RESEARCH REPORT

November 23, 2020

Utilities Deep Dive and Mini Pitches

Watt's Going On – the Sequel

While the QUIC Energy & Utilities team is often known for its affinity towards oil and gas-related companies, there is indeed another, often unappreciated side of the team's coverage space: utilities. During the 2018-2019 fiscal year, the team presented a utilities primer and NextEra mini pitch entitled "Watt's Going On." It was the knowledge gained through conducting extensive research into the utilities universe that gave the team the confidence to invest in Brookfield Renewable Partners (BEP.UN), a renewable power generator that possesses a footprint that spans numerous countries and continents.

Given the amount of time that has passed since E&U has last looked at the utilities space, the team would like to revisit the sector. Hence, this report will seek to provide an in-depth perspective into the general utilities space, as well as into a few of the largest players.

To begin, an overview of the utilities value chain and various types of power sources will be outlined. From there, the team will dive into how the regulatory environment functions and how utility companies thus make money. A brief outline of how macro trends (such as U.S. politics and the move towards ESG-related investing) have and will be affecting the industry moving forward will also be discussed. Last, the team will provide a deep dive into two of some of the most prominent U.S. utilities names: Duke Energy (NYSE:DUK) and Southern Company (NYSE:SO).

Energy & Utilities

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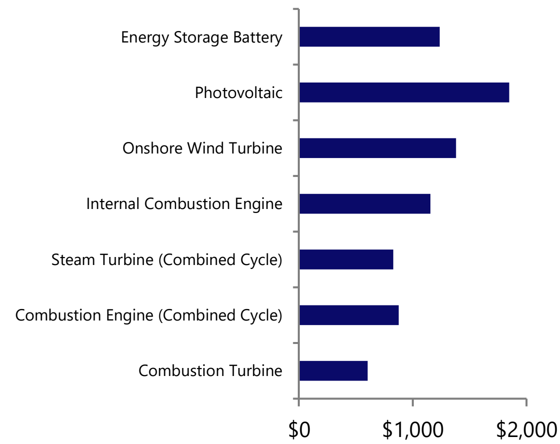
Utilities Value Chain

Generators

Generating facilities create electrical power through converting energy in the form of wind, hydro, solar, coal, natural gas, and nuclear fuel sources into electricity. The fundamental scientific process of any generator or fuel source involves the generator capturing mechanical or chemical energy from the fuel source and transferring this into an electrical circuit to create an electrical current. Most U.S. and global electricity generation is from electric power plants using turbines to drive electromagnetic generators. In a turbine generator, kinetic energy is generated from water, steam, combustion gases (dependent on the type of turbine/fuel source), or air pushing a series of blades mounted on a rotor shaft, causing the rotor shaft to spin/rotate, and the electromagnetic generator to convert the kinetic energy of the rotor into electric current flow that travels through power lines to consumers. Once generated, the electricity is stepped-up (voltage is increased) to allow for more efficient transport to the energy distribution lines. This beginning stage of the value chain tends to involve high capital expenditures at inception, largely due to costs associated with construction and purchase of the facility, equipment, and generators, and is especially high for hydro and nuclear plants. The time-to-build for power plant facilities varies between two to ten years in the United States depending on the regulatory cost of the state. The ongoing capex is relatively minimal for generators once operating. In terms of cost structure, companies operating natural gas and petroleum generators are heavily exposed to commodity price fluctuations. The best way to cost cut within this industry is to improve efficiency, as all generators operate in this volatile commoditized industry. Energy companies face a trade off between initial capital expenditures and ongoing operating costs when choosing the type of generating facilities to build, with most natural-gas and fossil fuel powered facilities being less capital intensive but incurring high operating input costs; and nuclear, solar, hydro, and wind powered facilities being highly capital intensive and incurring low operating input costs. Because of

EXHIBIT I

Average Capital Cost for Generators by Generator Type ($/kW)



Source(s): U.S. Energy Information Administration

EXHIBIT II

Capital and Operating Costs for Power Plants

Type of Power Plant / Generator	Capital Cost ($/kW)	Operating Cost ($/kWh)
Coal-fired combustion turbine	$500 — $1,000	0.02 — 0.04
Natural gas combustion turbine	$400 — $800	0.04 — 0.10
Coal gasification combined-cycle	$1,000 — $1,500	0.04 — 0.08
Natural gas combined-cycle	$600 — $1,200	0.04 — 0.10
Wind turbines	$1,200 — $5,000	> 0.01
Nuclear	$1,200 — $5,000	0.02 — 0.05
Photovoltaic Solar	$4,500+	> 0.01
Hydroelectric	$1,200 — $5,000	> 0.01

Source(s): Penn State University

Utilities Value Chain

this trade-off, comparing costs of different companies with different types of operating facilities requires using Leveraged Cost of Energy, which is the average price per unit of power a plant needs to break-even.

Energy Transmission and Distribution Networks

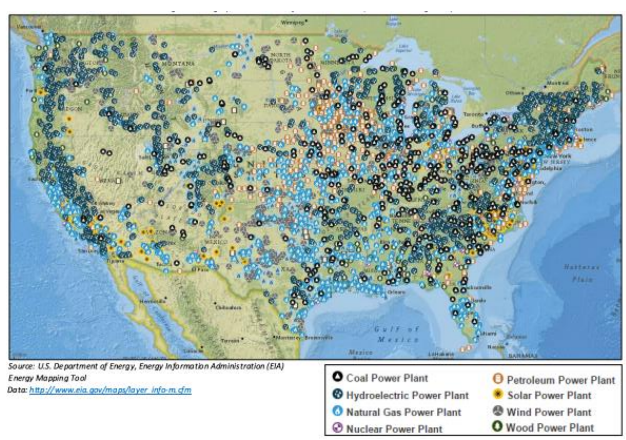
The combined transmission and distribution network for electricity is known as the power grid. North America's power system is comprised of four distinct power grids/interconnections. Interconnections are zones in which utilities are electrically tied together during normal system conditions. Each interconnection mainly operates separate from one another. The United States' bulk electric system consists of more than 360,000 miles of transmission lines, including approximately 180,000 miles of high-voltage lines, connecting to about 7,000 power plants. Transmission systems are generally administered on a regional basis by a regional transmission organization (RTO) or an independent system operator (ISO). Network operators transport electrical energy from the generating facility to substations by operating, developing, and maintaining networks of high-voltage electricity lines. Grid operators, regional network operators and distribution network operators generate revenue by selling access to their networks to retail service providers. Network operators are usually government companies acting as natural monopolies, given that the control system must ensure that supply exactly meets demand, or else generation plants and transmission equipment could shut-off. Regulated transmission operators have a limited and regulated ROE, while merchant transmission companies rely on contracts for capacity, which has traditionally been allocated through a competitive bidding process. The most recent business model for transmission assets in the U.S. has been a REIT structure, after the IRS recognized transmission assets as real-estate. In 16 U.S. states, transmission is deregulated, leaving traditional utilities to operate only distribution, with this deregulation meant to introduce market competition and maintain low utility prices for consumers.

Energy Traders and Marketers

Mw of electricity can be traded as a commodity on the wholesale market. The wholesale electricity market consists of electricity producers who sell electricity output to load serving entities and power marketers who sell to LSEs and other marketers. System operators predict hourly electricity demand, and generators offer an amount of energy generation capacity at a specific price. The winning bids are the lowest-priced combination of offers required to meet demand. The wholesale market is quite important as it is, in a competitive market, one of the largest predetermining factors for the electricity prices that consumers pay. By buying and selling energy futures and other derivatives, these companies help utilities and energy-intensive businesses secure a dependable supply of electricity at a stable, predictable price.

EXHIBIT III

Geographic Distribution of U.S. Power Plants



Source(s): U.S. Department of Energy

Utilities Value Chain & Power Sources

Energy Service Providers and Retailers

The retail market involves the sale of electricity from a provider to the end-user. Energy service providers and retailers oversee the final sale of power from provider to end-use consumer. Within regulated markets, this supply is obtained through rate-based generation from a singular provincial monopoly. On the other hand, if the local market is deregulated, then the majority of supply comes from the wholesale market. However, these deregulated markets usually have a "safety-net" option for customers who don't want to choose a competitive-market driven retailer.

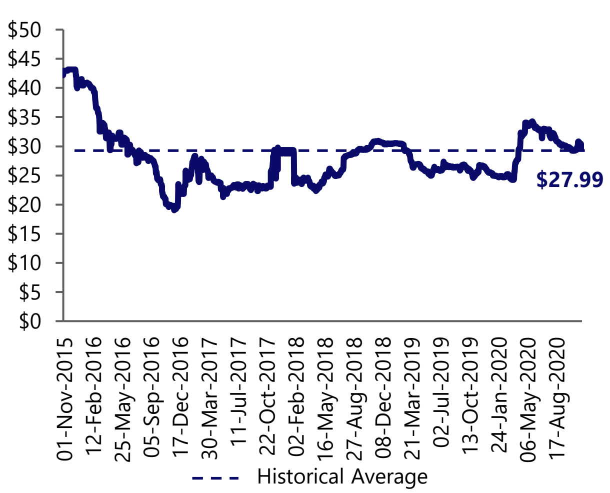
Nuclear Energy

Nuclear power plants generate thermal energy in the form of steam through uranium undergoing the process of nuclear fission. Uranium has one of the largest atoms of the 92 naturally-occurring elements on earth, thus making the element unstable and atoms more likely to split. The energy generated from single nuclear pellet is equivalent to that of 807 Kg of coal / 677L of oil / 476CM of natural gas.

Nuclear fission occurs when neutrons come into contact with and split uranium atoms, releasing heat energy in the form of additional neutrons. Nuclear reactors facilitate fission by slowing neutrons down and increasing the likelihood that atoms collide. Reactors control the reactivity by using control rods to slow or stop fission as needed. Nuclear reactors use uranium processed into ceramic fuel pellets and inserted into sealed metal tubes made from zirconium alloy, metal that is highly resistant to corrosion. The tubes are welded shut and several are assembled into a fuel bundle. Thousands of fuel bundles are inserted into the nuclear reactor's water-based core, where the uranium atoms undergo fission and give off vast amounts of heat used to boil water, thereby creating steam that spins a turbine and generator to produce electricity.

