History of Electricity and Electricity Futures

BY CORY WAGNER ON WEDNESDAY, AUGUST 13, 2014

What are Electricity Futures?

The demand for electricity is mostly inelastic, since a large portion of the world needs electricity to get through day to day life. Since it is relatively less affected by recession than other commodities, many investors find the electricity market an attractive long-term investment opportunity.

However, the electricity market can be quite risky during the short term. Electricity futures are the primary financial instruments used by electricity producers and consumers to manage short-term price risks in the electricity market.

An electricity future is a standardized, legally-binding contract that is traded on an exchange between two parties. The buyer of the contract agrees to take delivery of a specified amount of electricity at an agreed upon contract price, with delivery and payment occurring at a future specified date. The seller agrees to supply such a quantity as per the contract. In most cases, physical delivery doesn't take place and the futures contracts are settled financially.

What is Electricity?

Electricity is the most widely used form of energy that powers the vast majority of the world's industries and consumer goods.

Technically, electricity refers to the flow of electric charge (known as electrons). It is not a physical, tangible object, but can be only transported by cables and wires directly to the objects that it powers.

Electricity is a secondary source of power, converted from other forms of energy like coal or oil. Electricity can be made from both renewable or non-renewable sources of primary energy like coal, oil and nuclear power, through methods like static electricity, electromagnetic induction, nuclear transformation, photoelectric effect, etc.

Today, electricity in the U.S. is widely produced by the electromagnetic induction method.

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Most electricity is produced at electric utility power stations, using a generator containing electromagnets and wire coils. The generator produces electric currents by converting mechanical energy into electrical energy, and is usually powered by steam turbines, internal-combustion engines or similar machines.

This electric current is the electric power that is transmitted from power stations to our homes through cables. In the U.S. a network of 160,000 miles of high voltage transmission lines, called a "grid," carries electricity over long distances to smaller, lower-voltage, local distribution lines that provide power to customers using transformers on poles.

All creation and transmissions of electricity is almost instantaneous. Electricity generation is measured in kilowatts or megawatts and electricity is sold in units called kilowatt-hours or megawatt-hours. Electric utility companies may be not-for-profit municipal entities, co-ops or private for-profit companies.

Brief History of Electricity

Since electricity is found in nature, it has been the subject for much inquiry and curiosity from ancient times. Even in ancient Greek civilization, there are accounts of producing static electricity by rubbing amber.

But commercially produced electricity is a more modern invention. A large number of scientists and inventors worked on the mystery of electricity beginning 1600s. Benjamin Franklin demonstrated that electricity was found in lightning via his famous kite experiment during a lighting storm. In 1831, Michael Faraday discovered that electric current flows through a copper wire when a magnet is moved inside it. This forms the basis of the electricity generated today.

Thomas Edison invented the direct current (DC) electric generator in the 1870s and Nikola Tesla heralded the use of alternating current (AC) electricity around the same period. This greatly reduced the cost of transmitting electricity over long distance, thus bringing electricity indoor lighting in homes, and powering industries.

Electricity for public use was first created in 1881 using a waterwheel from a mill. Electricity has been generated at central stations since 1882. The earliest power plants used water power or coal to generate electricity. We continue to use coal (along with nuclear energy, natural gas and hydroelectric sources) to generate electricity even today.

Electricity was first sold in the U.S. in 1879 by the California Electric Light Company in San Francisco. It produced just enough electricity to power 21 electric light lamps.

By the mid 1960s, the use of power lines, power poles and an interconnected "grid" had created a public electricity supply that has been almost continuous over the past half century.

Where is Electricity Produced?

China leads the world in electricity production. Its 2013 output was estimated to be 5,398,000,000,000 kwh (5.3 trillion kwh). Most of this electricity is generated by coal.

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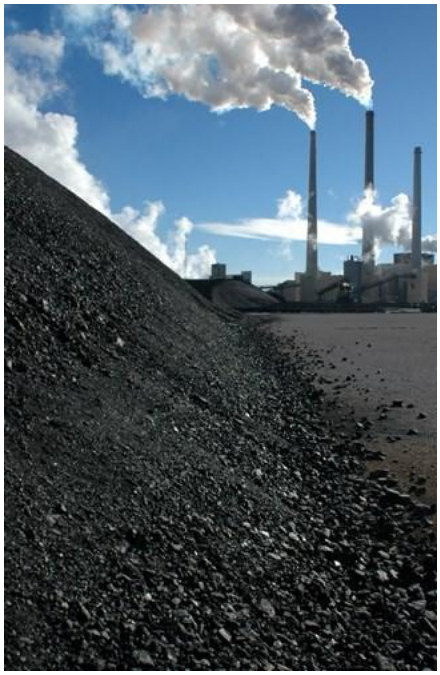
China is followed by the United States, European Union, Russia and India in terms of production output.



In the United States, most of the electricity is produced using coal and steam turbines. In 2012, the U.S. generated around 4 trillion kWh of electricity, 37% of which was derived from coal, 30% from natural gas, 19% from nuclear energy and the rest from renewable energy sources.

The U.S. trades in electricity mostly with Canada and Mexico. In 2012, the U.S. imported 59 million megawatt hours of electricity, out of which over 95% was imported from Canada and the remaining from Mexico. The U.S. also exported some 12 million megawatt-hours of electricity, to Canada and Mexico.

