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Equity Research Report
Southern Company: An Industry Trend Analysis

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Abstract
Equity Research Report – Southern Company: An Industry Trend Analysis

The present equity research thesis aims to assess the performance of Southern, an energy utility company located in the U.S.A. with a market capitalization of over $75B employing two different methodologies, Discounted Cash Flows and Multiple Analysis. Since the year 2010 the energy sector has changed drastically. From new targets by the Treaty of Paris, to energy enterprises closing coal-fired plants, the industry has been changing towards a greener and cleaner future. Hence, the supplemental purpose of this study aims to investigate how sector trends are shaping cash flows and industry's capital structure.

Keywords: Energy Sector, LCOE, Renewables, Paris Agreement

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This report is part of the Equity Research Report - Southern Company (annexed), developed by Ana Benjamim and Henrique Zhao and should be read has an integral part of it.

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Introduction

The purpose of this joint report is to evaluate the performance Southern, an energy utility company based in the United States of America, state if the enterprise is worth investing, and the reasons behind that choice.

Nowadays there's change all around us and technology has evolved more in the past 50 years than it has ever evolved in the history of mankind. The usage and advancement of technology allows energy companies to shift from previous main polluter's, fossil fuels, with focus in coal, to clean and reliable energy.

Yet, this shift in the industry was triggered not only by the decreasing costs of levelized cost of energy for the renewables, but also due to the Paris Agreement. The goal of the latter is reduced emissions, as otherwise the global temperatures will likely increase, shattering the prospects of future Human generations, and ending with a variety of species of animals. Therefore, the goal of this individual report is to explore shifts in the employment of the various fuels of energy. In addition, this research aims to discover proxy industry trends amongst ten other energy utility companies. For this purpose, the ten businesses were scrutinized, and their investment strategy was considered. In terms of financials, this individual report solely has a Multiples analysis, yielding a return of 16% for a period of one year. Nevertheless, since Multiples are a supplementary analysis to the method of Discounted Cash Flows, the advice to invest is overruled by the advice to "Hold," by the DCF.

On the other individual paper lies the financial analysis, including the DCF, not only for a period of one year, but 10 years, with a final recommendation to "Hold".

Macroeconomic Context

From the covid-19 pandemic to the most recent Russo-Ukrainian conflict, the macroeconomic scenario around the world has been concerning.

It all started in 2020, a few months after the discovery of a virus that would propagate the world and lead markets to a downfall. The S&P ETF would decline from $3380 to $2300 in 5 weeks-time (Index S&P 500, 2020)[1]. And dragged along with it most stocks, including the Southern Company's that had a value of $70.40 in February of 2020 deteriorating to $46.36 only a month later (Index Southern Company, 2022)[2].

Due to the state of the economy both the ECB and the FED decided to help citizens with helicopter money along with other compensations, that would later increase inflation (The White House, 2021)[3].

In 2021 the market was recovering only to be struck again, in 2022, as a result of global economic uncertainties due to the conflict in Eastern Europe, between Russia and Ukraine. The war has increased the price of natural gas futures to more than double compared to January 2022, and 7 times, compared to March 2020 (Natural gas futures price, 2022)[4]. Additionally, with the increase in price of petrol, inflation skyrocketed to a whopping 10.00% in august 2022 in the European Union and 8.26% in the United States in the same period. Leading to a depreciation of the euro compared to the U.S. dollar to 1.05 euros per dollar. The price in the aforementioned raw materials had massive impact in the economy.

Finally, considering the recent macroeconomic context, Southern company has managed it particularly well as the utilities market is heavily regulated hence hedging the most concerning metrics of an Energy company, by passing the increasing costs of natural gas to customers, as electricity is an inelastic good. In addition, it also benefits from fixed debt payments and low exposure to variable interest rates. For these reasons, and despite the state of the economy, it is believed that Southern Company is a great investment, that offers a unique opportunity to hedge further against natural gas prices, and consequently electricity price expansion, along with benefits from dividends.

Southern Company

Figure 1: Territory served by Southern Company

Back in the 1900s, James Mitchell, inspired by hydro-electric plant in England and the river force of Alabama, dreamt of electrifying American South. Hence, he created Alabama Power on the 4th of December 1906 (Alabama Power, 2022)[5]. The first of three electric holding companies that would later play major roles in the history of the company.

The company then proceeded to acquire and merge with other firms until it formed the Commonwealth & Southern Corporation. This system involved 5 Northern firms and 6 Southern corporations. Nevertheless, the massive company was dissolved in 1940 due to the Public Utility Holding Company Act (PUHCA) of 1935 (Chcom, 2020)[6]. The PUHCA gave the Securities and Exchange Commission power to break apart electric utility holding enterprises and limited each

electric utility holding to a single state (U.S. Energy Information Administration, 1993)[7].

Regardless of the PUHCA, 4 Southern electric holdings managed to be an integrated system and in November 1945, the Southern Company was finally incorporated in Delaware.

Through expansions, acquisitions, mergers, and customer growth, the Southern Company is now able to serve 9 million customers, both households and industrial clients across the U.S.A. and offers energy, natural gas, and other services for example fiber optic and telecommunication services (a) (Southern Company, 2022)[8].

Energy Mix Evolution

Nowadays, the energy sector is evolving, becoming cleaner and greener, yet, Humanity has gone through multiple trials and errors to achieve a sustainable energy mix. Not long ago, in 2010, the United States' sources of energy generation were as follows by figure 2, (Statista, 2021)[9].

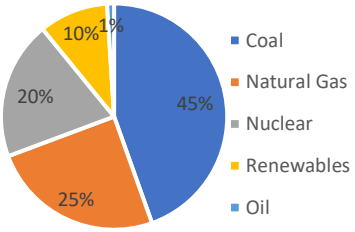

Figure 2: 2010 U.S. Power Generation by fuel

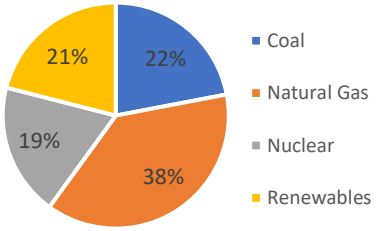

Figure3: 2021 U.S. Power Generation by fuel

As observable by figure 3, in 2010, coal was the predominant type of resource used, with 45% of the U.S.'s power generation being reliable on this source. Yet, in 2021 the energy mix by the industry in the United States of America has changed drastically, as depicted in figure 3.

Evolution of Natural Gas in the US

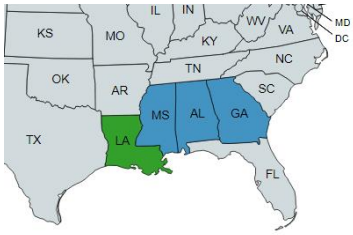

Figure 4: Blue: Southern's main electric service areas. Green: Henry Hub

In the transition to reduce greenhouse gas emissions worldwide, Natural Gas stands as the fossil fuel that helps facilitate this transition as it has lower emissions. The Henry Hub index is the primary United States benchmark for the price of natural gas. Depending on the location, spreads are then applied taking into account distribution and transportation costs through pipelines with distance and demand affecting the spread. Furthermore, Henry Hub is situated in the Southeast of the United States (Louisiana), relatively in proximity to the regions where Southern Company's retail electric generation plants operate (Mississippi, Alabama, Georgia). In turn, this could mean that the spread is not as impactful in the analysis of natural gas prices compared to the actual spot price at Henry Hub, figure 4. Natural Gas is sold in dollars per mmBtu, as in M British Thermal Units. Historically this index has been relatively stable with a decreasing trend in the past few years and an inverting trend beginning in 2021 (US Energy Information Administration)[10].

The Henry Hub index averaged at 2.04$/mmBtu in 2020, increasing by 92.06% to 3.91$/mmBtu in 2021, and increasing by another 71.66% to 6.71$/mmBtu as of September 2022 as presented by the EIA (US Energy Information Administration[11]), figure 5. These changes were the consequence of two separate situations that have influenced each other resulting in these two spikes in such a short amount of time. The first situation occurred in February 2021, when the

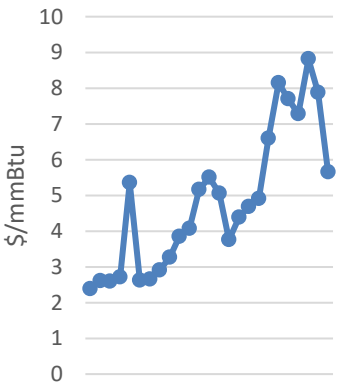

Figure 5: Henry Hub Index (2020-2022)

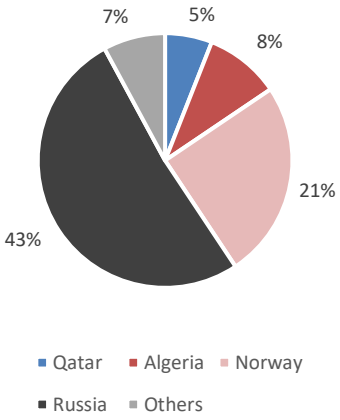

Figure 6: Natural Gas importation by the EU (in %)

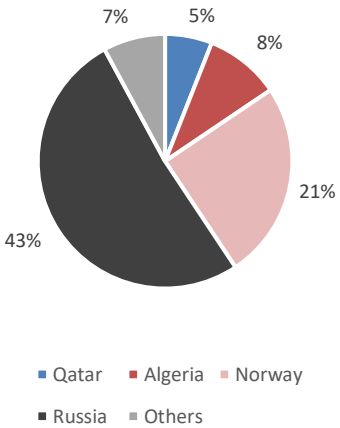

Figure 7: Natural Gas importation sources for the EU (in %)

average price of natural gas increased by approximately 900% on average in the United States with the Mid-Continent region seeing a price surge of 1,370% compared to previous year values according to S&P. This sharp monthly increase was due to an unexpected winter storm that hit Texas and Oklahoma leading to the Natural gas stored (in order to be used as supply in the future) to be promptly used to produce heating and electricity to cope with the catastrophe (Texas Electric Grid, 2021)[12]. Furthermore, the American natural gas seasonal trends are reversed when compared with that of European season trends. While Europe mostly saves up natural gas during the summer as there are spikes mostly during winter times. The spikes are due to the continent's necessity of using natural gas for heating (Safe Gas, 2022)[13]. In the meantime, the United States has a spike mostly during summer times. Natural Gas prices usually peak in the winter in regions where Southern Company operates, General Electric utilities sales though peak in both summer and winter seasons. This is because the country also uses natural gas and electricity for its air conditioning needs to fight the heat (Martínez and Torró, 2015)[14] leading to higher spot prices after decreases in storages in the winter. These sharp decreases in stored natural gas in the winter lead to significantly higher demand for US natural gas in the summer as a result of higher marginal cost production and demand inelasticity.

For instance, after a significant decrease in stored natural gas supply in February 2021, the rise in demand in the summer was not met with a similar growth in supply. Lower storage of natural gas correlated with higher prices afterwards (Forbes, 2022)[15] during the summer period. This led to a further boost in prices of natural gas in an overall upwards trend throughout the rest of 2021. Therefore, seasonal trends in US prices at the Henry Hub "are not directly linked to the global market, even as the country sends about 15% of its gas production overseas in the form of liquified natural gas" as stated by CNBC[16] with American seasonality prices of this fuel being unique.

Contrary to the United States, the European Union does not produce much of the natural gas it uses (importing more than 80% in 2020, figure 6), instead importing it through pipelines from other countries outside the EU. At the start of 2022, Europe imported around 40% of its natural gas from Russia though pipelines (From Where do we Important Energy, 2020)[17], figure 7. Due to the start of the war between Russia and Ukraine and the consequent sanctions imposed on Russia by the EU, European imports of natural gas are now down to 9% as of September 2022 (European Imports of Gas Fall, 2022)[18]. This significant decrease in imports has led to a shortage in supply as, unlike the U.S., Europe has its demand spike for natural gas during the winter months when heating requirements increase in the colder European countries. Even though the European Commission has proposed gas demand reduction plans to prepare the union for supply cuts[13], these demand reductions are not enough to fully account for the reduction in stored natural gas. To prevent the worst consequences of supply shortages, the EU imported as much natural gas from other sources as possible in the earlier months of the year to save up for the winter period. Therefore, Europe required natural gas from countries such as the United States where natural gas must be bought through LNG (Liquified Natural Gas) to be able to be transported across the Atlantic Ocean. LNG is significantly more expensive than natural gas sold through pipelines as liquefying natural gas requires the fuel to be cooled with various cryogenic processes

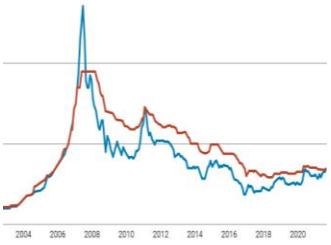

Figure 8: Evolution of Uranium Fuel Prices 2014-2022

and transported throughout the entire journey in special cryogenic vessels (Applied Energy, 2011)[19]. Consequently, natural gas prices at Henry Hub also raised as LNG prices for Europe are about four times higher than LNG prices within the United States. U.S. natural gas production has also not completely recovered since the pandemic meaning that similarly to the effects of the winter storms of 2021, the rise in demand in the summer months in 2022 could not be accompanied by a similar growth in supply (as the speed of production in 2022 has not fully picked up while stored amounts decreased during the first half of the year as the US sold much of its supply to the EU) leading to yet another sharp increase in natural gas prices by 71%(Why Gas Quadrupled, 2022)[20]. These two-yearly changes have severely impacted Southern Company's costs as fuel is one of the most crucial expenses in the company's operating structure. Furthermore, as Southern Company shifts away from generation sources such as Coal to Natural Gas due to its lower greenhouse gas emissions, it also means that Southern Company is increasingly exposed to price increases at Henry Hub. Thusly, increasing investments into the nuclear sector from Southern can also be seen as a hedge against this risk as nuclear fuel prices are generally more stable and uranium spot prices ($/lb U_3O_8) have decreased steadily since 2008 more than halving its spot price[21], figure 8.

Levelized Cost of Electricity

Nonetheless, it is crucial, and interesting to understand, what motivated the dramatic shift in energy mix by the industry in over the course of a decade, and the Levelized cost of electricity (LCOE) is used for this. Thus, LCOE is utilized to compare costs amongst the different types of energy generation. This indicator is a measure of the average net present cost of electricity for a generator over its lifetime in Megawatt-hour (a) (Corporate Finance Institute, 2022)[22]. In simplistic terms, the LCOE measures the lifetime costs of a plant, dividing it by its energy production over its life span.

As it is depicted below by figure 9, from the source: Solar lights up outlook for renewable energy in Texas in 2022 by the Federal Reserve Bank of Dallas[23], renewables are taking a stance next to the less environmentally conscious peers. In fact, Solar PV Crystalline became the most appealing source of energy over the course of 12 years, with an average unsubsidized levelized cost of energy of $36 per Megawatt-hour. Solar PV Crystalline, standing for Crystalline Silicon Photovoltaics is the most used technology in regard to photovoltaic panels.

To support this theory, it was analyzed the renewables and cleaner energy investments in 2021 (Visual Capitalist, 2022)[24]. In 2021, China had invested $266 billion in renewables and low-carbon technologies. Whereas, the United States of America took the second spot, with $114 billion spent in greener technologies. Notwithstanding, despite the impressive numbers, a supplementary assessment to the percentages of energy consumption that are generated by the renewable's portraits a different reality. Even though China has made an enormous investment, the total percentage of energy consumption employed, using clean technology is 14.95% as of 2021. Interestingly, the leader of renewables is Iceland with 86.87% of the primary energy coming from a clean source, followed by Norway with 70.56%, Sweden with 50.92% and Brazil with 46.22% (Our World Data, 2022)[25].

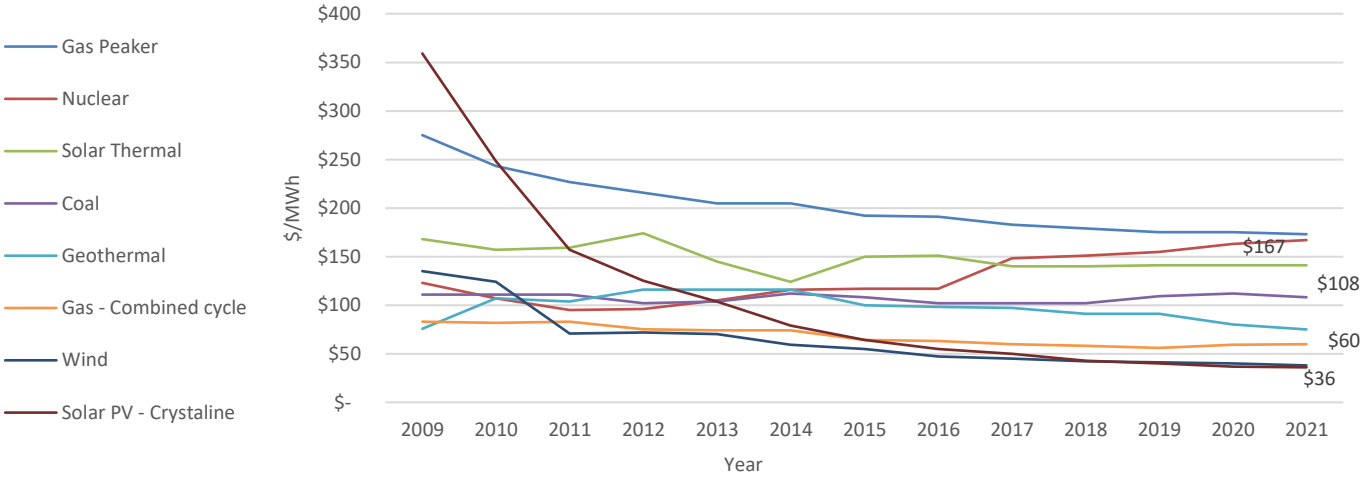

Figure 9: LCOE ($/MWh)

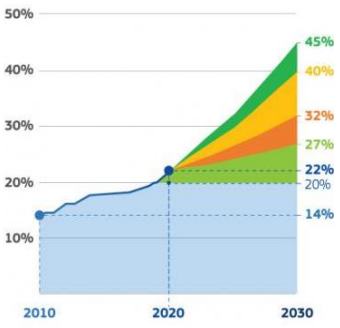

Figure 10: RePowerEU

Adding to the international effort of fighting global warming, in 2021, the European Union set a target regarding the energy mix inside the E.U. of at least 40% clean energy by 2030. Nonetheless, on the 18th of May 2022, the commission released the REPowerEU plan, in order to "rapidly reduce EU's dependence on Russian fossil fuels well before 2030 by accelerating the clean energy transition". Proposing that the previous directive of 40% by 2030, to be reconsidered, and setting a new target of at least 45% of renewables in the energy mix of the energy sector (European Commission, 2022)[26]. In figure 10 it is observable the different directives by the European Commission over the years, with the last one being at 45% clean energy by 2030. The relevance of the European Commission is unquestionable since it is the forefront of international efforts to combat climate change and plans to raise its targets in order to tackle global warming under the Paris Agreement. The United States has also further its commitment to net-zero carbon emissions, not only to power-plants, but to American homes and businesses by 2035. (U.S. to slash carbon emissions, 2022)[27].

The Southern Company Commitment

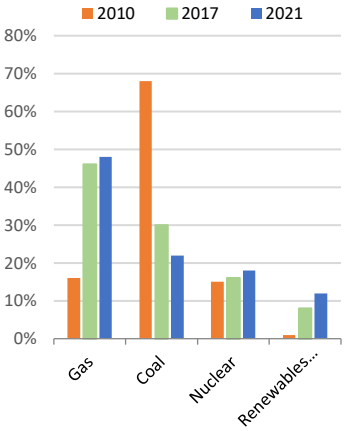

Figure 11: Evolution of energy sources at Southern Company (Statista, 2022)

In the foreseeable future, Southern Company aims to achieve carbon-neutrality by 2050, and a reduction of 50% in Greenhouse gases by 2030, relative to 2007. The strategy for the Southern Company to further evolve into a greener company implies a reduction of both indirect and direct emissions. This is achieved by reducing coal-fired assets, increase in natural gas and nuclear energy consumption as means to lower carbon emissions. In addition, other measures include: increase in renewable assets, finding carbon negative solutions (where the amount of CO_2 that the company removes from the atmosphere is greater than the CO_2 emissions of the company) and, investment in Research and Development of cleaner technologies (Southern Company, 2022b)[28]. The evolution of energy sources is depicted in figure 11, and the efforts in the reduction of coal are evident, as for 2010 coal represented almost 70% of the energy generated, and a decade later that value has dropped to 22% of the energy generated. (Statista SO energy by source, 2022)[29].

