

Week 5 Term Project Checkpoint B

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Introduction

Investing in Energy. Powered by Insight. After reflecting on feedback from my initial checkpoint and applying what I've learned through recent assignments, I've decided to narrow the focus of my term project to the energy sector. Concentrating on a single industry allows for deeper, more intentional analysis, and energy's long-established role in the market offers a rich history of price and volume data for robust technical modeling.

My interest in energy stems from both its critical role in the global economy and its meaningful impact on the environment. Energy powers nearly every aspect of modern life, and as someone preparing to start a family, I've become increasingly mindful of long-term sustainability. The ethical dimension of energy investing, particularly in companies working toward environmentally responsible solutions, is something I care deeply about. Cultural references like *Avatar* highlight the risks of resource exploitation without regard for future generations, a theme that resonates with me both personally and professionally.

My investment philosophy is rooted in technical analysis and guided by clear trading rules that inform security selection, entry points, and exit timing. The goal is to generate above-average income and build long-term wealth through disciplined, data-driven decisions, both personally and in collaboration with other individuals and institutions.

Rather than follow a pure buy-and-hold strategy, I'll apply trend-following and momentum indicators to identify medium- to long-term opportunities. The fund will primarily invest in stocks, with the goal of building an actively managed exchange-traded fund (ETF) that spans both traditional and renewable energy subsectors, offering diversified exposure across technologies and energy sources.

The strategy will follow a moderate-turnover approach, with quarterly rebalancing based on signal confirmation to cut through market noise while remaining responsive to shifting conditions. Over time, I plan to automate these rules through a programmatic trading framework to ensure consistency and reduce behavioral bias. While the fund will launch as long-only, I intend to explore shorting and hedging strategies in future iterations as tools for managing downside risk during periods of market volatility.

Ultimately, this fund is designed for investors seeking targeted energy exposure through a tactical, ESG-aware, and technically disciplined lens, built to navigate a complex, fast-evolving sector with both purpose and precision.

Literature Review

As recommended by Dr. Thomas Miller, I explored *Virtual Barrels: Quantitative Trading in the Oil Market* by Ilia Bouchouev. One of the biggest takeaways for me was how quantitative models can be applied to the oil market in a meaningful way. The book shows how low-risk arbitrage opportunities allowed quants to bring mathematical theory into real-world trading strategies—and build successful careers doing so. It also walks through how oil trading shifted from a closed, exclusive market to something much more publicly accessible. What stood out most is how complex the oil market really is and the need to understand that oil goes beyond just models and correlations, you have to consider different types of volatility (like local, realized, and implied) and have some level of fundamental understanding to make sense of how the market behaves.

Methods

For this project, I am using SEC Edgar Database, Yahoo Finance (yfinance), and Morningstar to retrieve daily stock prices, company fundamentals, and news coverage that range from analysts to companies.

First, I need to understand if I can combine renewable with non-renewable energy in one ETF. Many ETFs are typically focused on one theme. Renewable energy tends to be more responsive to monetary policy conditions, such as money supply and low interest rates, given its dependence on capital investment and subsidies. In contrast, non-renewable energy is more directly influenced by macroeconomic demand cycles and interest rate movements, particularly due to its role in industrial production and its link to commodity pricing. Therefore, I researched the following energy types: coal, oil, and renewable energy sources such as wind, hydro, and hydrogen. While I plan to focus this investment fund primarily on renewable energy, since it aligns more closely with my core values, I've also included oil and coal. These traditional sources remain critical to global manufacturing and still serve as the backbone of the energy sector today.

Additionally, I am using the Energy Select Sector SPDR (XLE) as a benchmark to learn from, given its strong performance and high dividend yield relative to the S&P 500 index (SPX). My performance evaluation that I propose in my final term project will be compared to the XLE and SPX to provide expected terms across different investment horizons.

When examining the composition of XLE, it focuses on 34 stocks, compared to 70+ in broader energy ETFs. I find that starting with a smaller universe of securities allows for more manageable modeling and can help navigate the risk-return tradeoff more effectively, as there are fewer combinations to account for in portfolio construction. What's interesting about the XLE is

that the top 10 accounts account for 76% of the fund. Therefore, I'd like to include those top 10 holdings and build from it. These ten stocks are: Exxon Mobil, Chevron, ConocoPhillips, The Williams Companies, EOG Resources, Kinder Morgan, Marathon Petroleum Corporation, ONEOK, Schlumberger Limited, and Phillips 66.

To justify my selection, I will use the Monte Carlo simulation and compare against the weight of the XLE holdings. Adding randomness to this will influence a more technical analysis rather than fundamental given the uncertainty about markets and create less cyclical and hedging against catastrophic events.

Results

From my recent analysis and research, I've come to realize that oil trading is a complex and dynamic segment within the broader energy sector. The level of volatility and the range of arbitrage opportunities across global markets demand a combination of both short-term and long-term trading strategies.

Given the sector's complexity, I plan to approach this with a risk-averse mindset, though this, too, presents its own set of challenges. Balancing caution with growth potential will be key.

To estimate the fund's fees, I'll likely follow the suggested breakdown: 1 to 4 percent for management, and 5 to 25 percent for performance exceeding the benchmark (alpha). My overall strategy is aimed at achieving high-growth potential while integrating effective risk management throughout the portfolio design.

Conclusion

Overall, the energy sector is highly cyclical and sensitive to market conditions, so being strategic in how the fund is balanced will be crucial to managing volatility. I also need to recognize that many investors may be hesitant to support coal and oil, which could limit broader appeal compared to other industries.

That said, I'm still figuring out how to build a model that can effectively rebalance itself. It's a complex space, and I sometimes feel overwhelmed given that my expertise in this area is still developing. The model cannot solely be based on historical prices given the nature of the industry sector and will need to rely on future signals. I plan on joining some office hours to ensure I'm on the right track and brainstorm ideas about the type of model that would be best to leverage for future signals.

References

Bouchouev, Ilia. *Virtual Barrels: Quantitative Trading in the Oil Market*. New York: Springer, 2023.

The Motley Fool. 2025. "Sector ETFs: A Diversified Strategy." *The Motley Fool*, January 29, 2025. Accessed August 3, 2025.

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