Close Parish Coal:

How the Dirtiest Coal Plant in Texas Harms Public Health and the Environment; and the Alternatives for Fort Bend

air ALLIANCE HOUSTON

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ABBREVIATIONS

CO_2	Carbon Dioxide
CO	Carbon Monoxide
DOE	Department of Energy
EIA	Energy Information Administration
EPA	Environmental Protection Agency
GHG	Greenhouse Gasses
kWh	kilowatt-hour
MW	Megawatt
NOx	Nitrogen Oxide
NRG	NRG Energy, Inc.
PM	Particulate Matter
SO_2	Sulfur Dioxide
UN	United Nations
WHO	World Health Organization

EXECUTIVE SUMMARY

The W.A. Parish power plant has four coal and four natural gas units and is located in Thompson, Texas. It is owned and operated by NRG Energy, Inc. (NRG). It began operations in 1958 and has a total Megawatt (MW) capacity of 2,737. The plant is responsible for approximately 178 premature deaths a year in the region.[1] In 2021 alone, the Parish plant emitted roughly 15 million tons of carbon dioxide (CO2).[2] This is just one of the many pollutants produced during the coal combustion process; coal accounts for three-quarters of the worldwide energy sector's sulfur dioxide (SO2) emissions, 70% of its nitrogen oxide (NOx) emissions, and over 90% of its fine particulate matter (PM2.5) emissions.[3] These pollutants are a health hazard to frontline communities, causing a negative health effect on the respiratory system and increasing the risk of cancer.[4] Pollutants from coal plants have also been connected to increased infant mortality and low birth weight.[5] These same pollutants also negatively affect the surrounding environment by contributing to climate change and global warming.

In early 2017, Unit 8 of the Parish plant was equipped with Petra Nova, a carbon capture and sequestration infrastructure demonstration project. Petra Nova was in operation until 2020. An independent report from the Institute for Energy Economics and Financial Analysis (IEEFA) suggests the reason for the closure of the project was that it "failed to meet expectations." The fossil fuel industry frames carbon capture as the future of "clean coal" usage. However, carbon capture and other technologies used to make coal "cleaner" are questionable because of their failure to produce results that reduce carbon emissions consistently and their economic viability.[6] The primary concern with carbon capture projects like Petra Nova is that it is hard to rationalize the cost of executing a project that fails to sufficiently reduce carbon emissions– especially when renewable energy is becoming a more reliable and cheaper alternative.

The Parish plant also faces growing concerns about reliability, as it has failed during several key moments, such as record-breaking heat in the summer of 2022, a fire in May 2022, Winter Storm Uri in 2020, and Hurricane Harvey in 2017.[7] In recent years, there has been an increase in the decommissioning of coal power plants across the country.[8] The Spruce coal power plant in San Antonio announced in January 2023 that by 2028 all of its coal units would be retired or converted to natural (methane) gas.[9]

Fort Bend County and the Greater Houston area need more reliable and healthier energy options that still provide the community with economic and energy security. The goal of this report is to compile the current available background information on the health and economic impacts of the Parish plant and options for a Parish alternative.

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1 Strasert, Brian, Su Yean Teh, and Daniel S. Cohan. 2019. "Air Quality and Health Benefits from Potential Coal Power Plant Closures in Texas." *Journal of the Air of the Waste Management Association* 69 (3): 333–50. https://doi.org/10.1080/10962247.2018.1537984.

2 Environmental Integrity Project. 2022. "W.A. Parish Electric Generating Station." Ashtracker. October 14, 2022. Accessed April 5, 2023. https://ashtracker.org/facility/100/wa-parish-electric-generating-station.

3 "Issue No. 28: Impacts of Pollution on Our Health and the Planet: The Case of Coal Power Plants." n.d. UNEP - UN Environment Programme. Accessed February 24, 2023. https://www.unep.org/resources/perspective-series/issue-no-28-impacts-pollution-our-health-and-planet-case-coal-power.

4 Erica Burt, Peter Orris, and Susan Buchanan, "Scientific Evidence of Health Effects from Coal Use in Energy Generation" (University of Illinois at Chicago School of Public Health, April 2013), https://saludsindanio.org/sites/default/files/documents-files/828/Health_Effects_Coal_Use_Energy_Generation.pdf.

5 Strasert, Brian, Su Yean Teh, and Daniel S. Cohan. 2019. "Air Quality and Health Benefits from Potential Coal Power Plant Closures in Texas." *Journal of the Air & Waste Management Association* 69 (3): 333–50. https://doi.org/10.1080/10962247.2018.1537984.

6 David Schlissel, "Petra Nova Mothballing Post-Mortem: Closure of Texas Carbon ... - IEEFA," ed. Dennis Wamsted, Petra Nova Mothballing Post-Mortem: Closure of Texas Carbon Capture Plant Is a Warning Sign (Institute for Energy Economics and Financial Analysis, August 2020), https://ieefa.org/wp-content/uploads/2020/08/Petra-Nova-Mothballing-Post-Mortem_August-2020.pdf.

7 "Coal Unit Catches Fire at NRG's W.A. Parish Generating Station in Fort Bend County." 2022. ABC13 Houston. May 10, 2022. https://abc13.com/power-plant-fire-nrg-wa-parish-generating-station-fort-bend-county-yu-jones-road-and-smithers-lake/11830712/.

8 "U.S. Coal Consumption Continues to Decline across All Sectors." n.d. https://www.eia.gov/todayinenergy/detail.php?id=44115.

9 Erdenesanaa, Delger. 2023. "San Antonio to End Use of Coal Within Five Years." *The Texas Observer*, January. https://www.texasobserver.org/san-antonio-coal-cps-energy-natural-gas/.

Health Impacts and Pollutants

Coal power plants are a major source of pollution, and exposure to these pollutants can cause severe health issues and even death. There are a variety of dangerous pollutants a community is exposed to when there is a coal power plant in their vicinity, from arsenic to particulate matter (PM). The different components of air pollution can cause acute and chronic damage to the lungs, heart, brain, and other critical systems of the human body.[10] The byproducts of coal and natural gas energy production negatively affect both human health and the environment. From the coal units alone, the CO2 emissions contribute to the greenhouse gas effect. SO2 causes acid rain, harming plants and animals in the water. At the same time, NOx and particulate matter contribute to ground-level ozone and haze. SO2 also converts into fine particulate matter, which can travel long distances and create haze and unhealthy air across the state and country as well as for marginalized communities near pollution sources, like the Parish plant.

