November 19th 2019

The Penn State Energy Marketing Association

Market Update

This Issue

A newly founded student organization

The Mission of the Penn State Energy Marketing Association is to establish an intellectual forum where likeminded individuals shall discuss, share, engage in, and debate content related to energy marketing for the purpose of acquiring industry fluidity and augmenting personal marketability.

Bridging the gap

Energy marketing is unique in that it brings together engineers and students of business-minded backgrounds for a common purpose. The Penn State Energy Marketing Association embraces this notion and is excited to establish an academically diverse forum.

Skill development

The Penn State Energy Marketing Association seeks to acquire industry knowledge and skills above and beyond what is taught in a college curriculum. PSEMA accomplishes this by hosting guest speakers, receiving special presentations from its corporate partners, and mutually sharing information in an academic forum setting.

About

The Penn State Energy Marketing Association's *Market Update* is a monthly publication containing price forecasts for crude oil and natural gas as well as updates on the status of renewables, economic events, and equities relating to the energy industry. It is co-authored by PSEMA members, and each segment is overseen by its respective Commodity Director:

Director of Economy:	Daniel Heinlein
Director of Electricity:	Reid Horstmyer
Director of Equities:	Robbie Epstein
Director of Natural Gas:	Steven Ennis
Director of Oil:	Mickey Hopkins
Director of Renewables:	Anthony Garcia

Co-Presidents Daniel Heinlein, Anthony Grider and Vice President Christina Cuppari serve as the Executive Editors.

Contributors

The following PSEMA members contributed to this edition of *Market Update*:

Crude Oil: *Compiled by Mickey Hopkins and assisted by Shaylen Amin*

Natural Gas: *Compiled by Steven Ennis and assisted by Seamus Gibbons and John Staropoli*

Renewables: *Compiled by Anthony Garcia*

Economy: *Compiled by Daniel Heinlein and assisted by Anthony Grider*

Equities: *Compiled by Robbie Epstein and assisted by Vincent Bufanio*

Electricity: *Compiled by Reid Horstmyer*

Comments from the President

The Penn State Energy Marketing Association is excited to publish the our first newsletter of the 2018-2019 year. We are always excited for the new school year to start. Each new year provides the opportunity for students to explore and learn more about energy markets and careers in the energy realm. Now is a chance for students of all ages, from freshmen to seniors, to push themselves to become better every day. All executive board members of PSEMA are here to aid and assist students in everything from questions from school to career prep. We pride ourselves on our collaborative, open-door policy which seeks to make our organization a safe place for anyone to come for the purpose of self-growth.

Market Update *is published every month and its price forecasts target for the upcoming monthly period. "Current" data pertains to values taken from various reputable news outlets. The Penn State Energy Marketing Association is a fairly new undergraduate student organization and we welcome any opportunity to collaborate with likeminded individuals and organizations. If you have any ideas that could improve our monthly newsletter or simply are interested in furthering the mission of PSEMA, please contact us at PennStateEMA@gmail.com or at PennStateEMA.com*

- Daniel Heinlein
Co-President

Market Overview

Segment Benchmarks

- **WTI:** $55.76
- **Brent:** $61.35
- **Natural Gas:** $2.5260
- **S&P500:** 3,121.66
- **Dow Jones:** 27,960.86
- **Nasdaq:** 8,578.15
- **US 10-Yr:** 1.79%
- **Gold:** 1,473.20
- **OVX:** 32.94
- **VIX:** 12.77
- **EUR - USD:** $1.1084

Overall Market Effect:
Investors around the world are finally starting to gain strong confidence in the markets. There have been constant fears of an impending recession, but recent rate cuts by the US Fed, coupled with stronger economic data results are bringing a fresh push to the equity markets.

The Dow Jones Industrial Index has reached 28,000 points for the first time in history and the S&P 500 index is also sitting around new all-time highs.

Moving forward, if the US and China can reach trade agreements, you would expect that all fears of a slowdown in the global economy to vanish. This would bring higher production and growth on a global scale and would be a big boost overall investor sentiment.