EXHIBIT IV

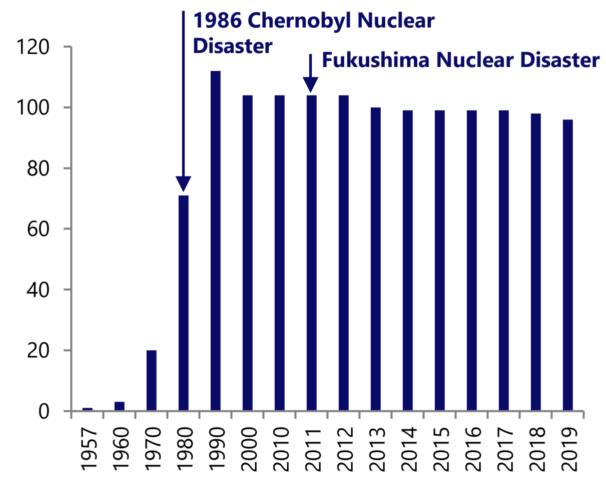
Uranium $/lb (NYMEX)



Source(s): S&P Capital IQ

EXHIBIT V

Number of Nuclear Reactors in the United States



Source(s): Statista, U.S. Energy Information Administration

Power Sources

The high radioactivity of the uranium means that the management and disposal of aging facilities requires high safety standards to prevent environment disasters. As of December 2019, the United States had 96 operating commercial nuclear reactors at 58 nuclear power plants in 29 states. Nuclear energy investments have declined due to the long-term cost of aged and decommissioned reactors, cost-overruns and delays in nuclear projects, improved cost efficiency of renewable energy, and past nuclear disasters.

Hydroelectric Power

Hydroelectricity is the oldest and first energy source used for AC electricity (global standard of electrical current), with its first uses in the United States. Hydroelectric power stations convert the kinetic energy of falling water into electrical energy using either the natural drop of a waterfall or building a dam to raise the water level enough to create that needed drop. Hydroelectric power plants also supply pumped storage in which the facility consumes pumping power to recharge the reservoir during non-peak, low-price hours, so that a larger supply is available at peak hours and prices.

The United States is the fourth largest producer of hydroelectric power in the world – the source accounts for 7% of the country's electricity generation and was the largest source of renewable energy in the U.S. until 2019. There are about 1,500 hydropower plants operating in the United States. Hydroelectricity is considered one of the most economical methods of generating electricity due to its low operating costs and lifespans ranging from 50-100+ years. Hydro energy is also a clean-energy source, producing virtually no smog or greenhouse gases. However, dams and hydroelectric facilities cause significant damage to aquatic ecosystems and reduce water quality, causing investments in hydroelectric energy and its share of energy production in the U.S. to decline as renewable energy investments are trending towards solar and wind energy due to increasing efficiencies and lower direct environmental impacts.

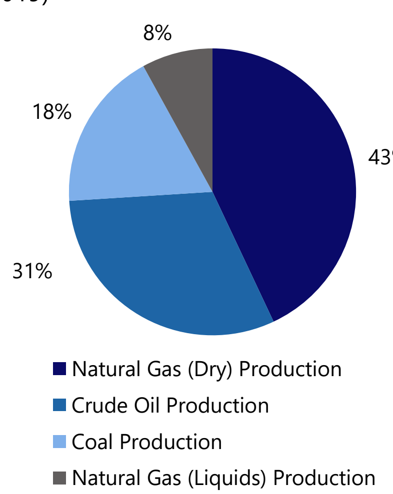
Thermal Power – Coal, Natural Gas, Oil

Thermal generating stations burn coal, oil, or natural gas to generate electricity. The fuel is stored in large stockpiles outside the station and is then crushed and burned to release vast amounts of heat. This heat is transferred to water (stored in tubes) surrounding the furnaces, thus producing steam. This steam is then transferred under pressure and at high speed through large pipes to propel a turbine.

Thermal plants are incredibly useful, as their output can be easily increased to help meet periods of peak demand and provide backup for intermittent sources like wind and solar. However, burning fossil fuels produces a copious amount of emissions, and governments are encouraging investment in renewable alternatives, and utilities must innovate to ensure that thermal plants meet planned environmental and social regulations set out by state and federal governments.

EXHIBIT VI

Breakdown of Thermal Power Production by Fuel Type (2019)



Source(s): U.S. Energy Information Administration

Power Sources

Biomass energy is one of the solutions being looked at as a possible alternative to the burning of fossil fuels and was originally the largest source of U.S. energy consumption until the mid-1800s. Biomass energy is a form of renewable energy generated from burning of plant material. This fuel provides climate change benefits because the amount of carbon dioxide released while burning is equal to the amount absorbed by the plant while it's being grown. Another advantage is that the turnover time between biomass and coal would be minimized, as plants can immediately switch form burning one to the other with no need for plant or equipment modifications.

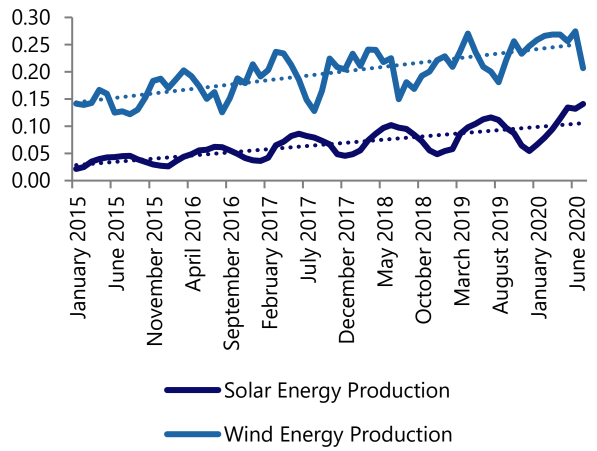
Wind Energy

Wind turbines generating electricity operate by having the wind turning the turbine in this scenario. Wind power provides 7.1% of the United States' electricity and is forecasted to be the fastest growing source of electricity generation, with a 14% rise in 2020 projected. Over the past five years, we have seen considerable growth in energy production through wind energy, increasing from 1.77 quadrillion Btu (unit of heat required to increase the temperature of a pound of water by 1° F) in 2015 to 2.73 quadrillion Btu in 2019 (54.2% increase). Investment in wind energy production has been increasing due to capital costs declining, its extremely low operating costs that require no input, and its lack of environmental risks.

The amount of energy that a wind turbine can produce depends on the strength and consistency of the wind at any given time. Generally, the wind needs to be blowing at 14km/h for a wind turbine to start producing electricity. When increasing the wind speed, the power output increases to a maximum at 50km/h. Typically the wind is stronger at night than during the day, and stronger in the winter than in the summer. Because of this, wind cannot always be relied upon to help meet peak energy demand.

EXHIBIT VII

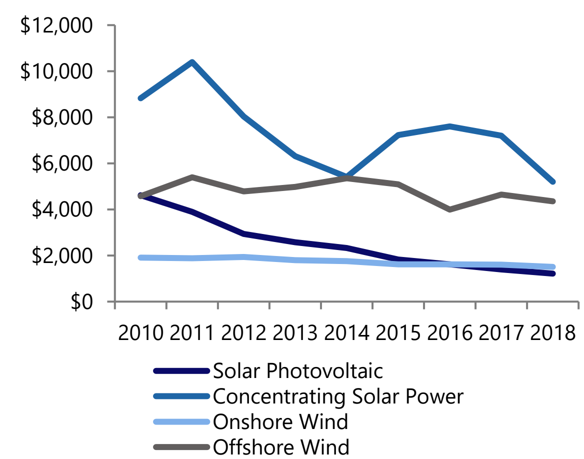
Monthly U.S. Solar & Wind Energy Production (Quadrillion Btu)



Source(s): U.S. Energy Information Administration

EXHIBIT VIII

Global Weighted Average Total Installed Costs of Solar & Wind Projects



Source(s): International Renewable Energy Agency

Power Sources & Power Sources Trends and Market Factors

Solar Energy

Unlike other energy sources, solar energy does not involve turbine generators and any mechanical energy. The energy of the sun is captured by solar photovoltaic devices (solar cells), electric devices which convert sunlight directly into electricity. The main advantage of solar energy is the lack of produced greenhouse gases and environmental effects. The limitations and efficiency concerns of solar energy are the inconsistency of the amount of sunlight, which varies based on location, time, season, and weather; and large surface area of solar panels necessary to absorb a useful amount of energy. Over the past five years, we have also seen strong growth in solar energy production as capital costs continue to decline due to innovation in solar cell technologies and its extremely low operational costs, with production increasing from 0.43 quadrillion Btu in 2015 to 1.04 quadrillion Btu in 2019 (140% increase).

Trends in Types of Energy Power Sources

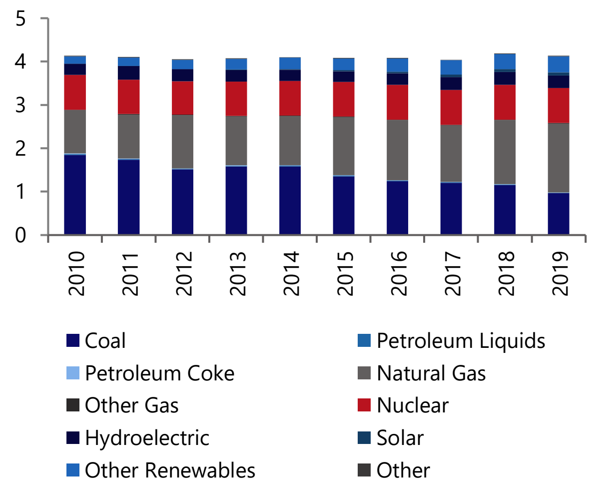
Thermal Power: Despite a reduction in energy production through coal and petroleum liquids and coke, there has been a consistent upward trend in U.S. natural gas production over the past ten years. Of all the fossil fuels, natural gas has the lowest CO2 emissions per unit of energy consumed, and global demand for natural gas has had consistent growth and consumption since 1965, with global natural gas consumption up 600%, compared to a 300% increase in global oil consumption over the same period. The United States alone consumed 30 Tcf (trillion cubic feet) of natural gas in 2019. This consumption is largely due to the residential, electrical power, industrial, and commercial sectors consistent reliance on natural gas. With technological innovation in the utilities sector focused on improving CO2 emissions from natural gas production, global natural gas production and consumption is projected to continue growing from 120 Tcf today to 203 Tcf by 2040. In the United States, natural gas production will be driven by Texas (23.9% of national production), Pennsylvania (20%), Louisiana (9.3%), Oklahoma (8.5%), and Ohio (7.7%).