Around 18,000 people die every day globally because of air pollution; this makes air pollution one of the leading causes of death worldwide.[11] W.A. Parish is responsible for approximately 178 premature deaths each year. Of these deaths, 177 are related to PM pollution, and 1 is related to ozone pollution.[12] Fort Bend County has more PM alert days than the state of Texas or the U.S.[13] In fact, a recent analysis by *The Guardian* ranked Houston as the sixth worst city for air pollution in the U.S.[14] In Fort Bend County, heart and lung disease are among the leading causes of death, which can be caused or exacerbated by PM and ozone pollution.[15]

According to the Environmental Protection Agency's (EPA) EJScreen mapping system, nearly 70% of the population in Fort Bend County are people of color, 22% are low-income, and 39% of the community is considered vulnerable due to their age (under 18, over 65).[16] Continued and prolonged exposure to Parish pollution leaves sensitive groups at risk. In total, about 83,000 students from Fort Bend ISD, Stafford ISD, and Needville ISD are being affected by the pollution from Parish.[17] This impact on students' health can affect their performance, and parents have to bear additional medical costs for health care for their child related to the issues that come with living near a facility like Parish.[18]

An analysis from the Sierra Club shows that people of color are exposed to more soot pollution from NRG (the company that owns Parish) than any other utility parent company in the country. NRG's coal plants exposed Latinos to 98% more and Black Americans to 40% more soot pollution than White Americans. With no firm retirement plans, plants like Parish will continue to harm communities across the South.[19]

COAL ASH

Coal-fired power plants produce coal ash, which

10 WHO. n.d. "The Invisible Killer- the Health Effects of Air Pollution." Accessed February 24, 2023. https://cdn.who.int/media/docs/default-source/air-pollution-documents/air-quality-and-health/conference-on-air-pollution-and-health/1_2_background-health_effects_background.pdf?sfvrsn=f5584678_9.

11 "Issue No. 28: Impacts of Pollution on Our Health and the Planet: The Case of Coal Power Plants." n.d. UNEP - UN Environment Programme. Accessed February 24, 2023. https://www.unep.org/resources/perspective-series/issue-no-28-impacts-pollution-our-health-and-planet-case-coal-power.

12 Scherffius, Jeffrey, Satish C. Reddy, John P. Klumpyan, and Anthony Armpriester. 2013. "Large-Scale CO2 Capture Demonstration Plant Using Fluor's Econamine FG PlusSM Technology at NRG's WA Parish Electric Generating Station." *Energy Procedia* 37 (January): 6553–61. https://doi.org/10.1016/j.egypro.2013.06.587.

13 "———." n.d. County Health Rankings & Roadmaps. Accessed May 1, 2023. https://www.countyhealthrankings.org/explore-health-rankings/texas/fort-bend?year=2023.

14 Sessions, Kennedy. 2023. "Houston Ranks among Worst U.S. Cities for Air Pollution." Chron, March 10, 2023. https://www.chron.com/news/houston-texas/article/houston-air-pollution-17830025.php.

15 Houston Methodist Sugar Land Hospital. n.d. "Community Health Needs Assessment 2022." Accessed May 1, 2023. https://www.houstonmethodist.org/-/media/pdf/community-benefits/2022-chna/hmsl---2022-community-health-needs-assessment.ashx.

16 United States Census Bureau QuickFacts. n.d. "U.S. Census Bureau QuickFacts: Fort Bend County, Texas." Census Bureau QuickFacts. https://www.census.gov/quickfacts/fortbendcounty-texas.

17 "Stafford MSchool District." n.d. U.S. News Education. https://www.usnews.com/education/k12/texas/districts/stafford-msd-108896#:~:text=Stafford%20MSchool%20District%20contains%204%20schools%20and%203%2C316%20students.

18 Larr, Allison S., and Matthew Neidell. "Pollution and Climate Change." *The Future of Children* 26, no. 1 (2016): 93–113. http://www.jstor.org/stable/43755232.

19 "New Report Shows Parish Coal Plant Kills People Across Texas and State Lines." 2023. Sierra Club. March 2, 2023. https://www.sierraclub.org/press-releases/2023/03/new-report-shows-parish-coal-plant-kills-people-across-texas-and-state-lines.

Arsenic	is associated with multiple forms of cancer, neurological impairments in children, and skin conditions.
Boron	is linked to developmental and reproductive toxicity (e.g., low birth weight and testicular atrophy), and is also toxic to aquatic life.
Cadmium	is associated with kidney damage, and the EPA's preliminary assessment suggests it is carcinogenic. It is also toxic to aquatic life.
Cobalt	is associated with blood diseases and thyroid damage.
Chromium	is associated with liver damage and other non-cancer health effects, but at incredibly low doses,it can also be cancerous.
Fluoride	is a neurotoxin that can also cause tooth and bone damage and may be carcinogenic.
Lead	is a well-known neurotoxin, according to EPA, a "probable carcinogen" and can be toxic to aquatic life. Exposure to lead is extremely dangerous for children.
Lithium	is associated with kidney damage, neurological damage, decreased thyroid function, and birth defects
Radium	is radioactive and cancerous.
Mercury	is a potent neurotoxin that bioaccumulates in aquatic food chains.
Molybdenum	is associated with gout-like symptoms in humans and reproductive toxicity in laboratory animals.
Selenium	is toxic to both human and aquatic life, it can bioaccumulate in the food chain as well as affecthuman skin, blood, and the nervous system.
Thallium	is associated with liver and kidney damage and hair loss.

Table 1: Toxic Elements that are a by-product of coal power plants and the health effects [21]

includes a variety of toxic elements. In 2014 the EPA decided the risks associated with these pollutants are a risk to human health and the environment and warranted regular monitoring.[20] Table 1 lists the major toxins emitted by the Parish plant through coal ash and their public health impacts.

These elements are all found in coal ash ponds and landfills, and unlined coal ash ponds and landfills worsen their effects. Parish has an 80-acre coal ash landfill known as "Cell 2" that is essentially unregulated and must be dealt with. NRG has failed to make public any groundwater monitoring data required by the coal ash rule for pollutants such as

20 EIP & Earthjustice. 2022. "Poisonous Coverup." November 3, 2022. Accessed March 13, 2023. https://earthjustice.org/wp-content/uploads/coal-ash-report_poisonous-coverup_earthjustice.pdf.

21 EIP & Earthjustice. 2022. "Poisonous Coverup." November 3, 2022. Accessed March 13, 2023. https://earthjustice.org/wp-content/uploads/coal-ash-report_poisonous-coverup_earthjustice.pdf.

arsenic, cobalt, and lithium.[22] Most of the elements from the landfill are able to seep into the ground and drinking water and become a health risk to the surrounding area. There are 64 groundwater wells being monitored surrounding Parish, 61 of which have been polluted above federal advisory levels based on samples collected between May 24, 2010, and October 18, 2019.[23] Groundwater at this site contains unsafe levels of sulfate, manganese, arsenic, strontium, fluoride, boron, lithium, molybdenum, antimony, chromium, cobalt, selenium, thallium, barium, and mercury. The United Nations estimates that coal power plants like Parish are responsible for 26% of global mercury emissions (339-657 metric tons/year). Once mercury is deposited into waterways and converted to methylmercury, the harmful effects are passed along the food chain. This is especially harmful to pregnant people because the consumption of high levels of methylmercury can cause developmental effects in children, such as delayed neurodevelopment and subtle changes in vision, memory, and language. A comprehensive epidemiologic study that included the U.S. concluded that many women already have blood mercury levels that are above acceptable levels due to the consumption of mercury-contaminated fish.[24]

Coal ash is just as or more radioactive than boiling water used in nuclear reactors, which is pumped through a nuclear reactor core.[25] In some instances, uranium from coal plants is collected and used in nuclear reactors. In 1987, the National Council on Radiation Protection and Measurements conducted research comparing coal ash waste from coal-fired power plants to waste from a nuclear power plant. They concluded that the potential risk for human health from coal-burning waste is comparable to the effects of nuclear waste because the population-effective dose equivalent to radioactivity from coal-fired electrical plants is 100 times that of a nuclear-powered electrical plant.[26] Radium, uranium, thorium, and ruthenium are all highly radioactive elements present in coal combustion waste. The level of radiation in coal ash can be as much as 5 times higher than in normal soil. Contaminated soil can not be used to farm or plant gardens because the toxic components can seep into the food, further introducing more health risks if consumed.[27] When these hazardous isotopes enter the body and circulate through the bloodstream, they deposit and accumulate in different bones and remain for life.[28]