We may not be completely out of the dark, but there is reason to believe that good times are ahead.

- Daniel Heinlein

Economy

October 19th, 2019

Economy

Last week, Jerome Powell, head chair of the FOMC (Federal Open Markets Committee) gave a speech before congress. One key aspect of that speech is that he does not see interest rates getting cut any further for the remainder of the year. The last federal funds rate cut came in October when the lowered the rate into a range between 1.50 – 1.75%. The New York fed added $111b in liquidity to financial markets on Nov. 12 – overnight repo worth $76.9b and 14-day repo worth $34.9b.

Earlier today, the Dow Jones Industrial Index broke through the 28,000 points mark for the first time in history. The S&P 500 index is also sitting around new all-time highs. These breakthrough in two of the most important stock market indices is a result of the newfound optimism in the strength of the economy. In the past few months there has been continuing anxiety and paranoia amongst investors that the trade war between the United States and China would cause a global slowdown. While yes, GDP growth around the world has been slowing, the total effect has been much less than anticipated. Also, there has been growing optimism that an agreement between the two countries, who also make up the two largest economies in the world, could happen sooner rather than later. A trade agreement would the financial markets booming once again and growth to continue picking up.

Crude Oil

November 19th, 2019

Crude Oil

WTI Crude Oil futures prices currently sit at $57.72 per barrel. This is the first time the price has pushed this close to the $58 threshold since the attacks on Saudi Arabian refineries in September, where the price surpassed $60 per barrel. U.S. Oil production is at an all-time high of 12.8 million barrels per day according to the U.S. Energy Information Administration, despite the number of U.S. oil drilling rigs down 23% on the year. This increase in production coupled with a decrease in rigs is due to producers using more efficient drilling technology. U.S. commercial crude inventories also increased by 2.2 million barrels last week, and are now about 3% above the 5-year average for this time of year. Along with increased supply and inventories, the Chinese economy is also putting downward pressure on prices since they have experienced increased inflation as well as a suppression of economic activity due to the Hong Kong protests. Negative economic activity in China can have a large effect oil prices since it is the second largest oil consuming nation in the world behind the U.S.

Crude Oil

November 19th, 2019

Despite all these factors that should have a bearish effect on oil prices, oil prices seem to be on a bullish streak due to fading recession fears in the U.S. after the Dow Jones industrial average surpassed 28,000 points for the first time on November 15th, 2019. Since the Dow includes some of the largest industrial companies in the economy, an increase in the Dow Jones can have a large influence on oil prices because it implies an increase in future energy use. Even though WTI prices are on a bullish rally at the moment, we believe that prices will stay within the $56.50 to $60 range through November due to bearish supply factors and a lack of demand.

Crude Oil

November 19th, 2019

NYMEX RBOB Gas

Hurricane season and refinery turnaround season is coming to an end, which has led to an increase in refined product supply across the United States. More specifically, U.S. RBOB Gasoline stocks have seen a marginal increase since October. This stock level, based on a five-year history of U.S. stock levels, is projected to continue increasing steadily through mid-December. NYMEX pricing will reflect this change in supply through a decrease in the NYMEX RBOB gas crack over the next month.

RBOB Gas futures after Q1 of 2020 may experience some volatility after OPEC's December 5th meeting. The current deal, of a 1.2 million bpd oil supply cut, will last until March of 2020 unless the group decides upon a new deal during the December meeting. However, after quarter one, it is very possible that new supply cuts will be seen in regard to crude oil supply. This, in turn, may transfer some volatility to the RBOB gas crack futures contracts for dates after March of 2020.

Natural Gas

November 19th, 2019

Natural Gas

In October, the spot price for Natural Gas at Henry Hub rose more than 15%. Prices have continued to rise into November closing at 2.87 $/MMBtu on November 11th its highest price since March. Unusually cold temperatures have been the main factor driving demand.