Nevertheless, the efforts to reduce carbon emissions do not belong solely to the Southern Company, but to a growing coalition of countries that are pledging net-zero by 2050. The Paris Agreement states that in order to contain global warming to no more than 1.5º Celsius compared to the late 1800s, overall, Greenhouse gas emissions of the planet need to be reduced by 45% in 2030 compared to 2010, and net-zero by 2050. For this purpose, 193 parties consented to the Paris Agreement, including the main polluters – United States, China and the European Union, covering 76% of global emissions. The Agreement also sets long-term goals, reviews countries commitments to cutting emissions every 5 years, and provides climate financing to developing countries (United Nations, 2021)[30].

Nuclear energy Investment

Southern Company along with its subsidiary Georgia Power and Southern Nuclear, are investing in nuclear plants, more specifically Plant Vogtle Units 3 and 4. These plants will be the first U.S. reactors to use the AP1000 technology (a) (Office of Nuclear Energy, 2022)[31]. Which are designed to be safer through a two-loop pressurized water reactor, (Westinghouse, 2022)[32] and to shut the reactors without any operator action or power source. Furthermore, the design of the plants also uses less piping, valves and pumps than other reactors, leading to lower maintenance and operating costs, thus giving Southern a competitive advantage in regards to this technology once fully functioning.

Furthermore, nuclear also has other benefits other than being cleaner that the other fossil fuels such as its increasingly cheaper cost. Despite the carbon-emissions made by the extraction of uranium, the process of producing electricity with the aid of nuclear plants does not emit carbon dioxide to the atmosphere, hence contributing to the net-zero carbon emission goal of 2050.

Nuclear plants have the highest capacity factor, compared to any source, (b) (Office of Nuclear Energy, 2021)[33]. Having the capacity of operating at maximum power for 92.5% of the year, whereas coal sits far behind at only 49.3%, and solar at 24.6%, as portraited by figure 12. Moreover, nuclear plants require refueling only 1 time per 2 years, consequently being less troublesome to maintain.

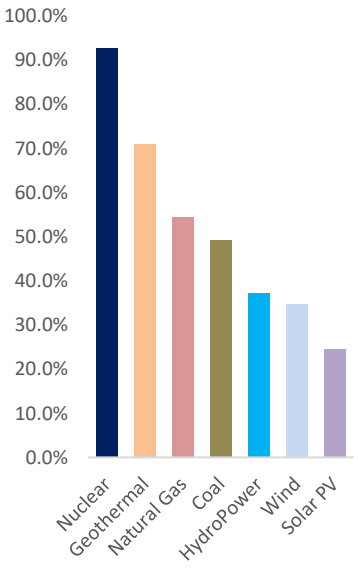

Figure 12: Capacity Factor

Despite the cost of $10.4 billion so far (subject to future changes in project estimation), both Vogtle 3 & 4 employed 7000 workers and 800 on permanent jobs since the start of operations, therefore developing local economy. Additionally, the plants have been one of the largest infrastructure projects in the U.S.A. and could represent a hedging solution to the rise in price of natural gas due to the uncertainty in regard to the conflict between Ukraine and Russia. Once the plants complete construction, these will be able to power 1 million customers for the next 60-80 years (Georgia Power, 2022)[34]. Additionally, the success of the plants in 2023 could potentially have a positive influence for another energy companies to start investing more in this technology, representing a leading shift in the industry.

Relevant Competitors Analysis

To create a proxy for the energy utilities sector in the United States, 10 companies were chosen as relevant peers to Southern Company. Out of these, 5 were chosen for a more in depth analysis in the following section.

NextEra Energy (NEE) is an energy company and the greatest generator of renewable energy from the wind and sun (a) (NextEra Energy, 2022)[35]. Furthermore, to complete its operation, it also relies on, and operates generating plants powered by natural gas, nuclear energy, and oil (b) (NextEra Energy, 2022)[36]. This company is the most similar to the Southern Company, in terms of the types of business it conducts in. Its EBITDA is $6,837M and the Enterprise value of the company is $242,930M, with multiples of 35.5x (EV/EBITDA) and 50.8x (P/E). It currently operates in over 15 states in the United States, and offers electricity in Texas through Gexa Energy, an affiliate company, figure 13.

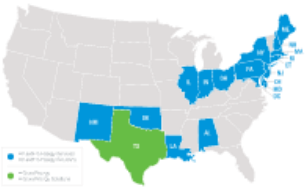

Figure 13: NextEra operational area

Regarding revenues, the company has made $17,049M for the year 2021. For this period, the energy mix utilized by the company was of 70% Natural Gas, 22% of nuclear power, 6% Solar energy and 2% of other fuels with a total 28,450 MW of generating capacity, figure 14.

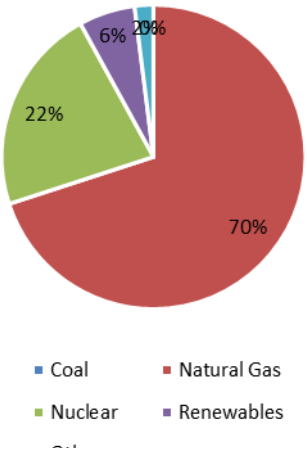

Figure 14: NextEra Energy Mix

Interestingly, NextEra did not utilize coal to generate power, even closing its last coal-fired plant in June of 2021. In comparison, Southern has a different energy mix, consisting of 12% of renewable energy, 18% of nuclear, 48% of natural gas, but yet, 22% of coal. Additionally, NextEra Energy plans to include 1,640 MW of solar generating capacity in its portfolio by 2023 and 1,200 MW of natural gas generating units through 2022 (FirstEnergy Investor relations, 2021)[37].

Concerning the Cash Flow management of the company, NextEra has had a negative conversion cycle for the past 3 years of operations. The inventory of NextEra for 2021 was valued at $1,561M, and cost of sales of $8,508M, resulting in an average holding period of 67 days. Yielding a similar result for the average collection period of 72 days. Notwithstanding, the fact that the average payable period is over 9 months, allows the company to have a rapid Cash Conversion Cycle of negative 158 days. Meaning that the inventory is sold before it must be paid to suppliers. In contrast Southern has a Cash Conversion Cycle of 31 days.

In common, both Southern and NextEra have a similar Net Debt, yielding $52,914M to Southern and $53,331M to NextEra. Nonetheless, it is not normal for NextEra to hold this parameter above $50,000M, and the reason may lie on the acquisition of Texas water and wastewater systems - “NextEra Water Texas, LLC, an indirect subsidiary of NextEra Energy Resources, LLC, announced that it has completed the previously announced acquisition of a portfolio of rate-regulated water and wastewater utility assets in eight counties”. Through this purchase, NextEra Water expanded its portfolio into 28 water and wastewater utility systems (NextEra water acquisition, 2022)[38].

Another acquisition of no less importance was the purchase of Gulf Power, a subsidiary of Southern Company. This purchase took place in 2018, and NextEra gained access to the largest electricity producer in Northwest Florida (NextEra acquires Gulf Power, 2019)[39]. This allowed

NextEra to capture 51% of the residential demand in Florida.

In addition, the enterprise has kept a constant net PP&E/Assets ratio, with an average of 0.71 for the last 3 years. Notwithstanding, the current ratio for NextEra yielded 0.53 for 2021, in turn it would mean that if the company liquidated all of its current assets, it would only be able to pay half of its current liabilities. In contrast, Southern had a current ratio of 0.82 for the same period.

NextEra's Debt to Equity ratio stands at 1.17 for the year of 2021, and it is predictable that it decreases as the company has issued $2 billion in outstanding shares. "NextEra Energy, Inc. (NYSE: NEE) announced today that it intends to sell $2.0 billion of equity units. Each equity unit will be issued in a stated amount of $50 (NextEra to sell equity units, 2022)[40].

American Electric Power (AEP) is a public utility holding company that operates in the generation, transmission, and distribution of electricity. This company has 5 M customers and serves 11 different states across the U.S.A., including, Arkansas, Indiana, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia, figure 15 (Operating Companies, 2022)[41]. Regarding its multiples it has an EV/EBITDA of 12.6x and a price to earnings ratio of 17.5x. With an enterprise value of $78,800 M and EBITDA of $6,237 M, in 2021.

Figure 15: American Electric Power Service Areas

Concerning revenues the company had sales of $16,792 M and a gross margin of 0.46, lower than the Southern Company, yielding 0.7 for the same period (2021). The energy mix of the company has a similar percentage of nuclear energy being employed at 22%. Notwithstanding, the company still heavily relies on coal, with an overall percentage for 2021 of 50%, natural gas for 16% and renewables only for 12% of the energy mix with a total generating capacity of 21,169 MWs, figure 16, (AEP Form 10-K)[42].

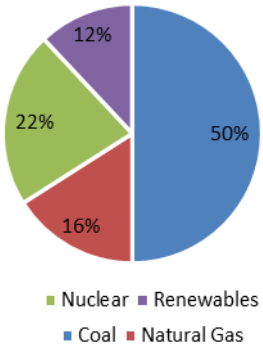

Figure 16: American Electric Power Energy Mix

In regard to Cash Flow management, the enterprise has managed to accomplish a Cash Conversion cycle of exactly 0 days. With an average payable period of 82 days, and collection period of 42 days.

When it comes to net debt, Southern has an average for a 5-year period of $48,757M, whereas American Electric Power has an average of $29,286M. The difference in debt amounts might be explained by the fact that Southern has a larger customer base, as well as a recent increase in nuclear energy investments. Notwithstanding, Net PP&E for American Electric Power has a value of $66,001 M, with total assets valued at $87,688M, yielding a Net PP&E/Total assets of 0.75 in 2021 (for Southern the value was lower at 0.64 for the same parameter).

Moreover, both PP&E and Debt are expected to increase in value due to the recent new renewables capacity purchase of 999.5 MW, whilst becoming a hedge against energy price volatility (News Releases 2022)[43].

Yet, despite the investment in renewables, American Electric power announced that it would be selling Kentucky Operations, including Kentucky Power, an utility subsidiary, and Kentucky Transco, a transmissions business, by the end of 2022[44].

The company's current ratio for the period of 2021 was 0.63, whereas Southern yielded a current ratio of 0.82. Still, the Solvency Ratio have similar results in both

companies, yielding 0.34 for the Southern Company and 0.35 for American Electric Power, respectively, for the period of 2021.

Dominion Energy (D) is an electric and power company based in Virginia and serves 7 million customers[45] (a) (Dominion Energy, 2022). This company provides natural gas, electricity and has also generation facilities across the United States. In 2021 the company generated an EBITDA of $5,497 M with an Enterprise Value of $10,755M, resulting in an EV/EBITDA multiple of 2.0x and a price to earnings ratio of 19.4x. The modest enterprise value multiple might be explained by the fact that in 2021, Ullico bought most of the Dominion Energy company and is expected to close the sale in 2022[46] (b) (Dominion Energy, 2022). Nevertheless, the company provides electricity in Virginia, North Carolina, and South Carolina and natural gas to Utah, Idaho and Wyoming, West Virginia, Ohio, Pennsylvania, North Carolina, South Carolina, and Georgia. In addition, the enterprise has production facilities in Indiana, Illinois, Connecticut, and Rhode Island, figure 17.

Figure 17: Dominion Energy Service Areas

Dominion had revenues of nearly $14,000M over the course of 2021. This result was the lowest of the 3 years (2019 to 2021). Despite this, Dominion has a generation capacity of 28,450 MW for 2021. In the meantime, the gross margin was 0.48 in 2021, which yields better results than if compared to the year of 2019, with a gross margin of 0.42.

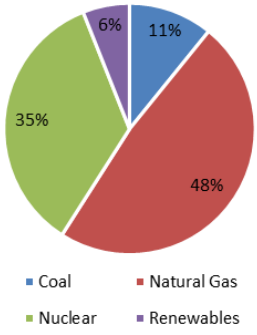

Figure 18: Dominion Energy Mix

Regarding investment goals, the company is investing in nuclear energy in order to attain the goal of net zero by 2050. Nonetheless. the business had an energy mix for 2021 containing 35% of nuclear energy, 48% natural gas, renewables 6% and only 11% of coal, with a total of 25,066 MW of generating capacity, figure 18. Additionally, Dominion has purchased a significant amount of power when compared to peers, totaling 5,134 MW of extra capacity purchased (Dominion Form 10-K, 2021)[47].

In terms of capital structure, Dominion has been expanding its net debt by 12.5% per year from 2019 to 2021 on average. Net PP&E/Assets ratio was 0.6 for 2 consecutive years (2020 and 2021). Yet, the latter will presumably shift due to the recent approval in extra capacity for this year. "The proposal includes 10 solar and energy storage projects, totaling nearly 500 MW, that will be owned and operated by Dominion Energy Virginia. The proposal also includes power purchase agreements (PPAs) with 13 solar and energy storage projects, totaling more than 300 megawatts, that are owned by independent developers" (New Solar and Energy Storages, 2022)[48]. In addition, the investment is in line with the treaty of Paris and important for ESG standards. Consistent with the ESG – inclusion, Dominion also has several military programs to incorporate veterans in the company (Navy Veteran, 2022)[49].

Concerning funding, it is part of Dominion's strategy and interest to continue investing in green energies. As the company expects to invest up to $21 billion from 2022 through 2035 in solar generation to achieve its target of 13,400 MW generating capacity in-service by the end of 2035.

Regarding other metrics, the current ratio of the company has increased from 0.64 in 2020 to 0.84 in 2021, portraying the enhanced ability to cope with their current liabilities. The financial autonomy ratio yields 0.27, hence for every dollar of assets, the company has $0.27 of equity. In

this parameter Southern yielded 0.25.

Exelon Corp (EXC) is an utility based in Chicago, and the largest regulated electric parent company with 10 million customers; 1 million more than the Southern Company. Through its operations, Exelon provides electricity distribution and transmission, and natural gas sales to Northern Illinois, Southeastern Pennsylvania, Central Maryland, Delaware, Southern New Jersey, and other regions in the Mid-Atlantic, Midwest, and New York, figure 19. Exelon has six subsidiaries, located and purchases electricity and natural gas from different sources through the aid of short-term, long-term contracts and spot rate contracts, in order to deliver the physical product to its customers. The customers vary between residential, commercial, industrial, public authorities and electric railroads (Exelon Corp overview, Exelon Corp)[50]. In 2021 this company had an enterprise value of $77,960 M and an EBITDA of $9,782 M. Regarding multiples, it had an EV/EBITDA of 8.0x and a P/E ratio of 23.1x in the same period.

Figure 19: Exelon Service Areas

As of 2021, Exelon generated 36,502 MW of power, and purchased 4,102 MW resulting in revenues of $18,498M. The energy mix of the company aims to be the cleanest of the peers with 20,899 MW generated by nuclear, with an average of 95% capacity factor, 8,819 MW of fossil fuels (primarily using natural gas and oil), 2,682 MWs using renewable energy, figure 20 (Exelon Report, 2021)[51]. Compared to Southern Company, Exelon focuses a more significant portion of its mix in clean energy generation totaling 73% of the portfolio in clean energy, with 65% coming from nuclear, and 8% renewables, instead of natural gas production (27%). In addition, the company does not employ coal, potentially resulting in safer cash flows taking into account recent volatility in natural gas prices.

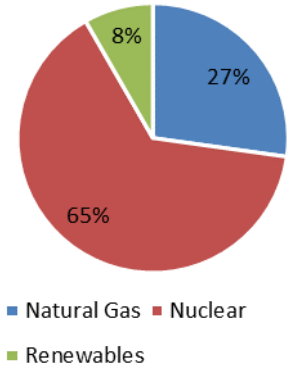

Figure 20: Exelon Energy Mix

Considering Exelon's cash flow management, the average holding period was 28 days and payable period of 62 days, resulting in a CCC of 19 days. Thus, the enterprise is quick to convert its investments into cash inflows, as it is common within the energy industry.

Similarly to Southern Company, Exelon, has maintained a steady Net PP&E over Total Asset ratio around 0.60 since 2018. Nonetheless, the key difference is that Exelon has been decreasing its Current Ratio from 1.17 in 2018 to 0.87 in 2021, portraying a deteriorating capacity in meeting liabilities in the short run. The company has also boosted its Net Debt considerably since 2018 from $38B to $46B resulting in an expansion of the D/E ratio from 1.24 to 1.36 in 2021.

The increase in Net Debt is a result of the investments made in 2021 as a strategy to accomplish the goal of reducing emissions by 50% in 2030. In fact Exelon invested more than $6.6 billion in energy infrastructure, with an additional $29 billion planned for 2022–2025 (Exelon Releases, 2021)[52]. Notwithstanding the total amount also includes investments in natural gas, and improvement in infrastructure.

As of 2022, Fitch ratings had diminished Exelon's rating from BBB+ to BBB while affirming a short-term credit quality of F2 as Good. Yet, Exelon's subsidiaries of Pepco, ACE, and PHI had their long-term rating upgraded from BBB to BBB+ while Pepco and ACE's senior secured rating was raised from A- to A (Exelon Investors Relationships, 2022)[53].

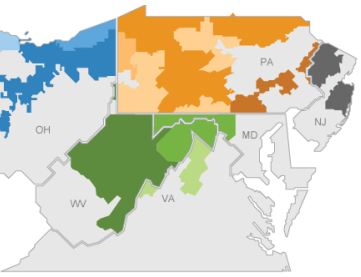

Figure 21: FirstEnergy Service Areas

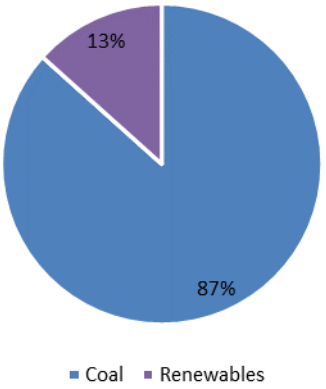

Figure 22: Exelon Energy Mix

First Energy (FE) is an utility company with headquarters in Ohio, serving 6 million customers across 65,000 square miles in Ohio, Pennsylvania, West Virginia, Maryland, New Jersey, and New York, figure 21 (First Energy, 2022)[54]. The company, along with ten subsidiaries provides the distribution, transmission, and generation of electricity. And supplies energy to residential, commercial, and industrial customers. This company had an Enterprise Value of $46,530M and EBITDA of $3,297 M in 2021, along with a multiple of 14.1x regarding EV/EBITDA and 17.2x of P/E ratio in 2021.

In 2021 the company had a capacity of 3,647MWs, in which 3,160MWs were by Coal-fired plants, and 487MWs by pumped-storage hydro, figure 22. This energy mix stands out in an opposing way to Exelon, with only 2 different types of resources to produce energy, and no nuclear or natural gas employed to generate energy. Furthermore, the fact that the company relies on coal for over 86% of its business implies that FirstEnergy will need to invest heavily in clean energy soon, to keep up with the industry trend. (Energy Coalition, 2022)[55].

In addition, FirstEnergy is the smallest company when it comes to generating capacity, out of the 10 being evaluated in the report with total assets being evaluated at $45,432M.

Regarding interest payments, this expense will surely increase, since as mentioned in the 10-K report of First Energy, a portion of indebtedness is exposed to interest at fluctuating interest rates and has not hedged against this risk, unlike Southern Company, which hedges around half of its exposed notional.

Moreover, in 2021 FirstEnergy was charged with wired fraud, tarnishing the company's reputation and has agreed to pay a $230 M monetary penalty (FirstEnergy charged Federally, 2021)[56].

Regarding other parameters of the Capital Structure, the company had the highest solvency ratio of the peers yielding 2.13. Lastly, FirstEnergy had the highest Revenue/Generating Capacity yielding $3.05M per Megawatt for the year of 2021, since the company had revenues of $11,132 M and sold 3,647 Megawatts of power.

Peers Comparison and Trends

Comparing the 10 peer companies to Southern, it is noticeable similar investments and trends amongst the 11 enterprises.

To assess peers and multiples, the median was employed instead of the regular average. The reason behind this choice was the fact that since only 10 companies were evaluated, if the average was considered, the data results would be skewed. Thus, median allows the valuation to be on the center of the database.

Firstly, the Cash Conversion Cycle of all companies is below one year, and the cash ratio for the utility companies is almost 0. The current ratio has a median value of 0.7 for the year 2021 and, this parameter has increased when compared with the 2 previous years.

