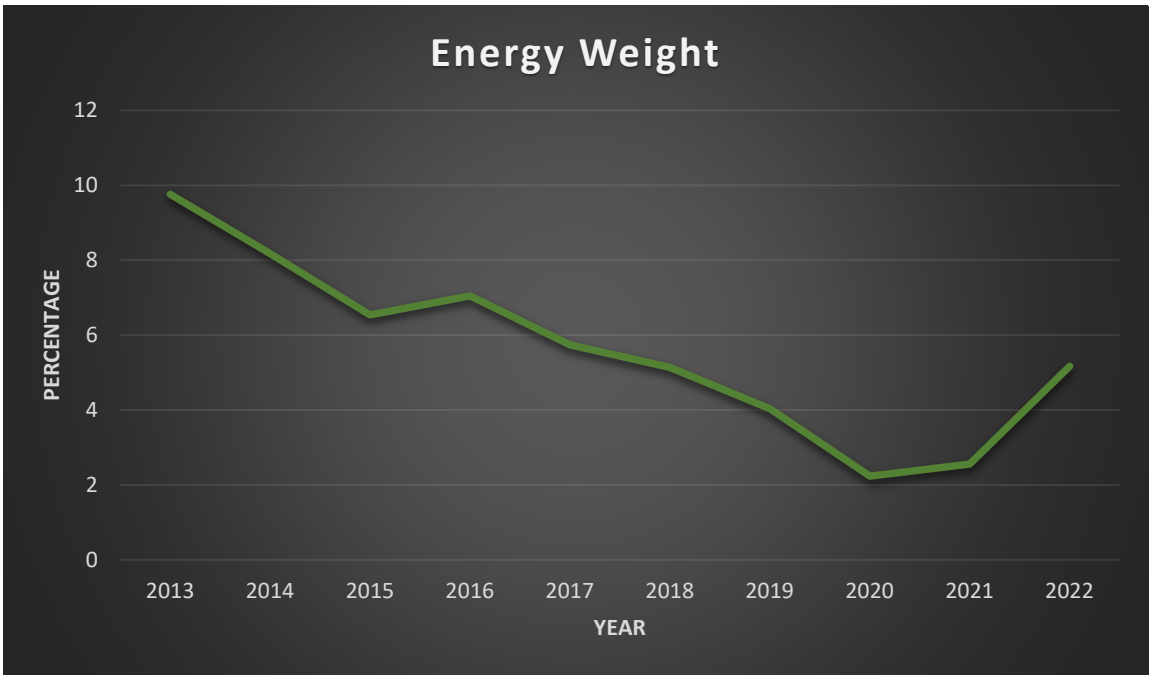


Figure 19: Average Energy ratio between 2013 and 2022

The following presents the energy weights of all funds. In 2016 and 2017, OEPRS had a lower energy weight than the other funds. However, the general tendency for the funds is relatively similar. Energy investments for all funds went up in 2021.