Renewables (Hydro, Solar, Wind): As aforementioned and indicated in Exhibit VII & VIII, increasing solar and wind capital cost efficiencies over the past ten years has resulted in increased solar and wind production, and represent the fastest growing energy sources in terms of production. Hydro energy production is largely unchanged over the past ten years, due to high capital costs, limited new natural locations for hydro plants, high environmental costs on the ecosystem, high regulatory nature, and particularly by the increasing appeal of solar and wind investments.

Nuclear Energy: As indicated on Exhibit V, the number of nuclear power plants in the United States was exponentially growing from the 1960s-1980s until the Three Mile Island accident and the Chernobyl Nuclear Disaster. Following these accidents, there was major political and social opposition to further development of nuclear facilities, overhauls of nuclear safety designs

EXHIBIT IX

Net Generation by Energy Source (Billions of MWh)



Source(s): U.S. Energy Information Administration

Power Sources Trends and Market Factors

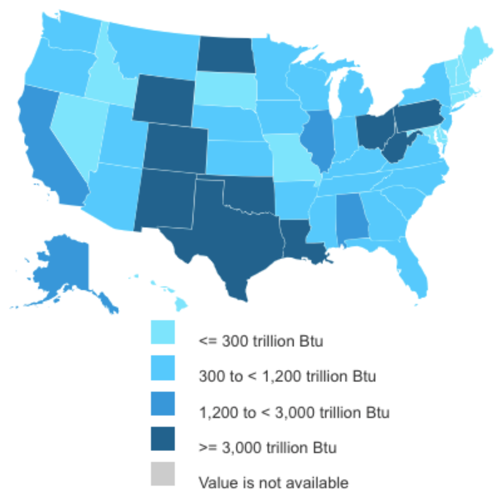
and procedures, and increased regulation on nuclear energy production. These combined factors increased capital, operating, and decommissioning costs increasing, causing investments in nuclear fission to plateau. Interest in nuclear power restarted during the 2000s, largely supported by the 2010 Nuclear Power program. However, the economic challenges following the 2008 Financial Crisis combined with overhauls and safety reviews following the Fukushima Nuclear Disaster resulted in the continuing decline in nuclear energy investment. During the 2010s, the U.S. nuclear industry saw early decommissioning due to lower costs of natural gas and renewable energy generation. With FirstEnergy and Exelon closing 5 nuclear power plants between 2018 and 2021, and Toshiba's Westinghouse Electric Company filing for bankruptcy in 2017, the U.S. nuclear industry is declining. However, investment in research and development on nuclear fusion – the process of combining atoms that is estimated to generate four times the energy of nuclear fission – is continuing and may lead to future industry growth.

Geographic Analysis of Production & Exports

The largest U.S. state markets for energy production are Texas, Pennsylvania, Wyoming, Oklahoma, and West Virginia, representing the North-Eastern and Mid-West markets. The main growth driver in energy production over the past ten years was Texas, with wells drilled in the Permian Basin in western Texas and the Eagle Ford shale in southern and eastern Texas leading to increased crude oil production. Texas is also the largest state in total energy production with more than double the production than Pennsylvania. In terms of energy production, the states with the largest consumption per capita are Wyoming, Louisiana, North Dakota, Alaska, Iowa, and Texas. Over the past five years, The U.S. energy industry's total exports exceeded imports for the first time in 2019 and was the result of increased domestic production and exports of crude oil, petroleum products, and natural products, and natural gas. . In 2019, U.S. energy exports were at an all time high, totaling 23.6 quadrillion Btu.

EXHIBIT X

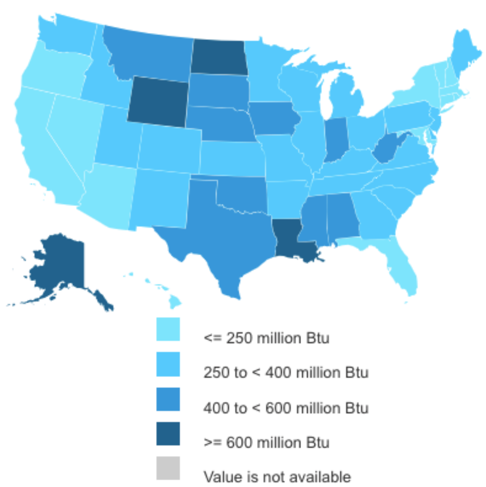
U.S. Energy Production by State



Source(s): U.S. Energy Information Administration

EXHIBIT XI

U.S. Energy Consumption by State Per Capita



Source(s): U.S. Energy Information Administration

Regulatory Environment

History

The history of the electric utilities industry begins with Thomas Edison, who created the lightbulb in 1879. Recognizing a need to deliver electricity to homes, he created the first power plant in New York's financial district. Since then, large-scale centralized distribution has remained the norm thanks to significant economies of scale. This began to occur after entrepreneurs like Samuel Insull began to understand that the technology behind electricity generation made it economic to reach the broadest consumer base possible. Initially, these plants produced DC current. However, with Nikola Tesla's help, AC current quickly became the norm, as it resulted in less lost power and allowed for much more wide-reaching power generation facilities.

The nature of the utilities sector results in natural monopolies, as the economies of scale in this sector are tremendous. Larger facilities and service areas allow for both lower costs to providers and consumers (if effectively regulated). Regulators realized this early in the development of utilities firms, and quickly sought solutions. Some states implemented policies to regulate utilities in the early 20th century, but widespread reform did not come until the Great Depression. Franklin Roosevelt campaigned in 1932 on reformation that sought to end the unchecked monopolies of Insull's age and bring electricity to rural America. FDR established the Public Utility Holding Company Act in 1935, significantly limiting the financial flexibility of utility firms and confining their operations to avoid Standard Oil-esque monopolies on the basis that electricity is a public good.

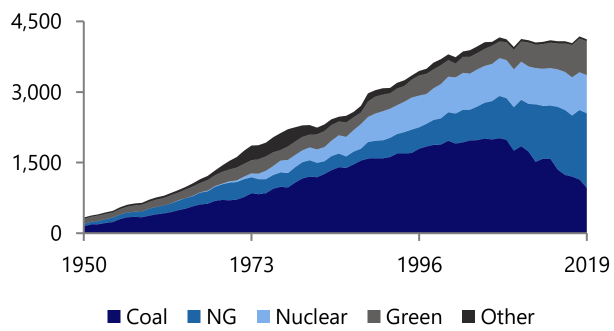
With the above regulation in place, little changed until the 1970s, when energy prices began to spike due to OPEC supply disruptions. Regulators began to implement new policies aimed at driving energy production away from oil and creating a more competitive pricing environment. In 1978, the Federal Energy Regulatory Commission (FERC) was created to this end. Furthermore, power plants that were not vertically integrated (meaning that they did not own transmission lines) were permitted to sell their electricity at its replacement cost for other utility firms. Later, in 1992, the Energy Policy Act was instituted, essentially allowing states to break up the power given to Public Utilities Commissions (PUCs). This allowed for further competition as merchant developers of electricity were able to transmit electricity unabated, regardless of ownership of transmission lines. Many states, particularly in the U.S. Northeast, have opted to suspend the monopolies and shift to a competitive environment since then.

State-by-State Regulation

As mentioned above, states can use their discretion to determine whether they wish to enforce the natural monopolies through public utilities commissions, or if they want to opt for a more competitive marketplace. Republican states, like Louisiana and Alabama, have generally kept their strong PUCs in place, while Democrat states like those in the Northeastern U.S. have generally opted to move to a more competitive power generation system. The U.S. South remains strongly tied to the old monopoly-based system, with utility firms supported by friendly PUCs that see no reason to upend the current system (corruption is a potential factor, as discussed later).

EXHIBIT XII

Annual U.S. Electricity Generation in Billions of KWh



Source(s): EIA

Regulatory Environment

The FERC

Given the size and the economies of scale associated with the utilities industry, there is a need to ensure that regulation exists to govern intrastate power transfer/generation. This is where the Federal Energy Regulatory Commission, or FERC for short, comes in. Initially established in 1977, an updated version of the Energy Policy Act in 2005 gave the FERC wide-reaching powers to govern the transmission of both electricity and petroleum across state borders. They are responsible for governing the wholesale sales of electricity, including setting price caps and licensing projects. The FERC oversees around 73% of the electricity used in the U.S. with a goal of ensuring "fair and reasonable" pricing for consumers, although some critics have accused them of being too laissez-faire. They are willing to lay out huge fines if competitive practices are not followed, however, with JPMorgan having to pay $410 million in 2013 as a result of market manipulation. The firm also monitors the electricity grid, ensuring that adequate infrastructure is in place and operating safely across the States..

Unregulated Assets

One of the features of the utilities reform at the end of the 20th century was the legalization of merchant power generators. These are non-utility operators who do not enter into purchase agreements and instead sell their electricity at spot rates. This creates a more competitive environment where traditional utility firms are forced to compete with independent producers and share their transmission lines. Independent developers, oil and gas companies, and equipment suppliers are all examples of investors who have begun to enter the merchant power generation space (partially thanks to low natural gas prices). These producers can offer electricity generation at a cost of only three cents per KWh, which is well below the 12.5 cents per KWh of regulated utilities players.

Relationships/Corruption

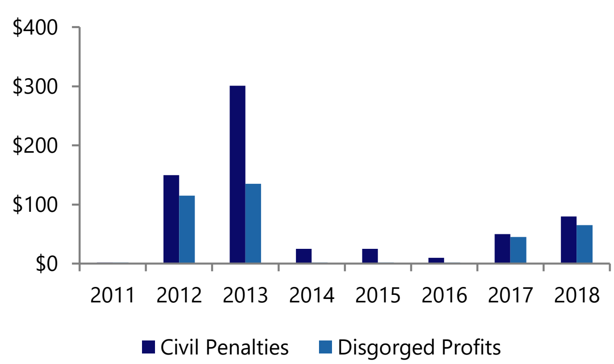
A challenge faced by all regulated monopolies is the fact that corruption and relationships within the government can influence the success of businesses. In the U.S., issues have ranged from charitable donations to those who hold sway with politicians to outright racketeering (see FirstEnergy, who paid Larry Householder $60 million to pack the Ohio House of Representatives with supporters). ComEd admitted to paying bribes to ensure infrastructure project approval and favorable rate structures in Illinois. They had to pay $200 million in fines. Many of these conspiracies only come to light when there are enormous cost overruns on projects, meaning that there is likely an even higher level of corruption than apparent.