Spot prices | Spot prices table | Nymex prices | NGPL prices

Spot Prices ($/MMBtu)	Thu, 07-Nov	Fri, 08-Nov	Mon, 11-Nov	Tue, 12-Nov	Wed, 13-Nov
Henry Hub	2.84	2.82	2.69	2.73	2.62
New York	2.90	2.38	4.26	5.60	3.27
Chicago	2.86	2.71	2.67	2.63	2.49
Cal. Comp. Avg.*	2.90	2.79	2.74	2.78	2.71
Futures ($/MMBtu)					
December contract	2.772	2.789	2.637	2.621	2.600
January contract	2.859	2.873	2.728	2.714	2.692

*Avg. of NGI's reported prices for: Malin, PG&E Citygate, and Southern California Border Avg.

Source: NGI's Daily Gas Price Index

As we can see from the above spot prices table, December futures contracts leave the market in backwardation. As this past week has progressed, the market has shifted back toward contango. January futures are headed in that direction as well.

https://www.eia.gov/naturalgas/weekly/#tabs-prices-1

According to the U.S. Commodity Futures Trading Commission, in the two weeks from October 22 through November 5 the total number of futures and options positions by Managed Money Traders on the NYMEX fell by more than 71,000. This included the second-largest single week drop this year. The ratio of short/long positions, which had been 3/1 just two weeks ago, has almost been cut in half. Short positions had been building against long since early September. However, in the last two weeks, the number of short positions by Managed Money traders has fallen by more than 90,000.

https://www.cftc.gov/MarketReports/SwapsReports/L2FXAct.html

Looking ahead, demand for Natural Gas should continue at its current price range through November 20th. In recent days, long-range weather models have fluctuated greatly in temperature forecasts for November 20th through Thanksgiving. As of

Uncertainty of Weather Pattern decreases Short Positions

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Natural Gas

November 19th, 2019

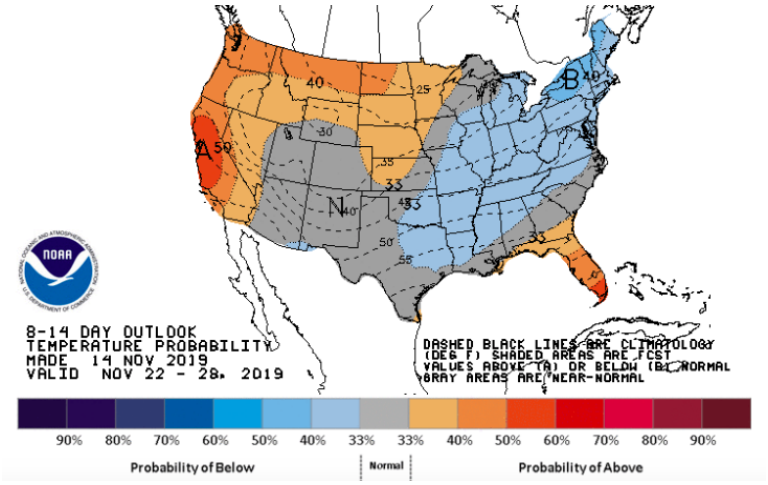
November 14th, the National Weather Service gives a slightly higher probability of below-average temperatures for

the November 22th to 28th. Temperatures appear to be leaning toward below average for November 20th and beyond. However, with the uncertainty in the long-range weather models, this should be monitored closely moving forward.

The weekly Natural Gas storage report released by the EIA on November 14th showed working gas in storage to be 3,732 Bcf. This is just 2 Bcf above the 5-year average.

Summary:

Given the current weather forecast, one would expect prices to fall modestly. Although the forecast projects colder temperatures, it will not have the same effect or be nearly as cold as the previous two weeks. This past September a similar weather-related price spike occurred. Current supply information suggests prices will not fall as sharply this time around.



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Electricity

November 19th, 2019

ISO New England

Winter is coming: A look at December

Going into the winter, New England's power market becomes more interesting.

With the lower productivity of PV generation, increased needs due to electric heaters, gas constraints due to gas heaters, and general plant issues that come up during cold weather (coal piles freezing, parts breaking due to cold, water intakes clogging with ice) the normally plentiful power generation of New England can become constrained, leading to higher prices.