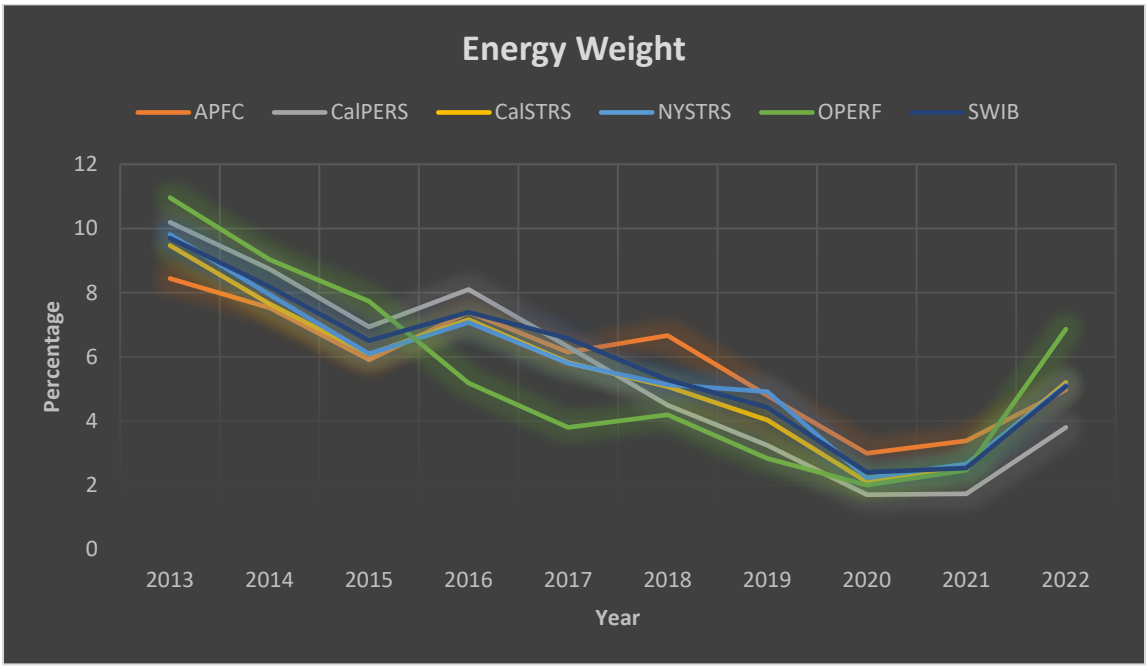


Figure 20: Energy weights of the funds between 2013 and 2022

Emissions Analyses

Based on the Bloomberg database, we analyzed the GHG emissions of the funds based on the ratio of holdings compared to the total market values of the holdings. Then, we calculated the GHG emissions for members of the energy sector and the other sectors, respectively. The results are presented in Table 2.

Table 2: GHG emissions in metric tonnes

Fund	GHG portfolio	GHG ex-energy	Difference	Difference in %
APFC	773,026,160	637,672,723	135,353,438	17.5%
CalPers	115,614,801	103,094,541	12,520,261	10.8%
CalSTRS	111,288,249	91,730,965	19,557,284	17.6%
CoPERA	278,128,685	243,337,013	34,791,671	12.5%
MSRPS	36,005,789	32,960,274	3,045,515	8.5%
NYSTRS	101,451,378	84,783,164	16,668,215	16.4%
OPERF	149,238,012	120,064,700	29,173,312	19.5%
SWIB	116,790,520	88,277,504	28,513,016	24.4%
Average	210,192,949	175,240,110	34,952,839	
Median	116,790,520	103,094,541	28,513,016	
Sum	1,681,543,595	1,401,920,883	279,622,712	16.6%

The average difference in GHG emissions between the reference and ex-energy portfolios is 16.6 percent or 279.6 million metric tonnes. This is the equivalent of the energy use of 35 million homes per year or 62 million gasoline-powered passenger vehicles driven for one year (see https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results).

Methods

The following section will present the methods used for the analyses based on Bloomberg data and the analyses based on Capital IQ data. The latter was used if Bloomberg data was unavailable for specific funds.

Bloomberg analyses

For the financial performance, we conducted a 10-year data retrieval of portfolio performance metrics from Bloomberg Finance L.P. using the <PORT> function. We note that the Bloomberg database was used to analyze the following pension funds as they were accessible using the terminal:

- California Public Employees' Retirement System (CalPERS)
- California State Teachers' Retirement System (CalSTRS)
- New York State Teachers' Retirement System (NYSTRS)
- Alaska Permanent Fund Corporation (APFC)
- Oregon Public Employees' Retirement Fund (OPERF)
- State of Wisconsin Investment Board (SWIB)

The performance period analysed for each fund was December 31, 2012 to December 31, 2022, using public equity investment holdings, weights, and valuation information as disclosed in March 2023. Then, we plotted two scenarios:

- Scenario 1: The reported actual portfolio (reference portfolio) without any exclusions of equity holdings
- Scenario 2: Ex-energy portfolio with the GICS "Energy" sector excluded as defined by the Bloomberg terminal. The weight of the removed equity holdings was redistributed equally across the remaining holdings. This exclusion was run directly using the <PORT> function.