Scandals

With the utility sector's ties to the political sphere, scandals can be severely detrimental to the underlying business. Most scandals involve bribery, political spending, or failed projects, but recent years have seen utility firms go so far as to hire paid actors to show support for certain projects. As companies that rely on the public for income, scandals that damage their reputation can have far reaching political impacts. A strong and politically intelligent management team is necessary to ensure that utility interests can be pushed through legislation.

EXHIBIT XIII

Penalties Recovered by FERC in US$MM



Source(s): JDSUPRA

Regulatory Environment

Implementation

As discussed in future sections, the generation of revenue for utilities companies is unlike any other industry. Since most operate as regulated monopolies, government agencies are responsible for setting an acceptable level of profit. This is largely done by placing a cost of capital on the assets owned by a firm so that investors are guaranteed a certain return on their investment. As such, firms are incentivized to have the largest possible asset base. While regulators are responsible for approving projects and increases in price to consumers, recent increases in electricity consumption have meant that utility firms have had no need to increase their rates to cover capex expenses. Furthermore, with recent pushes to increase renewable power generation, firms have continuously increased capex spending, which ultimately improves its bottom line. Some critics have argued that this system has resulted in utility companies pushing for more expensive solutions when simple ones would suffice.

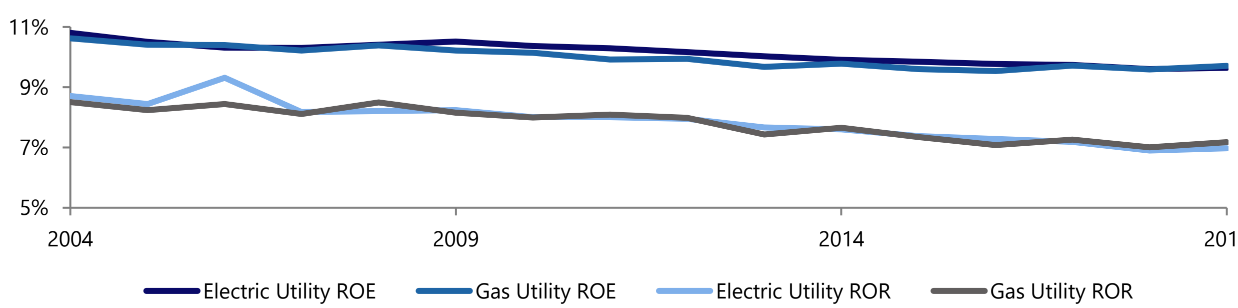
With both the cost of equity and size of asset base critical to utility company's bottom line, the accounting and calculation of each has been the subject of much debate. For now, the cost of equity largely relies on the CAPM pricing model for public companies, while private firms will use comparable players (individually set by the regulating body). This value is ultimately combined with the cost of debt to come to the company's WACC. It is worth noting that debt levels on operating companies are strictly regulated and cannot be excessive. To calculate the assets on which this rate is attached to, firms add the value of their prudent capex annually to a total balance. They then subtract asset disposals and depreciation to come to the regulatory asset base for the year. Assets, in this case, do not include those that are funded without investor money, intangibles, assets that do not provide the utility service, or customer contributed assets. It is also worth noting that rate base calculations only include generation facilities in vertically integrated systems and not in restructured systems. Firms can be hit with lawsuits or fines if they attempt to manipulate these numbers.

Supply/Demand Impacts

The rate base, or a company's prudent capital investments, is impacted by demand increases in the long term. However, in the short term, companies generally keep their maintenance capex flat (even if demand is lost). As such, the nature of their regulated returns means that demand or supply shocks do not impact revenue or profit. Over the long run, however, there will be a need for approved increased growth capex to meet demand increases, meaning that firms will earn more (but not necessarily a higher rate).

EXHIBIT XIV

U.S. Authorized ROE and ROR for Utility Firms



Source(s): S&P Global Market Intelligence – RRA Regulatory Focus Major Rate Case Decisions

Business Model Analysis

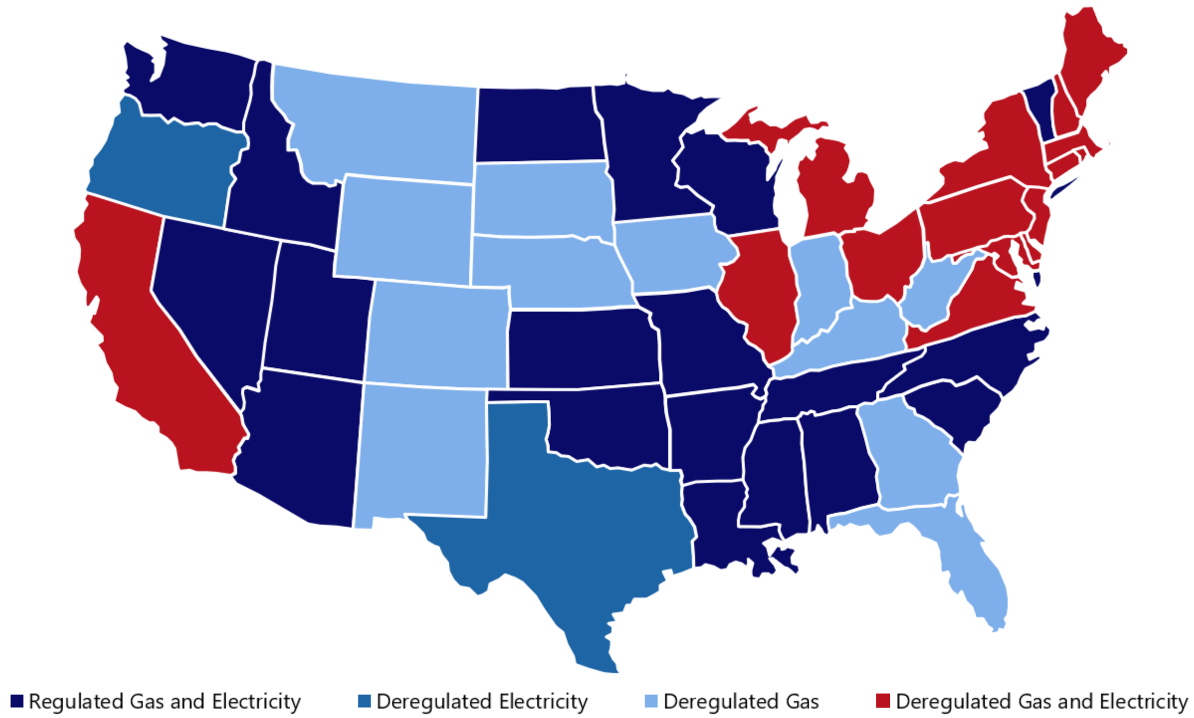
There are various levels of regulation within the utilities industry across the United States. Due to their monopolistic nature, all companies are governed to an extent for the protection of shareholders' interest and captive customers; however, specific permissions vary by state based on political dynamics, consumer behaviour, and market trends relating to environmental goals, new technology, and distribution requirements.

In deregulated environments, consumers tend to select utility providers based on price and proximity. Resultingly, simple supply and demand dynamics drive success in these oligopolistic commodity markets in the sense that only the lowest-cost producers attract customers and ultimately survive.

In regulated environments, utilities earn profits in a unique and counter-intuitive manner. A state commission or alternative governing body will forecast consumer demand and determine the utility's appropriate rate base. This is essentially the amount of capital or value of PP&E assets that (a) will enable the provision of appropriate services, and (b) the company is permitted to earn a certain rate of return on, which is again specified by regulators. The overall goal is to allow the utility to remain profitable and earn its weighted average cost of capital.

Exhibit XV

Energy Market Regulation by U.S. State



Source(s): Electric Choice

Business Model Analysis

Once the rate base is settled, regulators determine other factors relevant to the utility's operations. These include capital structure maintenance policies, which costs can be capitalized into the rate base, and how various assets are to be depreciated. Once all variables are outlined, the rate base is multiplied by both the cost of equity and the equity thickness to yield the utility's regulated net income. Moving backwards through the income statement, taxes, debt costs, depreciation, and operating expenses are added back to the bottom line. This process arrives at a revenue figure, and assuming accurate market estimates and accordingly-set regulations, the revenue required to serve utility demand and earn the permitted return on capital. The revenue requirement is then divided by the same kWh demand figure originally used to set PP&E and other regulations to ultimately back into a rate for the utility's services.

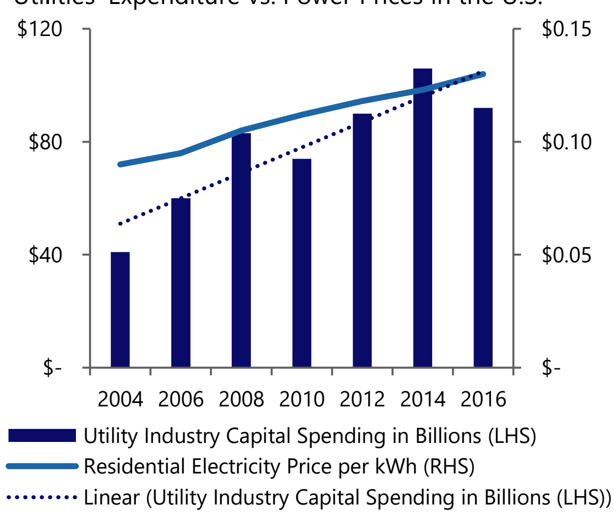
Since it is utilities' return on capital that is regulated and protected, profits can scale on an absolute value basis under different capital structures. For example, under this business model a utility with a D/E ratio of 1.0 would earn greater after-tax profits than a counterpart with a D/E ratio of 2.0. This is because only the percentage of the rate base financed by equity is retained for net income. Further, since debt acts as a tax shield, the company with greater equity thickness will be taxed more heftily, ultimately boosting the revenue requirement and customers' rates.

This concept is important because utilities tend to function as operating companies that pay out shares to a holding company, with only the former being susceptible to regulation by the state commission. Without the ability to manage its earnings model, OpCo's try to maintain high equity thickness while passing all costs through to customers so as to maximize after-tax profits. However, as an unregulated HoldCo with no rate of return cap, levering up allows the amplification of nominal but consistent returns from shares of the OpCo.