With forecasts showing a colder-than-normal November, prices in New England should be expected to be volatile at the least. If the colder than usual weather continues, or a winter storm appears, we should expect prices in New England to spike due to gas constraints. The winter is a time of natural gas pipeline constraints in New England due to the increased demand caused by the gas heaters used in New England and the reliance the region has on gas fired generation.

Even if no major winter storms appear, prices in New England should be expected to be higher than usual, as the increased use of natural gas in the winter and the continuing lack of pipeline expansion into the region will cause local natural gas prices to be high than average.

At the time of writing, Mass Hub Day-Ahead futures were trading at $57.88/MW for peak and $47.18/MW for off-peak. This is within the $30 - $60/MW range which we expect prices to continuously be at for the month. We suggest if you are hedging load costs to buy around $55/MW for peak and $45/MW for off-peak if available.

Electricity

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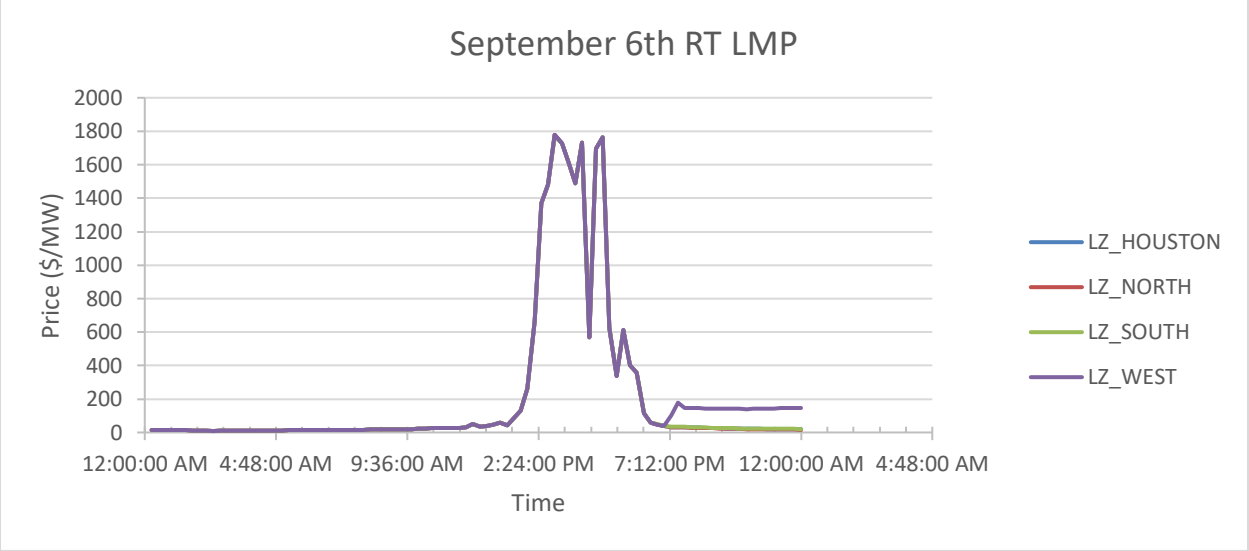
ERCOT

With no analysts available to analyze the market for the coming month, are we going to go over notable days of the past year and explain why prices were what they were.

A Day in the Market: ERCOT Friday September 6th, 2019

With ERCOT issuing an electricity conservation alert and the National Weather Service predicting 100 degree temperatures for most of the state, September 6th was looking to be a day with tight reserves and high prices. While it was not a repeat of August, when prices hit the cap of $9000/MW, we still saw the highest ever recorded September load, and what will probably be the highest prices for the rest of the year.



Graph of Real Time Locational Marginal Prices across the day for all four major load zones.