To analyze the GHG emissions for the year 2022, we conducted a data retrieval of portfolio holdings, weights, and emission metrics based on Bloomberg Finance L.P. <PORT> function. Total GHG emissions are defined as "Total GHG Emissions" in millions of metric tonnes of Scope 1 and 2 emissions.

S&P Capital IQ analyses

The S&P Capital IQ database was used to access data for the funds unavailable in the Bloomberg Terminal database. This included the Alaska Retirement Management Board (ARMB) and the Public Employees Retirement Association of Colorado (CoPERA). Historical public holdings information was accessed to obtain Shares Held, Percentage of Equity, and Market Value data for each fund from December 31, 2012 to December 31, 2022. Data was obtained for two scenarios:

- Scenario 1: The reported actual portfolio (reference portfolio) without any exclusions of public equity holdings
- Scenario 2: The energy sector excluded portfolio as defined by the Capital IQ database. The customization window in Capital IQ was used to create this portfolio.

For each fund and portfolio scenario, the price per share for each holding in each year was calculated by dividing the holding market value by the number of shares held. The one-year rate of return was calculated for each holding for each of the ten years. For the reference portfolio scenarios, the one-year weighted rate of return was first calculated by multiplying the one-year rate of return for each holding by the percentage of equity held by the fund and then summing the values for each holding. For the energy sector exclusion scenarios, the one-year weighted return was first calculated by multiplying the one-year rate of return for each holding by the percentage of equity held by the fund plus an equal redistribution of the percentages previously held by the energy sector holdings and then summing the values for each holding. For both scenarios, the one-year weighted return values were then used to calculate the cumulative portfolio value (Vc) from December 31, 2012, to December 31, 2022.

If holdings in the energy sector were removed, the percentage of the portfolio in the energy sector was calculated for each year by subtracting the sum of the percentage of equity of the non-energy holdings from 100 percent. For the ex-energy weighted one-year total portfolio returns calculation, the total return was calculated by redistributing the percentage of equity previously held by energy holdings equally across the ex-energy portfolio.

Discussion and Conclusion

The results of the analyses demonstrate that the cumulative value of the company equity portfolio of pension funds would have been higher if they had divested from the energy sector ten years ago. The

average difference between the reference portfolio and the ex-energy portfolio is 13 percent. Even in a three-year perspective, the cumulative value of the ex-energy portfolios is only 2 percent smaller than the value of the original portfolios. However, share prices in the energy sector increased significantly. For the six funds analyzed using data obtained from the Bloomberg database, the total value of the ex-energy portfolios would have been $424.6 billion, while the value of the reference portfolios was $402.8 billion. Hence, the difference is more than $20 billion.

In addition to creating additional value, ex-energy portfolios have lower exposure to climate risks and have less GHG emissions. This is important because the financial industry, including many institutional investors, strives for net-zero portfolios. Hence, energy divestments are able to create a win-win situation with higher financial returns and lower emissions.

A weakness of the study is that it could not analyze differences between reference and ex-energy portfolios of funds that do not directly invest and disclose their investments in public equities. Most member funds (12) of the Climate Safe Pensions Network (CSPN) invest exclusively or partially in other financial products. Due to this data not being publicly available, conducting our analyses on these funds and their financial products was not possible.

Future analyses could go into more detail with regard to the emissions of particular portfolio holdings on a per-holdings basis. They might analyze the emissions of specific companies and then exclude those with the highest emissions.

Annex

See the file 'Fund Data Set for Annex' for detailed fund data.