Besides, the industry relies primarily on property, plant and equipment for its operations and to generate revenues. Therefore, as long as CCC is below one year, a current ratio of below 1 is

not concerning. Notwithstanding, in regard to the parameter of Net PP&E to Total Assets, the peers' median is 0.69, with Southern Company yielding 0.64 for this measurement.

The debt ratio for the peers had a median value of 0.38. Nevertheless, this parameter has expanded, presumably due to the continuous investment in cleaner sources of power to generate electricity.

The debt-to-equity ratio of the group is 1.25 for the year 2021 and has risen 14.7% in one year. Out of the group a clear outlier is PG&E with D/E of 0.30, followed by FirstEnergy with a D/E ratio of 0.73 for 2021. As aforementioned, the company was charged a $230M penalty, is the smallest of the peer group and is also the only firm using merely 2 energy sources (coal and hydro). All these factors combined could potentially be the reason for the value of 0.73 for the year 2021, albeit the average of the two previous years was not too far off, at 0.78. In contrast, Southern Company had the highest D/E ratio in 2021, yielding 1.64.

Regarding Gross Margin, the median of the group was 0.39, and the Revenue per MW of capacity was $0.98M per megawatt. This metric was pondered for comparison reasons, as it wouldn't be ideal to compare revenues or capacities of different companies as no business has the same exact same size, consequently, skewing the data. For that purpose, this parameter was employed in order to understand how much revenue a company could produce, per Megawatt of capacity. Concerning this metric, FirstEnergy leads the way at a Revenue per Capacity of $3.05M/MW, followed by PG&E with $2.69 M/MW, Edison International with $2.13M/MW and Exelon at $1.12M/MW. In this parameter, Southern was the second worst company with $0.53M/MW. Notwithstanding, the net profit margin for the companies with higher Revenue per MW of Capacity was eroded by the rest of the expenses along the Income Statement, with Exelon yielding the lowest net profit margins for 2021. In contrast FirstEnergy's net profit margin was below median at 12%. The median for this parameter was 13%, with Dominion Energy having the highest margin, at 24% in 2021. In contrast, in the year 2020, Dominion experienced a loss of $401M, resulting in a negative profit margin of 3%. Lastly PGEG had a negative net margin of 11%, for the period of 2021.

Concerning investment trends, all of the companies aim to reduce emissions by 2030 and reach net carbon-emissions of 0% by 2050. Hence to reach the goal, the 10 companies are investing massively in cleaner technology. Exelon is paving the way when it comes to generating power without producing carbon emissions, with a percentage of 73% of nuclear and renewables in its energy mix, and 0% of coal. Moreover, NextEra has also divested in coal, yet the investment in greener technologies remains low, at 28% of the energy mix. In the meantime, Southern has the potential to further boost its clean energy percentage as Vogtle 3 and 4 will begin operations in 2023, nevertheless as of 2021 its green energy mix was 30% still relying on coal for 22% of their operations.

Consequently, the green movement in the energy industry is instigated mostly by a rise in nuclear and solar energy. The boost in nuclear energy, despite having a costly initial investment, has much less operational cost[57]. Nevertheless, LCOE remains high at an average of $167/MWh (Federal Reserve bank of Dallas, 2022)[23]. For that reason, companies are additionally investing

in solar energy, which as aforementioned in the Energy Evolution, Solar PV has become the most appealing source of energy with an average unsubsidized levelized cost of energy of $36 per Megawatt-hour.

Notwithstanding, since Solar only has a capacity factor of 1/4th of nuclear capacity factor (b) (Office of Nuclear Energy, 2021)[36], a mix of both different resources is essential to be able to fulfil the demand at a sustainable cost.

Multiple Valuation

Multiple Valuation analysis is a supplementary methodology to the Discounted Cash Flows analysis and is based on forecasts of the DCF method. The primary difference between both models is that DCF is based on the Southern Company and its long-term prospects, whereas Multiples valuation is centered on the market's view of the energy industry.

The idea behind multiples analysis is to evaluate the different companies within the energy sector and geography and calculate Southern's implied value based on the peers' analyses. Thus, it is assumed that it is possible to rank and value an enterprise within a similar group (Berk and DeMarzo, 1962)[58]. The first step of the method is to identify similar companies to Southern, for this, 10 U.S. energy utility companies were considered. To determine the enterprise value multiple, the metric of Enterprise Value / Earnings Before Interest Taxes, Depreciation and Amortization. Whereas to understand the equity multiple the Price per earning ratio was employed.

Regarding the EV/EBITDA multiple, the median by Southern peers was 13.4x for 2021, with a maximum of 35.5x and a minimum of 2.0x, the 25th and 75th percentile were also calculated at 10.2x and 20.2x respectively. From 2019 to 2021, the median of the multiple has increased from 12.0x to 13.4x, resulting in 11% growth. Interestingly, the EV/EBITDA multiple in another countries other than in the United States is lower at 10.2x for the same period.

Concerning the P/E multiple, the median of the peers was 17.4x, with a maximum and a minimum of 50.8x and -242.8x, respectively for the year of 2021. In this case the 75th percentile was 23.1x and the 25th percentile close to median at 16.8x. Other enterprises across the globe yielded a higher P/E multiple at 19.5x. Nevertheless, this metric was highly volatile for the period and hence the EV/EBITDA was considered a more reliable metric than P/E, disregarding the latter multiple.

In relation to Southern Company and with the aid of the discounted cash flows model, it was forecasted that the EBITDA for the enterprise to be 10,872.89M, and Net Income of $2,509.51M, for the year 2023.

Furthermore, if multiples are held constant throughout years, it would be expected that the enterprise value of Southern Company for 2023 to be $145,294.79M, using an EV/EBITDA multiple of 13.4x. This value would result in a share price for 2023 of $83.09, yielding a return of 16.68% in one year, compared to the value of $71.21, on December 13th, 2022.

For the year 2033, the DCF model predicted that EBITDA and Net Income were $14,912.60M and $2,741.19M respectively. In addition, if the same EV/EBITDA multiple is utilized, Southern

would have a total enterprise value of $199,828.78M with share price of $133.16.

Lastly, to conclude the multiples analysis, a bear and bull case were considered. The bear case takes into account the multiple of the 25th percentile of peers instead of the median, whereas the bull case considers the 75th percentile. Both the scenarios were calculated in the same fashion as the previous base scenario, only changing the multiples.

For the bear case the multiple of 10.2x EV/EBITDA was employed, yielding an enterprise value for Southern in 2023 of $110,354.38M, and a share price of $51.00. The return for the share price would then be -28.38% for the period of 1 year if the bear case held to be true. In regard to 2033, the bear scenario predicts an increase of share price of 25.03% in the course of 10 years, resulting in a stock price of 89.04 and enterprise value of $151,774.10M.

On the optimistic side, the multiple is 15.4x, yielding an enterprise value of $167,442.09M in one year, with a share price of $103.42, generating a total return of 45.24%. In the meantime, the bull case for 2033 predicts an enterprise price of $230,288.74M and stock price of 126.28%, resulting in returns of 126.28%.

Recommendation

When it comes to valuating if Southern is worth investing in, a multiple valuation was taken into account as a supplementary assessment of the Discounted cash flows model. Therefore, and despite the positive outlook of 16% return for the company, this value must be taken with prudency and the DCF model should consequently overrule the decision to invest in the company, as it explores other key operational factors hence it is advised to simply hold.

It is also worth noting that when accounting for differences in generating capacity, Southern seems to be lagging behind its peers, generating less Revenue per MW of capacity.

SOUTHERN COMPANY

COMPANY REPORT

ENERGY SECTOR

13 DECEMBER 2022

ANA BENJAMIM, HENRIQUE ZHAO

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Southern aiming for nuclear returns

A safe bet against rising fuel prices

- EBITDA and Comprehensive Income increase to pre-pandemic levels. Following positive Q3 earnings reports, Southern Company expected to grow its Net Income to $4,269M in 2022, stabilizing to $2,625M in 2023, and growing to $3,611M in 2023.
- Southern has completed the sale of Sequent ahead of schedule with additional $93M after-tax gains. The company has also sold Gulf Power to Next Era Energy while increasing its renewable energy generation by 384MWs.
- Georgia Power to finish construction of Plant Vogtle Units 3 and 4 in 2023. Rate base rise for retail base rates approved as of 2022 for Unit 3.
- Through an additional Multiple analysis, an Enterprise Value of $145,294M was assessed with an EV/EBITDA multiple of 13.4x.
- **Valuation:** Based on an Enterprise DCF reformulation and valuation, Southern Company is forecasted to reach a target price of $75.31 by the end of 2023, achieving a return of 5.76%. Multiples Valuation was utilized as well for supplementary analysis and comparing results.

Company description

Southern Company is primarily regulated utility company that serves 9 million customers in the states of Mississippi, Alabama, and Georgia in the United States. The holding company distributes and sells Natural Gas services as well. Southern also participates in other markets such as Telecommunications and Fiber optic.

Recommendation:	**HOLD**
Price Target FY23:	**75.31 $**
Price (as of 13-Dec-22)	**71.21 $**

Reuters: SO, Bloomberg: SO:US

52-week range ($)	60.71-80.57
Market Cap (€m)	69,620.63
Outstanding Shares (m)	1,086

Source: Reuters

Source: Company data and Yahoo Finance

(Values in $ Ms)	2021	2022E	2023F
Revenues	23,113	29,811	29,910
Revenue Growth	13.44%	28.98%	0.33%
Operating income	5,703	8,088	7,096
Operating Margin	24.67%	27.13%	23.72%
Comprehensive Income	2,382	4,242	2,591
ROIC	5.89%	8.31%	7.42%
ROE	7.32%	13.02%	7.36%

Source: Company Data and Forecasts

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Southern Company

Back in the 1900s, James Mitchell, inspired by hydro-electric plants in England and the river force of Alabama, dreamt of electrifying the American South. Hence, he created Alabama Power on the 4th of December 1906 (Alabama Power, 2022)[1]. It became the first of three electric holding companies that would later play major roles in the history of the company.

The company then proceeded to acquire and merge with other firms until it formed the Commonwealth & Southern Corporation. This system involved 5 Northern firms and 6 Southern corporations. Nevertheless, the massive company was dissolved in 1940 due to the Public Utility Holding Company Act (PUHCA) of 1935 (Chcom, 2020)[2]. The PUHCA gave the Securities and Exchange Commission power to break apart electric utility holding enterprises and limited each electric utility holding to a single state (U.S. Energy Information Administration, 1993)[3]. Regardless of the PUHCA, 4 Southern electric holdings managed to be an integrated system and in November 1945, Southern Company was finally incorporated in Delaware.

Figure 1: Territory served by Southern Company

Through expansions, acquisitions, and customer growth, Southern Company is now able to serve 9 million customers, both households and industrial clients across the U.S.A. and offers energy with over 43,202 MWs of nameplate generation capacity, natural gas distribution and services, as well as other services for example fiber optic and telecommunication services (Southern Company, 2022a)[4].

Southern company Within the Model

Both Income Statements and Balance Sheets can be organized according to a reformulation system[5]. This reformulation aims to divide a company's activity into its core and non-core portions to then analyze each relevant segment of the core portion of the company. Seeing Southern Company's main company description, the core component is composed of three main segments: Retail electricity generation and sales, Gas distribution and related services, and other core activities such as telecommunications (grouped under 'Other core businesses'). Under this framework, non-core activities consist of items that do not directly impact the ability of the company's operation to generate future turnover or results. Examples of these items are derivatives, one-off revenues or expenses such as COVID-19 benefits, pension related obligations, other non-controlling minority investments. This allows for more detailed analysis and forecasts into Southern Company's enterprise value.

Southern Company Commitment to a greener future

In the foreseeable future, Southern Company aims to achieve carbon-neutrality by 2050, and a reduction of 50% in Greenhouse gases by 2030, relative to 2007. The strategy for the Southern Company to further evolve into a greener company

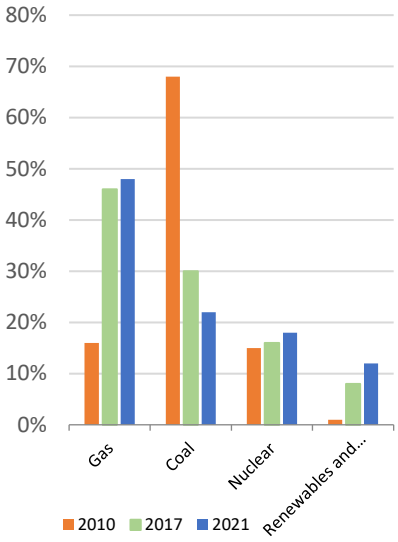


Figure 2: Evolution of energy sources at Southern Company (Statista, 2022)

implies a reduction of both indirect and direct emissions. This is achieved by reducing coal-fired assets, increase in natural gas and nuclear energy consumption as means to lower carbon emissions, figure 2. In addition, other measures include: increase in renewable assets, finding carbon negative solutions (where the amount of CO_2 that the company removes from the atmosphere is greater than the CO_2 emissions of the company) and, investment in Research and Development of cleaner technologies (Southern Company, 2022b)[6]. The evolution of energy sources is depicted in graph 5, and the efforts in the reduction of coal are evident, as for 2010 coal represented almost 70% of the energy generated, and a decade later that value has dropped to 22% of the energy generated. (Statista SO energy by source, 2022)[7].

Nevertheless, the efforts to reduce carbon emissions do not belong solely to the Southern Company, but to a growing coalition of countries that are pledging net-zero by 2050. The Paris Agreement states that in order to contain global warming to no more than 1.5º Celsius compared to the late 1800s, overall Greenhouse gas emissions of the planet need to be reduced by 45% in 2030 compared to 2010, and net-zero by 2050. For this purpose, 193 parties consented to the Paris Agreement, including the main polluters – United States, China and the European Union, covering 76% of global emissions. The Agreement also sets long-term goals, reviews countries commitments to cutting emissions every 5 years, and provides climate financing to developing countries (United Nations, 2021)[8].

Finally, considering the recent macroeconomic context, Southern company has managed particularly well as the utilities market is heavily regulated. As electricity is an inelastic good, by passing the increasing costs of natural gas to customers, Southern hedges the most concerning metrics of an Energy company. In addition, it also benefits from fixed debt payments and low exposure to variable interest rates. For these reasons, and despite the state of the economy, it is believed that Southern Company is a great investment, that offers a unique opportunity to hedge further against natural gas prices, and consequently electricity price expansion.

Macroeconomic Context

From the COVID-19 pandemic to the most recent Russo-Ukrainian conflict, the macroeconomic scenario around the world has been concerning.

It all started in 2020, a few months after the discovery of a virus that would propagate the world and lead markets to a downfall. The S&P ETF would decline from $3380 to $2300 in 5 weeks-time (Index S&P 500, 2020)[9] and dragged along with it most stocks, including Southern Company's that had a value of $70.40 in February of 2020 deteriorating to $46.36 only a month later (Index Southern Company, 2022)[10].

Due to the state of the economy both the ECB and the FED decided to help citizens with helicopter money along with other compensations, that would later increase inflation (The White House, 2021)[11].

In 2021 the market was recovering only to be struck again, in 2022, as a result of global economic uncertainties due to the conflict in Eastern Europe, between Russia and Ukraine, and the continuous increases in interest rates by the Federal Reserve of the U.S. .The war has increased the price of natural gas futures to more than double compared to January 2022, and 7 times, compared to March 2020 (Natural gas futures price, 2022)[12]. Additionally, with the increase in price of petrol, inflation skyrocketed to a whopping 10.00% in August 2022 in the European Union and 8.26% in the United States in the same period. This led to a depreciation of the euro compared to the U.S. dollar to 0.95 euros per dollar. The price in the aforementioned raw materials had a massive impact in the economy.

Energy Mix Evolution

Nowadays, the energy sector is evolving, becoming cleaner and greener, yet, Humanity has gone through multiple trials and errors to achieve a sustainable energy mix. Not long ago, in 2010, the United States' sources of energy generation were as follows by figure 3, (Statista, 2021)[13].

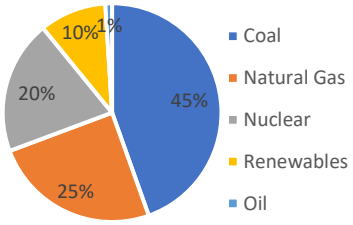


Figure 3: 2010 U.S. Power Generation

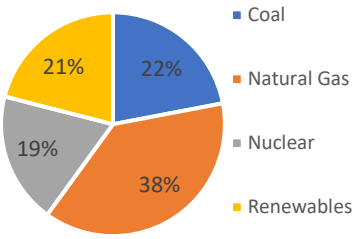


Figure 4: 2021 U.S. Power Generation

As observable by figure 3, in 2010, coal was the predominant type of resource used, with 45% of the U.S.'s power generation being reliable on this source. Yet, in 2021 the energy mix by the industry in the United States of America has changed drastically, as depicted in figure 4.

In recent years, coal has diminished to half its total percentage, and renewables doubled in size from 10% to 21%. Natural gas also increased from 24% to 38%, replacing coal as the most used fuel by 2021. Although natural gas is a fossil fuel in the same way as coal; burning this resource produces about half as much CO2 as coal in the production of same amount of energy (Reuters, 2020)[14].

Levelized Cost of Electricity

Nonetheless, it is crucial, and interesting to understand, what motivated the dramatic shift in energy mix by the industry in over the course of a decade, and the Levelized cost of electricity (LCOE) is used for this. Thus, LCOE is utilized to compare costs amongst the different types of energy generation. This indicator is a measure of the average net present cost of electricity for a generator over its lifetime in Megawatt-hour (a) (Corporate Finance Institute, 2022)[15]. In simplistic terms, the LCOE measures the lifetime costs of a plant, dividing it by its energy production over its life span.

As it is depicted below by figure 5, from the source: Solar lights up outlook for renewable energy in Texas in 2022 by the Federal Reserve Bank of Dallas[16],

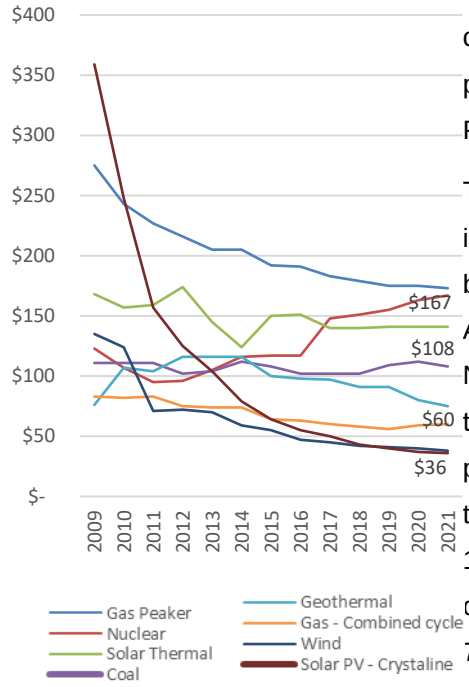
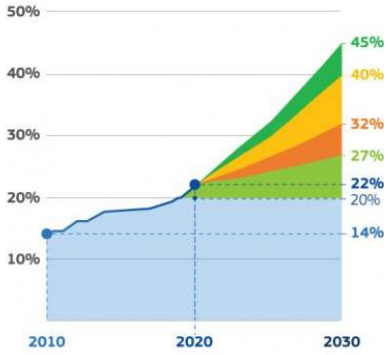


Figure 5: LCOE ($/MWh)



Graph 6: REPowerEU

Evolution of Natural Gas in the US

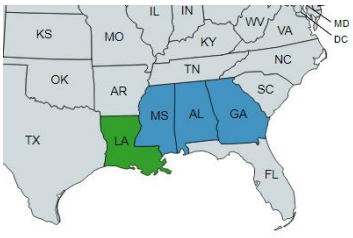


Figure 7: Blue: Southern's main electric service areas. Green: Henry Hub

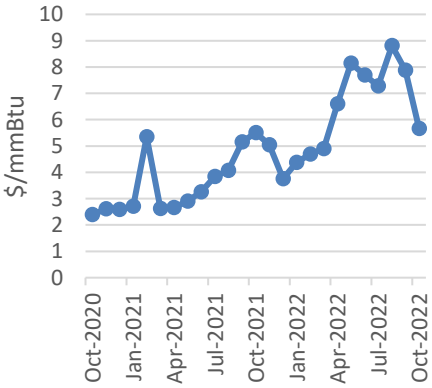
renewables are taking a stance next to the less environmentally conscious peers. In fact, Solar PV Crystalline became the most appealing source of energy over the course of 12 years, with an average unsubsidized levelized cost of energy of $36 per Megawatt-hour. Solar PV Crystalline, standing for Crystalline Silicon Photovoltaics is the most used technology in regard to photovoltaic panels.

