

Impact of Refinery Row on the City of Corpus Christi

Applied Economics Clinic

Prepared on behalf of Indigenous Peoples of the Coastal Bend



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Executive Summary

Six out of the 30 petroleum refineries in the State of Texas are located in the City of Corpus Christi, in a 72 square mile stretch referred to as “Refinery Row” where air pollution above permitted levels was detected for almost every day of the year in 2019. Petroleum refineries release harmful air pollutants such as benzene, carbon monoxide, and particulate matter in addition to greenhouse gas emissions, exacerbating the already disparate environmental burden, placed on predominately low-income and Black, Indigenous, and People of Color communities.

In the absence of more stringent reporting requirements and enforcement actions, Corpus Christi’s petroleum refineries release harmful pollutants above permitted levels while suffering only minor consequences; in contrast the neighborhoods closest to Refinery Row suffer disparate rates of asthma and cancer prevalence as compared to other areas in Corpus Christi. Moreover, major petroleum companies oversell the economic benefits that Refinery Row provides to nearby communities; workers employed in petroleum and coal manufacturing make up less than 2 percent of Nueces County’s total workforce (see ES-Table 1).

ES-Table 1. Nueces County 2021 employment in selected industries

Industry name	Number of employees	Share of employees
Health care and social assistance	28,844	19%
Accommodation and food services	18,660	12%
Retail trade	17,730	12%
Educational services	10,749	7%
Petroleum and coal products manufacturing	2,392	2%
Total, all industries	152,319	100%

The serious health and environmental impacts of oil refineries and other fossil fuel infrastructure pollution on Corpus Christi communities are not “normal.” The City’s predominately BIPOC residents face a myriad of environmental hazards that put them at increased risk of adverse health outcomes such as asthma, cancer, and heart disease. Corpus Christi’s struggles with the impacts of industrial pollution are rooted in a history of systemic inequity. Ongoing battles for environmental justice within Texas and across the United States offer several strategic lessons for Corpus Christi’s communities in working to address and remediate the inequitable harms of the fossil fuel industry.



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About the Applied Economics Clinic

Based in Arlington, Massachusetts, the Applied Economics Clinic (AEC) is a mission-based non-profit consulting group that offers expert services in the areas of energy, environment, consumer protection, and equity from seasoned professionals while providing on-the-job training to the next generation of technical experts.

AEC’s non-profit status allows us to provide lower-cost services than most consultancies and when we receive foundation grants, AEC also offers services on a pro bono basis. AEC’s clients are primarily public interest organizations—non-profits, government agencies, and green business associations—who work on issues related to AEC’s areas of expertise. Our work products include expert testimony, analysis, modeling, policy briefs, and reports, on topics including energy and emissions forecasting, economic assessment of proposed infrastructure plans, and research on cutting-edge, flexible energy system resources.

AEC works proactively to support and promote diversity in our areas of work by providing applied, on-the-job learning experiences to graduate students—and occasionally highly qualified undergraduates—in related fields such as economics, environmental engineering, and political science. Over the past four years, AEC has hosted research assistants from Boston University, Brandeis University, Clark University, Tufts University, and the University of Massachusetts-Amherst. AEC is committed to a just workplace that is diverse, pays a living wage, and is responsive to the needs of its full-time and part-time staff.

Founded by Clinic Director and Senior Economist Elizabeth A. Stanton, PhD in 2017, AEC’s talented researchers and analysts provide a unique service-minded consulting experience. Dr. Stanton has had two decades of professional experience as a political and environmental economist leading numerous studies on environmental regulation, alternatives to fossil fuel infrastructure, and local and upstream emissions analysis. AEC professional staff includes experts in electric, multi-sector and economic systems modeling, climate and emissions analysis, green technologies, and translating technical information for a general audience. AEC’s staff are committed to addressing climate change and environmental injustice in all its forms through diligent, transparent, and comprehensible research and analysis.

I. Introduction

Texas is home to one-fifth of the nation's petroleum and coal industry workers and hosts 30 petroleum refineries. Six of those oil refineries can be found in Corpus Christi's "Refinery Row" district, along with 20 other polluting facilities that create greenhouse gas emissions and release various toxic chemicals into the surrounding air and water. Emissions and pollution from hazardous facilities are linked to a myriad of adverse health impacts—including respiratory and cardiovascular disease and cancer—that disproportionately impact overburdened communities including children, pregnant people, older adults, and individuals with pre-existing health conditions.