SULFUR DIOXIDE (SO2)

SO2 is a colorless, non-flammable, and odorless gas. The dangers of this pollutant can not be seen immediately by the naked eye. Exposure to gaseous SO2 emitted by coal-burning power plants has been shown to cause decreased lung function and exacerbate respiratory symptoms, such as bronchitis or asthmatic reactions. This is especially true for young children and adults over the age of 65, who are known to have higher hospitalization for these symptoms. Texas has historically led the way in SO2 pollution, producing more than twice as much SO2 as second-ranked Missouri. Parish is ranked second in SO2 pollution in the region contributing to Texas' overall standing as one of the worst states for SO2 pollution.[29]

The federal Clean Air Act requires states to protect communities, national parks, and wilderness areas across the central United States. On April 19, 2023,

22 "WA Parish Coal Plant Near Houston Continues to Pollute - Public Citizen." 2021. Public Citizen. November 18, 2021. https://www.citizen.org/news/wa-parish-coal-plant-near-houston-continues-to-pollute/.

23 Environmental Integrity Project. 2022. "W.A. Parish Electric Generating Station." Ashtracker. October 14, 2022. Accessed April 5, 2023. https://ashtracker.org/facility/100/wa-parish-electric-generating-station.

24 Erica Burt, Peter Orris, and Susan Buchanan, "Scientific Evidence of Health Effects from Coal Use in Energy Generation" (University of Illinois at Chicago School of Public Health, April 2013), https://saludsindanio.org/sites/default/files/documents-files/828/Health_Effects_Coal_Use_Energy_Generation.pdf.

25 "NUCLEAR 101: How Does a Nuclear Reactor Work?" n.d. Energy.Gov. https://www.energy.gov/ne/articles/nuclear-101-how-does-nuclear-reactor-work.

26 Kravchenko, Julia, and H. Kim Lyerly. 2018. "The Impact of Coal-Powered Electrical Plants and Coal Ash Impoundments on the Health of Residential Communities." *North Carolina Medical Journal* 79 (5): 289–300. https://doi.org/10.18043/ncm.79.5.289.

27 United Nations Environment Programme. n.d. "Soil Pollution a Risk to Our Health and Food Security." *UNEP*. https://www.unep.org/news-and-stories/story/soil-pollution-risk-our-health-and-food-security.

28 Kravchenko, Julia, and H. Kim Lyerly. 2018. "The Impact of Coal-Powered Electrical Plants and Coal Ash Impoundments on the Health of Residential Communities." *North Carolina Medical Journal* 79 (5): 289–300. https://doi.org/10.18043/ncm.79.5.289.

29 Strasert, Brian, Su Yean Teh, and Daniel S. Cohan. 2019. "Air Quality and Health Benefits from Potential Coal Power Plant Closures in Texas." *Journal of the Air & Waste Management Association* 69 (3): 333–50. https://doi.org/10.1080/10962247.2018.1537984.

the EPA published a draft rule to address Clean Air Act requirements and reduce haze pollution coming from 12 coal plants in Texas. Haze is visible pollution caused by sulfur dioxide emissions from power plants and industrial sources which reduces visibility in our most revered sites and threatens public health. Because the haze plan from Texas was vastly inadequate, the law required EPA to step in and propose a strong draft rule which would require six of the largest Texas coal plants to collectively cut their sulfur dioxide pollution by 80,000 tons per year. This would nearly halve the state's overall SO_2 emissions from the biggest haze polluters. Groups like the Sierra Club expect EPA to finalize the haze rule late 2023.

OZONE (CO, CO2 , NOX)

Carbon dioxide (CO_2) is a colorless, odorless, slightly acidic, and non-flammable gas. Inhaling high concentrations of CO_2 is known to lead to hyperventilation, loss of consciousness, tachycardia, and headaches. It is also the main anthropogenic emission that comes from the burning of fossil fuels. Carbon monoxide (CO) is also released during the coal combustion process and is a toxic, flammable, odorless, colorless, and tasteless gas. Inhalation of CO_2 in small concentrations can cause mental confusion, vertigo, headaches, nausea, weakness, and loss of consciousness. Prolonged or continuous exposure to CO, can lead to adverse effects on the nervous and cardiovascular system. Prolonged exposure to CO can also lead to death because it displaces oxygen in the blood making it unavailable to vital organs in the human body.

The production of electricity from coal is one of the main sources of CO_2 emissions. Coal is mostly carbon, which, when burned, reacts with oxygen in the air to produce carbon dioxide. CO_2 is a heat-trapping gas that works like a blanket over the earth's atmosphere, helping warm the earth above its normal temperature. Texas has been experiencing life-threatening weather extremes. The Houston area is not immune to this effect; in the summer of 2022, Houston saw a record-breaking heat wave, with the hottest June ever recorded.[30] Coal accounts for roughly one-quarter of all energy-related carbon emissions in the U.S.[31] The annual average amount of coal used to generate a kilowatt-hour of electricity in 2021 is 1.12 pounds/kWh.[32] The carbon emission factor (grams of CO_2 for every kilowatt-hour of electricity produced) depends on the type of coal used; anthracite is approximately 860g CO_2 /kWh, while lignite is 1,020g CO_2 /kWh. Natural gas, or methane gas, is favored over coal-burning power plants because natural gas's carbon emission factor is 400.24 CO_2, 50 to 60% fewer carbon emissions, and new natural gas power plants are more efficient than new coal plants.[33] This is just one reason why the use of coal fire generation has declined over the last decade by approximately 40%; this accounts for 75% of the total reduction of 800 million metric tons in U.S. energy-related CO_2 emissions between 2005 and 2017.[34]

These are just some of the many gasses that are a by-product of coal power plants; NOx has its own family of toxic gas pollutants. These pollutants can irritate and corrode skin and the respiratory tract, as well as lead to pulmonary edema and weakening of the immune system and lungs if one is exposed to high enough concentrations. When some of the NOx family compounds react with chemicals in the atmosphere, they create ozone (smog), nitrous oxide (N_2O), and nitrogen dioxide (NO_2). When asthmatic children are exposed to NO_2, they can suffer an increase in wheezing and coughing or a viral and bacterial infection. High concentrations (1-2 ppm) of NO_2 exposure can cause airway inflammation. At low concentrations (0.2 - 0.5 ppm), NO_2 causes decrements in lung function in asthmatics. NO_2 levels, at their worst, can cause increases in hospital admissions and emergency department visits for respiratory causes, particularly asthma.[35]

30 Hoffman, Ken. 2022. "Houston Slogs through Brutal Heat: 'Hottest Weather I've Ever Seen.'" *Washington Post*, July 12, 2022. Accessed May 1, 2023. https://www.washingtonpost.com/climate-environment/2022/07/12/heat-wave-houston-texas-records/.