To support this theory, it was analyzed the renewables and cleaner energy investments in 2021 (Visual Capitalist, 2022)[17]. In 2021, China had invested $266 billion in renewables and low-carbon technologies. Whereas, the United States of America took the second spot, with $114 billion spent in greener technologies. Notwithstanding, despite the impressive numbers, a supplementary assessment to the percentages of energy consumption that are generated by the renewable's portraits a different reality. Even though China has made an enormous investment, the total percentage of energy consumption employed, using clean technology is 14.95% as of 2021. Interestingly, the leader of renewables is Iceland with 86.87% of the primary energy coming from a clean source, followed by Norway with 70.56%, Sweden with 50.92% and Brazil with 46.22% (Our World Data, 2022)[18].

Adding to the international effort of fighting global warming, in 2021, the European Union set a target regarding the energy mix inside the E.U. of at least 40% clean energy by 2030. Nonetheless, on the 18th of May 2022, the commission released the REPowerEU plan, in order to "rapidly reduce EU's dependence on Russian fossil fuels well before 2030 by accelerating the clean energy transition". Proposing that the previous directive of 40% by 2030, to be reconsidered, and setting a new target of at least 45% of renewables in the energy mix of the energy sector (European Commission, 2022)[19]. In graph 6 it is observable the different directives by the European Commission over the years, with the last one being at 45% clean energy by 2030. The relevance of the European Commission is unquestionable since it is the forefront of international efforts to combat climate change and plans to raise its targets in order to tackle global warming under the Paris Agreement. The United States has also further its commitment to net-zero carbon emissions, not only to power-plants, but to American homes and businesses by 2035. (U.S. to slash carbon emissions, 2022)[20].

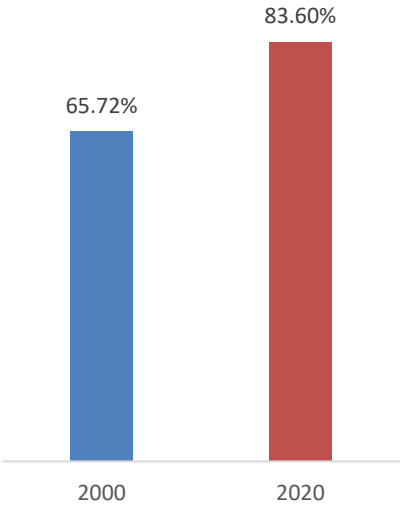
In the transition to reduce greenhouse gas emissions worldwide, Natural Gas stands as the fossil fuel that helps facilitate this transition as it has much lower emissions. The Henry Hub index is the primary United States benchmark for the price of natural gas. Depending on the location, spreads are then applied taking into account distribution and transportation costs through pipelines with distance and demand affecting the spread. Also worth noting that Henry Hub is situated in the Southeast of the United States (Louisiana), relatively in proximity to the regions where Southern Company's retail electric generation plants operate (Mississippi,

Alabama, Georgia) meaning that the spread is not as impactful in the analysis of natural gas prices compared to the actual spot price at Henry Hub, figure 7. Natural Gas is sold in $ per mmBtu as in M British Thermal Units. Historically this index has been relatively stable with a decreasing trend in the past few years with an inverting trend beginning in 2021 (US Energy Information Administration[21]).



Graph 8: Henry Hub Index (2020-2022)

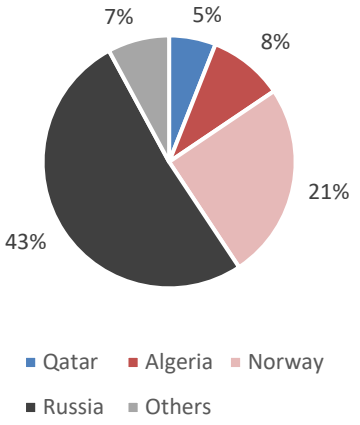
The Henry Hub index averaged at 2.04$/mmBtu in 2020, increasing by 92.06% to 3.91$/mmBtu in 2021, and increasing by another 71.66% to 6.71$/mmBtu as of September 2022 as presented by the EIA (US Energy Information Administration[21]), graph 8. These changes were the consequence of two separate situations that have influenced each other resulting in these two spikes in such a short amount of time. The first situation occurred in February 2021, when the average price of natural gas increased by approximately 900% on average in the United States with the Mid-Continent region seeing a price surge of 1,370% compared to previous year values according to S&P[22]. This sharp monthly increase was due to an unexpected winter storm that hit Texas and Oklahoma leading to much of Natural gas stored supply being promptly used to produce heating and electricity to cope with the catastrophe[23]. It is also important to note that American natural gas seasonal trends are reversed when compared with that of European season trends. While Europe mostly saves up natural gas during the summer as there are spikes mostly during winter times as the continent uses more natural gas for heating[24], the United States has a spike mostly during summer times. Natural Gas prices usually peak in the winter in regions where Southern Company operates, general electric utilities sales though peak in both summer and winter seasons. This is because the country also uses natural gas and electricity for its air conditioning needs to fight the heat (Martínez and Torró, 2015)[25] leading to higher spot prices after decreases in storages in the winter. These sharp decreases in stored natural gas in the winter lead to significantly higher demand for US natural gas in the summer as a result of higher marginal cost production and demand inelasticity.

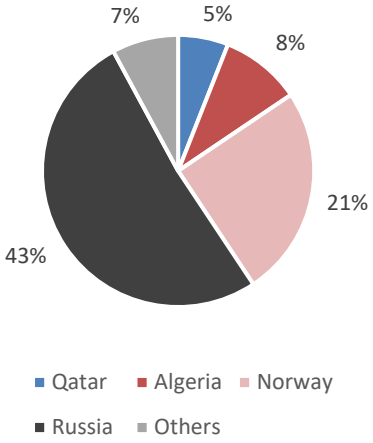


Graph 9: Natural Gas imported from outside the EU (evolution in %)

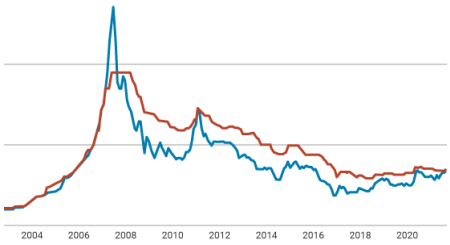
For instance, after a significant decrease in stored natural gas supply in February 2021, the rise in demand in the summer was not met with a similar growth in supply. Lower storage of natural gas correlated with higher prices afterwards[26] during the summer period. This led to a further boost in prices of natural gas in an overall upwards trend throughout the rest of 2021. Therefore, seasonal trends in US prices at the Henry Hub “are not directly linked to the global market, even as the country sends about 15% of its gas production overseas in the form of liquified natural gas” as stated by CNBC[27] with American seasonality prices of this fuel being unique.

Contrary to the United States, the European Union does not produce much of the natural gas it uses (importing more than 80% in 2020, graph 9), instead importing





Graph 10: Evolution of Uranium fuel prices (2014-2022)



Graph 11: Evolution of Uranium fuel prices (2014-2022)

it through pipelines from other countries outside the EU. At the start of 2022, Europe imported around 40% of its natural gas from Russia though pipelines[28], graph 10. Due to the start of the war between Russia and Ukraine and the consequent sanctions imposed on Russia by the EU, European imports of natural gas are now down to 9% as of September 2022[29]. This significant decrease in imports has led to a shortage in supply as, unlike the U.S., Europe has its demand spike for natural gas during the winter months when heating requirements increase in the colder European countries. Even though the European Commission has proposed gas demand reduction plans to prepare the union for supply cuts[30], these demand reductions are not enough to fully account for the reduction in stored natural gas. To prevent the worst consequences of supply shortages, the EU imported as much natural gas from other sources as possible in the earlier months of the year to save up for the winter period. Therefore, Europe required natural gas from countries such as the United States where natural gas must be bought through LNG (Liquified Natural Gas) to be able to be transported across the Atlantic Ocean. LNG is significantly more expensive than natural gas sold through pipelines as liquefying natural gas requires the fuel to be cooled with various cryogenic processes and transported throughout the entire journey in special cryogenic vessels[31]. Consequently, natural gas prices at Henry Hub also raised as LNG prices for Europe are about four times higher than LNG prices within the United States. U.S. natural gas production has also not completely recovered since the pandemic meaning that similarly to the effects of the winter storms of 2021, the rise in demand in the summer months in 2022 could not be accompanied by a similar growth in supply (as the speed of production in 2022 has not fully picked up while stored amounts decreased during the first half of the year as the US sold much of its supply to the EU) leading to yet another sharp increase in natural gas prices by 71%[32]. These two yearly changes have severely impacted Southern Company's costs as fuel is one of the most crucial expenses in the company's operating structure. Furthermore, as Southern Company shifts away from generation sources such as Coal to Natural Gas due to its lower greenhouse gas emissions, it also means that Southern Company is increasingly exposed to price increases at Henry Hub. Thusly, increasing investments into the Nuclear sector from Southern can also be seen as a hedge against this risk as Nuclear fuel prices are generally more stable and uranium spot prices ($/lb U_3O_8) have decreased steadily since 2008 more than halving its spot price[33], graph 11.

Nuclear energy investment

Southern Company along with its subsidiary Georgia Power and Southern Nuclear, are investing in nuclear plants, more specifically Plant Vogtle Units 3 and 4. These plants will be the first U.S. reactors to use the AP1000 technology (a) (Office of Nuclear Energy, 2022)[34]. Which are designed to be safer through a two-loop pressurized water reactor, (Westinghouse, 2022)[35] and to shut the reactors without

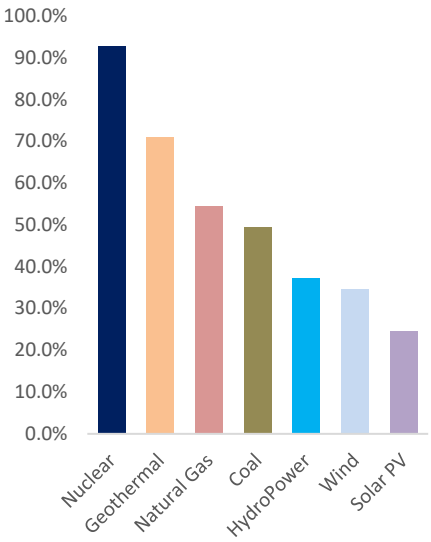


Figure 12: Capacity Factor

any operator action or power source. Furthermore, the design of the plants also uses less piping, valves and pumps than other reactors, leading to lower maintenance and operating costs, thus giving Southern a competitive advantage in regards to this technology once fully functioning.

Furthermore, nuclear also has other benefits other than being cleaner that the other fossil fuels such as its increasingly cheaper cost. Despite the carbon-emissions made by the extraction of uranium, the process of producing electricity with the aid of nuclear plants does not emit carbon dioxide to the atmosphere, hence contributing to the net-zero carbon emission goal of 2050.

Nuclear plants have the highest capacity factor, compared to any source, (b) (Office of Nuclear Energy, 2021)[36]. Having the capacity of operating at maximum power for 92.5% of the year, whereas coal sits far behind at only 49.3%, and solar at 24.6%, as portraited by figure 12. Moreover, nuclear plants require refueling only 1 time per 2 years, consequently being less troublesome to maintain.

Despite the cost of $10.4 billion so far (subject to future changes in project estimation), both Vogtle 3 & 4 employed 7000 workers and 800 on permanent jobs since the start of operations, therefore developing local economy. Additionally, the plants have been one of the largest infrastructure projects in the U.S.A. and could represent a hedging solution to the rise in price of natural gas due to the uncertainty in regard to the conflict between Ukraine and Russia. Once the plants complete construction, these will be able to power 1 million customers for the next 60-80 years (Georgia Power, 2022)[37]. Additionally, the success of the plants in 2023 could potentially have a positive influence for another energy companies to start investing more in this technology, representing a leading shift in the industry.

Relevant Competitors Analysis

To create a proxy for the energy utilities sector in the United States, 10 companies were chosen as relevant peers to Southern Company. Out of these, 5 were chosen for a more in depth analysis in the following section.

NextEra Energy (NEE) is an energy company and the greatest generator of renewable energy from the wind and sun (a) (NextEra Energy, 2022)[38]. Furthermore, to complete its operation, it also relies on, and operates generating plants powered by natural gas, nuclear energy, and oil (b) (NextEra Energy, 2022)[39]. This company is the most similar to the Southern Company, in terms of the types of business it conducts in. Its EBITDA is $6,837M and the Enterprise value of the company is $242,930M, with multiples of 35.5x (EV/EBITDA) and 50.8x (P/E). It currently operates in over 15 states in the United States, and offers electricity in Texas through Gexa Energy, an affiliate company, figure 13.

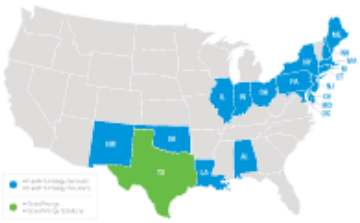


Figure 13: NextEra operational area

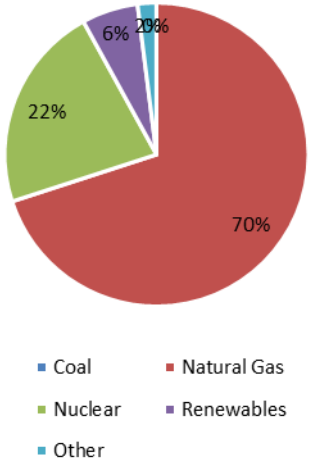


Figure 14: NextEra Energy Mix

Regarding revenues, the company has made $17,049M for the year 2021. For this period, the energy mix utilized by the company was of 70% Natural Gas, 22% of nuclear power, 6% Solar energy and 2% of other fuels with a total 28,450 MW of generating capacity, figure 14.

Interestingly, NextEra did not utilize coal to generate power, even closing its last coal-fired plant in June of 2021. In comparison, Southern has a different energy mix, consisting of 12% of renewable energy, 18% of nuclear, 48% of natural gas, but yet, 22% of coal. Additionally, NextEra Energy plans to include 1,640 MW of solar generating capacity in its portfolio by 2023 and 1,200 MW of natural gas generating units through 2022 (FirstEnergy Investor relations, 2021)[40].

Concerning the Cash Flow management of the company, NextEra has had a negative conversion cycle for the past 3 years of operations. The inventory of NextEra for 2021 was valued at $1,561M, and cost of sales of $8,508M, resulting in an average holding period of 67 days. Yielding a similar result for the average collection period of 72 days. Notwithstanding, the fact that the average payable period is over 9 months, allows the company to have a rapid Cash Conversion Cycle of negative 158 days. Meaning that the inventory is sold before it must be paid to suppliers. In contrast Southern has a Cash Conversion Cycle of 31 days.

In common, both Southern and NextEra have a similar Net Debt, yielding $52,914M to Southern and $53,331M to NextEra. Nonetheless, it is not normal for NextEra to hold this parameter above $50,000M, and the reason may lie on the acquisition of Texas water and wastewater systems - “NextEra Water Texas, LLC, an indirect subsidiary of NextEra Energy Resources, LLC, announced that it has completed the previously announced acquisition of a portfolio of rate-regulated water and wastewater utility assets in eight counties”. Through this purchase, NextEra Water expanded its portfolio into 28 water and wastewater utility systems (NextEra water acquisition, 2022)[41].

Another acquisition of no less importance was the purchase of Gulf Power, a subsidiary of Southern Company. This purchase took place in 2018, and NextEra gained access to the largest electricity producer in Northwest Florida (NextEra acquires Gulf Power, 2019)[42]. This allowed NextEra to capture 51% of the residential demand in Florida.

In addition, the enterprise has kept a constant net PP&E/Assets ratio, with an average of 0.71 for the last 3 years. Notwithstanding, the current ratio for NextEra yielded 0.53 for 2021, in turn it would mean that if the company liquidated all of its current assets, it would only be able to pay half of its current liabilities. In contrast, Southern had a current ratio of 0.82 for the same period.

NextEra's Debt to Equity ratio stands at 1.17 for the year of 2021, and it is predictable that it decreases as the company has issued $2 billion in outstanding shares. "NextEra Energy, Inc. (NYSE: NEE) announced today that it intends to sell $2.0 billion of equity units. Each equity unit will be issued in a stated amount of $50 (NextEra to sell equity units, 2022)[43].

American Electric Power (AEP) is a public utility holding company that operates in the generation, transmission, and distribution of electricity. This company has 5 M customers and serves 11 different states across the U.S.A., including, Arkansas, Indiana, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia, figure 15 (Operating Companies, 2022)[44]. Regarding its multiples it has an EV/EBITDA of 12.6x and a price to earnings ratio of 17.5x. With an enterprise value of $78,800 M and EBITDA of $6,237 M, in 2021.

Figure 15: American Electric Power Service Areas

Concerning revenues the company had sales of $16,792 M and a gross margin of 0.46, lower than the Southern Company, yielding 0.7 for the same period (2021). The energy mix of the company has a similar percentage of nuclear energy being employed at 22%. Notwithstanding, the company still heavily relies on coal, with an overall percentage for 2021 of 50%, natural gas for 16% and renewables only for 12% of the energy mix with a total generating capacity of 21,169 MWs, figure 16, (AEP Form 10-K)[45].

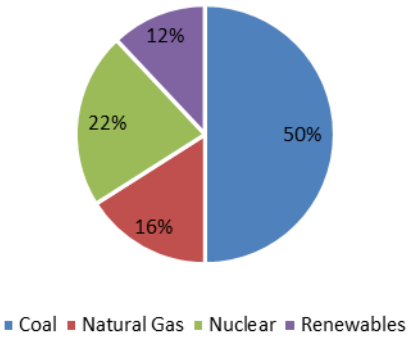


Figure 16: American Electric Power Energy Mix

In regard to Cash Flow management, the enterprise has managed to accomplish a Cash Conversion cycle of exactly 0 days. With an average payable period of 82 days, and collection period of 42 days.

When it comes to net debt, Southern has an average for a 5-year period of $48,757M, whereas American Electric Power has an average of $29,286M. The difference in debt amounts might be explained by the fact that Southern has a larger customer base, as well as a recent increase in nuclear energy investments. Notwithstanding, Net PP&E for American Electric Power has a value of $66,001 M, with total assets valued at $87,688M, yielding a Net PP&E/Total assets of 0.75 in 2021 (for Southern the value was lower at 0.64 for the same parameter).

Moreover, both PP&E and Debt are expected to increase in value due to the recent new renewables capacity purchase of 999.5 MW, whilst becoming a hedge against energy price volatility (News Releases 2022)[46].

Yet, despite the investment in renewables, American Electric power announced that it would be selling Kentucky Operations, including Kentucky Power, an utility subsidiary, and Kentucky Transco, a transmissions business, by the end of 2022[47].

The company's current ratio for the period of 2021 was 0.63, whereas Southern yielded a current ratio of 0.82. Still, the Solvency Ratio have similar results in both

companies, yielding 0.34 for the Southern Company and 0.35 for American Electric Power, respectively, for the period of 2021.

Dominion Energy (D) is an electric and power company based in Virginia and serves 7 million customers[48] (a) (Dominion Energy, 2022). This company provides natural gas, electricity and has also generation facilities across the United States. In 2021 the company generated an EBITDA of $5,497 M with an Enterprise Value of $10,755M, resulting in an EV/EBITDA multiple of 2.0x and a price to earnings ratio of 19.4x. The modest enterprise value multiple might be explained by the fact that in 2021, Ullico bought most of the Dominion Energy company and is expected to close the sale in 2022[49] (b) (Dominion Energy, 2022). Nevertheless, the company provides electricity in Virginia, North Carolina, and South Carolina and natural gas to Utah, Idaho and Wyoming, West Virginia, Ohio, Pennsylvania, North Carolina, South Carolina, and Georgia. In addition, the enterprise has production facilities in Indiana, Illinois, Connecticut, and Rhode Island, figure 17.

Figure 17: Dominion Energy Service Areas

Dominion had revenues of nearly $14,000M over the course of 2021. This result was the lowest of the 3 years (2019 to 2021). Despite this, Dominion has a generation capacity of 28,450 MW for 2021. In the meantime, the gross margin was 0.48 in 2021, which yields better results than if compared to the year of 2019, with a gross margin of 0.42.