This Applied Economics Clinic (AEC) report, prepared on behalf of the Indigenous Peoples of the Coastal Bend (IPCB), summarizes the negative impacts of the polluting facilities located in the City of Corpus Christi and its "Refinery Row" district, including a discussion of the ways in which negative impacts from polluting facilities fall disproportionately across communities, creating the greatest harms for the most overburdened.

Compared to Texas as a whole, Corpus Christi residents are more likely to be Black, Indigenous, People of Color (BIPOC), earn less income, and have attained less formal education. Within Corpus Christi, residents near Refinery Row are more likely to be overburdened than residents farther away—that is, they are more likely to have lower incomes, higher rates of disability, and higher shares of children, older adults, BIPOC and English-isolated households. Therefore, Corpus Christi residents—and particularly those nearest Refinery Row—have a greater risk of adverse health outcomes from fossil fuel related pollution. Pollution levels in Corpus Christi often surpass legal thresholds: In 2019, the Corpus Christi region had illegal air pollution events on 351 calendar days out of the year. However, regulators have largely declined to enforce penalties on polluting facilities and existing legislation does not provide robust protection for the overburdened communities living near Refinery Row who are bearing the greatest burden of Corpus Christi's fossil fuel-related impacts.

In order to address and remediate the inequitable harms of the fossil fuel industry in Corpus Christi, AEC makes three recommendations for strategic advocacy: 1) mount legal and regulatory challenges against fossil fuel industry activity; 2) organize refinery and other fossil fuel industry workers to mobilize resistance to actions taken and harms created by fossil fuel companies; and 3) engage in direct action and advocacy campaigns with community coalitions and sustained community engagement.

The remainder of the report is organized as follows: Section II provides a background on Texas' oil refineries and Corpus Christi's "Refinery Row" district; Section III presents an overburdened community index (OCI) for Corpus Christi based on U.S. Census data; Section IV summarizes adverse health outcomes from industrial pollution and how overburdened groups face disproportionate negative health impacts from industrial pollution; Section V summarizes the roles and responsibilities of federal, state and city-level decision-makers with authority over Corpus Christi's oil refineries, the actions of those authorities to date as they relate to enforcement of pollution regulations, and the state of environmental justice protections in Texas; and Section VI presents three recommendations for strategic advocacy to address and remediate the inequitable harms of the fossil fuel industry in Corpus Christi.

II. Refinery Row

According to the U.S. Bureau of Labor Statistics (BLS), Texas is home to one-fifth of the nation’s petroleum and coal products manufacturing industry workforce, more than 20,000 workers.¹ About 2,000 of these workers have jobs in Nueces County—representing ten percent of Texas’ petroleum workforce and two percent of the nation’s petroleum workforce.

Less than 2 percent of Nueces County’s workforce is employed by refineries

Despite industry claims that refineries provide substantial job opportunities for local communities,² Nueces County’s petroleum workers make up less than 2 percent of the County’s total workforce (see Table 1).³ In contrast, almost three-fifths (57 percent) of all Nueces County workers are employed in just five industries: health care and social assistance; accommodation and food services; retail trade; construction; and educational services. Refineries create high-paying jobs—but only for the small minority of the workforce employed in the petroleum industry. While workers in Nueces County’s five largest industries earned an average annual pay of \$36,800 in 2021, petroleum refinery workers earned an average annual pay of \$133,000—more than three times the average annual pay for Nueces County workers across all industries in the same year.⁴

Table 1. Nueces County 2021 employment in selected industries

Industry name	Number of employees	Share of employees
Health care and social assistance	28,844	19%
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Petroleum and coal products manufacturing	2,392	2%
Total, all industries	152,319	100%

Data source: U.S. BLS. 2021. “QCEW NAICS-Based Data files (1975 – most recent).”

Corpus Christi’s “Refinery Row” district hosts six petroleum refineries and 20 other polluting facilities in a

¹ U.S. BLS. 2021. “QCEW NAICS-Based Data files (1975 – most recent).” [Annual Averages By Industry Table 324: Petroleum and coal products manufacturing.] Available at: <https://www.bls.gov/cew/downloadable-data-files.htm>

² See, for example: Gulf Coast Growth Ventures. June 13, 2019. “ExxonMobil, SABIC to proceed with Gulf Coast Growth Ventures project” [Press Release]. Available at: <https://gulfcoastgv.com/june-13-2019>.

³ U.S. BLS. 2021. “QCEW NAICS-Based Data files (1975 – most recent).”