31 "Coal Power Impacts." 2017. Union of Concerned Scientists. November 15, 2017. https://www.ucsusa.org/resources/coal-power-impacts.

32 "Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA)." 2023. March 16, 2023. https://www.eia.gov/tools/faqs/faq.php?id=667&t=2.

33 "Environmental Impacts of Natural Gas." 2014. Union of Concerned Scientists. June 19, 2014. Accessed February 24, 2023. https://www.ucsusa.org/resources/environmental-impacts-natural-gas#:~:text=Environmental%20Impacts%20of%20Natural%20Gas%201%20Global%20warming,Water%20use%20and%20pollution%20...%205%20Earthquakes%20.

34 "The U.S. Coal Sector - Brookings Institution," accessed April 28, 2023, https://www.brookings.edu/wp-content/uploads/2019/01/H.Gruenspecht_U.S.-Coal-Sector_Final_Jan_20191.pdf.

35 Erica Burt, Peter Orris, and Susan Buchanan, "Scientific Evidence of Health Effects from Coal Use in Energy Gener-

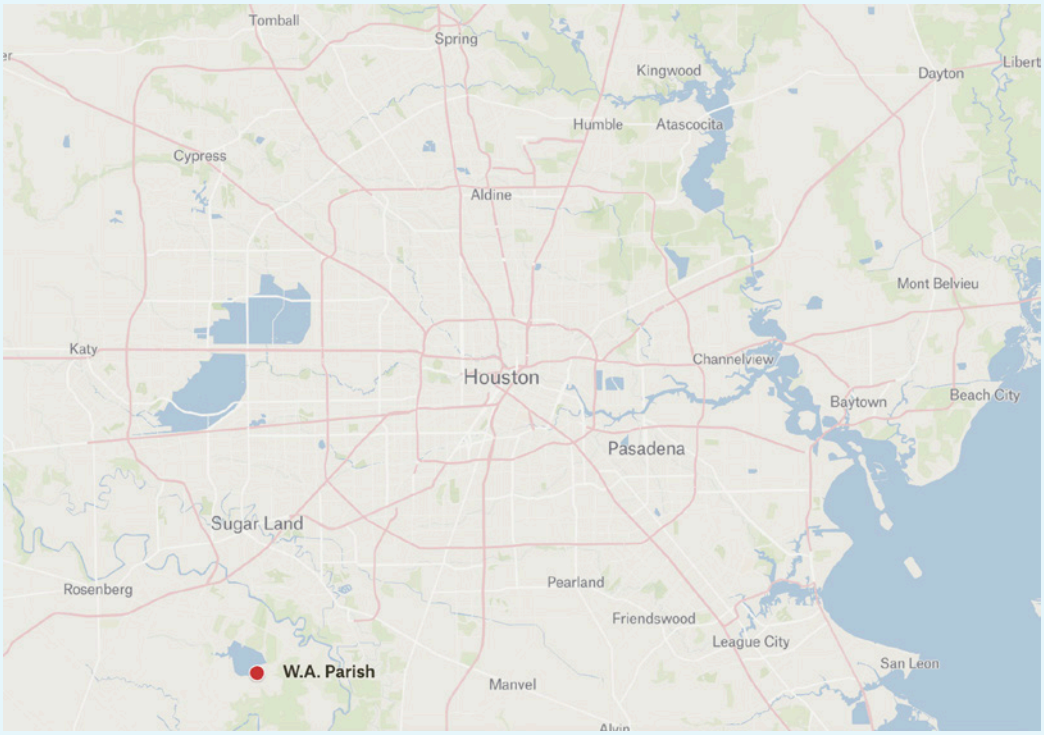

Figure 1: W.A. Parish's close proximity to Houston

When these air toxins combine with sunlight, volatile organic compounds, and heat, it causes ozone pollution. Ozone primarily impacts the lungs and causes various respiratory issues, such as shortness of breath, coughing, and inflamed or damaged lung lining, and can exacerbate existing issues, such as lung disease or asthma. These symptoms can occur only after a few hours of exposure.[36] Harris, Bexar, Dallas, and Tarrant Counties suffered due to the highest peak ozone concentrations in June and August of 2012. Ozone concentrations during the episodes were 13–21% higher than those noticed during the entire ozone season in these counties, and PM2.5 concentrations were 17–20% higher than the annual averages.[37] Under the National Ambient Air Quality Standards (NAAQS), regions are considered to be in 'nonattainment' if their ozone levels are higher than those set by the EPA; the Houston-Galveston-Brazoria (HBG) region has never reached attainment for ozone since the NAAQS were created. Fossil fuel infrastructure such as Parish is a primary reason for this.[38]

PM

NO2 and SO2 are a precursor to the formation of secondary particulate matter (PM). They are also composed of inorganic compounds such as silicates, aluminates, and heavy metals, among others, as well as organic material associated with carbon particles.[39] PM is small particles less than 2.5 micrometers (PM2.5) and larger particles up to 10 micrometers (PM10). These particles are formed during coal combustion, and the different sizes of PM cause different levels of damage. The smaller the particle size, the more dangerous it is to human health. The EPA has studied the health effects of exposure

ation" (University of Illinois at Chicago School of Public Health, April 2013), https://saludsindanio.org/sites/default/files/documents-files/828/Health_Effects_Coal_Use_Energy_Generation.pdf.

36 Larr, Allison S., and Matthew Neidell. "Pollution and Climate Change." *The Future of Children* 26, no. 1 (2016): 93–113. http://www.jstor.org/stable/43755232.

37 Strasert, Brian, Su Yean Teh, and Daniel S. Cohan. 2019. "Air Quality and Health Benefits from Potential Coal Power Plant Closures in Texas." *Journal of the Air & Waste Management Association* 69 (3): 333–50. https://doi.org/10.1080/10962247.2018.1537984.

38 "Texas, Houston/Galveston Area, Ozone, Attainment Plan Summary | US EPA." 2022. US EPA. July 13, 2022. https://www.epa.gov/sips-tx/texas-houstongalveston-area-ozone-attainment-plan-summary#:~:text=The%20Houston%2FGalveston%20area%20%28Houston%29%20was%20designated%20as%20a,sure%20nonattainment%20areas%20make%20continued%20progress%20toward%20attainment.

39 "Issue No. 28: Impacts of Pollution on Our Health and the Planet: The Case of Coal Power Plants." n.d. UNEP - UN Environment Programme. Accessed February 24, 2023. https://www.unep.org/resources/perspective-series/issue-no-28-impacts-pollution-our-health-and-planet-case-coal-power.

to PM2.5 and found that it causes respiratory symptoms, contributes to the development of asthma, and decreases lung function in children.[40]

Evidence of the harmful effects of PM2.5 has been proven globally and has even been linked to the development of lung cancer; there is also evidence that PM can also damage the lungs and cells, leading to inflammation, cytotoxicity, and cell death when inhaled.[41] Cancer is the second leading cause of death in Fort Bend and Harris Counties, and the most common is lung cancer.[42] The method of injury for cardiovascular and respiratory symptoms is the same. When inhaled, PM 2.5 can enter the bloodstream causing irregular heartbeat, and can induce a heart attack; they have also been connected to cardiovascular disease.[43] The World Health Organization (WHO) estimates that worldwide, 5% of cardiopulmonary deaths are due to PM pollution. Those who experience regular exposure to PM2.5 have an increased likelihood of developing the health issues described above and an increased likelihood of emergency hospital visits and hospitalizations.