The sustainability and adaptability of regulated utilities' business models is advantageous to investors. Rate of return regulation creates a price floor, meaning that investor risk and the overall cost of capital is low. However, despite maintaining fair market conditions for both consumers and suppliers in theory, the emphasis on cost recovery in rate of return regulation is known to cause inefficiency. If utilities' requests for funding are not appropriately analyzed from a cost-benefit lens, the direct relationship between capital spending, profits, and customer's utility prices can be exploited. Further, due to significant debt levels and cost of equity formulation, utilities are hypersensitive to changes in interest rates. When the yield on government bonds lessens and the market exhibits bearish activity, utilities' rate base returns rise under capital asset pricing model and investors flock to the these companies' stability. However, in the opposite scenario of an improving economy and rising interest rates, investors tend to prefer higher-yield alternatives. This creates an inverse correlation between utilities' performance and the macroeconomy.

Exhibit XVI

Utilities' Expenditure vs. Power Prices in the U.S.



Source(s): The Wall Street Journal

Key Industry Trends

COVID-19 Impact

In a similar manner to most industries, the COVID-19 virus has taken a toll on the utilities space. However, due to the nature of utilities business models, the detriments were not as severe as what most companies experienced. Due to work-from-home trends initiated to slow the spread of the virus, electricity consumption has fallen by 12% and 9% in the commercial and retail sectors, respectively. However, the same factor caused residential power consumption to jump 3%, a less significant change due to the contradictive affect of a slightly cooler summer in the U.S. than that prior. Overall, power demand dipped to ~1B kWh, its lowest point since 2009; however, the overall effect on utilities' bottom lines was minimal due to protected rates of return.

While the pandemic itself may not have materially impacted utilities, its influence on the macroeconomy took an indirect effect. When the 10Y treasury yield plummeted in alignment with the market in Q2 of 2020, there was a notable downswing in utilities' costs of equity given most stocks' sub-1 beta. Any PP&E added to the rate bate at this time would have been assigned a lower cost of capital. Theoretically this would lead to lower rates for customers, but given the difficulty for regulators to adjust power pricing mid-contract, many utilities became suddenly positioned to experience a short-term spike in profits. The fact that most utility stocks dipped in March implies market underappreciation of this unique concept.

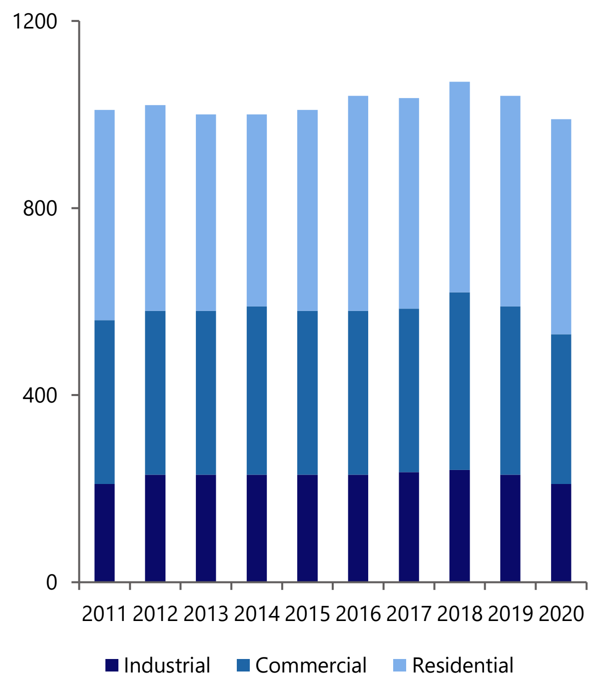
Benefits of Renewable Energy

There are substantial merits to focusing on the development of renewable energy assets and sources for utilities. As mentioned, due to mandated costs of capital on the rate base, companies are indirectly incentivized to build out their asset pool to the greatest extent possible. With this motivation, utilities across the country unanimously push for the need to maintain grid infrastructure and upgrade their assets to new, cleaner technology.

A recent explanation that utilities have been offering for their requests to build out infrastructure is the importance of shifting to renewable energy. This is where various political motivations come into play. Regulators in Democratic states value the use of clean energy as a source for utilities more so than those in Republican states, and are thus more willing to finance asset build-outs that in many cases boost the company's bottom line more so than consumers' experiences. Utilities in red states cannot leverage the renewable energy trend to the same extent, as governance is still generally less-willing to finance these projects and is more wary of inefficiency.

Exhibit XVII

U.S. Electricity Demand by Sector in Billions of kWh



Source(s): Energy Information Administration

U.S. Political Impacts

Trump's Legacy and Biden's Changes

Like most Republicans, Trump's term was marked with widespread support for fossil fuel industries. He often spoke of O&G and coal jobs at rallies and suggested that wind energy caused cancer. Through the pandemic, Trump rarely offered support to renewable energy workers while quickly propping up struggling fossil fuel companies. The Trump administration approved fewer renewable projects than Obama, eliminated the Bureau of Land Management for renewable companies, slowed competitive renewable leases, and prioritized O&G lobbyists. These changes have made renewable power production more difficult in the US, which impacts utilities players. Another change comes from Trump's focus on national security, which has resulted in utilities firms facing difficulties in acquiring bulk power systems. The US has not produced high voltage transformers for years, meaning there is a reliance on Chinese products, which introduces some security risk given the critical nature of the electric grid. As such, the Trump administration blacklisted several international companies, which will result in higher costs for the utilities industry.

Biden is widely expected to reverse some of the anti-renewables policies of the Trump administration, with a goal of zero emissions from the power industry by 2035. Several firms have already set this as goal. With increased tax rates having little impact on utilities, Biden's presidency is expected to have a much more positive result than Trump.

Biden's Clean Energy Policies

President-elect Biden's policies to support green energy production have supported hopes for green utility firms like Nextera, ultimately turning it into America's largest energy company. Supportive policies that allow for new infrastructure to be built have increased capital investment in the industry. However, another branch of Biden's environmental policy focuses on punishing polluters and fossil fuel users. While not explicitly pushing for a carbon tax, Biden's policies make it clear that he is seeking financial restitution from polluters. This includes coal and natural gas fired power plants. Utilities firms dependent on these methods for electricity production will see higher costs. However, Biden's plan also calls for significant investment in the green energy space, potentially making it easier for firms to transition to clean fuels.

EXHIBIT XVIII

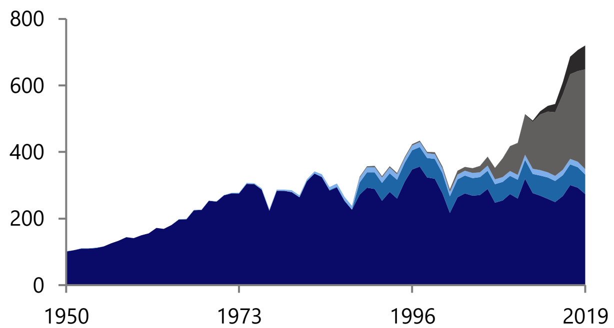
COVID-19 Policy Changes by Industry

Issue	O&G	Green
Royalties	Suspended/cut	Increased
Land for Sale	245,582 acres	0 acres
Offshore for Sale	78,000,000 acres	0 acres
Trump Tweets	11	0

Source(s): Center for American Progress

EXHIBIT XIX

US Green Electricity Generation in Billions of KWh



Source(s): EIA

U.S. Political Impacts

Biden's Tax Plan Overview

President-elect Joe Biden has highlighted many policy changes relating to the macroeconomic environment. One of which is the raise in corporate income tax from 21% to 28%, a partial reversal to Trump's slash from 35% in 2017. However, utilities companies will not suffer from reduced after-tax profit as nearly all businesses would. As mentioned prior, these companies operate under rate of return regulation; income statements are formulated backwards starting from a permitted net income and adding back all expenses – including taxes – to arrive at predetermined revenue, which coupled with demand yields the rate that customers pay for service. If a utility's income tax rises, the required revenue will do so in alignment and the company is virtually unaffected. Captive customers, on the other hand, will have to foot the elevated cost by paying higher rates.

Contradictive Government Policy

The purpose of Biden's tax plan is to fund expansions in child care, health care, and education; sectors that ultimately support the welfare of society. What makes this interesting is that in addition to the funds coming out of the pockets of large corporations and wealthy individuals, the plan is partially being financed by everyday citizens via their monthly utility bill. This is in unfortunate contrast to what is being increasingly emphasized by utility regulators themselves: lowering the cost of power for customers. Over the last decade, The FERC pushing for to reduce rates because costs per kWh have been climbing, largely due to utilities' tendency to select expensive projects over simpler investments.

Such is not to claim that the loophole unique to utilities' role in Biden's tax plan exhibits unethical behaviour; it is simply a function of how these businesses work, and the additional charges to everyday consumers will be nominal compared to the contributions of Biden's named tax targets. However, it is an interesting example of how people making less than $400,000 per year will contribute to the president-elect's public welfare project despite his Democrat party's constant reaffirmation that this would not be the case.

Duke Energy (NYSE:DUK) – Deep-dive

Overview

Duke Energy is an energy company headquartered in Charlotte, North Carolina, subject to regulation by the FERC and other regulatory agencies. Duke Energy's segment structure includes three core business segments: *Electric Utilities and Infrastructure, Gas Utilities and Infrastructure, and Commercial Renewables.*

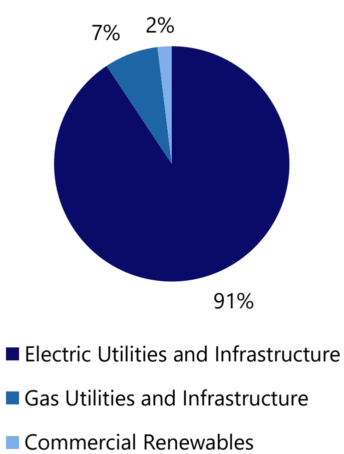
Electric Utilities and Infrastructure

Electric Utilities and Infrastructure conducts operations mainly through the regulated public utilities of Duke Energy Carolinas, Duke Energy Progress, Duke Energy Florida, Duke Energy Indiana and Duke Energy Ohio. Electric Utilities and Infrastructure provides retail electric service through the generation, transmission, distribution and sale of electricity to approximately 7.8 million customers within the Southeast and Midwest regions of the U.S. This area is approximately 91,000 square miles across six states with a total estimated population of 25 million people. The operations represent electricity sold wholesale to municipalities, electric cooperative utilities and other load-serving entities. Electric Utilities and Infrastructure is also a joint owner in certain electric transmission projects. Electric Utilities and Infrastructure has a 50% ownership interest in DATC, a partnership with American Transmission Company, formed to design, build and operate transmission infrastructure. DATC owns 72% of the transmission service rights to Path 15, an 84-mile transmission line in central California. Electric Utilities and Infrastructure also owns a 50% ownership interest in Pioneer, which builds, owns and operates electric transmission facilities across North America.