⁴ Ibid.

72⁵ square mile area (see Figure 1 below).⁶ In Corpus Christi, located in Nueces County in coastal South Texas, 16 percent of households are living below the poverty level compared to 14 percent statewide.⁷ Similarly, 73 percent of residents living in Corpus Christi identify as Black, Indigenous, and/or people of color (BIPOC)⁸ compared to just 58 percent of Texas residents.⁹

Texas' 30 petroleum refineries convert petroleum—sometimes called crude oil—into various industrial and commercial products including gasoline, diesel fuel, fuel oils, and other petrochemicals.¹⁰ According to the U.S. Energy Information Administration (EIA), nearly one-quarter (24 percent) of the United States' operating petrochemical refineries are located in Texas, the highest number within any U.S. state.¹¹

⁵ AEC Estimation using ArcPro GIS software.

⁶ Agency for Toxic Substances and Disease Registry (ATSDR). 2016. "Refinery Row Facilities and Stationary Air Monitor Locations, Corpus Christi, TX." CDC. Available at: https://www.atsdr.cdc.gov/HAC/pha/CorpusChristi/Brochure_Fact_Sheet_508.pdf.

⁷ U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables [S1701]. Available at:

https://data.census.gov/cedsci/table?q=S1701&g=0500000US48355_1600000US4817000&tid=ACSSY2020.S1701

⁸ "BIPOC" refers to Black, Indigenous, and people of color. The term "BIPOC" uses person-first language and is preferred alternative to the terms "minority" or "marginalized" because these terms can lack humanity, suggest inferiority, or reinforce bias. However, "BIPOC" is an umbrella term and should not be used for individuals or smaller racial or ethnic groups where more specific language (e.g., Black, Indigenous, Latinx) is appropriate. Sources: (1) HUES Book Box. N.d. "Stop saying 'minority' and 'POC.' Switch to 'BIPOC' instead." Available at: <http://www.huesbookbox.com/articles/educational/stop-saying-the-words-minority-and-poc-switch-to-bipoc-instead-heres-why>. (2) Raypole, C. November 9, 2021. "BIPOC: What it Means and Why it Matters." Healthline. Available at: <https://www.healthline.com/health/bipoc-meaning>.

⁹ U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables [B03002]. Available at:

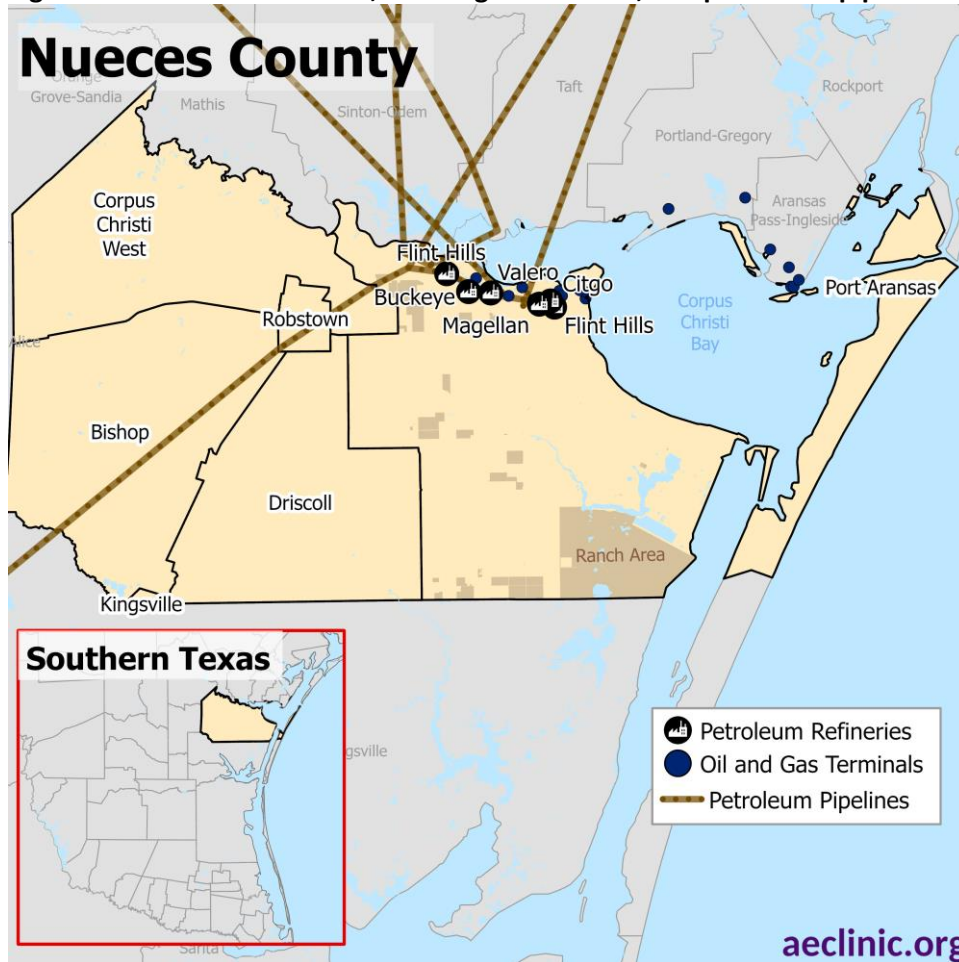
<https://data.census.gov/cedsci/table?q=%20B03002&g=0500000US48355%241400000&tid=ACSDY2020.B03002>