NATURAL GAS (METHANE)

Natural gas, or methane gas, is the second most abundant anthropogenic GHG after CO_2; it accounts for about 20% of global emissions. What makes methane an incredible risk to reducing the global temperature rise is that methane is more than 25 times as potent than CO_2 at trapping heat in the atmosphere. In a related activity, methane concentration in the atmosphere has more than doubled in the last two centuries.[44] Methane represented 10.9% of the total (5,981.4 million metric tons) of GHG emissions in 2020 because of human activity in the U.S., while CO_2 represented 78.8% of the total GHG emissions.[45]

Natural gas power plants will be a viable energy option if natural gas drilling, extraction from wells, and transportation in pipelines have less methane leakage. Natural gas is healthier for surrounding communities than coal; the combustion of natural gas produces negligible amounts of sulfur, mercury, and particulates. Burning natural gas does produce NOx, which is a precursor to smog. The Department of Energy (DOE) analyses indicate that every 10,000 U.S. homes powered with natural gas instead of coal avoid the annual emissions of 1,900 tons of NOx, 3,900 tons of SO_2, and 5,200 tons of particulates. The annual average amount of natural gas used to generate a kilowatt-hour (kWh) of electricity in 2021 was 7.36 cubic feet/kWh.[46] However, another problem with natural gas power plants is water use in the production cycle; this could worsen water scarcity in the future.[47]

Climate Change

Climate change is caused by the accumulation of GHG in the Earth's atmosphere. GHG are defined as any of the variety of compounds that cause the greenhouse gas effect that increases the earth's overall temperature; these include methane and CO_2. The consequences of climate change are astronomical; among other things, it can cause permafrost, glaciers, and ice caps to melt, which leads to rising sea levels and altering habitats leading to possible extinctions of different flora and fauna species.[48] Without swift and transformative changes to how energy is consumed, there will be irreversible

40 EPA. n.d. "Particle Pollution and Your Health." Accessed May 1, 2023. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1001EX6.txt.

41 Larr, Allison S., and Matthew Neidell. "Pollution and Climate Change." *The Future of Children* 26, no. 1 (2016): 93–113. http://www.jstor.org/stable/43755232.

42 Houston Methodist Sugar Land Hospital. n.d. "Community Health Needs Assessment 2022." Accessed May 1, 2023. https://www.houstonmethodist.org/-/media/pdf/community-benefits/2022-chna/hmsl---2022-community-health-needs-assessment.ashx.

43 Erica Burt, Peter Orris, and Susan Buchanan, "Scientific Evidence of Health Effects from Coal Use in Energy Generation" (University of Illinois at Chicago School of Public Health, April 2013), https://saludsindanio.org/sites/default/files/documents-files/828/Health_Effects_Coal_Use_Energy_Generation.pdf.

44 "Importance of Methane | US EPA." 2022. US EPA. June 9, 2022. Accessed March 16, 2023. https://www.epa.gov/gmi/importance-methane.

45 "Electricity and the Environment - U.S. Energy Information Administration (EIA)." n.d. Accessed March 16, 2023. https://www.eia.gov/energyexplained/electricity/electricity-and-the-environment.php.

46 "Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA)." 2023. March 16, 2023. https://www.eia.gov/tools/faqs/faq.php?id=667&t=2.

47 "Importance of Methane | US EPA." 2022. US EPA. June 9, 2022. Accessed March 16, 2023. https://www.epa.gov/gmi/importance-methane.

48 Erica Burt, Peter Orris, and Susan Buchanan, "Scientific Evidence of Health Effects from Coal Use in Energy Generation" (University of Illinois at Chicago School of Public Health, April 2013), https://saludsindanio.org/sites/default/files/documents-files/828/Health_Effects_Coal_Use_Energy_Generation.pdf.

damage as climate change can increase severe weather events like hurricanes, heat waves, and snowstorms.[49] The Greater Houston area will experience intensified hurricanes and tornadoes as warming temperatures help fuel these storms.[50]

The energy sector has been the key to fighting climate change for years because of the emissions and pollutants released by the industry. In 2021, Texas led the nation in energy production and consumption more than any other state. Texas burned more than 60 million tons of coal to fire electric generation plants. In the U.S., electricity generation accounts for about 25% of GHG emissions, according to the EPA.[51] U.S. power plants rank as the nation's second-biggest contributor to global warming. The Biden Administration and EPA have done some work to better regulate the energy/fossil fuel industry by trying to tighten the Good Neighbor Rule as well as the 2012 Mercury and Air Toxics Standards.[52]

The Biden Administration has proposed many changes to the energy industry, for example, requiring coal plants to filter toxic metals thoroughly before the wastewater is released into nearby rivers, streams, and lakes, reducing the disposal of pollutants into the country's waterways by about 584 million pounds annually.[53] Parish is a main contributor to groundwater pollution in Fort Bend County and would have to implement new pollution control technology to mitigate the effects. Power plants use various technologies to reduce pollutants from the bag-house to trap particles and wet and dry scrubbers to lessen SO2 emissions. However, these technologies are not enough to stop climate change, and the damage from these power plants should not be overlooked. The Washington Post reports that President Biden has pledged to make the U.S. electricity sector carbon-neutral by 2035. These standards have been one of the most powerful drivers over the past decade in lowering emissions by pushing power plants to replace coal with cleaner options like natural gas, wind, and solar.[54]

One of the reasons why the Biden Administration and the rest of the world are pushing for "green energy" is the Paris Climate Agreement and the goal to stop the earth's temperature from rising. To meet the Paris Climate Agreement, the U.S. needs to decommission all coal power plants by 2023. The U.S. is not reducing its coal capacity fast enough to reach this goal. Although the U.S. has made great strides in reducing its dependence on coal, global usage went up worldwide. Former President Trump pulled the U.S. from the accord, but the U.S. rejoined the agreement. It is important for Americans to reduce their carbon footprint because Americans make up 4% of the world's population but are responsible for almost a third of excess CO2 emissions.[55]

Economic Impacts

There is a cost to keeping coal power plants like Parish operational: upfront cost of building the facility as well as ongoing maintenance, labor, and the price of resources. These costs must be contrasted with the consistent drop in consumer demand for coal and the impacts of global energy policy.

As of 2016, the Parish plant was not profitable; the pre-tax earnings are estimated to be $124.2 million.[56]

49 "Issue No. 28: Impacts of Pollution on Our Health and the Planet: The Case of Coal Power Plants." n.d. UNEP - UN Environment Programme. Accessed February 24, 2023. https://www.unep.org/resources/perspective-series/issue-no-28-impacts-pollution-our-health-and-planet-case-coal-power.

50 "Tornadoes and Climate Change." n.d. https://education.nationalgeographic.org/resource/tornadoes-and-climate-change/.

———. 2022b. "Houston Slogs through Brutal Heat: 'Hottest Weather I've Ever Seen.'" Washington Post, July 12, 2022. Accessed May 1, 2023. https://www.washingtonpost.com/climate-environment/2022/07/12/heat-wave-houston-texas-records/.

51 Buckley, Kyra. 2023. "Half of U.S. Coal-Fired Electricity Generation to Shut down by 2026." *Houston Chronicle*, April 5, 2023. https://www.houstonchronicle.com/business/energy/article/coal-electricity-generation-shut-down-2026-17871797.php.