Electricity

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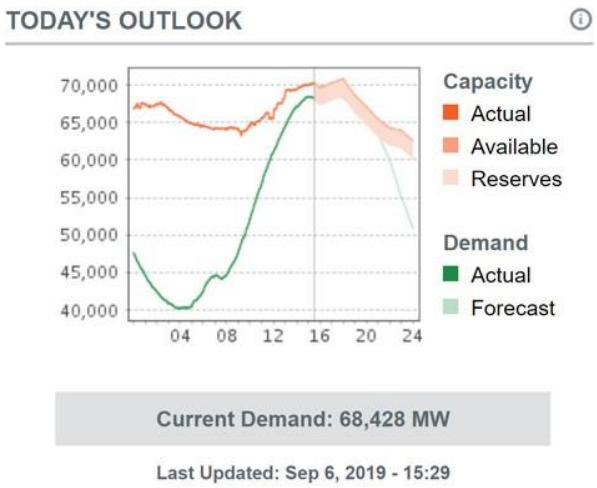
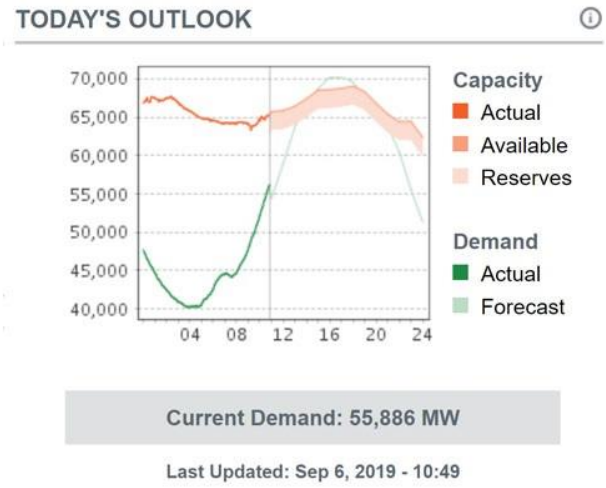
The day started off normal, with prices $10 - $16 per MW. As the morning ramp started, prices began slowly but steadily increasing, reaching $30/MW by noon. There were no price differences between the four main load zones.

As the morning continued, the weather forecast improved. Temperatures during the afternoon were 2 – 4 degrees lower in all major cities, and surprise rain helped lower temperatures further in other parts of the state. The changing weather conditions brought load predictions down, and the peak ended up being almost 9.5 GW lower than predicted the day before.





ERCOT real time system conditions at 3:29pm and 10:49am respectively. You can easily see the impact changing weather conditions had on forecasted demand.

In the afternoon, as reserves tightened, more expensive generating units came online to serve load. Between noon and 3pm, prices soared almost 3500%, peaking at 3pm at around $1770/MW for all zones. Most of the price increase can be attributed to rapidly diminishing capacity and the corresponding rapid increase of the real time price adders, not the increasing

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costs of the marginal unit. Price difference between the zones was minimal during this time.

By 7pm system conditions had improved, with load reaching its peak of 68,817 MW between 4pm and 5pm, and rapidly decreasing from there. After this the rest of the day was normal, with the exception of the price difference of the Western Load Zone from the rest of the system. This was due to the continuing Permian Basin constraint due to load growth, low wind production that night, and the lack of the Permian Basin units to respond due to their limited emission credits.

Because of the dramatic weather changes during the afternoon, the price separation between the day ahead market and real time was extreme. The day ahead peak cleared at almost $4500/MW, two and a half times more than the real time peak.

Equities

November 19th, 2019

Saudi Aramco

Equity Signal: ARMCO
Coverage: Robert Epstein

Company Overview:
Aramco is the state-owned oil company of the Kingdom of Saudi Arabia and is based in Dhahran. They rank first among oil companies worldwide in terms of crude oil production, crude oil exports, and natural gas liquids(NGL) exports. Aramco manages well over one hundred oil and gas fields and has one of the largest influences on the global oil markets. They hope to raise capital in their upcoming IPO and use it to fund other sectors of Saudi Arabia's Economy.

Notes:

- Crown Prince Mohammed bin Salman is seeking to sell shares to raise billions of dollars to diversify the Saudi economy away from oil.
- Aramco's supply can be vulnerable to attacks, it was targeted by drones on September 14th which temporarily locked up 5.7 million barrels per day of output.
- There will be a "statutory lockup period" which will forbid Aramco of listing any more shares to the public for 6 months.