Electric Utilities and Infrastructure's businesses operate as the sole supplier of electricity within their service territories, except in Ohio, which currently has a competitive electricity supply market for generation

Exhibit XX

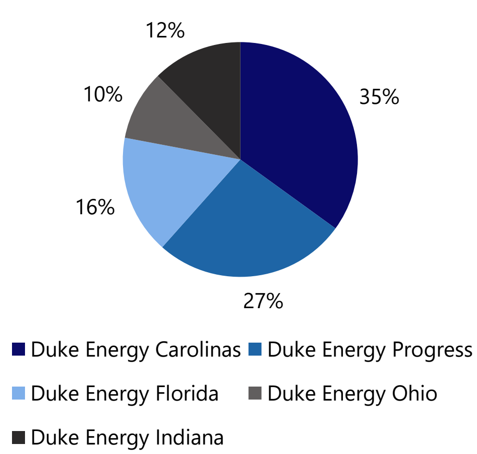
2019 Revenue Breakdown by Reportable Segment



Source(s): Company Filings

Exhibit XXI

Electric Utilities and Infrastructure GWh Sales



Source(s:): Company Filings

Duke Energy (NYSE:DUK) – Deep-dive

service. Electric Utilities and Infrastructure owns and operates facilities necessary to generate, transmit, distribute and sell electricity. Services are priced by state commission approved rates designed to include the costs of providing these services and a fair return on invested capital. This regulatory policy is intended to provide safe and reliable electricity at fair prices. In Ohio, Electric Utilities and Infrastructure conducts competitive auctions for electricity supply. The cost of energy purchased through these auctions is recovered from retail customers. Electric Utilities and Infrastructure earns a retail margin in Ohio on the transmission and distribution of electricity, however not on the cost of the underlying energy.

The state electric utility commissions approve rates for Duke Energy's retail electric service within their respective states. The state electric utility commissions has authority over the construction and operation of Electric Utilities and Infrastructure's generating facilities to varying degrees. The underlying concept of utility ratemaking is to set rates at a level that allows the utility to collect revenues equal to its cost of providing service plus earn a reasonable rate of return on its invested capital, including equity.

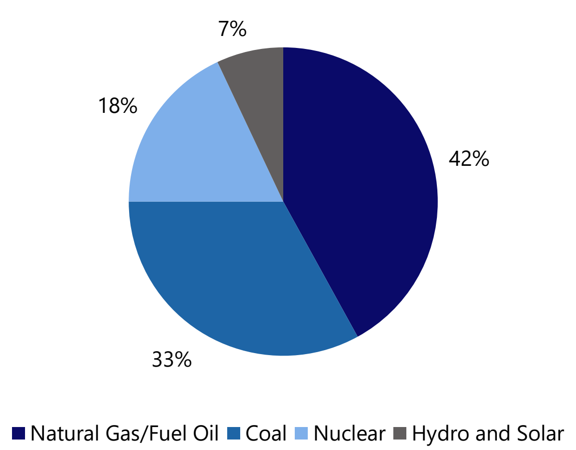
The FERC approves Electric Utilities and Infrastructure's cost-based rates for electric sales to certain power and transmission wholesale customers. Regulations of FERC and the state electric utility commissions govern access to regulated electric and other data by nonregulated entities and services provided between regulated and nonregulated energy affiliates. These regulations affect the activities of nonregulated affiliates with Electric Utilities and Infrastructure.

Gas Utilities and Infrastructure

Gas Utilities and Infrastructure conducts natural gas operations primarily through the regulated public utilities of Piedmont, Duke Energy Ohio and Duke Energy Kentucky. The natural gas operations

Exhibit XXII

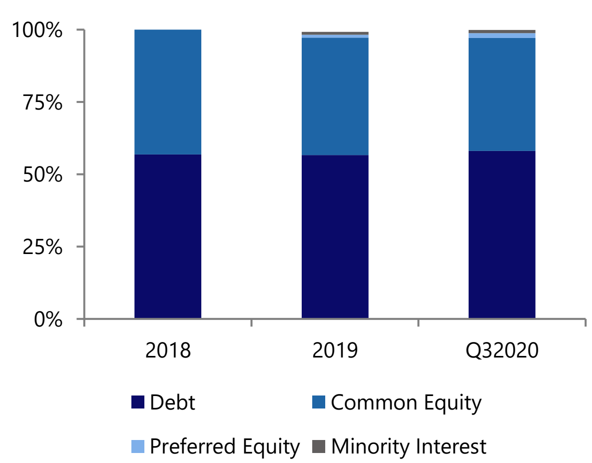
2019 Generation Diversity (% Owned Capacity)



Source(s): Company Filings

Exhibit XXIII

Historic Capitalization



Source(s:): Capital IQ

Duke Energy (NYSE:DUK) – Deep-dive

are subject to the rules and regulations of the NCUC, PSCSC, PUCO, KPSC, TPUC, PHMSA and the FERC. Gas Utilities and Infrastructure serves residential, commercial, industrial and power generation natural gas customers, including customers served by municipalities who are wholesale customers. Gas Utilities and Infrastructure has over 1.6 million customers, including 1.1 million customers located in North Carolina, South Carolina and Tennessee, and an additional 535,000 customers located within southwestern Ohio and northern Kentucky. In the Carolinas, Ohio and Kentucky, the service areas are comprised of numerous cities, towns and communities. In Tennessee, the service area is the metropolitan area of Nashville.

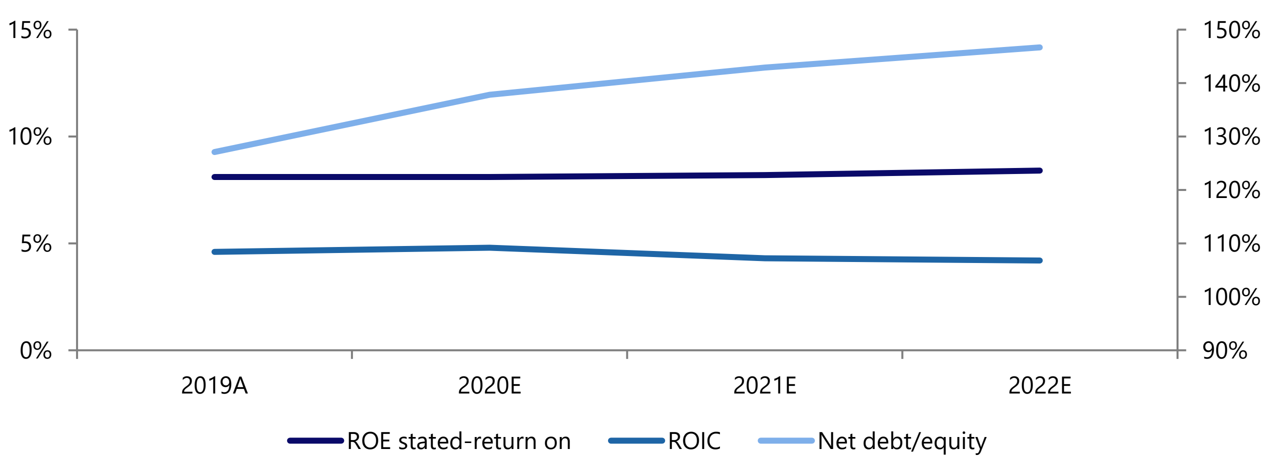
Gas Utilities and Infrastructure's businesses operate as the sole provider of natural gas service within their retail service territories. The business segment owns and operates facilities which are necessary to transport and distribute natural gas and earns a retail margin on the transmission and distribution of natural gas, however not on the cost of the underlying commodity. Services are priced by state commission approved rates designed to include the costs of providing these services and a reasonable return on invested capital.

In residential, commercial and industrial customer markets, natural gas distribution operations compete with other companies that supply energy, primarily electric companies, propane and fuel oil dealers, renewable energy providers and coal companies in relation to sources of energy for electric power plants, as well as nuclear energy. Arguably, the most significant competitive factor is price.

The state gas utility commissions approve rates for Duke Energy's retail natural gas service within their respective states. The state gas utility commissions, to varying degrees, have authority over the construction and operation of Gas Utilities and Infrastructure's natural gas distribution facilities. CPCNs issued by the state gas utility commissions or other government agencies, as applicable, authorize Gas Utilities and Infrastructure to construct and operate its natural gas distribution facilities and to sell natural gas to retail and wholesale customers.

Exhibit XXIV

Return and Debt Metrics



Source(s): Credit Suisse

Duke Energy (NYSE:DUK) – Deep-dive

Commercial Renewables

Commercial Renewables primarily acquires, develops, builds, operates and owns wind and solar renewable generation throughout the continental U.S. The portfolio includes nonregulated renewable energy and energy storage businesses.

Commercial Renewables' renewable energy includes utility-scale wind and solar generation assets, distributed solar generation assets, distributed fuel cell assets and a battery storage project, which total 2,282 MW across 19 states from 22 wind facilities, 126 solar projects, 11 fuel cell locations and one battery storage facility. Revenues are primarily generated by selling the power produced from renewable generation through long-term contracts to utilities, electric cooperatives, municipalities and corporate customers. In most instances, these customers have obligations under state-mandated renewable energy portfolio standards or similar state or local renewable energy goals.

Commercial Renewables primarily competes for wholesale contracts for the generation and sale of electricity from generation assets it either develops or acquires and owns.