52 Puko, Timothy. 2023. "EPA Clamps down on Mercury from Coal Power Plants." *Washington Post*, April 5, 2023. Accessed April 19, 2023. https://www.washingtonpost.com/climate-environment/2023/04/05/biden-epa-coal-plants-mercury/.

53 Phillips, Anna. 2023. "More Coal Plants Could Shut Down Under EPA's New Water Pollution Rule." *Washington Post*, March 8, 2023. Accessed March 16, 2023. https://www.washingtonpost.com/climate-environment/2023/03/08/epa-coal-water-pollution-climate/?utm_source=twitter&utm_medium=social&utm_campaign=wp_main.

54 Joselow, Maxine, and Vanessa Montalbano. 2023. "Inside Biden's Balancing Act on Ditching Coal." *Washington Post,* April 6, 2023. Accessed April 22, 2023. https://www.washingtonpost.com/politics/2023/04/06/inside-biden-balancing-act-ditching-coal/.

55 Ellis, Jonathan, and Douglas Alteen. 2021. "The Paris Climate Agreement: What You Need to Know." *The New York Times*, January 21, 2021. Accessed April 22, 2023. https://www.nytimes.com/2021/01/21/climate/biden-paris-climate-agreement.html.

56 Strasert, Brian, Su Yean Teh, and Daniel S. Cohan. 2019.

The price of renewable energy is decreasing rapidly while the cost of fossil fuels is ever-growing. The U.S. could save $78 billion by closing coal-fired power plants in line with the Paris Climate Agreement's goals. Moreover, coal power generation has seen a decline over the last decade by 40%. This reduction accounted for 75% of the total reduction of 800 million metric tons in U.S. energy-related CO2 emissions between 2005 and 2017. The U.S. Energy Information Administration (EIA) reported 12.6 GW of coal capacity will close in 2022, representing 85% of all electric generation capacity retirements this year. Coal is mainly used for power generation; consequently, if our reliance on it for energy decreases, so will its impact.[57] The U.S. is set to hit a new record with coal plant closures with roughly 25 GW coal capacity reduction by 2024; the EIA projects a 65 GW decline through 2030.[58] As coal plants like Parish transition across the country, facilities are focusing on the transition of their workforce into natural gas or renewable energy management.

"Air Quality and Health Benefits from Potential Coal Power Plant Closures in Texas." *Journal of the Air & Waste Management Association* 69 (3): 333–50. https://doi.org/10.1080/10962247.2018.1537984.

57 "The U.S. Coal Sector - Brookings Institution," accessed April 28, 2023, https://www.brookings.edu/wp-content/uploads/2019/01/H.Gruenspecht_U.S.-Coal-Sector_Final_Jan_20191.pdf.

58 Energy Innovation: Policy and Technology. 2018. "Plunging Prices Mean Building New Renewable Energy Is Cheaper Than Running Existing Coal." *Forbes*, December 3, 2018. Accessed April 17, 2023. https://www.forbes.com/sites/energyinnovation/2018/12/03/plunging-prices-mean-building-new-renewable-energy-is-cheaper-than-running-existing-coal/?sh=7bf8d04231f3.

PETRA NOVA: W.A. PARISH CARBON CAPTURE PROJECT

Petra Nova is a billion-dollar ($4,200/kW) carbon capture project that is a joint venture between the American independent power producer NRG and Japan's JX Nippon Oil and Gas Exploration Corporation. It began operations in January 2017. The DOE shared a portion of the total cost of the project under the Clean Coal Power Initiative and contributed $167 million to the project.[59] Petra Nova is currently the largest application of post-combustion carbon capture at an existing coal-fired power plant in the world.[60] The project was supposed to demonstrate an economically viable carbon capture project that collects 90% CO_2 of a 240 MW gas stream coupled with CO_2-enhanced oil recovery chances nearby.[61] This is less than 9% of the overall coal capacity of the plant, and only 20-31% of the total carbon produced in Parish's units would be captured over the next 100 years of operation.[62]

Carbon capture is a relatively new technology that many believe could lead to a clean coal option, but it fails to address many concerns like coal ash.[63] It also fails to capture all the carbon emitted throughout the process and the troubles of retrofitting already operating coal plants. The carbon capture process involves separating the CO_2 from the exhaust stream of a coal stack; similar to the SO_2 scrubbing process, then special chemical solvents called amines are employed, which bind to and absorb CO_2 in the exhaust. Heat is then applied to strip the CO_2 from the carbon-rich amine solution. The amine is recycled and used again, and the resulting high-purity CO_2 stream is compressed into a supercritical or liquefied state.[64] From here, the captured CO_2 is dried, compressed, and transported via an 81-mile pipeline to the West Ranch oilfield (West Ranch) in Jackson County, Texas, where it is injected to boost oil production.[65] Petra Nova failed to meet expectations by not meeting target operating time, total CO_2 captured and CO_2 injected into West Ranch did not bring meaningful oil production.[66] This led to the conclusion that it is not commercially viable.

The post-combustion process is energy intensive and requires a dedicated natural gas unit to accommodate the energy requirements of the carbon-capture process.[67] The Petra Nova system requires approximately 0.497 kWh of electricity to run per kWh produced by the coal plant. Even if a carbon capture system like Petra Nova removes 85-90% of CO_2 with natural gas, there is still an energy penalty of 25%.[68] Accounting for upstream emissions from the mining and processing of coal and natural gas. The carbon capture equipment reduces coal and gas combustion plus upstream CO_2 by a net of only 10.8% over 20 years and 20% over 100 years. The reason for the 20-year time frame is to avoid 1.5 degrees Celsius global warming and resulting climate feedback. If wind, instead of gas, is used to power the equipment, CO_2 emissions would decrease by 37.4% over 20 years and 44.2% over 100 years compared with no carbon capture.[69] The energy requirement for carbon capture

59 Petra Nova Parish LLC and OSTI. 2020. "FINANCING MEGA-SCALE ENERGY PROJECTS: A CASE STUDY OF THE PETRA NOVA CARBON CAPTURE PROJECT." 1608572. DOE.
Jacobson, Mark Z. 2019. "The Health and Climate Impacts of Carbon Capture and Direct Air Capture." *Energy and Environmental Science* 12 (12): 3567–74. https://doi.org/10.1039/c9ee02709b.

60 Jacobson, Mark Z. 2019. "The Health and Climate Impacts of Carbon Capture and Direct Air Capture." *Energy and Environmental Science* 12 (12): 3567–74. https://doi.org/10.1039/c9ee02709b.

61 Scherffius, Jeffrey, Satish C. Reddy, John P. Klumpyan, and Anthony Armpriester. 2013. "Large-Scale CO2 Capture Demonstration Plant Using Fluor's Econamine FG PlusSM Technology at NRG's WA Parish Electric Generating Station." *Energy Procedia* 37 (January): 6553–61. https://doi.org/10.1016/j.egypro.2013.06.587.

62 "Petra Nova - W.A. Parish Project." n.d. Energy.Gov. https://www.energy.gov/fecm/petra-nova-wa-parish-project.