Regarding investment goals, the company is investing in nuclear energy in order to attain the goal of net zero by 2050. Nonetheless. the business had an energy mix for 2021 containing 35% of nuclear energy, 48% natural gas, renewables 6% and only 11% of coal, with a total of 25,066 MW of generating capacity, figure 18. Additionally, Dominion has purchased a significant amount of power when compared to peers, totaling 5,134 MW of extra capacity purchased (Dominion Form 10-K, 2021)[50].

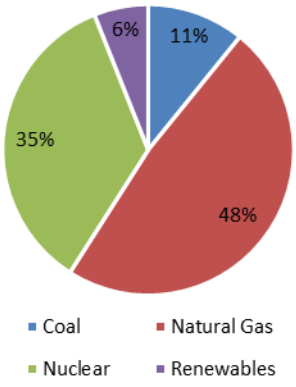


Figure 18: Dominion Energy Mix

In terms of capital structure, Dominion has been expanding its net debt by 12.5% per year from 2019 to 2021 on average. Net PP&E/Assets ratio was 0.6 for 2 consecutive years (2020 and 2021). Yet, the latter will presumably shift due to the recent approval in extra capacity for this year. “The proposal includes 10 solar and energy storage projects, totaling nearly 500 MW, that will be owned and operated by Dominion Energy Virginia. The proposal also includes power purchase agreements (PPAs) with 13 solar and energy storage projects, totaling more than 300 megawatts, that are owned by independent developers” (New Solar and Energy Storages, 2022)[51]. In addition, the investment is in line with the treaty of Paris and important for ESG standards. Consistent with the ESG – inclusion, Dominion also has several military programs to incorporate veterans in the company (Navy Veteran, 2022)[52].

Concerning funding, it is part of Dominion's strategy and interest to continue investing in green energies. As the company expects to invest up to $21 billion from 2022 through 2035 in solar generation to achieve its target of 13,400 MW generating capacity in-service by the end of 2035.

Regarding other metrics, the current ratio of the company has increased from 0.64 in 2020 to 0.84 in 2021, portraying the enhanced ability to cope with their current liabilities. The financial autonomy ratio yields 0.27, hence for every dollar of assets, the company has $0.27 of equity. In this parameter Southern yielded 0.25.

Exelon Corp (EXC) is an utility based in Chicago, and the largest regulated electric parent company with 10 million customers; 1 million more than the Southern Company. Through its operations, Exelon provides electricity distribution and transmission, and natural gas sales to Northern Illinois, Southeastern Pennsylvania, Central Maryland, Delaware, Southern New Jersey, and other regions in the Mid-Atlantic, Midwest, and New York, figure 19. Exelon has six subsidiaries, located and purchases electricity and natural gas from different sources through the aid of short-term, long-term contracts and spot rate contracts, in order to deliver the physical product to its customers. The customers vary between residential, commercial, industrial, public authorities and electric railroads (Exelon Corp overview, Exelon Corp)[53]. In 2021 this company had an enterprise value of $77,960 M and an EBITDA of $9,782 M. Regarding multiples, it had an EV/EBITDA of 8.0x and a P/E ratio of 23.1x in the same period.

Figure 19: Exelon Service Areas

As of 2021, Exelon generated 36,502 MW of power, and purchased 4,102 MW resulting in revenues of $18,498M. The energy mix of the company aims to be the cleanest of the peers with 20,899 MW generated by nuclear, with an average of 95% capacity factor, 8,819 MW of fossil fuels (primarily using natural gas and oil), 2,682 MWs using renewable energy, figure 20 (Exelon Report, 2021)[54]. Compared to Southern Company, Exelon focuses a more significant portion of its mix in clean energy generation totaling 73% of the portfolio in clean energy, with 65% coming from nuclear, and 8% renewables, instead of natural gas production (27%). In addition, the company does not employ coal, potentially resulting in safer cash flows taking into account recent volatility in natural gas prices.

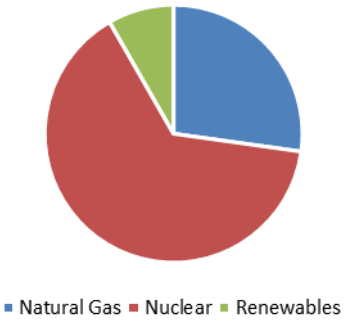


Figure 20: Exelon Energy Mix

Considering Exelon's cash flow management, the average holding period was 28 days and payable period of 62 days, resulting in a CCC of 19 days. Thus, the enterprise is quick to convert its investments into cash inflows, as it is common within the energy industry.

Similarly to Southern Company, Exelon, has maintained a steady Net PP&E over Total Asset ratio around 0.60 since 2018. Nonetheless, the key difference is that Exelon has been decreasing its Current Ratio from 1.17 in 2018 to 0.87 in 2021,

portraying a deteriorating capacity in meeting liabilities in the short run. The company has also boosted its Net Debt considerably since 2018 from $38B to $46B resulting in an expansion of the D/E ratio from 1.24 to 1.36 in 2021.

The increase in Net Debt is a result of the investments made in 2021 as a strategy to accomplish the goal of reducing emissions by 50% in 2030. In fact Exelon invested more than $6.6 billion in energy infrastructure, with an additional $29 billion planned for 2022–2025 (Exelon Releases, 2021)[55]. Notwithstanding the total amount also includes investments in natural gas, and improvement in infrastructure.

As of 2022, Fitch ratings had diminished Exelon's rating from BBB+ to BBB while affirming a short-term credit quality of F2 as Good. Yet, Exelon's subsidiaries of Pepco, ACE, and PHI had their long-term rating upgraded from BBB to BBB+ while Pepco and ACE's senior secured rating was raised from A- to A (Exelon Investors Relationships, 2022)[56].

First Energy (FE) is an utility company with headquarters in Ohio, serving 6 million customers across 65,000 square miles in Ohio, Pennsylvania, West Virginia, Maryland, New Jersey, and New York, figure 21 (First Energy, 2022)[57]. The company, along with ten subsidiaries provides the distribution, transmission, and generation of electricity. And supplies energy to residential, commercial, and industrial customers. This company had an Enterprise Value of $46,530M and EBITDA of $3,297 M in 2021, along with a multiple of 14.1x regarding EV/EBITDA and 17.2x of P/E ratio in 2021.

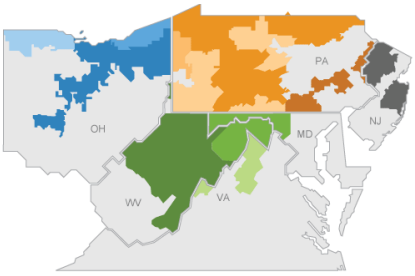


Figure 21: FirstEnergy Service Areas

In 2021 the company had a capacity of 3,647MWs, in which 3,160MWs were by Coal-fired plants, and 487MWs by pumped-storage hydro, figure 22. This energy mix stands out in an opposing way to Exelon, with only 2 different types of resources to produce energy, and no nuclear or natural gas employed to generate energy. Furthermore, the fact that the company relies on coal for over 86% of its business implies that FirstEnergy will need to invest heavily in clean energy soon, to keep up with the industry trend. (Energy Coalition, 2022)[58].

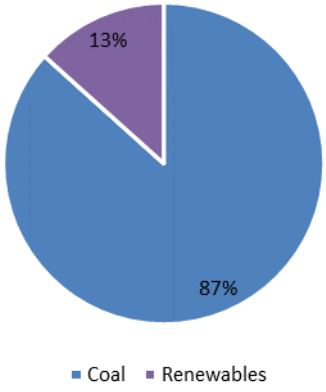


Figure 22: Exelon Energy Mix

In addition, FirstEnergy is the smallest company when it comes to generating capacity, out of the 10 being evaluated in the report with total assets being evaluated at $45,432M.

Regarding interest payments, this expense will surely increase, since as mentioned in the 10-K report of First Energy, a portion of indebtedness is exposed to interest at fluctuating interest rates and has not hedged against this risk, unlike Southern Company, which hedges around half of its exposed notional.

Moreover, in 2021 FirstEnergy was charged with wired fraud, tarnishing the company's reputation and has agreed to pay a $230 M monetary penalty

(FirstEnergy charged Federally, 2021)[59].

Regarding other parameters of the Capital Structure, the company had the highest solvency ratio of the peers yielding 2.13. Lastly, FirstEnergy had the highest Revenue/Generating Capacity yielding $3.05M per Megawatt for the year of 2021, since the company had revenues of $11,132 M and sold 3,647 Megawatts of power.

Peers Comparison and Trends

Comparing the 10 peer companies to Southern, it is noticeable similar investments and trends amongst the 11 enterprises.

To assess peers and multiples, the median was employed instead of the regular average. The reason behind this choice was the fact that since only 10 companies were evaluated, if the average was considered, the data results would be skewed. Thus, median allows the valuation to be on the center of the database.

Firstly, the Cash Conversion Cycle of all companies is below one year, and the cash ratio for the utility companies is almost 0. The current ratio has a median value of 0.7 for the year 2021 and, this parameter has increased when compared with the 2 previous years.

Besides, the industry relies primarily on property, plant and equipment for its operations and to generate revenues. Therefore, as long as CCC is below one year, a current ratio of below 1 is not concerning. Notwithstanding, in regard to the parameter of Net PP&E to Total Assets, the peers' median is 0.69, with Southern Company yielding 0.64 for this measurement.

The debt ratio for the peers had a median value of 0.38. Nevertheless, this parameter has expanded, presumably due to the continuous investment in cleaner sources of power to generate electricity.

The debt-to-equity ratio of the group is 1.25 for the year 2021 and has risen 14.7% in one year. Out of the group a clear outlier is PG&E with D/E of 0.30, followed by FirstEnergy with a D/E ratio of 0.73 for 2021. As aforementioned, the company was charged a $230M penalty, is the smallest of the peer group and is also the only firm using merely 2 energy sources (coal and hydro). All these factors combined could potentially be the reason for the value of 0.73 for the year 2021, albeit the average of the two previous years was not too far off, at 0.78. In contrast, Southern Company had the highest D/E ratio in 2021, yielding 1.64.

Regarding Gross Margin, the median of the group was 0.39, and the Revenue per MW of capacity was $0.98M per megawatt. This metric was pondered for comparison reasons, as it wouldn't be ideal to compare revenues or capacities of

different companies as no business has the same exact same size, consequently, skewing the data. For that purpose, this parameter was employed in order to understand how much revenue a company could produce, per Megawatt of capacity. Concerning this metric, FirstEnergy leads the way at a Revenue per Capacity of $3.05M/MW, followed by PG&E with $2.69 M/MW, Edison International with $2.13M/MW and Exelon at $1.12M/MW. In this parameter, Southern was the second worst company with $0.53M/MW. Notwithstanding, the net profit margin for the companies with higher Revenue per MW of Capacity was eroded by the rest of the expenses along the Income Statement, with Exelon yielding the lowest net profit margins for 2021. In contrast FirstEnergy's net profit margin was below median at 12%. The median for this parameter was 13%, with Dominion Energy having the highest margin, at 24% in 2021. In contrast, in the year 2020, Dominion experienced a loss of $401M, resulting in a negative profit margin of 3%. Lastly PGEG had a negative net margin of 11%, for the period of 2021.

Concerning investment trends, all of the companies aim to reduce emissions by 2030 and reach net carbon-emissions of 0% by 2050. Hence to reach the goal, the 10 companies are investing massively in cleaner technology. Exelon is paving the way when it comes to generating power without producing carbon emissions, with a percentage of 73% of nuclear and renewables in its energy mix, and 0% of coal. Moreover, NextEra has also divested in coal, yet the investment in greener technologies remains low, at 28% of the energy mix. In the meantime, Southern has the potential to further boost its clean energy percentage as Vogtle 3 and 4 will begin operations in 2023, nevertheless as of 2021 its green energy mix was 30% still relying on coal for 22% of their operations.

Consequently, the green movement in the energy industry is instigated mostly by a rise in nuclear and solar energy. The boost in nuclear energy, despite having a costly initial investment, has much less operational cost[60]. Nevertheless, LCOE remains high at an average of $167/MWh (Federal Reserve bank of Dallas, 2022)[12]. For that reason, companies are additionally investing in solar energy, which as aforementioned in the Energy Evolution, Solar PV has become the most appealing source of energy with an average unsubsidized levelized cost of energy of $36 per Megawatt-hour.

Notwithstanding, since Solar only has a capacity factor of 1/4th of nuclear capacity factor (b) (Office of Nuclear Energy, 2021)[36], a mix of both different resources is essential to be able to fulfil the demand at a sustainable cost.

Financial Analysis

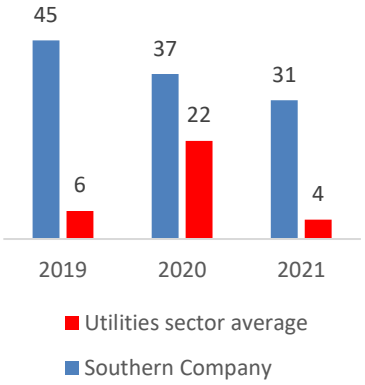


Chart 23: Southern and Sector Cash Conversion Cycle

Looking at the Cash Flow activity ratios (Average Holding Period, Average Collection Period, Average Payable Period), Southern Company has managed to maintain its healthy Cash conversion cycle of 31 days in 2021. The company has kept this indicator around 30-40 days since 2017. The company's larger average holding period of 123 days is counteracted by its average payable period of 139 days, resulting in the positive indicator. Following the analyzed companies in the 'Competition Analysis' section, a proxy for the industry average was computed in key ratios to compare with Southern Company. Taking into account the utilities sector's average Cash Conversion Cycle of 4 days in 2021, Southern seems to be in line with its peers. It is worth noting that while Southern Company has a longer Average holding period compared to the comparable 39 days, Southern also has a considerably longer Average Payable Period against the industry average of 62 days which balances out the effect in the final Cash Conversion Cycle. Thus, following similar values across the industry, Southern Company signs of quick conversion of cash flow liquidity, as seen in chart 23.

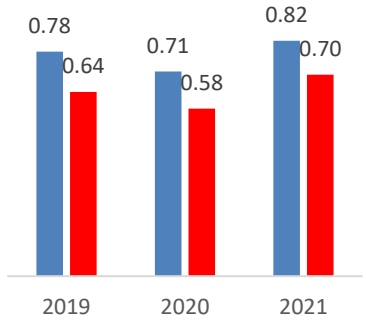


Chart 24: Southern and Sector Current Ratio

Southern Company's current ratio improved from 0.71 in 2020 to 0.82 in 2021. This represents a better ability for the company to meet its obligations in the short run, even if there is still room for improvement to cover some portions of these obligations. This indicator has a similar behavior across all players in the energy utility market in the US (with SO having overall healthier liquidity ratios) increasing from 0.58 in 2020 to 0.70 in 2021 on average, chart 24. This trend of improvement is also present in the quick ratio, developing from 0.51 to 0.61 in 2021 and the cash ratio improving from 0.09 to 0.16 in 2021. For comparison, the sector's quick ratio was similar at 0.62 while the cash ratio was significantly lower at 0.03 in 2021. Overall, while current ratios are still below 1, this is contextually normal for the industry and there are signs of significant improvement in SO's liquidity ratios. Combined with a healthy cash conversion cycle, signs of possible distress for Southern Company decreased significantly from 2020 to 2021.

Capital Structure

Following the start of the project of constructing Plant Vogtle Units 3 and 4 as discussed previously, net debt raised as it was the main way in which the project was financed. This has led a change in the debt-to-equity ratio from 1.52 in 2020 to 1.64 in 2021, chart 25. Comparatively, the industry increased from 1.18 in 2019 to 1.25 in 2021 with overall rising values of net debt following 2019 due to the COVID-19 pandemic. It is worth noting that while increasing, the industry D/E ratio remains significantly lower than Southern's capital structure, maintaining a consistent difference since 2019. As Southern has access to a cost of debt around 3%, if interest payments can be made with no significant increase in the probability

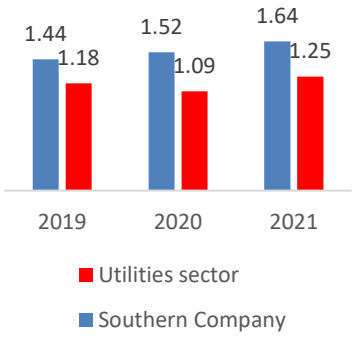


Chart 25: Southern and Sector D/E Ratio

of default, Southern can make use of more debt to further its investments into PP&E (particularly, the construction of nuclear Plant Vogtle Units 3 and 4 in recent years for example) with the higher D/E not necessarily signaling any immediate issues. Similarly, the solvency ratio (Equity over Liabilities) has decreased from 0.36 to 0.34 following a decreasing trend since 2019 due to the increase in debt while the industries has been relatively stable around 0.37. Given a target ratio of 1.53 by year 2033, net debt is set to expand from $53B in 2021 to $54B in 2023, up to $74B by 2033. This amount of net debt will then continue to grow throughout the steady state period maintaining a constant D/E ratio of 1.53.

Rate base cases and evolution

As energy utilities are a heavily regulated industry, revenues are usually controlled according to base rates. These rates dictate that revenues may not exceed certain values, ROE cannot exceed preestablished values and all rises must be approved in base rate cases by regulatory authorities. Therefore, it is crucial to analyze potential base rate raises to see potential future revenue growth. Alabama Power (one of the three entities that comprise of Southern Company's main business of electric utilities) has adopted a Rate RSE (Rate Stabilization and Equalization). These adjustments are for any two-year period if these do not exceed 4% with an annual limit of 5%. There is also a possibility of a raise of 0.07% if Alabama Power achieves a credit rating of A or is in the top one-third of a customer value benchmark survey, though this is currently improbable. Since Alabama Power has surpassed the WCER (Weighted common equity return) top of 6.15% in the years of 2019, 2020, and 2021. This has led to a $181M refund back to customers as of 2021. $126M out of the $181M were allowed to be applied to reduce the Rate ECR (Alabama Power's Rate Energy Cost Recovery) through under recovered balances based on estimates of higher future energy costs while the rest were refunded back to customers through bill credits in July 2022. For Georgia Power, following the construction of Plants Vogtle 3 and 4, the entity has voted to approve rate increases for 2021 of $111M and 2022 of $157M. Georgia Power plans to end construction of Plant Vogtle Units 3 and 4 by 2023 in a forecasted remaining total project capital cost of $10.4B of which $8.4B has already been incurred by December 2021 (subject to future changes in project estimation). Financing costs were initially calculated to be $3.4B for Plant 3 and $2.9B for Plant 4 but the pandemic resulted in construction delays due to mandatory personnel being forced to quarantine from COVID-19 resulting in delays spanning several months with a further estimated loss of $1.6B in 2021.

Power generation mix

As of 2021, Southern had a total 43,202,267 KWs of generating capacity. Steam generation facilities using fossil fuels accounted for 31% of total capacity while Nuclear facilities were about 9%. Combustion Turbines and Combined Cycle turbines using natural gas accounted for 12% and 29% of total capacity,

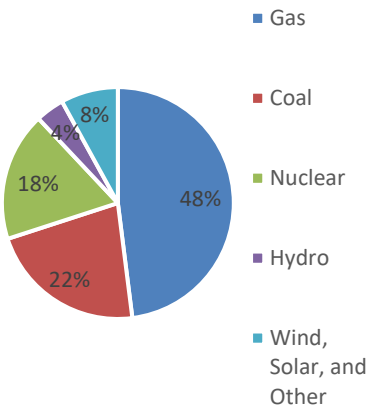


Chart 26: Southern's fuel mix (2021)

respectively. Remaining facilities used renewable sources such as Hydroelectric, Solar, and Wind facilities each accounting for around 6% of total capacity (approximately 18% of renewable generation combined). Fossil fuels used for generation fell in cost such as Coal, decreasing from 0.0291$/KWh to 0.0285$KWh. Similarly, the cost of using Nuclear power diminished from 0.0078$/KWh to 0.0075$KWh. The surge in cost of Natural Gas explains why Southern Company decreased this fuel in its generation mix in 2021 (dropped from 52% to 48%) in favor of Coal (which expanded from 18% to 22% in 2021 following a previously steady decrease from 30% to 18% from 2017 to 2020). There was an expansion in the power generation percentage of Hydro and Wind, Solar, and Other renewables accounting for 12% of total power generation in 2021 (overall growing since 8% in 2017, charts 26. This illustrates the company's transition to lower emissions following the industry trend, as the deadline of 2030 by the Paris Agreement approaches.