In the U.S., investor-owned utility companies generated over 50% of the electricity and controlled over 80% of transmission. Public-owned utilities, co-operatives or federal agencies together were responsible for around 25% of the generation and the remaining 20% of the transmission. Independent power producers were responsible for the balance 25% of generation. The Federal Energy Regulatory Commission monitors interstate power sales and the State Public Utility Commissions regulate electric services within states.

How is Electricity Used?

Electricity consumption was nearly 3,856 billion Kilowatt-hours (kWh) in 2011. U.S. electricity use in 2011 was more than 13 times greater than electricity use in 1950.

There are over 140 million electricity consumers in the U.S. 37% of the electricity consumed in the United States is for residential purposes, 34% for commercial purposes and 25% for industrial purposes.

On average, a typical household in the United States uses 920 kWh of electricity per month, with appliances and lighting accounting for 64.7% of electricity consumption.

Electricity consumption has increased over time, but demand has slowed progressively every decade since 1950s. The U.S. Energy Information Administration (EIA) projects electricity demand to grow by 0.8% per year through 2035.

As with most other energy sources, the demand from developing countries is set to increase even faster in the future. While Non-OECD countries consumed around 47% of the world's total electricity supply in 2008, they are expected to account for 60% of the world's electricity use by 2035.

Who Invests and Trades Electricity Futures?

The electricity market is extremely volatile due to the instant nature of delivery of electricity, possibility of power outages and seasonal fluctuations in demand. Supply and demand can go out of balance drastically within a few hours.

Electricity futures provide a way for the industry's players to manage these risks and plan investment decisions better.

Electricity traders can be broken down into two main categories: hedgers and speculators.

Generators and retailers use futures to hedge their risk.

Local and regional electricity producers and suppliers usually use a short hedge. This will set a fixed selling price for the electricity that they will produce, so that they will get the specified amount in the contract, even if prices fall in the future.

New entrants in the electricity market also can use the futures market to secure fixed prices for their consumers. This lowers the barrier to entry and spurs more competition in the electricity industry, thus putting a downward pressure on electricity prices.

Consumers (businesses and even some private consumers) can use a long hedge to set a fixed purchase price for a specified quantity of electricity as per their need.

With interest in electricity as a commodity increasing, Electricity futures are also traded by speculators. Speculators have no vested interest in the underlying asset, that is, they will neither deliver electricity nor take delivery for electricity.

They take on the price risk that hedgers are trying to avoid, because they hope to profit from the price movements. Speculators look to benefit from the miscalculations or forecast errors of electricity companies. Electricity speculators buy electricity futures if they believe that the price of electricity will go up, and sell electricity futures if they believe that the price of electricity will go down.

Electricity Futures Contracts

The largest electricity grid system in the world is controlled by the PJM interconnection. PJM serves over 50 million customers in the U.S. and generates over 700 million megawatt-hours of electricity. PJM futures track the price of electricity as administered by the PJM interconnection. PJM future contracts are traded on the Chicago Board of trade (CBOT) and the New York Mercantile Exchange (NYMEX). Given PJM's dominance in the U.S. market, PJM futures are a widely accepted electricity benchmark.

The PJM Interconnection Monthly Peak Electricity futures on the NYMEX have a trading unit of 40 megawatt-hours (mWh) per peak day (there are usually between 19 and 23 peak days in a month, varying by time of the year).This cash settled future has the symbol "JM," is quoted in U.S. dollars and cents per Mwh, and has a minimum price movement of $0.05 per mWh. The contract is for the current year, plus the next five calendar years. The future is traded electronically only.

New York Mercantile Exchange (NYMEX) was the first to start trading electricity futures and offers several other electricity futures too, including Electric Relaibility Council of Texas

(ERCOT) contracts, via its ClearPort electronic trading platform.

Other exchanges trading in electricity are the Mumbai-based Multi Commodity Exchange (MCX), the Intercontinental Exchange (ICE), the European Energy Exchange and the Australian Securities Exchange (ASX). Recent announcements indicate that the Singapore Exchange (SGX) will also launch Asia's first electricity futures by the end of 2014.

How to Trade Electricity Futures: Costs and Different Brokers

You can trade futures by opening a trading account with a trusted broker who handles futures trading. Starsupply Commodity Brokers, CME Globex, CME Clear Port and Etrade are some well known online platforms for trading futures.

Most brokerages will charge the National Futures Association fees, which is roughly around $0.02 per side, along with a commission (which can range from $0.025 to $3 and more, per contract per side). You will also have to pay an exchange fee, which will vary depending on the exchange and the specific contract you are trading. Be sure to look at the fine print and add up all the fees into your cost.

Risks

Electricity futures trading is accompanied by several risks affecting the underlying commodities. Electricity futures undergo frequent price fluctuations. One of the key reasons for price fluctuations is that electricity supply needs to continuously and instantaneously match demand, since electricity can't be stored economically.

Electricity generators decide the type and quantity of electricity to produce based on future forecasts of consumption. If the actual consumption turns out to be higher or lower than expected, there will be immediate impact on prices. Electricity demand also fluctuates from one period to another. Prices soar during times of peak demand. Besides, generators can have outages, the prices of coal and other fuels used in electricity generation can sway and even the weather can impact electricity prices.

There are also the risks typical to financial trading. Electricity futures have a lot of leverage, which allows traders to control a large amount of commodities for a small amount of investment. However, it also means that even a small, unfavorable change in the prices of electricity can drastically reduce traders' equity.

However, despite these risks, electricity futures hold great value in the market given that electricity is in use all over the world which ensures a massive market base for the commodity. Electricity futures are generally considered a liquid asset, and if traded wisely can create great gains for everyone.

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