63 Scherffius, Jeffrey, Satish C. Reddy, John P. Klumpyan, and Anthony Armpriester. 2013. "Large-Scale CO2 Capture Demonstration Plant Using Fluor's Econamine FG PlusSM Technology at NRG's WA Parish Electric Generating Station." *Energy Procedia* 37 (January): 6553–61. https://doi.org/10.1016/j.egypro.2013.06.587.

64 Jenkins, Jesse. 2015. "FINANCING MEGA-SCALE ENERGY PROJECTS: A CASE STUDY OF THE PETRA NOVA CARBON CAPTURE PROJECT." *Paulson Institute*, October. http://www.paulsoninstitute.org/wp-content/uploads/2015/10/CS-Petra-Nova-EN.pdf.

65 Petra Nova Parish LLC. n.d. "FINANCING MEGA-SCALE ENERGY PROJECTS: A CASE STUDY OF THE PETRA NOVA CARBON CAPTURE PROJECT." 81.131. DOE.

66 Ibid.

67 "Petra Nova Is One of Two Carbon Capture and Sequestration Power Plants in the World." n.d. Accessed March 20, 2023. https://www.eia.gov/todayinenergy/detail.php?id=33552.

68 Jacobson, Mark Z. 2019. "The Health and Climate Impacts of Carbon Capture and Direct Air Capture." *Energy and Environmental Science* 12 (12): 3567–74. https://doi.org/10.1039/c9ee02709b.

69 Jacobson, Mark Z. 2019. "The Health and Climate Impacts of Carbon Capture and Direct Air Capture." *Energy and*

could come from renewable energy, but no matter if renewable energy or natural gas is used, pollution is still being released into the environment.[70] Carbon capture is not as secure of an option as renewable energy; at the same time, renewable energy is just getting more reliable and cheaper than ever before. The equipment cost of new coal and wind electricity in the U.S. is a mean of $102 per MWh and $42.5 per MWh, respectively. The capital cost of carbon capture equipment, $4200 per kW, is about 74% of the capital cost of a new coal plant ($5700 per kW), suggesting that new coal plus carbon capture utilization (CCU) is 1.74 $102 per MWh/$42.5 per MWh = 4.2 times the equipment cost of new wind. Since carbon capture equipment reduces only 10.8% of coal CO_2 emissions over 20 years and 20% over 100 years, the equipment for coal-CCU powered by natural gas alone costs 39 and 21 times that of wind-replacing coal per mass CO_2 removed over 20 and 100 years, respectively.[71]

Petra Nova is a dangerous and unreliable investment. NRG reported three impairment charges related to the Parish plant and the Petra Nova project. The charges, recorded in 2016, 2017, and 2019, totaled $310 million. NRG had written off essentially all its investment in the project. This is striking, given that Petra Nova not only benefited from the U.S. Energy Department's $195 million grant but also received $250 million in concessionary lending from the Japan Bank for International Cooperation (JBIC) and Mizuho.[72] Petra Nova is a pointless investment into coal that sets us back in our Paris Climate Agreement targets and is failing at its purpose to mitigate climate change. We should be expediting the decommissioning of coal power plants and switching to renewable energy.

Environmental Science 12 (12): 3567–74. https://doi.org/10.1039/c9ee02709b.

70 Ibid.

71 Ibid.

72 Mattei, Suzanne, and David Schlissel. n.d. "The Ill-Fated Petra Nova CCS Project: NRG Energy Throws in the Towel | IEEFA." Accessed March 20, 2023. https://ieefa.org/resources/ill-fated-petra-nova-ccs-project-nrg-energy-throws-towel#:~:text=-JX%20Nippon%20now%20says%20it%20anticipates%20bringing%20Petra,too%20little%20attention%20to%20date%2C%20also%20weren%E2%80%99t%20reported.

DECOMMISSIONING AND REBUILDING PARISH

As coal continues to be phased out all over the U.S., Parish should be next. The decommissioning of the coal units at the Parish power plant will improve the health and environment of the surrounding community. A decommissioning of a plant like Parish consists of making a plan that prioritizes human health and safety, environmental impact, and the laws and regulations surrounding the decommissioning and post-decommissioning process. The process will take over a year to be implemented correctly.[73] The decommissioning process consists of disposing of hazardous waste, structural demolition, salvage and scrap recovery, remediation, and more. Decommissioning costs for a typical 500-MW coal-fired power plant range from $5 million to $15 million.[74] However, the energy lost from the coal units will need to be replenished in some other way. Based on infrastructure, location, and affordability, there are two main options for a Parish transition: converting to solar or converting the coal unit to natural gas.

Solar

The Fort Bend area has already seen what renewable energy can do for the community with the recent construction of a solar farm in the county. This $258 million investment is estimated to employ up to 450 people at peak construction with 12 full-time jobs during operation.[75] This is a roughly four times cheaper investment than the Petra Nova carbon capture project in Parish. There are many advantages to solar: it is a renewable energy source with low maintenance and zero emissions once built, and it is a one-time, long-term investment. There are however, two major cons to solar; first, the lifespan of a panel

73 "COAL PLANT DECOMMISSIONING: PLANT DECOMMISSIONING, REMEDIATION AND REDEVELOPMENT." n.d. EPA. https://www.epa.gov/sites/default/files/2016-06/documents/4783_plant_decommissioning_remediation_and_redevelopment_508.pdf.

74 Power, and Power. 2016. "Coal Power Plant Post-Retirement Options." *POWER Magazine*, September. https://www.powermag.com/coal-power-plant-post-retirement-options/.

75 "Fort Bend County Solar Farm | ACCIONA | Business as Unusual." n.d. Accessed February 24, 2023. https://www.fortbendsolarfarm.com/.

is only about 25 years, and afterwards, needs to be replaced. In addition, there is no option to recycle the used solar panels. It must also be considered that, with solar, there are fluctuations with seasons and output of energy. Still, those fluctuations usually align with peak seasons and the peak need for energy. Fort Bend County sees enough sunny days to ensure that this renewable energy source is reliable for the community.[76]

Parish would not be the first to consider a solar transition. The fossil fuel industry is large (as of 2019, nearly 1.7 million people work in the industry), but with the phasing out of coal, the industry is getting smaller.[77] In a Brookings study, they mapped out all the best possible places to institute solar and deduced that many places that are used for fossil fuel energy production are also great places for renewable energy.[78] An example of this is the North Valmy coal plant which is now being turned into a solar farm and storage facility. The company that owned the plant was also able to secure millions of dollars in investments from the Inflation Reduction Act.[79] NRG could follow in theirs and many other plants footsteps and transition to solar at the Parish facility.