Summary:
This past month Aramco has finally stepped up to the plate and announced that they are planning to launch its initial public offering on December 5th when OPEC meets. The oil giant will be offering 0.5% of its shares to individual retail investors. With a 1.5 trillion-dollar valuation that will make the offering the largest public offering to date. Simply stated they are the world's largest oil monopoly with production significantly larger than any of the domestic oil companies in the United States and globally. For Aramco attain the best valuation possible it is imperative that oil prices remain inflated.
After the IPO takes place, they are telling their investors that they will pay out $75 billion in dividends yearly. Many investors see that a large dividend will be hard to maintain due to their limited growth potential in the long run. There oil production cap will be limited because of the stagnant demand of oil globally.

Renewables

November 19th, 2019

Global energy demand will outpace the current renewable energy supply

Globally, countries are transitioning towards a future powered by renewable energy. But, this transition may not come soon enough. The International Energy Agency (IEA) released its World Energy Outlook 2019 report on November 12th. In it, the agency states "While the importance of transitioning to a carbon-neutral world is recognized, society is still heavily dependent on fossil fuels and it will remain that way unless major policy changes are made." In 2018, renewable energies produced more energy than in years prior. Coincidingly, the global carbon emissions reached an all-time high. The IEA projects that the there needs to be a drastic change in government policies for renewable energy to overtake fossil fuel counterparts. Growing economies and populations from developing nations are restricting the growth of the renewable sector. The current price of renewable energy is not competitive compared to traditional fossil fuels in developing countries. This has resulted in a slower global expansion of solar and wind energy than anticipated by the IEA. In the future, projections show that battery storage and improvements in manufacturing will lead to renewable energy being competitive for all countries to deploy.

Stevens, P. (2019, November 12). Global energy demand means the world will keep burning fossil fuels, International Energy Agency warns. Retrieved from https://www.cnbc.com/2019/11/12/global-energy-demand-will-keep-world-burning-fossil-fuels-agency-says.html

Fukushima set to become a renewable energy provider

The former Fukushima nuclear power station is being converted into a renewable energy hub. The site is famous for the 2011 meltdown than occurred when a tsunami hit the coast of Japan. The land became toxic with nuclear waste and resulted in the one of the largest nuclear disasters in the history of the world. Japan has begun to invest $2.7 billion towards redesigning the location with solar and wind power infrastructure. The plan is projected to have 11 solar and 10 wind power plants by 2024. The powerplants will produce 600 megawatts annually. This will be 2/3 of the energy that the original nuclear power plant produced prior to the 2011 disaster. Japan polled the nearby population and found that 54% of respondents were in favor of a renewable energy redesign. The new power generated will be transferred to Tokyo through transmission lines. The capital has been steadily increasing the renewable energy within the country's energy portfolio. The country is planning to be 100% powered by renewables by 2040.

The United States can take similar action. A great way to streamline clean energy would be by implementing renewable energy to the already existing nuclear infrastructure in the country. Nuclear sites require vast amounts of land and this can be optimized by introducing solar panels and wind turbines. By using all of the land, the energy capacity of nuclear sites can be increased dramatically. As the United States begins to implement more renewable technology, this can be an innovative way to increase the renewable energy portfolio domestically.

Calma, J. (2019, November 12). Fukushima reinvents itself with a $2.7 billion bet on renewables. Retrieved from https://www.theverge.com/2019/11/12/20961827/fukushima-japan-renewable-energy-nuclear

Hydropower leads renewables as source of electricity generation

As reported by the EIA, Hydropower was used to produce 293 billion kWh of electricity in the United States during 2018. This generation was 7% of the United States annual energy portfolio.

Coal production has decreased 11% in 2019

The United States is at a nine year low in coal production. The decrease can be attributed to new energy methods being deployed domestically and in foreign markets. Liquified natural gas (LNG) has become economically viable as an export product. This development has significantly cut into coal exports from U.S. miners.