**Commodity markets.**

Formal energy trade has existed since the late 1800s.

The trade of energy products occurs on commodity markets alongside other raw materials and primary products.

Energy products are traded on commodity markets among other raw materials and primary products.

Primary energy commodities include crude oil, natural gas, and coal.

A great deal of the trade volume in these markets is related to market participants hedging their positions \cite{chan2019financial}.

Markets are influenced by many factors such as geopolitics, economic policy, market psychology, and supply and demand to name a few.

Seasonal trends can be observed in some commodities, such as natural gas.

Supply and demand of energy products are inelastic.

Oil and gas storage plays a key role in reducing price volatility. When supply outstrips demand storage inventories are drawn upon, and when demand outstrips supply inventories are increased.

Energy products are typically distinguished by gas and liquids.

Gas is, for the most part, delivered directly by pipelines, while liquids, for the most part, are shipped in tankers.

Tankers are mostly owned by independent third-party companies and must be chartered.

The cost of transportation plays a significant role in pricing commodities.

Commodity markets are becoming more efficient, and thus it is becoming a low-margin business.

**Futures.**

The basis of energy trade is energy futures which is a derivative contract with energy products as the underlying asset \cite{chan2019financial}.

Futures contracts are standardized forward contracts listed on a stock exchange.

They are interchangeable, which improves liquidity \cite{taleb1997dynamic}.

Futures contracts obligate a buyer and seller to transact a given quantity of the underlying asset at a future date and price.

The quantity, quality, delivery location, and delivery date are all specified in the contract.

To avoid having to take physical delivery of the underlying commodity, the holder of the contracts needs to sell their holding to the market before expiry.

Therefore, the futures price and physical price of the underlying commodity converge as the delivery date approaches.

Futures contract essentially achieves the same outcome as buying a commodity in the spot market on margin and storing it to a future date.

The relative price of these alternatives is connected as it presents an arbitrage opportunity.

The difference in price between a futures contract and the spot price of the underlying commodity will therefore depend on the financing cost, storage cost, and convenience yield of holding the physical commodity over the futures contract.

Physical traders use futures as a hedge while they are transporting commodities from producer to consumer.

If a trader wishes to extend the expiry of her futures contract, she can "roll" the contract by closing the contract about to expire and enter a new contract with the same terms, but a later expiry date \cite{chan2019financial}.

The "roll yield" is the difference in price for these two contracts and might be positive or negative.

Futures contracts involve future payments. There is always a risk that the other party might not be able to fulfill the obligations of the contract.

This is known as counterparty risk.

This risk is often mitigated by having the exchange clearinghouse cover the risk by using a margin system \cite{chan2019financial}.

Both parties deposit margin into an account with the clearinghouse at the contract inception.

After each trading day, both parties will have their margin account adjusted for the daily profit/loss.

If the margin account falls below a certain threshold the clearinghouse is within its rights to sell the forward contract(s) to raise the needed equity for that account.

**Commodity trading.**

Essentially, a commodity trader wants to discover and exploit market inefficiencies.

Inefficiencies in commodity markets typically consist of one or more of arbitrage opportunities in time, place, or form.

Time refers to buying a product when the price is low, storing it, and then selling it later.

Place refers to buying a product at one place in the world, transporting it to a different place, and selling it.

Form refers to the buying a product, then changing the form of it through refining, blending, etc. and then selling the new product.

The commodity market has become so efficient that these inefficiencies are small and few. As a result, commodity trading is a low-margin business. To generate significant profit, the volume therefore must be large.

Commodity traders often must combine all three arbitrage opportunities to find inefficiencies that are large enough to be worthwhile.

**Hedging.**

In a typical physical commodity transaction, a trader will buy a commodity and simultaneously sell it in another transaction.

By convention the price is not fixed until the commodity is delivered.

This leaves the trader exposed to fluctuating underlying prices from the time it takes delivery of the commodity to it delivers it.

This is known as flat price risk.

To hedge against this risk the trader can take out futures contracts against both transactions.

If the trader buys futures on the date of the first transaction and sells it back when it collects the delivery it can fix the price of the first transaction.

The trader can sell futures on the day of the second transaction and buy them back when the commodity has shipped to fix the price of the second transaction.

It is important to point out that this does not remove all risk as physical, and futures prices might deviate.

This remaining risk is known as basis risk.

Futures are standardized contracts that will not be equal to a unique physical commodity transaction.

However, most of the same factors apply to both instruments, so the price movement is relatively correlated.

Hedging physical trades with futures will therefore not eliminate all risk, but basis risk is much smaller than flat price risk.

Gross margin is just a part of commodity trading. A trader also must consider the cost of sourcing, transforming, and transporting the commodity to meet the customers specification.

This creates a demand for additional hedging.

Transportation rates are determined by supply and demand can be volatile.

They are important factors in the profitability of trades; therefore, traders want to fix the price at the time of execution.

This is done using freight forward agreements (FFA). Traders can buy FFAs to protect against future freight rates.

Every trade also carries with it opportunity cost, as no trading operation has access to infinite capital and logistical resources.