Investment strategy and Mergers

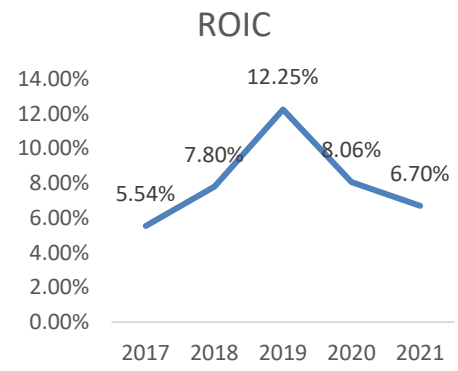
Southern Company invested $5B in PP&E from 2020 to 2021 with $3.5B related to the construction of Plant Vogtle Units 3 and 4 at Georgia Power after a $5.4B investment from 2019 to 2020. This raised total PP&E to $115.5B in 2021 from $110.5B in 2020. Revenue growth in the electric utilities industry is mainly derived from base rate cases being approved by the state PSC (Public Service Commission) for each state Southern operates in. This in turn depends on the company being able to serve more customers with enhanced efficiency. Net PP&E over Total Assets has remained constant from 2020 at 0.64 increasing from 0.63 in 2019. This indicates that PP&E represents a significant portion of Southern's total assets. For comparison, the utilities sector proxy had a value of 0.69 in 2021. It is then apparent that in the industry of electric utilities it is common to have PP&E represent most of a company's total assets. The investment in PP&E in 2020 and 2021 are mostly due to the construction of Plant Vogtle Units 3 and 4, adding generating capacity by a total of 2,200 MWs (1,100MWs each) allowing Southern to serve an additional 1 M customers. The construction of these Nuclear facilities will further increase this energy's impact in the energy mix of Southern's generation, allowing the company to further decrease its environmental impact by being able to reduce the percentage of fossil fuels needed to generate electricity as well as increased generation reliability coupled with lower fuel costs in the future. This investment accounts for approximately $3.4B with $2.9B incurred through December of 2021. However, Southern Company generates on average $0.53M per MW of generating capacity while the utilities sector proxy had an average of $0.98M per MW of capacity. This may signal that Southern's generating facilities are not creating as many revenues when compared to similar peers. Conversely, there has also been a noteworthy divestment of $400M in PP&E by the sale of several Gas Storage facilities by Southern such as Jefferson Island

(Natural Gas Storage Facility) and Triton (cargo container leasing company that was aggregated into Southern Company Gas), decreasing Gas Storage facilities PP&E from $1.7B to $1.3B in 2021 being the only segment of PP&E that decreased.

Southern Company sold Gulf Power to a wholly owned subsidiary of NextEra for approximately $5.8B (minus $1.3B of indebtedness assumed) as of 2019 for an estimated $1.4B after tax gain. There were also other sales such as Pivotal LNG, Atlantic Coast Pipeline, and Sequent with the latter being the second largest sale at $159M. Other plants were also sold including a natural gas and biomass plants (Plant Mankato and Plant Nacogdoches) representing 500MWs worth of capacity with earnings totaling $41M as of 2019. Southern also completed the acquisition of multiple wind and other renewable plants, including Deuel Harvest, Beech Ridge II, DSGP with a total capacity of 384 MWs to add to its renewable portion in the generation mix.

ROIC and growth

Total ROIC decreased from 8.06% to 6.70% in 2021 with Core ROIC (Return on Invested Capital) decreasing from 7.49% in 2020 to 5.68% in 2021, graph 27. This evolution is mainly related to a worsening operational result from $6B to $4.8B despite the change in investment in Invested Capital (from $81.6B to $85.5B in 2021). RONIC (Return on New Invested Capital) is thus negative at -36.97% following a similar trend of -32.41% from 2019 to 2020 due to decreases in the net result despite increases in invested capital. This is also a consequence of investment into new plants taking time before they can begin operations to produce revenues, such as Plant Vogtle Unit 3 and 4. Analyzing the three main core segments - Electric utilities segment, Natural Gas segment, and Others segment (including other core business such as Telecommunications), there are different insights to be had. The core electric segment followed the same trend as the overall core ROIC seeing as it occupies the largest percentage of core revenues and invested capital, decreasing its ROIC from 8.57% to 5.97% in 2021 with a RONIC of -68.30%. Contrasting with this, due to soaring natural gas prices as well as improved revenues during the colder weather in the Heating season, the Natural Gas Segment grew its ROIC from 5.20% to 5.66% in 2021 with a RONIC of 13.81%. This positive evolution however was not able to compensate the overall decline in the result of the Electric segment as the Natural Segment has less than one third of the invested capital and consequently less operational result. Finally, the Others (telecommunications, etc.) segment also had a decreasing ROIC, continuing the negative trend_from -3.44% to -7.19% in 2021 with a RONIC of -12.98% as revenues decreased. However, the divestment in invested capital in this segment led to a better RONIC compared to the evolution of 2019 to 2020 of -18.85%. Divestment in invested capital in 2021 in this segment, therefore, leads



Graph 27: ROIC evolution

to a positive growth rate of 52% as the negative investment rate combined with a negative RONIC produced a positive growth rate. Core ROIC is forecasted to 7.01% in 2023 and to converge towards 7.31% in 2033 in the steady state.

Impact of recent interest rate changes

Variable interest rate exposure from Southern Company is approximately $45M for a 100-basis point change in interest rates with $4.5B of long-term variable interest rate exposure. The transition from LIBOR to IBOR systems is also not expected to have a drastic impact to Southern Company. Following historical levels of inflation in the United States exceeding 8% (at 8.2% at September 2022 according to OECD's database[61], the US Federal Reserve has voted in September of 2022 to "unanimously [to] approve a ¾ percentage point increase in the primary rate to 3.25 percent" to tackle the high levels of inflation in the country[62]. Similar to the European Central Bank's objective, the Federal Reserve has also stated in a press release on September 21, 2022 that the Committee is "strongly committed to returning inflation to its 2 percent objective" and that they "anticipate that ongoing increase in the target range will be appropriate"[63]. As of November 2nd, 2022, the US Federal Reserve further voted to rise the primary interest rate by another ¾ percentage point to a primary rate of 4 percent[64]. Thus, given there is a high level of uncertainty regarding possible future interest rate hikes and changes in monetary policy it is prudent to look at the exposure of Southern Company to these possible changes. As of December 2021, Southern Company had a total of 4,464M notional amount exposed to long-term variable interest rates. The weighted average interest rate on this exposed amount was 0.84%. Therefore, it is calculated that with a 100-basis point change in interest rates, interest expenses would increase by 45M every year. Considering the Federal Reserve's interest rate hike of 75 basis points as of September 2022 and further raise by 75 basis points in November 2022, and possible future rises, this interest expense may have an impact in the company's result. Consequently, it is likely that long-term variable interest rates increase by a total of 150 basis points from December 2021 to December 2022 resulting in a raise in annual interest expenses by $67.5M without hedges with possible further changes in 2023. All in all, considering Southern Company's returns, these interest rate developments should not significantly impact results in a meaningfully negative manner.

As of 2021, the company had $1,900M hedged against variable interest rates given its $4,464M notional amount of exposure. These derivatives have maturities ranging between 2028 and 2031 with weighted average interested rates paid according to the 1-month LIBOR rate plus a spread. The received fixed interest rate is approximately 2.78% as a weighted average of the notional hedged amounts. This value is lesser than the average yearly interest payments of 3.65% by the company on its debt. Thus, Southern Company has hedged 42.56% of its

notional amount exposed to variable interest rates away, meaning that the previously forecasted 150bps change in interest rates would only lead to an increase in annual interest rate expenses worth $38.8M instead of $67.5M. This decreases Southern Company's exposure to increases in interest rates by the Federal Reserve even further considering the amount of leverage that it has in its capital structure.

Credit rating

In 2021 the company did not have any credit arrangements or material changes resulting in changes to payment schedules in the case of a downgrade credit rating in the short term. Nonetheless, newly acquired debt would increase in cost accordingly to the new lower rating which in turn may change the desirable capital structure for the company. Considering Southern's long term contracts, the company would be required to increase its collateral if its credit rating were to decrease. In the case of a credit downgrade in the long-term issuer default rating to BBB and/or Baa2, Southern would be required to supplement its collateral by $41M. In a downgrade to BBB- and/or Baa3 this amount would be $419M. If Southern were to have a downgrade to BB+ and/or Ba1 or below these contracts would demand an increase in collateral by $1,934M. Given that Southern has not had a rating change since February 2018, when it was decreased from A- to BBB+[65], it has remained affirmed with a relatively stable outlook since. Though currently marked with a negative outlook by Fitch ratings, the rating has remained Affirmed and in the small likelihood that it does decrease to BBB or even BBB- (which is even more unlikely), the increase in collateral amounts in the short term should not have a significant impact in the operation and forecasted outlook of Southern Company.

Hedging against Natural Gas price fluctuations

Considering that Southern Company generated 179 billion KWH as of 2021 with over 43,202 MWs of total nameplate capacity out of which 48% was produced with natural gas, it is important to analyze the volume of natural gas required to fuel Southern Company's retail electric segment. Southern Company currently has over 12,414 MWs of combined cycle facilities and has been authorized to build 720-MW combined cycle facilities in Alabama Power's Plant Barry as well as acquiring 240MWs worth of combined cycle generation under a long-term PPA as of 2020. Among other acquisitions such as an 885-MW combined cycle generation facility of Central Alabama Generating Station, it is possible to estimate that Southern Company has a mix of both simple and combined cycles in its natural gas generation facilities. EIA (US Energy Information Administration) published data in 2015 that combined cycle technology had an average heat rate of 7,340Btu/kWh while simple cycle technology had an average heat rate of 9,788Btu/kWh. By analyzing the nameplate capacity of Southern's powerplants, combined cycle capacity represents over 39.6% of total fossil steam, combustion

turbines, cogeneration, and combined cycle facilities. Therefore, Southern Company is thus estimated to have used approximately 714 M mmBtu of natural gas to generate its power. Worth noting that Southern has around 311M mmBtu in net long position derivatives as of 2021. So, Southern has an estimated exposed unhedged amount of 403M mmBtu to changes in natural gas prices. However, it is relevant to note that a portion of this exposure is reduced due to regulations that pass fuel costs onto customers without the company having to incur on additional fuel expenses due to its long-term contracts. Given recent trends, and the industry trend increase of the relevance of natural gas as a source of electricity generation, Southern's fuel prices are forecasted to trend upwards in this valuation with fuel prices maintaining a positive drift throughout the next years.

For the traditional electric operating segment, the company enters energy-related derivatives to hedge its exposure against the primary sources of volatility in the operation such as natural gas and other fuel price changes (Note 14 of SO's Annual 2021 report). Nonetheless, since regulations and rates are cost-based, exposure is limited as long-term sales contracts shift most of fuel costs changes onto customers.

Discounted Cash Flows Valuation

Revenues: Electric

The main segment of core revenues – Retail electricity generation and sale – is further subdivided into three main categories of Residential, Commercial, and Industrial revenues. With Residential being the main source of retail electric revenues, this category accounts for more than 43% of retail electricity sales as of 2021. With a predicted growth in revenue per KWH sold of 2.80% yoy (average between 2018 and 2021) and a growth in the KWH sold by 0.467% (according to the growth rate of the US population in the latest census), Residential sales may grow from $6,207M in 2021 to $8,389M in 2023, and up to $11,582M in 2033. Other subsegments of Retail electric revenues have their bases held constant, only varying by Revenue per KWH sold for a more prudent valuation. Additionally, since the industry in which Southern Company is inserted in is heavily regulated, revenue growth is capped both by regulations according to its relevant rate base and its operational costs. Revenue is thus directly constrained by the company's capacity to increase its PP&E. Therefore, regulated Revenues are not allowed to grow at significantly faster than investment rates into PP&E.

As Wholesale electric revenues deal with industrial customers and not residential customers, KWH sold are allowed to increase as long as Southern Company has enough capacity for new PPA (Power Purchase Agreements). Therefore, the KWH sold base is set to increase at the average between 2018 and 2021 of 0.24% while revenue per KWH sold is set to increase at the average rate of 3.35% (also average

between 2018 and 2021) until 2027 and converging to 3% as the steady state approaches (the investment rate of electric PP&E). As the effect of both drivers are stable, wholesale electric revenues are forecasted to increase at a stable 3.60% until 2027 and 3.25% from 2027 onwards, forecasted to change from $1,851M in 2021 to $3,898M in 2023, and $5,438M in 2033. The significant initial increase is due to wholesale electric revenues climbing sharply by 103.28% from 2021 to 2022 as a result of both revenue per KWh sold changing by 20.85% while new PPA agreements added more than 17.3% to the KWh sold base.

Revenues: Gas

Similarly to the retail electric segment, the Natural gas distribution segment is also further subdivided into several categories – Residential, Commercial, Transportation, Industrial, and Others. Since Residential customers are households, once again the customer base is set to expand at the rate of the population growth value of 0.467% from the latest US census[66]. The total customer base is set to increase as well following the relatively high investment rate into Natural Gas PP&E by Southern to increase the market it can service at 0.62% yoy. Revenue per customer is then projected to grow at 4.07% yoy throughout the forecasted period from $3,625M in 2021 to $5,663M in 2033. This average growth rate between 2018 and 2022 is less than the rate from 2020 to 2021 at 25.52% because that rate was mostly a result increased prices of natural gas in the United States following a one-time 92.06% rise in the fuel at Henry Hub due to winter storms in February 2021. Therefore, the overall growth rate of gas distribution revenues was set to a stable rate of 4.70% to determine a valuation scenario of relatively sustained growth of the sector throughout the period from $3,625M in 2021 to $5,663M in 2033 (compared to forecasted 4.86% of yearly natural gas distribution PP&E investment rate). This is valid since the entire segment serves as a hedge for Southern Company against rising fuel prices with gas being a crucial input for its main Retail Electric and Wholesale electric segments. Rising natural gas prices increase costs and decreases margins for the main segments but boosts revenues for the Natural gas distribution and services sectors. It is then crucial for Southern Company to continue investing into this segment to diversify some of its risk exposure to this fossil fuel.

On the contrary, Natural gas services' revenue base are then forecasted to decrease on average -7.43% yoy on average from $2,668M in 2021 to $1,299M in 2033. Though 2021 showed an increase of 24.04%, on average this segment has been decreasing significantly in revenues in past years, resulting in divestment by Southern Company in the Gas Storage facilities PP&E explained previously that is forecasted to continue at an average yearly rate of -3.88%.

Operating expenses

Taking into account Southern Company's main core segments (retail electricity generation and sale, wholesale electricity generation and sale, natural gas distribution, and natural gas services) it is unsurprising that the main operation costs are related to fuel, purchased power, and natural gas needed to generate sold power as well as natural gas inventories for sale. Fuel costs expanded the most due to a higher cost of natural gas seeing as electricity generation uses natural gas as 48% of its generation sources as of 2021. Therefore, Fuel costs are considered to grow from $4,010M in 2021 to $7,336M in 2023, and then at a 2.36% yearly rate to $9,254M in 2033 to accompany similar levels of growth in revenues. This significant increase from 2021 to 2023 is possible as both regulated industries of electricity generation and natural gas distribution are allowed to pass on a portion of rising fuel costs to their customers. Therefore, as revenues can absorb a portion of higher fuel costs, the Gross Margin is forecasted to decrease from 43% in 2021 to 36% in 2022. Then this margin is forecasted to remain relatively stable around 36% until 2033 even though operating expenses increase significantly. The process can be seen through the one-time increase of over 30.8% in retail electric revenues from 2021 to 2022 (estimate) by over $4B.

However, rising fuel costs also concern wholesale of other services besides the traditional regulated industries, therefore, rising Fuel costs concern returns on mostly segments of operations classified as Others. Similarly, as the Cost of natural gas represents the expenses related to the distribution and services related to the fossil fuel, these costs can also be passed on to customers. This cost is thus allocated to the total of both Natural Gas distribution and services revenues. Therefore, Cost of natural gas is forecasted to change its yearly cost from 1,619M in 2021 to $2,475M in 2023 with a sharp increase. The value is then forecasted to stabilize to $2,426M in 2033 as natural gas service revenues decrease while gas distribution revenues increase.

Purchased power relates to mostly additional capacity that Southern Company may require to reach its generation needs for both retail electricity and wholesale PPAs due to spontaneous changes in demand, therefore this expense depends on the amount needed as well as $ per KWH purchased. As Southern Company finishes construction of Plant Units Vogtle 3 and 4, Purchased Power expenses is forecasted to be held constant. The reasoning is that additional capacity from new plants may lead to lesser additional capacity requirements. This $/KWh will also grow at the rate of Southern's WACC resulting in an opposite effect to the forecasted decreasing capacity. Therefore, this item is forecasted to hold constant after a sharp rise from $978M to $1,746M for estimated 2023 values until 2033 onwards. This value is consistent with the above analysis as the Purchased Power expense was mostly stable around $900M from 2018 to 2021 rising mostly during

2022 as a result of a spike in $/KWh (due to the high price of natural gas).

Given the importance of PP&E in Southern Company's assets, it is evident that Maintenance and other operational costs also occupy a large portion of operating expenses. These costs are further separated between the electric, gas, and other core businesses segments. Their proportions were held constant to their respective revenues as drivers and varied across the forecasting period, increasing in total from $6,088M in 2021 to $7,776M in 2023, up to $9,871M in 2033. In the same way, Depreciation and Amortization was also forecasted to expand from $3,565M in 2021 to $5,152M in 2033 in a yearly 3.79% rate given similar growth rates in PP&E investments throughout the forecasted period. Total Operating expenses are thus forecasted to increase from $18,311M in 2021 to $23,549M in 2023, up to $29,032M in 2033 at an average yearly rate of 2.27%. The EBIT margin is thus set to stabilize from 27.13% in 2022 to 23.72% in 2023, increasing to 25.74% at the steady state.

Taxes and result

Non-core result before taxes is forecasted to remain around $787M during the forecasted period. This result is mainly the combination of gains on dispositions and other income from investments not related to the core operations. Federal statutory taxes are expected to remain at 21% of EBT for the entirety of the forecasting period. Core adjustments include State income tax and non-deductible book depreciation which should occur with similar values throughout each forecasted year for 6.4% of EBT. Adjustments such as employee stock plans' dividend reduction, AFUDC (Allowance for funds used during construction), Amortization of ITC (Investment Tax Credits) and Noncontrolling interests are assumed to be constant during the forecasted period for a total adjustment amount of -3.8% of total EBT. Flowback of excess deferred income taxes are not considered since they vary depending on years and changes that might not occur; therefore, its effect is not considered in the projected tax adjustments (which has a significant impact in the non-core result after tax as the item represented a -11.7% of EBT reduction in non-core taxes as of 2021) which may lead to underestimation of possible higher results in the next years. Comprehensive Income is forecasted to grow at 5.13% yearly from $2,382M in 2021 to $2,576M in 2023, up to $3,435M in 2033, considering an average of -$10M in OCI items. Thus, Net margin is set to stabilize around 9.52% in 2033, after initially decreasing from 10.63% in 2021 to 8.78% in 2023.

Balance Sheet items

Main core items besides PP&E related to Southern's core operations are Operating Cash, Receivables, Fuels (Fossil fuel for generation and Nuclear fuel), Accounts payable and Customer deposits, and Regulatory items. Operating Cash is projected to be 2% of total revenues with remaining cash amounts classified as Excess of Cash. For a more prudent valuation, Excess of Cash is not forecasted

to be reinvested for any positive returns. Receivables are allocated to a stable average collection period of 58.36 days. Materials and Supplies, Fossil fuel for generation, and nuclear fuel all depend on fixed percentages in proportion to the total core Cost of Sales maintaining a proportion of 21%. Similarly, Fossil fuel for generation is projected as 7% of Cost of Sales and Nuclear fuel as 12% of Cost of Sales. Accounts payable and Customer deposits were both allocated to a fixed average payable period of 157.75 days. Therefore, Southern Company is expected to maintain a strong Cash conversion cycle of 31 days. Southern Company is forecasted to keep investing 3.0% yoy (average level of investment between 2019 and 2021) in Electric PP&E to be able to maintain similar levels of growth of 2.69%-2.74% in its electric revenues throughout the forecasted period, as increasing generation capacity is the main way in which Southern can increase its turnover.

Capital structure

Given the necessity to finance its investment into PP&E to achieve growth in the core result, Southern needs to expand its debt over time. This debt growth is forecasted to be around 3.31%, which is in line with change in debt in previous years (average between 2018 and 2021). In the short run, Southern needs to decrease its payout ratio to 38.22% (average between 2018 and 2021) to keep investing into its PP&E capacity to grow its base rate and revenues in the future. The payout ratio will then expand to 76.13% (average between 2019 and 2021) as Southern converges to its steady state in the forecasted period. This will culminate in a D/E ratio of 1.53 which is similar to its current capital structure (average of 1.54 between 2018 and 2021) while still higher than the computed industry average of 1.25 as of 2021.