¹⁰ Petrochemicals are chemical products that result from the processing of petroleum. These products include rubbers and plastics, aromatics, detergents, dyes, and industrial chemicals. See: (1) U.S. EIA. February 23, 2022. "Oil and petroleum products explained: Refining crude oil." Available at: <https://www.eia.gov/energyexplained/oil-and-petroleum-products/refining-crude-oil-the-refining-process.php>. (2) Speight, J.G. 2011. "Petrochemicals." *Handbook of Industrial Hydrocarbon Processes*. Houston, TX: Gulf Professional Publishing.

¹¹ U.S. EIA. 2022. "Petroleum & Other Liquids: Number and Capacity of Petroleum Refineries." Available at:

https://www.eia.gov/dnav/pet/pet_pnp_cap1_dcunusa.htm

Figure 1. Petroleum refineries, oil and gas terminals, and petroleum pipelines in Nueces County, Texas



Data source: U.S. EIA. 2022. "Layer Information for Interactive State Maps." Available at: https://www.eia.gov/maps/layer_info-m.php

Corpus Christi residents are disproportionately BIPOC and earn lower incomes on average

Compared to Texas as a whole, Corpus Christi residents are more likely to be BIPOC, earn less income, and have attained less formal education (see Table 2). In Corpus Christi, 73 percent of residents are BIPOC compared to 59 percent of residents in the State of Texas as a whole (and 41 percent nationwide). Similarly, 37 percent of Corpus Christi households earn less than double the federal poverty level (in 2021, double the federal poverty threshold was \$55,480 for a family of four), compared to 33 percent of all Texas residents.¹² The median household income in Corpus Christi is around \$55,000 per year: That means that half of all households in Corpus Christi earn more than \$55,000 and half earn less. In comparison, Texas' median household income is over \$63,000, and the nationwide median household income is nearly

¹² The U.S. Census Bureau defines the federal poverty line as an indicator of financial need determined by the gross income of a household, size of the family, ages, and the CPI-U inflation index. Sources: (1) U.S. Census Bureau. 2022. "How the Census Bureau Measures Poverty." Available at <https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html>; (2) U.S. Census Bureau. 2022. "Poverty Thresholds." Available at: <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html>

\$70,000 per year. In Corpus Christi, 21 percent of the population holds a college degree, compared to 31 percent in Texas as a whole and 35 percent nationwide.

Table 2. Community snapshot

Statistic	Corpus Christi	Texas	United States
Median household income (\$)	\$55,336	\$63,826	\$69,717
Below federal poverty level	16.4%	14.2%	12.8%
Residents above 65	13.6%	12.5%	16.0%
Residents under 18	24.8%	25.8%	22.4%
BIPOC residents	72.5%	58.0%	39.9%
Spanish-speaking households	32.8%	28.8%	13.2%
Limited English speaking households	4.0%	7.3%	4.2%
Disabled residents	12.6%	11.5%	12.7%
No high school diploma	16.4%	15.6%	10.6%
With college degree	20.9%	30.7%	35.0%
Uninsured residents	17.9%	17.3%	8.7%