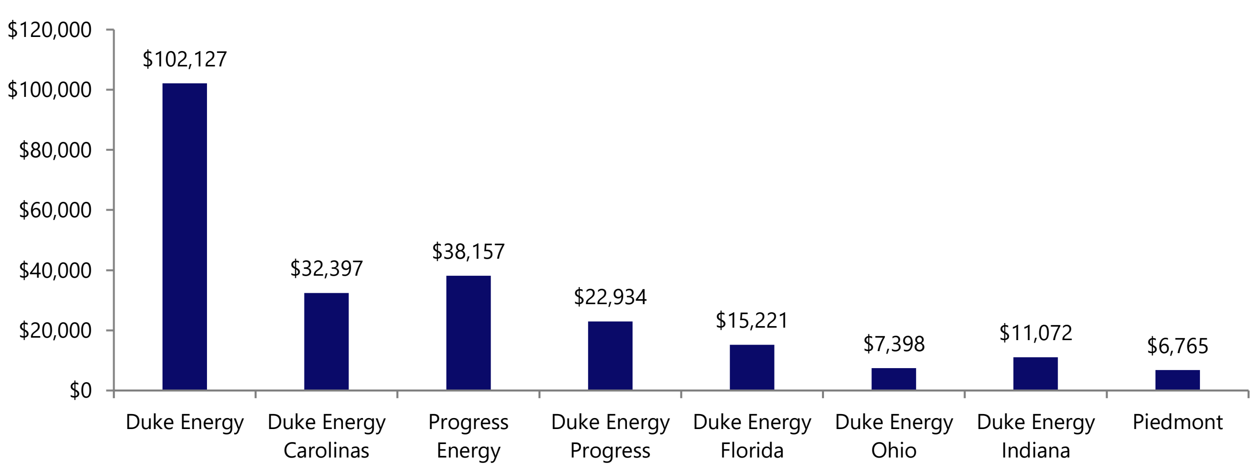
Management

Lynn J. Good: Lynn Good was elected as Chairman of the Board at Duke on January 1, 2016 and assumed her position as President and Chief Executive Officer in July 2013. Prior to that, she served as Executive Vice President and Chief Financial Officer since 2009.

Steven K. Young: Steven Young assumed his current position of Chief Financial Officer on August 2013. Prior to that, he served as Vice President, Chief Accounting Officer and Controller, assuming the role of Chief Accounting Officer in July 2012 and the role of Controller in December 2006.

Exhibit XXV

Duke 2019 Net PP&E by Subsidiary ($ in millions)



Source(s): Company Filings

Duke Energy (NYSE:DUK) – Deep-dive

What We Like

Similar to the Southern Company, Duke represents a potential opportunity to add stability and consistent returns to the QUIC portfolio. However, there are still differentiated aspects of Duke which both favour and raise caution of its validity as a possible name in the QUIC portfolio.

DUK previously increased its capital plan ~$2B to ~$58B, as the company looks to double its enterprise-wide renewable portfolio to 16GW by 2025. Additionally, the 5yr capital plan is de-risked and focused on smaller scale projects. In Q2 of 2020, DUK placed an emphasis on renewables to fill the $4B hole in the earnings growth plan with the cancellation of the ACP. The longer outlook from 2025-2029 emphasizes clean energy mandates through renewables. DUK plans to keep customers rates low through fuel savings, lower O&M than coal plants, efficiencies from technology, reduced contractor reliance, and higher growth in customer base in Carolinas.

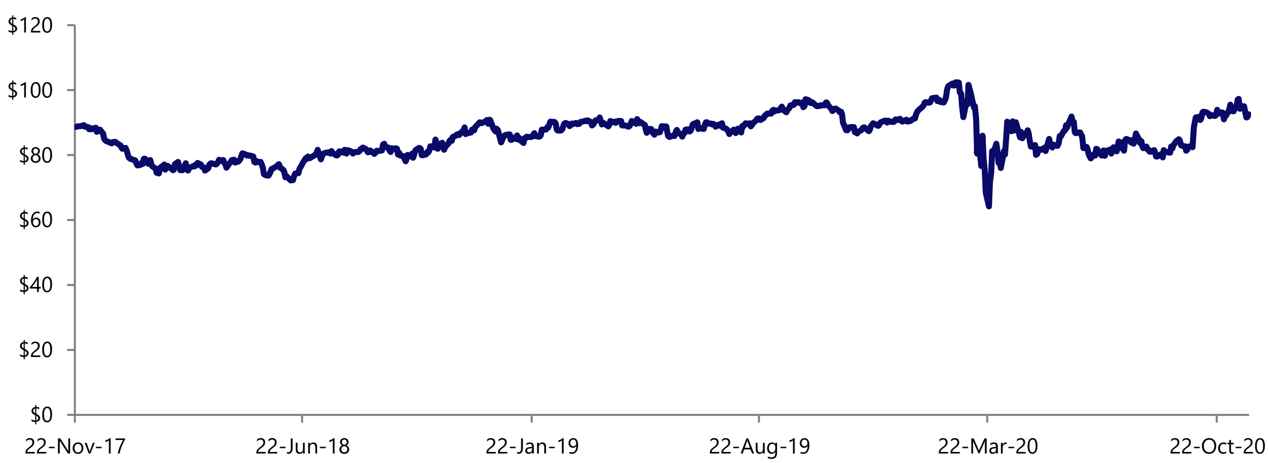
Duke also expects to continue annual equity issuances of $500M per year through 2022. Additionally, the company expects to receive ~$575M of refundable AMT credits in 2020. Available liquidity as of Sep 30th, 2020 is $9.2B and Duke continues to expect FFO/debt of ~15% in 2020.

DUK additionally plans to accelerate coal plant retirements across the Carolinas and Midwest and is planning to retire 15.2 GW coal units by 2030 in addition to 6.5 GW already having been retired since 2010. This represents a total of 72% of coal being retired since 2010, with the bulk of retirement in the Carolinas, where 100% of 9.0 GW is planned to be retired by 2030. In Indiana, the company plans to retire another 2 GW by 2030 for a total 4.1 GW since 2010, resulting in 48% of coal retired in Indiana by 2030. Coal assets as a percentage of earnings base for Duke reduced by half over their 5-year plan and are projected to approach near zero by 2029.

Dukes commitment to retiring all coal-only units in the Carolinas by 2030, to achieving net-zero methane emissions from the natural gas business by 2030, and to reach net-zero carbon emissions across the company

Exhibit XXVI

Duke 3-Year Share Price Performance



Source(s): Capital IQ

Duke Energy (NYSE:DUK) – Deep-dive

by 2050 is undoubtedly impressive. This falls alongside their plans to add ~40GW of renewable capacity by 2050, including reaching 16GW by 2025 comparative to 8GW in 2019. The base case capex outlook calls for ~20% of the $58B five-year plan to relate to clean energy at the utilities, in addition to ~5% for Commercial Renewables for a combined ~$14.5B.

What We Don't Like

In terms of regulatory environments, while the Carolinas are above-average jurisdictions, they have undoubtedly deteriorated in recent years, due in part to coal ash environmental issues. Duke currently awaits a North Carolina Supreme Court decision in late 2020 regarding a challenge to its recovery of costs associated with coal ash basin remediation. Regarding the coal ash, which was not covered by the settlements, Duke expects a decision from the Supreme Court in December regarding past rate cases and from the NCUC in December or January for the 2020 rate cases. It is unclear which will come first.

It is important to also note possible red flags, regarding Duke management's track record around mega-projects. This management has been weak, with notable scars from ACP, the Constitution Pipeline, the Edwardsport coal-to-gas plant, and the Crystal River, Levy, and Lee nuclear plants, among others. These have caused billions of dollars of shareholder losses over the years and will be crucial to analyze in the scenario where QUIC further considers allocating capital to Duke.

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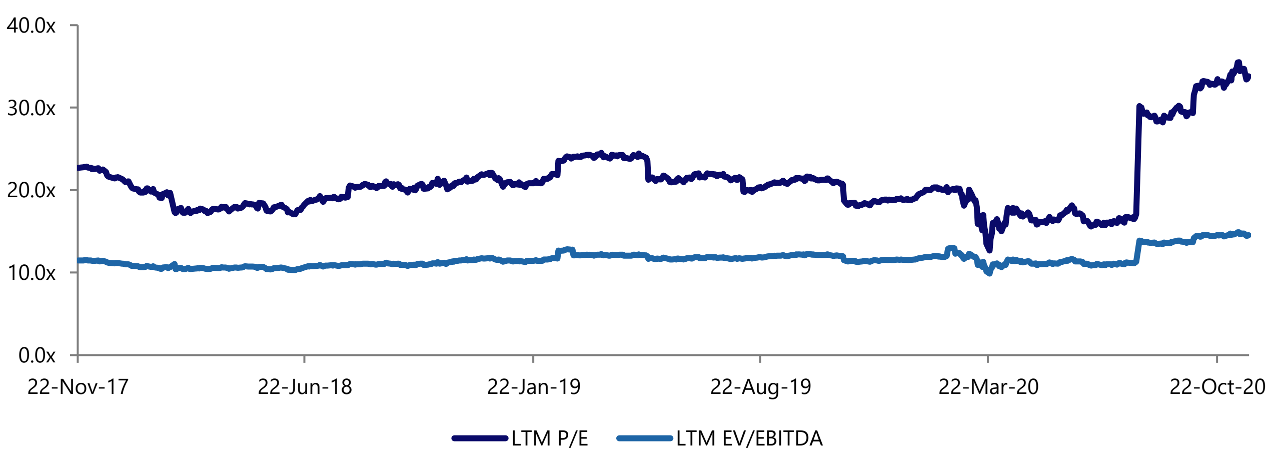
Exhibit XXVII

Duke 3-Year Trailing Historic Multiples



Source(s): Capital IQ

The Southern Company (NYSE:SO) – Deep-dive

Overview

Headquartered in Atlanta, Georgia the Southern Company participates in the generation, transmission and distribution of power. SO owns in entirety three traditional electric operating companies (Alabama Power, Georgia Power and Mississippi Power), and is the parent company of Southern Power and Southern Company Gas. Thus, the company's reportable segments are the sale of electricity through traditional electric operating companies, the sale of electricity in the competitive wholesale market (Southern Power), and the sale of natural gas (Southern Company Gas). The Southern Company employs roughly 28,000 people and was founded in 1945.

Traditional Electric Operating Companies

Such consists of Alabama Power, Georgia Power and Mississippi Power. The aforementioned three companies are vertically integrated utilities whom provide electric service to both wholesale and retail customers. The majority of electricity is fueled by natural gas and coal.