Free Cash Flow

Given that Free Cash Flow reflects both changes in Invested Capital and Net Result, the final Free Cash Flow can be calculated as sum of the result and the change in invested capital from the previous year to the current year. Both core and non-core parts are summed to reach the final Free Cash Flow. It is worth mentioning that depreciation, although not a cash flow, is included in the net result by design of the valuation framework. Then, net amounts for both tangible fixed assets and intangible assets instead of their gross values are used for the calculation of change in Invested Capital so that depreciation has a net zero effect on Free Cash Flow. Southern Company is forecasted to have a projected negative Core Free Cash Flow of -1.2$B in 2023 and average 1,234$M until 2033.

Core Free Cash Flow reaches an average growth of 5.97% converging to a steady state growth rate of 2.66%. Given values from the CAPM analysis, the risk-free rate for the forecasted period of 10 years should be 4.00% (using the 10-year US Treasury Bill as of November 30th, 2022)[67], a market risk premium of 3.17% (also as of November 30th, 2022)[68], and a Beta for Southern Company of approximately 0.54 (computed using 10 years of daily data). Following a cost of equity of 5.72%

and a cost of debt of 3.42% we reach a WACC of 3.90% with a constant D/E ratio of 1.53. With these values it is possible to calculate terminal values necessary for the Enterprise Value.

Valuation

With a steady state following the forecasted period of 2033, performing the stated valuation methods according to literature, by 2023 the core value of Southern Company should reach $81.3B and non-core should reach 55.4$. The high non-core value is mostly a consequence of tax deductions which are considered recurring non-core post-tax cash flows in the reformulation such as employee stock plans' dividend deductions and AFUDC (Allowance for funds used during construction) of equity. As these tax reductions are significant, they create a high non-core post tax cash flow that does not require any investment into non-core invested capital. This results in increasing Non-core Cash flows which create a large non-core portion for the enterprise value of Southern Company. With the current share price at $71.21 and 1.089B shares outstanding as of December 13th, 2022, if Southern reaches its target price of $75.31 (Enterprise Value of $136,828M) this yields a total return of 5.76% at end 2023.

Scenario Analysis

For the Income Statement, the US population growth rate largely dictates Residential customers for both retail electricity and natural gas distribution, with 0.467% being the estimated 2022 value. Since the estimated average for 2023 onwards is of 0.50%, this value was allocated to the bull case while the base and bear cases are set to 0.467%. Wholesale electricity revenue per KWh is set to increase at the average rate of 3.35% until 2027 and then to converge to 3% as the steady state approaches (as this is the investment rate into electric PP&E, the long-term revenue growth rate should not exceed it). Due to the sharp increase in natural gas prices, revenues spiked from 2020 to 2021 for both Natural Gas segments. Given this, Natural gas distribution revenue per customer averages 4.07% from 2018 to 2022 despite the 24% yoy variation from 2020 to 2021. Natural gas services however show a different behavior, with an average of -7.43% in the same period, while increasing by 24% to 2021. Therefore, considering the relevance of natural gas as a natural gas against Southern's main sources of revenues, and the constant 8% yearly investment rate into these segments' PP&E, it is prudent to assume a lower, but positive growth rate of 4.70% for natural gas distribution revenues. However, Natural gas services have shown decreasing revenues both in revenue per mmBtu sold and in the sale base of mmBtu. Further divestment of approximately -3.88% per year in Storage facilities PP&E related to Natural Gas service revenues mean that this sales base will continue to decrease during the forecasted period at the average of -7.43% per year.

Core FCF are estimated to grow at rates of 2.74% (bear), 2.66% (base), and 2.47% (bull). For a sanity check, it is worth noting that these perpetual growth rates are lower than the US nominal GDP growth estimates of 8.9% in 2022 and 4.1% in 2023[69] and that Southern's projected growth rates are not higher than both of these values.

For the base scenario, Excess of Cash was considered to not bring any non-core returns to Southern Company. For the bull case, this item is considered to earn returns in the rate of the WACC for cash to not lose value over time to discounting. Since the bull case has a higher WACC than the base case, Excess of Cash is forecasted to earn 3.90% in non-core returns yoy. This item was assigned a null value for both Base and Bear scenarios.

As explained previously, Purchased power expenses were held constant with the assumption that higher $/KWh values would be compensated with less purchased capacity as Southern increased its generation capacity. However, for the Bear scenario, this item is forecasted to grow at a positive rate throughout the forecasted period even after the initial increase of 178.51% in this item from $879M in 2021 to $1,746M in 2022. This item is constant in both Base and Bull scenarios.

Forecasted share price of Southern Company in 2023 ranges between $59.64 and $98.33 with an enterprise value interval of $113,880M to $152,672M, for the Bear and Bull case, respectively. Though it is unlikely for the share price to reach either limit of this interval.

Sensitivity Analysis

Sensitivity Analysis (Base case)

		g		
	$ 75.31	2.41%	2.66%	2.91%
WACC	3.65%	$ 78.38	$107.97	$ 157.57
	3.90%	$ 56.14	**$ 75.31**	$ 104.17
	4.15%	$ 40.30	$ 53.62	$ 72.32

Sensitivity Analysis (Bear case)

		g		
	$ 59.64	2.22%	2.47%	2.72%
WACC	3.55%	$ 62.34	$ 85.85	$ 123.51
	3.80%	$ 43.96	**$ 59.64**	$ 82.58
	4.05%	$ 30.60	$ 41.72	$ 57.02

Sensitivity Analysis (Bull case)

		g		
	$ 98.33	2.49%	2.74%	2.99%
WACC	3.58%	$ 101.96	$ 143.20	$ 219.36
	3.83%	$ 73.11	**$ 98.33**	$ 138.55
	4.08%	$ 53.34	$ 70.20	$ 94.80

Figure 28: SA with WACC and core g

Firstly, the base case was used to perform a two-variable sensitivity analysis with the core growth rate of Free cash flows and the WACC. Both growth rates and the WACC have similar impacts as the two are close in value. Due to the nature of Terminal Value calculations, as the steady state growth rate of 2.66% is close to the WACC value of 3.90%, even incremental percentual changes have a significant influence in the calculation of the Terminal value perpetuity and in the share price. As the perpetuity uses the difference of the two values as its denominator, the closer this difference is, the lower the denominator will decrease, and the higher the valuation will spike (note that the WACC and the core g become more similar, the denominator tends to 0, and the entire fraction of the perpetuity will tend to infinity). Thus, considering a 0.25% increase in the growth rate, the share price would increase to 104.17$ in the Base case, while decreasing the growth rate by the same amount would decrease the share price to 56.14$. It is worth noting that in the case of an equal value increase in both rates, the share price would decrease to 72.32$. This means that decreasing the WACC would increase the value of Southern's share price more than increasing its growth rate. Though this difference

is not large and approaching either rate to the other rate would increase Southern's valuation significantly (as both rates are only around 1% apart already), figure 28.

Looking at the bear case and the bull case, there is a similar behavior of the impact of percentual changes of WACC and core growth rates of FCF on the share price. The impact is similar with WACC having a slightly larger influence on the valuation.

Multiple Valuation

Multiple Valuation analysis is a supplementary methodology to the Discounted Cash Flows analysis and is based on forecasts of the DCF method. The primary difference between both models is that DCF is based on the Southern Company and its long-term prospects, whereas Multiples valuation is centered on the market's view of the energy industry.

The idea behind multiples analysis is to evaluate the different companies within the energy sector and geography and calculate Southern's implied value based on the peers' analyses. Thus, it is assumed that it is possible to rank and value an enterprise within a similar group (Berk and DeMarzo, 1962)[70]. The first step of the method is to identify similar companies to Southern, for this, 10 U.S. energy utility companies were considered. To determine the enterprise value multiple, the metric of Enterprise Value / Earnings Before Interest Taxes, Depreciation and Amortization. Whereas to understand the equity multiple the Price per earning ratio was employed.

Regarding the EV/EBITDA multiple, the median by Southern peers was 13.4x for 2021, with a maximum of 35.5x and a minimum of 2.0x, the 25th and 75th percentile were also calculated at 10.2x and 20.2x respectively. From 2019 to 2021, the median of the multiple has increased from 12.0x to 13.4x, resulting in 11% growth. Interestingly, the EV/EBITDA multiple in another countries other than in the United States is lower at 10.2x for the same period.

Concerning the P/E multiple, the median of the peers was 17.4x, with a maximum and a minimum of 50.8x and -242.8x, respectively for the year of 2021. In this case the 75th percentile was 23.1x and the 25th percentile close to median at 16.8x. Other enterprises across the globe yielded a higher P/E multiple at 19.5x. Nevertheless, this metric was highly volatile for the period and hence the EV/EBITDA was considered a more reliable metric than P/E, disregarding the latter multiple.

In relation to Southern Company and with the aid of the discounted cash flows model, it was forecasted that the EBITDA for the enterprise to be 10,872.89M, and Net Income of $2,509.51M, for the year 2023.

Furthermore, if multiples are held constant throughout years, it would be expected

that the enterprise value of Southern Company for 2023 to be $145,294.79M, using an EV/EBITDA multiple of 13.4x. This value would result in a share price for 2023 of $83.09, yielding a return of 16.68% in one year, compared to the value of $71.21, on December 13th, 2022.

For the year 2033, the DCF model predicted that EBITDA and Net Income were $14,912.60M and $2,741.19M respectively. In addition, if the same EV/EBITDA multiple is utilized, Southern would have a total enterprise value of $199,828.78M with share price of $133.16.

Lastly, to conclude the multiples analysis, a bear and bull case were considered. The bear case takes into account the multiple of the 25th percentile of peers instead of the median, whereas the bull case considers the 75th percentile. Both the scenarios were calculated in the same fashion as the previous base scenario, only changing the multiples.

For the bear case the multiple of 10.2x EV/EBITDA was employed, yielding an enterprise value for Southern in 2023 of $110,354.38M, and a share price of $51.00. The return for the share price would then be -28.38% for the period of 1 year if the bear case held to be true. In regard to 2033, the bear scenario predicts an increase of share price of 25.03% in the course of 10 years, resulting in a stock price of 89.04 and enterprise value of $151,774.10M.

On the optimistic side, the multiple is 15.4x, yielding an enterprise value of $167,442.09M in one year, with a share price of $103.42, generating a total return of 45.24%. In the meantime, the bull case for 2033 predicts an enterprise price of $230,288.74M and stock price of 126.28%, resulting in returns of 126.28%.

Recommendation

In terms of trends, Southern has made strides in reducing its carbon emissions while increasing investment into Renewable generation capacity and lower emission generation capacity, such as Nuclear power plants. Considering that the industry is leaning towards reducing its emissions as much as possible by 2030, this evolution by Southern also makes them more appealing to invest in by funds that may give importance to green factors.

More importantly, Southern's Nuclear investments increase medium and long-term cash flows, due to higher plant availability on average (meaning more consistent generation and more consistent energy sales) around 93%, while Fossil-steam plants have an average plant availability factor near 80%. Operational costs are also significantly lower (despite higher initial investments) for Nuclear plants, while fuel – Uranium – is significantly less volatile compared to other prominent fossil fuels such as Natural Gas.

Therefore, considering that recent Nuclear investments and Renewable investments made by Southern increase cash flows, hedge against rising prices of fossil fuels, and increase the appeal of the company to funds, this strategy provides a positive outlook for the evolution of the company in the future.

When it comes to valuating if Southern is worth investing, a multiple valuation was taken into account as a supplementary assessment of the Discounted cash flows model. Therefore, and despite the positive outlook of 16% return for the company, this value must be taken with prudency and the DCF model should consequently overrule the decision to invest in the company, and simply hold, as it explores other key operational factors

It is also worth noting that when accounting for differences in generating capacity, Southern seems to be lagging behind its peers, generating less Revenue per MW of capacity.

In conclusion, considering the nuclear investments of Southern Company as of 2022 and its function as a hedge against rising natural gas prices, this equity research report estimates a share price of $75.31 according to the Enterprise DCF Model for 5.76% return. Therefore, the final recommendation for Southern Company's stock is "HOLD".

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Appendix

Financial Statements

Appendix 1 – Income Statement

Forecasted Income Statement (in million $)	2020	2021	2022E	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P	2031P	2032P	2033P
Core Operations														
Operating Revenues:									Converging towards Steady State					
Residential	$ 6,113	$ 6,207	$ 8,123	$ 8,389	$ 8,664	$ 8,948	$ 9,241	$ 9,544	$ 9,857	$ 10,180	$ 10,514	$ 10,859	$ 11,215	$ 11,582
Commercial	$ 4,699	$ 4,877	$ 6,382	$ 6,516	$ 6,653	$ 6,792	$ 6,935	$ 7,080	$ 7,229	$ 7,380	$ 7,535	$ 7,693	$ 7,855	$ 8,019
Industrial	$ 2,775	$ 3,067	$ 4,014	$ 4,105	$ 4,198	$ 4,294	$ 4,392	$ 4,491	$ 4,594	$ 4,698	$ 4,805	$ 4,914	$ 5,026	$ 5,140
Other	$ 90	$ 93	$ 122	$ 132	$ 142	$ 154	$ 167	$ 180	$ 195	$ 211	$ 228	$ 247	$ 267	$ 289
Total Retail electric revenues	**$ 13,677**	**$ 14,244**	**$ 18,641**	**$ 19,142**	**$ 19,658**	**$ 20,188**	**$ 20,734**	**$ 21,296**	**$ 21,875**	**$ 22,470**	**$ 23,082**	**$ 23,713**	**$ 24,362**	**$ 25,030**
Total Wholesale electric revenues	**$ 1,399**	**$ 1,851**	**$ 3,763**	**$ 3,898**	**$ 4,038**	**$ 4,183**	**$ 4,334**	**$ 4,490**	**$ 4,635**	**$ 4,786**	**$ 4,941**	**$ 5,102**	**$ 5,267**	**$ 5,438**
Total Natural gas distribution revenues	**$ 2,888**	**$ 3,625**	**$ 3,418**	**$ 3,579**	**$ 3,747**	**$ 3,923**	**$ 4,107**	**$ 4,300**	**$ 4,502**	**$ 4,713**	**$ 4,934**	**$ 5,166**	**$ 5,409**	**$ 5,663**
Total Natural gas services revenues	**$ 2,151**	**$ 2,668**	**$ 2,516**	**$ 2,810**	**$ 2,602**	**$ 2,408**	**$ 2,229**	**$ 2,064**	**$ 1,911**	**$ 1,769**	**$ 1,637**	**$ 1,516**	**$ 1,403**	**$ 1,299**
Other core sources of revenue:	**$ 260**	**$ 725**	**$ 1,474**	**$ 481**	**$ 520**	**$ 531**	**$ 543**	**$ 556**	**$ 569**	**$ 583**	**$ 598**	**$ 460**	**$ 472**	**$ 485**
Total core operating revenues	**$ 20,375**	**$ 23,113**	**$ 29,811**	**$ 29,910**	**$ 30,564**	**$ 31,234**	**$ 31,947**	**$ 32,705**	**$ 33,491**	**$ 34,320**	**$ 35,193**	**$ 35,955**	**$ 36,912**	**$ 37,914**
Operating Expenses:														
Fuel	$ 2,967	$ 4,010	$ 7,158	$ 7,336	$ 7,504	$ 7,683	$ 7,863	$ 8,048	$ 8,238	$ 8,432	$ 8,630	$ 8,833	$ 9,041	$ 9,254
Purchased power	$ 799	$ 978	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746	$ 1,746
Cost of natural gas	$ 972	$ 1,619	$ 3,219	$ 2,475	$ 2,213	$ 2,207	$ 2,209	$ 2,218	$ 2,235	$ 2,259	$ 2,291	$ 2,329	$ 2,374	$ 2,426
Cost of other sales	$ 327	$ 357	$ 385	$ 379	$ 403	$ 413	$ 423	$ 434	$ 445	$ 456	$ 468	$ 432	$ 444	$ 456
Other operations and maintenance	$ 5,413	$ 6,088	$ 6,612	$ 7,776	$ 7,953	$ 8,131	$ 8,319	$ 8,519	$ 8,726	$ 8,944	$ 9,173	$ 9,359	$ 9,609	$ 9,871
Depreciation and amortization	$ 3,518	$ 3,565	$ 3,632	$ 3,747	$ 3,867	$ 3,991	$ 4,119	$ 4,252	$ 4,390	$ 4,532	$ 4,679	$ 4,831	$ 4,989	$ 5,152
Impairment charges	$ -	$ 2	$ -	$ 89	$ 92	$ 96	$ 99	$ 103	$ 106	$ 110	$ 114	$ 119	$ 124	$ 128
Estimated loss on Plant Vogtle Units 3 and 4	$ 325	$ 1,692	$ -65	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total core operating expenses	**$ 14,321**	**$ 18,311**	**$ 22,686**	**$ 23,549**	**$ 23,778**	**$ 24,266**	**$ 24,778**	**$ 25,321**	**$ 25,886**	**$ 26,480**	**$ 27,102**	**$ 27,649**	**$ 28,327**	**$ 29,032**
Non-core operations														
Non-core result before taxes	$ 497	$ 901	$ 962	$ 734	$ 707	$ 727	$ 718	$ 765	$ 774	$ 793	$ 812	$ 835	$ 855	$ 879
Statutory taxes	$ 104	$ 189	$ 202	$ 154	$ 149	$ 153	$ 151	$ 161	$ 163	$ 167	$ 170	$ 175	$ 180	$ 185
Tax adjustments	$ -465	$ -438	$ -1,181	$ -242	$ -258	$ -265	$ -272	$ -281	$ -289	$ -298	$ -307	$ -316	$ -326	$ -338
in % of core EBT	-13.30%	-17.00%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%
Items of OCI	$ -91.00	$ 74.00	$ -8	$ -34	$ -15	$ 4	$ -13	$ -14	$ -9	$ -8	$ -11	$ -11	$ -10	$ -10
Non-core result	$ 767	$ 1,224	$ 1,934	$ 787	$ 802	$ 843	$ 827	$ 870	$ 891	$ 916	$ 937	$ 964	$ 992	$ 1,022
Financing operations														
Interest expense, net of amounts capitalized	$ -1,821.00	$ -1,837.00	-2052.97	-2182.74	-2252.86	-2325.30	-2400.15	-2477.47	-2557.36	-2639.90	-2725.17	-2813.27	-2904.29	-2998.32
in % of net debt	3.66%	3.39%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%	3.65%
Statutory taxes	$ -382.41	$ -385.77	$ -431	$ -458	$ -473	$ -488	$ -504	$ -520	$ -537	$ -554	$ -572	$ -591	$ -610	$ -630
Financial result	$ -1,439	$ -1,451	$ -1,622	$ -1,724	$ -1,780	$ -1,837	$ -1,896	$ -1,957	$ -2,020	$ -2,086	$ -2,153	$ -2,222	$ -2,294	$ -2,369
EBT	**$ 4,730**	**$ 3,866**	**$ 6,035**	**$ 4,913**	**$ 5,240**	**$ 5,369**	**$ 5,487**	**$ 5,672**	**$ 5,822**	**$ 5,994**	**$ 6,178**	**$ 6,328**	**$ 6,537**	**$ 6,763**
Comprehensive Income	**$ 3,013**	**$ 2,382**	**$ 4,242**	**$ 2,591**	**$ 2,797**	**$ 2,882**	**$ 2,923**	**$ 3,022**	**$ 3,104**	**$ 3,196**	**$ 3,290**	**$ 3,367**	**$ 3,480**	**$ 3,601**