Natural gas/Methane

In terms of upfront costs, converting Parish's coal units into natural gas is the cheapest option, with the conversion cost being about $50 to $75/kW. The project will take a little over a year, and the total cost ranges from $25 to $75 million, depending on the project. Because of the benefits of converting to natural gas, which is mostly methane, there are already several conversion processes going on in the U.S.[80] According to the EIA, 103 coal-fired power plants were converted to or replaced by natural gas-fired plants between 2011 and 2019.[81] Over the past decade, natural gas has become a cheaper and more economically and environmentally friendly fossil fuel source than coal. However, prices can still fluctuate, making electricity prices less stable. Methane is not a permanent solution; there are still many faults. Natural gas produces half as much carbon dioxide as coal when burned, however, natural gas is mostly methane, a far more potent greenhouse gas than carbon dioxide.[82] The four natural gas units at the Parish plant already release methane into the atmosphere, contributing to global warming.[83]

There are two options if Parish is turned into a fully natural gas power plant; the first is to retire the coal-fired plant and replace it with a new natural gas-fired combined-cycle (NGCC) plant. The second option is to convert the boiler of a coal-fired steam plant to burn other types of fuel, such as natural gas.[84] The benefit of methane compared to coal is there are fewer pollutants released during the electricity generation process and no by-products that harm the health of the community. Although pollutants are still released

76 https://weatherspark.com/y/9274/Average-Weather-in-Rosenberg-Texas-United-States-Year-Round
Sena, Solar. 2022. "Pros and Cons of Solar Farms – Advantages & Disadvantages." SolarSena, April. https://solarsena.com/pros-cons-solar-farm/.

77 Tomer, Adie, Joseph Kane, and Caroline George. 2023. "How Renewable Energy Jobs Can Uplift Fossil Fuel Communities and Remake Climate Politics." *Brookings*, March 24, 2023. Accessed April 17, 2023. https://www.brookings.edu/research/how-renewable-energy-jobs-can-uplift-fossil-fuel-communities-and-remake-climate-politics/.

78 Tomer, Adie, Joseph Kane, and Caroline George. 2023. "How Renewable Energy Jobs Can Uplift Fossil Fuel Communities and Remake Climate Politics." *Brookings*, March 24, 2023. Accessed April 17, 2023. https://www.brookings.edu/research/how-renewable-energy-jobs-can-uplift-fossil-fuel-communities-and-remake-climate-politics/.

79 Energy Innovation: Policy and Technology. 2023. "99% Of U.S. Coal Plants Are More Expensive Than New Renewables. A Coal-To-Clean Transition Is Worth $589 Billion, Mostly In Red States." *Forbes*, January 30, 2023. Accessed April 23, 2023. https://www.forbes.com/sites/energyinnovation/2023/01/30/99-of-us-coal-plants-are-more-expensive-than-new-renewables-a-coal-to-clean-transition-is-worth-589-billion-mostly-in-red-states/?sh=30328be32510.

80 Power, and Power. 2011. "Natural Gas Conversions of Existing Coal-Fired Boilers." *POWER Magazine*, August. https://www.powermag.com/natural-gas-conversions-of-existing-coal-fired-boilers/.
Power, and Power. 2016. "Coal Power Plant Post-Retirement Options." *POWER Magazine*, September. https://www.powermag.com/coal-power-plant-post-retirement-options/.

81 "More than 100 Coal-Fired Plants Have Been Replaced or Converted to Natural Gas since 2011." n.d. Accessed April 23, 2023. https://www.eia.gov/todayinenergy/detail.php?id=44636#:~:text=Two%20different%20methods%20are%20used%20to%20switch%20coal-fired,other%20types%20of%20fuel%2C%20such%20as%20natural%20gas.

82 WAGNER, GERNOT. "CUT POWER PLANT POLLUTION." *Foreign Policy,* no. 198 (2013): 60–61. http://www.jstor.org/stable/41726751.

83 "Frequently Asked Questions (FAQs) - U.S. Energy Information Administration (EIA)." 2023. March 16, 2023. https://www.eia.gov/tools/faqs/faq.php?id=667&t=2.

84 "More than 100 Coal-Fired Plants Have Been Replaced or Converted to Natural Gas since 2011." n.d. Accessed April 23, 2023. https://www.eia.gov/todayinenergy/detail.php?id=44636#:~:text=Two%20different%20methods%20are%20used%20to%20switch%20coal-fired,other%20types%20of%20fuel%2C%20such%20as%20natural%20gas.

when natural gas is used as an energy source, it is cleaner than coal for the community's health.

Community Action

The Fort Bend community needs a more reliable and cleaner energy option, but NRG is unlikely to change Parish without community action. Whatever new energy option is implemented, it will provide jobs for the community that can last through this generation's energy transition occurring in the U.S. and around the world.[85] The community surrounding the Parish plant can decide and take action toward the energy option that is best for their community. However, as noted above, conversion to solar or converting the Parish coal units to natural gas is the most suitable and cost-efficient options. There are many ways of taking action and advocating for alternative energy options with NRG and the county.

Moreover, private investors have signaled a greater willingness to invest in renewable energy like solar as it is considered a low-risk investment (with the available subsidies) and a move toward cleaner renewable energy.[86] The Fort Bend community needs to show support for and willingness to pay for solar-based electricity for change. Showing an interest in solar could also mean adding home solar panels and battery storage systems to homes and buildings. There is a return on solar energy investments through lower customer electricity bills and a cleaner environment. Another possibility for action to close the coal units at Parish is creating a Climate Action Plan for Fort Bend. This comprehensive plan could include creating an outline for the decommissioning of Parish and regulating pollutants from other facilities.

85 David L. Chandler | MIT News Office. (n.d.). *The uncertain role of natural gas in the transition to clean energy*. MIT News | Massachusetts Institute of Technology. https://news.mit.edu/2019/role-natural-gas-transition-electricity-1216

86 Ambrose, Jillian. 2021. "Coal Financing Costs Surge as Investors Opt for Renewable Energy." *The Guardian*, August 25, 2021. Accessed April 17, 2023. https://www.theguardian.com/environment/2021/apr/19/coal-financing-costs-surge-as-investors-opt-for-renewable-energy.

CONCLUSION

There is no excuse why the communities surrounding Parish cannot have better air quality and a cleaner environment. Sooner or later, Parish will reach its lifespan, and NRG will have to determine a course forward for the facility. Action should be taken now to better the community with a cleaner energy option, as many other communities around the U.S. have already achieved. NRG should invest in the Fort Bend community by ending investments into carbon capture at Parish and using that money to decommission and redesign the four coal units into methane gas or solar. Parish, like many other coal plants all over the U.S., has been struggling to keep pace with renewable energy.

The time to act is now while there is support to switch to a cleaner energy source. A Fort Bend County transition could receive financial support through the Inflation Reduction Act (IRA) or Bipartisan Infrastructure Law (BIL). This transition could be a part of a larger movement in Fort Bend to increase the quality of life through policy measures like a climate action plan to ensure other companies are also being held accountable for their impact on the community and environment. Unfortunately, NRG is not even doing the bare minimum by constantly violating rules and regulations.[87] A failure to change the greater Harris-Fort Bend energy landscape is failing our most vulnerable; the nearest school to Parish is only 6.8 miles from the coal plant, meaning that the students, our future, are consistently being exposed to deadly pollution. The Parish power plant accounts for 15% of Houston's energy, and that energy should not be at the cost of lives.[88] NRG should lead the way in renewable energy for Fort Bend County and the Greater Houston area.

87 "WA Parish Coal Plant Near Houston Continues to Pollute - Public Citizen." 2021. Public Citizen. November 18, 2021. https://www.citizen.org/news/wa-parish-coal-plant-near-houston-continues-to-pollute/.

88 "Coal Unit Catches Fire at NRG's W.A. Parish Generating Station in Fort Bend County." 2022. ABC13 Houston. May 10, 2022. https://abc13.com/power-plant-fire-nrg-wa-parish-generating-station-fort-bend-county-yu-jones-road-and-smithers-lake/11830712/.

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