Southern Power

Southern Power develops, constructs, acquires, owns and manages power generation facilities, and in turn sells electricity via the wholesale market. These sales are conducted at market-based rates; however, Southern Power commits to the construction or purchase of said facilities only after entering into long-term PPAs. The bulk of electricity is fueled by natural gas.

Southern Company Gas

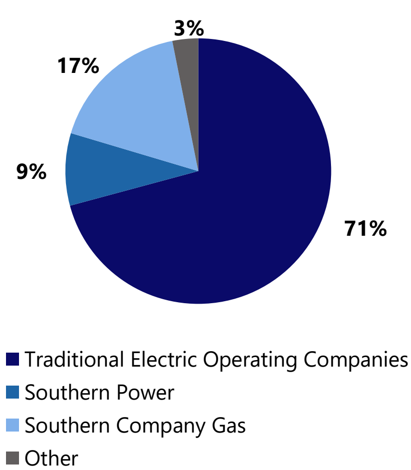
Southern Company Gas is involved in the distribution of natural gas, and owns gas distribution facilities in Illinois, Georgia, Virginia and Tennessee. The business consists of four segments: gas distribution operations, gas pipeline investments, wholesale gas services and gas marketing services.

Power Generation by Source

The traditional electric operating companies and So. Power collectively own 30 hydroelectric stations, 24

Exhibit XXVIII

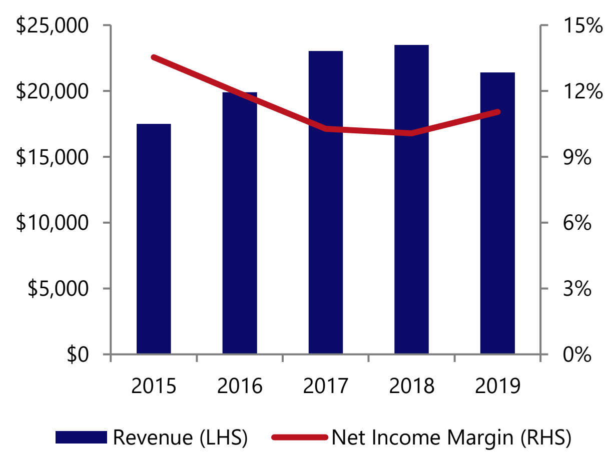
2019 Revenue Breakdown by Reportable Segment



Source(s): Company Filings

Exhibit XXIX

Historic Gross Revenue and Net Income Margin



Source(s:): Company Filings

The Southern Company (NYSE:SO) – Deep-dive

fossil fuel generating stations, 3 nuclear generating stations, 13 combined cycle/cogeneration stations, 42 solar facilities, 10 wind facilities, 1 fuel cell facility and 1 battery storage facility. Total generating capacity stands at 10.8MM KWs for Alabama Power, 13.4MM KWs for Georgia Power, 3.5MM KWs for Mississippi Power and 12.2MM KWs for Southern Power. Hence, total capacity is 41.9MM KWs and total energy supply consists of the following breakdown: 47% gas, 20.3% coal, 14.7% nuclear, 3.2% hydro, 5.9% other and 8.9% purchased power.

Management Overview

The Southern Company is led by Chairman, President & CEO Thomas A. Fanning. Fanning has been in his current role since 2010, and has held a number of other executive positions since joining the company in 1980 as a Financial Analyst. Fanning holds a Bachelors degree as well as a Master's Degree from Georgia Tech.

Andrew W. Evans serves as the company's Executive VP & CFO, and has been in his current role since 2018. Prior to his current role, Evans has served in a variety of positions (primarily within the Southern Company Gas segment) since joining the company in 2002.

Recent Expansion and M&A Activity

Southern Company

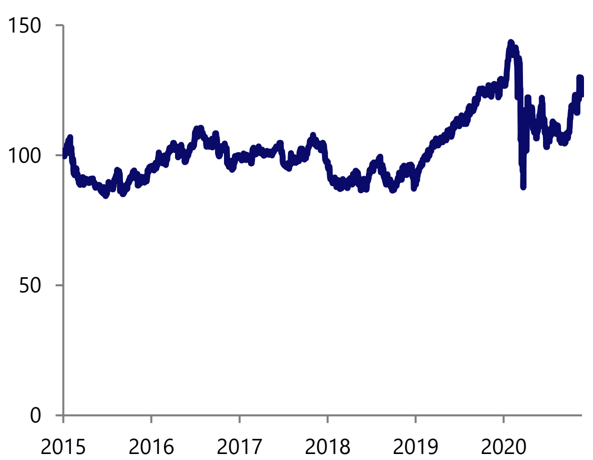
In 2019, Southern Company completed the sale of Gulf Power to NextEra Energy for an aggregate cash price of $5.8B. Such consists of a public utility that is involved in the generation, transmission and distribution of power throughout Northwest Florida.

Southern Power

During 2019, Southern Power completed the construction of the Mankato plant expansion (385 MW of natural gas capacity) and the Wildhorse Mountain Facility (100MW of wind capacity), and continued construction of the Skookumchuck and Reading facilities (~$490-535MM total aggregate construction costs). In 2018, Southern Power sold a noncontrolling interest in SP Solar (an LP that indirectly owns all of Southern Power's solar facilities) to Global Atlantic for $1.2B as well as a noncontrolling tax equity interest in SP Wind (a portfolio of eight operating wind facilities) to a group of financial investors for $1.2B.

Exhibit XXX

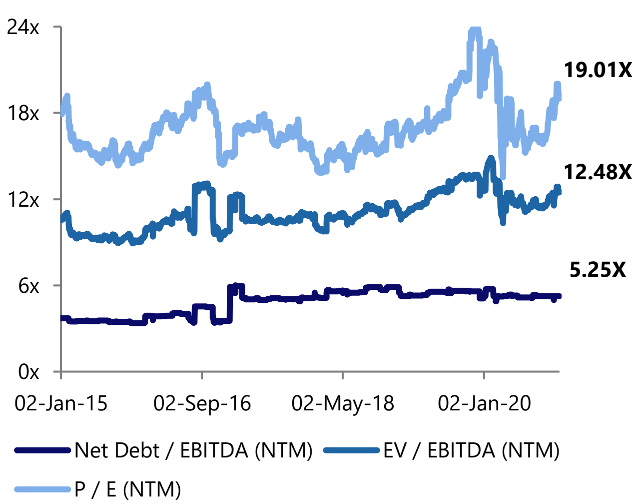
Historic Share Price Performance



Source(s): Capital IQ

Exhibit XXXI

Historic Multiple Performance



Source(s:): Capital IQ

The Southern Company (NYSE:SO) – Deep-dive

Southern Company Gas

In 2018, Southern Company Gas completed the stock sale of Pivotal Home Solutions to American Water Enterprises LLC for $365MM as well as the cash sales of 2 natural gas distribution utilities (Elizabethtown Gas and Elkton Gas) to South Jersey Industries, Inc. for $1.7B. Also, in 2018 Southern Company Gas also completed the stock sale of Pivotal Utility Holdings (which mostly consists of Florida City Gas) to NextEra Energy for $587MM aggregate.

What We Like and Don't Like About the Business

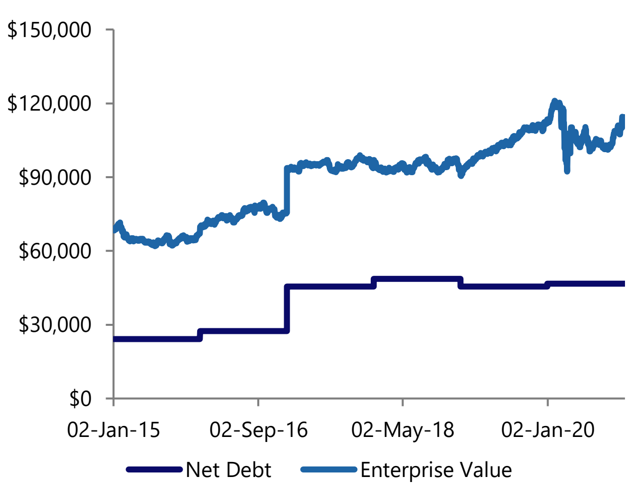
As is the case with other utilities, The Southern Company represents a potential opportunity to add a stable mooring to the QUIC portfolio. That being said, there are some unique traits (both good and bad) to SO's operating model that are worth mentioning.

In terms of positives, the company's financial position is sound: net liquidity stands at $9.6B, along with $3.4B in cash. Further, the company's pension is 95% funded. Overall, such gives the team confidence that the company will be able to weather any bumps in the road that have/will come. In addition, the company holds a near-monopolistic position in many of the markets that it serves; thus, the risk of displacement is low. Last, SO is particularly well-positioned if federal tax rates increase. If tax rates increase from 21% to 28%, profitability for SO's regulated utilities would not be impacted as the rates would be passed along to consumers through higher bills. Moreover, this increase in tax collections would actually increase holding company cash flow, which would then lower parent company financing costs.

That being said, there are some risks with SO. Such issues largely pertain to the company's asset base; for example, ~15% of the business' generating capacity comes from nuclear energy. However, nuclear facility additions are notoriously expensive, and subject to cost overruns. Also, ~20% of capacity is generated from thermal coal; however, given heightened ESG awareness and tightening government regulations, the E&U team views SO's exposure to the commodity as a key risk and something that must be looked into further.

Exhibit XXXII

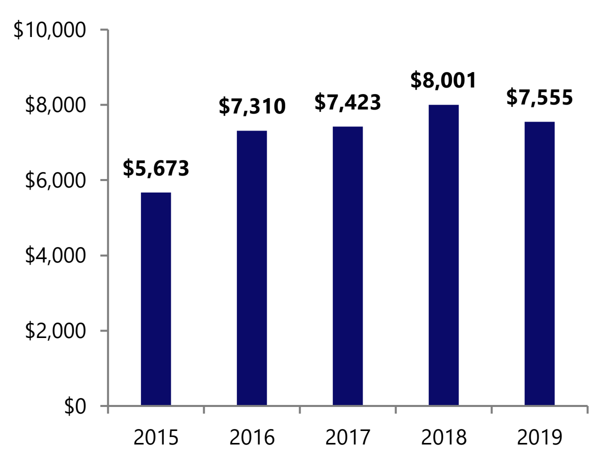
Historic Enterprise Value and Net Debt ($MM)



Source(s): Capital IQ

Exhibit XXXIII

Historic Capex Rates ($MM)



Source(s:): Capital IQ

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