Appendix 2 – Balance Sheet

Forecasted Balance Sheet (in million $)	2017	2018	2019	2020	2021	2022E	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P	2031P	2032P	2033P
Operating Cash	$ 461.26	$ 469.90	$ 428.38	$ 407.50	$ 462.26	$ 596.23	$ 598.20	$ 611.28	$ 624.67	$ 638.95	$ 654.11	$ 669.82	$ 686.41	$ 703.86	$ 719.11	$ 738.25	$ 758.29
Receivables:	$ 3,441.00	$ 3,258.00	$ 2,981.00	$ 2,819.00	$ 2,962.00	$ 4,766.93	$ 4,782.71	$ 4,887.24	$ 4,994.36	$ 5,108.50	$ 5,229.67	$ 5,355.34	$ 5,487.92	$ 5,627.46	$ 5,749.38	$ 5,902.41	$ 6,062.63
Total PP&E	$ 103,542.00	$ 103,706.00	$ 105,114.00	$ 110,516.00	$ 115,592.00	$ 119,267.49	$ 123,071.21	$ 127,007.55	$ 131,081.10	$ 135,296.63	$ 139,659.07	$ 144,173.56	$ 148,845.44	$ 153,680.26	$ 158,683.77	$ 163,861.95	$ 169,221.03
Less: Accumulated depreciation (Total)	$ 31,457.00	$ 31,038.00	$ 30,765.00	$ 32,397.00	$ 34,079.00	$ 35,392.49	$ 36,521.24	$ 37,689.34	$ 38,898.17	$ 40,149.12	$ 41,443.67	$ 42,783.34	$ 44,169.71	$ 45,604.44	$ 47,089.22	$ 48,625.84	$ 50,216.14
Plant in service, net of depreciation	$ 72,085.00	$ 72,668.00	$ 74,349.00	$ 78,119.00	$ 81,513.00	$ 83,875.00	$ 86,549.97	$ 89,318.21	$ 92,182.94	$ 95,147.51	$ 98,215.40	$ 101,390.22	$ 104,675.73	$ 108,075.82	$ 111,594.54	$ 115,236.11	$ 119,004.88
Regulatory assets - asset retirement obligations	$ -4,824.00	$ -5,461.00	$ -5,405.00	$ -5,536.00	$ -6,002.00	$ -6,257.43	$ -6,456.99	$ -6,663.52	$ -6,877.24	$ -7,098.41	$ -7,327.28	$ -7,564.14	$ -7,809.25	$ -8,062.91	$ -8,325.43	$ -8,597.10	$ -8,878.27
Other regulatory assets/liabilities	$ 2,468.00	$ 1,515.00	$ 2,171.00	$ 2,045.00	$ 2,132.00	$ 2,291.04	$ 2,364.11	$ 2,439.72	$ 2,517.97	$ 2,598.95	$ 2,682.75	$ 2,769.47	$ 2,859.21	$ 2,952.09	$ 3,048.20	$ 3,147.67	$ 3,250.61
Other cost of removal obligations (includes Accrued environmental	$ -2,684.00	$ -2,297.00	$ -2,239.00	$ -2,211.00	$ -2,103.00	$ -2,565.95	$ -2,647.78	$ -2,732.47	$ -2,820.11	$ -2,910.80	$ -3,004.66	$ -3,101.78	$ -3,202.29	$ -3,306.31	$ -3,413.96	$ -3,525.36	$ -3,640.66
Prepaid expenses	$ 452.00	$ 432.00	$ 314.00	$ 276.00	$ 330.00	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80	$ 360.80
Other current assets	$ -340.00	$ -419.00	$ 182.00	$ 202.00	$ 72.00	$ -54.04	$ -54.22	$ -55.40	$ -56.62	$ -57.91	$ -59.28	$ -60.71	$ -62.21	$ -63.79	$ -65.18	$ -66.91	$ -68.73
Assets held for sale/Assets held for sale deferred	$ 12.00	$ 5,743.00	$ 638.00	$ 60.00	$ 42.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Liabilities held for sale	$ -	$ -425.00	$ -5.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Construction work in progress	$ 6,904.00	$ 7,254.00	$ 7,880.00	$ 8,697.00	$ 8,771.00	$ 8,734.33	$ 9,012.89	$ 9,301.16	$ 9,599.48	$ 9,908.20	$ 10,227.67	$ 10,558.28	$ 10,900.42	$ 11,254.49	$ 11,620.91	$ 12,000.12	$ 12,392.59
Nuclear decommissioning trusts, at fair value	$ 1,832.00	$ 1,721.00	$ 2,036.00	$ 2,303.00	$ 2,542.00	$ 2,276.48	$ 2,344.85	$ 2,415.28	$ 2,487.83	$ 2,562.55	$ 2,639.52	$ 2,718.80	$ 2,800.46	$ 2,884.58	$ 2,971.22	$ 3,060.46	$ 3,152.39
Leveraged leases	$ 775.00	$ 798.00	$ 788.00	$ 556.00	$ -	$ 725.70	$ 728.10	$ 744.01	$ 760.32	$ 777.69	$ 796.14	$ 815.27	$ 835.46	$ 856.70	$ 875.26	$ 898.56	$ 922.95
Operating lease right-of-use assets/obligations, net of amortization	$ -	$ -	$ -44.00	$ -50.00	$ -52.00	$ -50.09	$ -50.25	$ -51.35	$ -52.48	$ -53.68	$ -54.95	$ -56.27	$ -57.66	$ -59.13	$ -60.41	$ -62.02	$ -63.70
Goodwill	$ 6,268.00	$ 5,315.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00	$ 5,280.00
Other intangible assets, net of amortization of $307 and $328, respectively	$ 873.00	$ 613.00	$ 536.00	$ 487.00	$ 445.00	$ 699.18	$ 701.49	$ 716.83	$ 732.54	$ 749.28	$ 767.05	$ 785.48	$ 804.93	$ 825.40	$ 843.28	$ 865.72	$ 889.22
Miscellaneous property and investments	$ 249.00	$ 269.00	$ 391.00	$ 398.00	$ 653.00	$ 575.04	$ 576.94	$ 589.56	$ 602.48	$ 616.25	$ 630.86	$ 646.02	$ 662.02	$ 678.85	$ 693.56	$ 712.02	$ 731.34
Deferred/Accrued charges related to income taxes; Accumulated deferred income taxes; Deferred credits related to income taxes	$ -13,273.00	$ -12,245.00	$ -13,168.00	$ -13,276.00	$ -13,489.00	$ -16,997.85	$ -13,838.14	$ -14,760.10	$ -15,124.52	$ -15,456.69	$ -15,976.31	$ -16,399.94	$ -16,883.20	$ -17,401.72	$ -17,825.62	$ -18,412.73	$ -19,048.56
Unamortized loss on reacquired debt	$ 206.00	$ 323.00	$ 300.00	$ 280.00	$ 258.00	$ 521.20	$ 497.35	$ 494.44	$ 502.06	$ 510.04	$ 518.62	$ 527.67	$ 537.25	$ 547.32	$ 555.87	$ 566.92	$ 578.47
Energy marketing	$ 61.00	$ -55.00	$ -14.00	$ 22.00	$ -	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29	$ -11.29
Natural gas for sale	$ 595.00	$ 524.00	$ 479.00	$ 460.00	$ 362.00	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88	$ 455.88
Natural gas cost under recovery	$ -	$ -	$ -	$ -	$ 266.00	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73	$ 267.73
Other current liabilities/Other deferred charges and assets/Other deferred credits and liabilities	$ 693.00	$ -2,096.00	$ -359.00	$ -299.00	$ 284.00	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40	$ -355.40
Total Core Invested Capital	**$ 76,097.26**	**$ 75,547.90**	**$ 77,668.38**	**$ 81,086.50**	**$ 84,897.26**	**$ 84,702.33**	**$ 90,695.52**	**$ 92,843.58**	**$ 95,656.07**	**$ 98,616.22**	**$ 101,508.00**	**$ 104,614.75**	**$ 107,788.45**	**$ 111,057.64**	**$ 114,518.61**	**$ 117,992.85**	**$ 121,562.64**
Total Non-Core Invested Capital	**$ -633.00**	**$ -823.00**	**$ 151.00**	**$ 483.00**	**$ 584.00**	**$ 739.07**	**$ 906.51**	**$ 967.48**	**$ 1,056.19**	**$ 1,149.59**	**$ 1,237.96**	**$ 1,333.85**	**$ 1,430.61**	**$ 1,529.44**	**$ 1,634.23**	**$ 1,737.56**	**$ 1,842.72**
Net Debt and Other Claims																	
Excess Cash	$ 1,668.74	$ 926.10	$ 1,546.62	$ 657.50	$ 1,335.74	$ 5,794.37	$ 3,092.04	$ 4,530.23	$ 5,392.70	$ 6,193.80	$ 7,197.10	$ 6,922.53	$ 6,674.54	$ 6,426.42	$ 6,076.34	$ 5,821.19	$ 5,580.24
Other Financial Liabilities (Negative Financial Debt)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Securities due within one year	$ -3,892.00	$ -3,198.00	$ -2,989.00	$ -3,507.00	$ -2,157.00	$ -2,228.50	$ -2,302.37	$ -2,378.70	$ -2,457.55	$ -2,539.01	$ -2,623.18	$ -2,710.13	$ -2,799.97	$ -2,892.79	$ -2,988.68	$ -3,087.75	$ -3,190.10
Notes payable	$ -2,439.00	$ -2,915.00	$ -2,055.00	$ -609.00	$ -1,440.00	$ -1,487.73	$ -1,537.05	$ -1,588.00	$ -1,640.64	$ -1,695.03	$ -1,751.22	$ -1,809.27	$ -1,869.24	$ -1,931.21	$ -1,995.22	$ -2,061.36	$ -2,129.69
Accrued interest	$ -488.00	$ -472.00	$ -474.00	$ -513.00	$ -533.00	$ -550.67	$ -568.92	$ -587.78	$ -607.27	$ -627.40	$ -648.19	$ -669.68	$ -691.88	$ -714.81	$ -738.51	$ -762.99	$ -788.28
Long-term debt	$ -44,462.00	$ -40,736.00	$ -41,798.00	$ -45,073.00	$ -50,120.00	$ -51,781.42	$ -53,497.91	$ -55,271.31	$ -57,103.49	$ -58,996.40	$ -60,952.06	$ -62,972.55	$ -65,060.02	$ -67,216.68	$ -69,444.84	$ -71,746.85	$ -74,125.18
Net Debt and Other Claims	**$ -49,612.26**	**$ -46,394.90**	**$ -45,769.38**	**$ -49,044.50**	**$ -52,914.26**	**$ -50,253.96**	**$ -54,814.22**	**$ -55,295.56**	**$ -56,416.24**	**$ -57,664.03**	**$ -58,777.55**	**$ -61,229.10**	**$ -63,746.57**	**$ -66,329.07**	**$ -69,090.91**	**$ -71,837.77**	**$ -74,653.02**
Equity	**$ 25,852.00**	**$ 29,330.00**	**$ 32,050.00**	**$ 32,525.00**	**$ 32,567.00**	**$ 35,187.45**	**$ 36,787.81**	**$ 38,515.50**	**$ 40,296.02**	**$ 42,101.78**	**$ 43,968.40**	**$ 44,709.50**	**$ 45,472.49**	**$ 46,258.01**	**$ 47,061.93**	**$ 47,892.65**	**$ 48,752.34**

Appendix 3 - Free Cash Flow Map

Free Cash Flows ($M)

Year	2018	2019	2020	2021	2022E	2023P	2024P	2025P	2026P	2027P	2028P	2029P	2030P	2031P	2032P	2033P
Total Revenues	$ 23,495.00	$ 21,817.00	$ 20,375.00	$ 23,113.00	$ 29,811.39	$ 29,910.06	$ 30,563.80	$ 31,233.68	$ 31,947.49	$ 32,705.26	$ 33,491.16	$ 34,320.29	$ 35,192.96	$ 35,955.41	$ 36,912.44	$ 37,914.42
Total Costs	$ -18,699.00	$ -15,022.00	$ -14,321.00	$ -18,311.00	$ -22,686.30	$ -23,548.58	$ -23,778.20	$ -24,265.94	$ -24,778.21	$ -25,320.51	$ -25,885.72	$ -26,479.58	$ -27,101.61	$ -27,648.69	$ -28,326.81	$ -29,032.36
Total Core Taxes	$ -2,205.47	$ -2,655.25	$ -2,968.56	$ -2,192.38	$ -3,195.58	$ -2,833.86	$ -3,011.16	$ -3,092.09	$ -3,176.95	$ -3,276.23	$ -3,372.11	$ -3,475.63	$ -3,585.72	$ -3,681.41	$ -3,803.87	$ -3,934.24
Core Result	$ 2,590.53	$ 4,139.75	$ 3,685.44	$ 2,609.62	$ 3,929.51	$ 3,527.63	$ 3,774.44	$ 3,875.64	$ 3,992.33	$ 4,108.51	$ 4,233.33	$ 4,365.07	$ 4,505.63	$ 4,625.31	$ 4,781.76	$ 4,947.81
Operational Cash Flow (= Core Result + Depreciation and Amortization)	$ 6,140.53	$ 7,177.75	$ 7,203.44	$ 6,174.62	$ 7,561.09	$ 7,275.00	$ 7,641.62	$ 7,866.81	$ 8,111.80	$ 8,360.74	$ 8,622.94	$ 8,896.85	$ 9,184.52	$ 9,456.43	$ 9,770.43	$ 10,099.51
Core Invested Capital	$ 76,547.90	$ 77,668.38	$ 81,086.50	$ 84,897.26	$ 84,702.33	$ 90,695.52	$ 92,843.58	$ 95,656.07	$ 98,616.22	$ 101,508.00	$ 104,614.75	$ 107,788.45	$ 111,057.64	$ 114,518.61	$ 117,992.85	$ 121,562.64
Change in Core Invested Capital			$ 3,418.12	$ 3,810.76	$ -194.93	$ 5,993.19	$ 2,148.06	$ 2,812.49	$ 2,960.15	$ 2,891.77	$ 3,106.75	$ 3,173.70	$ 3,269.19	$ 3,460.97	$ 3,474.24	$ 3,569.79
Financial Cash Flow (= Change in Core IC + Depreciation or Amortization)			$ 6,936.12	$ 7,375.76	$ 3,436.66	$ 9,740.55	$ 6,015.24	$ 6,803.66	$ 7,079.62	$ 7,144.00	$ 7,496.36	$ 7,705.48	$ 7,948.07	$ 8,292.09	$ 8,462.91	$ 8,721.49
Core Free Cash Flow (= Core Result - Change in Core IC)			**$ 267.32**	**$ -1,201.14**	**$ 4,124.43**	**$ -2,465.56**	**$ 1,626.38**	**$ 1,063.15**	**$ 1,032.18**	**$ 1,216.74**	**$ 1,126.58**	**$ 1,191.37**	**$ 1,236.44**	**$ 1,164.34**	**$ 1,307.52**	**$ 1,378.02**
Non-Core Result	$ 846.57	$ 2,259.64	$ 766.60	$ 1,223.71	$ 1,934.09	$ 787.25	$ 801.95	$ 843.49	$ 826.80	$ 870.20	$ 891.15	$ 916.28	$ 937.46	$ 964.43	$ 992.16	$ 1,021.75
Non-Core Invested Capital	$ -823.00	$ 151.00	$ 483.00	$ 584.00	$ 739.07	$ 906.51	$ 967.48	$ 1,056.19	$ 1,149.59	$ 1,237.96	$ 1,333.85	$ 1,430.61	$ 1,529.44	$ 1,634.23	$ 1,737.56	$ 1,842.72
Change in Non-Core Invested Capital			$ 332.00	$ 101.00	$ 155.07	$ 167.44	$ 60.97	$ 88.71	$ 93.40	$ 88.36	$ 95.89	$ 96.76	$ 98.83	$ 104.79	$ 103.34	$ 105.16
Non-core Free Cash Fow (=NC Result - Change in NC IC)			**$ 434.60**	**$ 1,122.71**	**$ 1,779.02**	**$ 619.82**	**$ 740.98**	**$ 754.78**	**$ 733.39**	**$ 781.84**	**$ 795.25**	**$ 819.52**	**$ 838.63**	**$ 859.64**	**$ 888.82**	**$ 916.59**
Free Cash Flow			**$ 701.92**	**$ -78.43**	**$ 5,903.45**	**$ -1,845.74**	**$ 2,367.36**	**$ 1,817.93**	**$ 1,765.58**	**$ 1,998.58**	**$ 1,921.83**	**$ 2,010.89**	**$ 2,075.08**	**$ 2,023.99**	**$ 2,196.34**	**$ 2,294.61**
interest expense, net of amounts capitalized	$ -1,842.00	$ -1,736.00	$ -1,821.00	$ -1,837.00	$ -2,052.97	$ -2,182.74	$ -2,252.86	$ -2,325.30	$ -2,400.15	$ -2,477.47	$ -2,557.36	$ -2,639.90	$ -2,725.17	$ -2,813.27	$ -2,904.29	$ -2,998.32
Total Financial Taxes	$ 386.82	$ 364.56	$ 382.41	$ 385.77	$ 431.12	$ 458.38	$ 473.10	$ 488.31	$ 504.03	$ 520.27	$ 537.05	$ 554.38	$ 572.29	$ 590.79	$ 609.90	$ 629.65
Financial Result	$ -1,455.18	$ -1,371.44	$ -1,438.59	$ -1,451.23	$ -1,621.85	$ -1,724.37	$ -1,779.76	$ -1,836.99	$ -1,896.12	$ -1,957.20	$ -2,020.31	$ -2,085.52	$ -2,152.88	$ -2,222.48	$ -2,294.39	$ -2,368.67
Net Debt and other claims	$ -46,394.90	$ -45,769.38	$ -49,044.50	$ -52,914.26	$ -50,253.96	$ -54,814.22	$ -55,295.56	$ -56,416.24	$ -57,664.03	$ -58,777.55	$ -61,239.10	$ -63,746.57	$ -66,329.07	$ -69,090.91	$ -71,837.77	$ -74,653.02
Change in Net Debt		$ 625.52	$ -3,275.12	$ -3,869.76	$ 2,660.30	$ -4,560.26	$ -481.34	$ -1,120.69	$ -1,247.79	$ -1,113.52	$ -2,461.55	$ -2,507.47	$ -2,582.49	$ -2,761.84	$ -2,746.86	$ -2,815.26
Equity	$ 29,330.00	$ 32,050.00	$ 32,525.00	$ 32,567.00	$ 35,187.45	$ 36,787.81	$ 38,515.50	$ 40,296.02	$ 42,101.78	$ 43,968.40	$ 44,709.50	$ 45,472.49	$ 46,258.01	$ 47,061.93	$ 47,892.65	$ 48,752.34
Change in Equity		$ 2,720.00	$ 475.00	$ 42.00	$ 2,620.45	$ 1,600.36	$ 1,727.69	$ 1,780.52	$ 1,805.77	$ 1,866.62	$ 741.10	$ 762.99	$ 785.52	$ 803.92	$ 830.72	$ 859.69
Comprehensive Income	$ 1,981.91	$ 5,027.95	$ 3,013.45	$ 2,382.10	$ 4,241.75	$ 2,590.51	$ 2,796.62	$ 2,882.14	$ 2,923.01	$ 3,021.51	$ 3,104.16	$ 3,195.83	$ 3,290.21	$ 3,367.26	$ 3,479.54	$ 3,600.88
Financial FCF			**$ -701.92**	**$ 78.43**	**$ -5,903.45**	**$ 1,845.74**	**$ -2,367.36**	**$ -1,817.93**	**$ -1,765.58**	**$ -1,998.58**	**$ -1,921.83**	**$ -2,010.89**	**$ -2,075.08**	**$ -2,023.99**	**$ -2,196.34**	**$ -2,294.61**
Core DCF				*$ -1,201.14*	*$ 3,969.77*	*$ -2,284.12*	*$ 1,450.20*	*$ 912.43*	*$ 852.64*	*$ 967.40*	*$ 862.13*	*$ 877.53*	*$ 876.58*	*$ 794.51*	*$ 858.75*	*$ 871.12*

10-year Treasury Bill (November 30th)	4.00%
Market return (10y MRP + Rf)	7.17%
SO Beta	0.54
Cost of equity	5.72%
Cost of debt	3.42%
WACC	3.90%
D/E	1.53

Converging towards Steady State

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
core g	-10.97%	-29.19%	50.58%	-10.23%	7.00%	2.68%	3.01%	2.91%	3.04%	3.11%	3.22%	2.66%	3.38%	3.47%
core RONIC		-31.47%	34.64%	206.17%	4.12%	4.71%	4.15%	3.92%	4.32%	4.24%	4.43%	3.66%	4.52%	4.78%
ROE					7.26%	7.15%	6.94%	6.87%	6.94%	7.03%	7.11%	7.15%	7.27%	7.39%
Core ROIC	7.47%	5.66%	8.41%	7.01%	7.31%	7.28%	7.27%	7.28%	7.27%	7.27%	7.29%	7.25%	7.28%	7.31%

Disclosures and Disclaimers

Report Recommendations

Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

This report was prepared by Ana Benjamim and Henrique Zhao, a Master in Finance student of Nova School of Business and Economics ("Nova SBE"), within the context of the Field Lab – Equity Research.

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