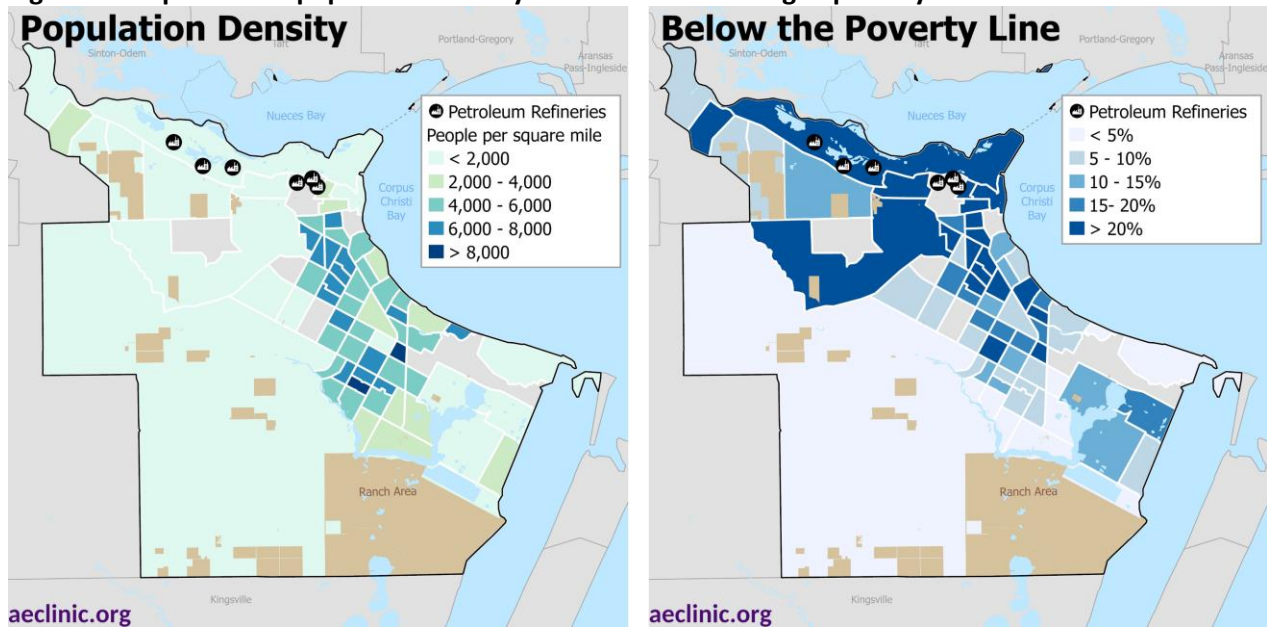
Data sources: See Table 6 in Appendix.

The Corpus Christi communities closest to Refinery Row are more densely populated and face disproportionate poverty rates compared to the rest of the city (see Figure 2). According to the U.S. Census American Community Survey, about half of those living below the poverty line in Corpus Christi are Indigenous Peoples, Black, and/or Asian, and almost 90 percent are non-white and/or Hispanic or Latinx.¹³

¹³ U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables [S1701]. Available at:

https://data.census.gov/cedsci/table?q=S1701&g=0500000US48355_1600000US4817000&tid=ACSS15Y2020.S1701

Figure 2. Corpus Christi population density and households living in poverty



Data Source: U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables [B01001; S1701].

III. Equity Analysis

Communities that have historically been placed at greater risk of environmental hazards are often termed environmental justice (EJ) communities. According to the U.S. Environmental Protection Agency (EPA), environmental justice is:

“the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”¹⁴

EJ communities bear the brunt of climate change impacts and air and water pollution exposure,¹⁵ putting these communities at higher risk for adverse health outcomes as outlined in the *Health Outcomes* section

¹⁴ U.S. EPA. n.d. “Environmental Justice.” Available at: <https://www.epa.gov/environmentaljustice>

¹⁵ (1) Island, S.N. & Winkel, J. 2017. *Climate Change and Social Inequality*. DESA Working Paper No. 152. Available at: https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf; (2) Ikati, I., Benson, A.F., Luben, T. J. Sacks, J.D, and Richmond-Bryant, J. 2018. “Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status.” *American Journal of Public Health*, 108,480-485. Available at: <https://doi.org/10.2105/AJPH.2017.304297>; (3) Banzhaf, S., Ma, L., and Timmins, C. 2019. “Environmental Justice: The Economics of Race, Place, and Pollution.” *Journal of Economic Perspectives*, 33 (1),185-208. Available at: <https://www.aeaweb.org/articles?id=10.1257/jep.33.1.185>

below, such as respiratory illnesses¹⁶ and conditions like severe COVID-19 infections,¹⁷ cardiovascular disease, and cancer.

Corpus Christi communities living near petroleum refineries are overburdened

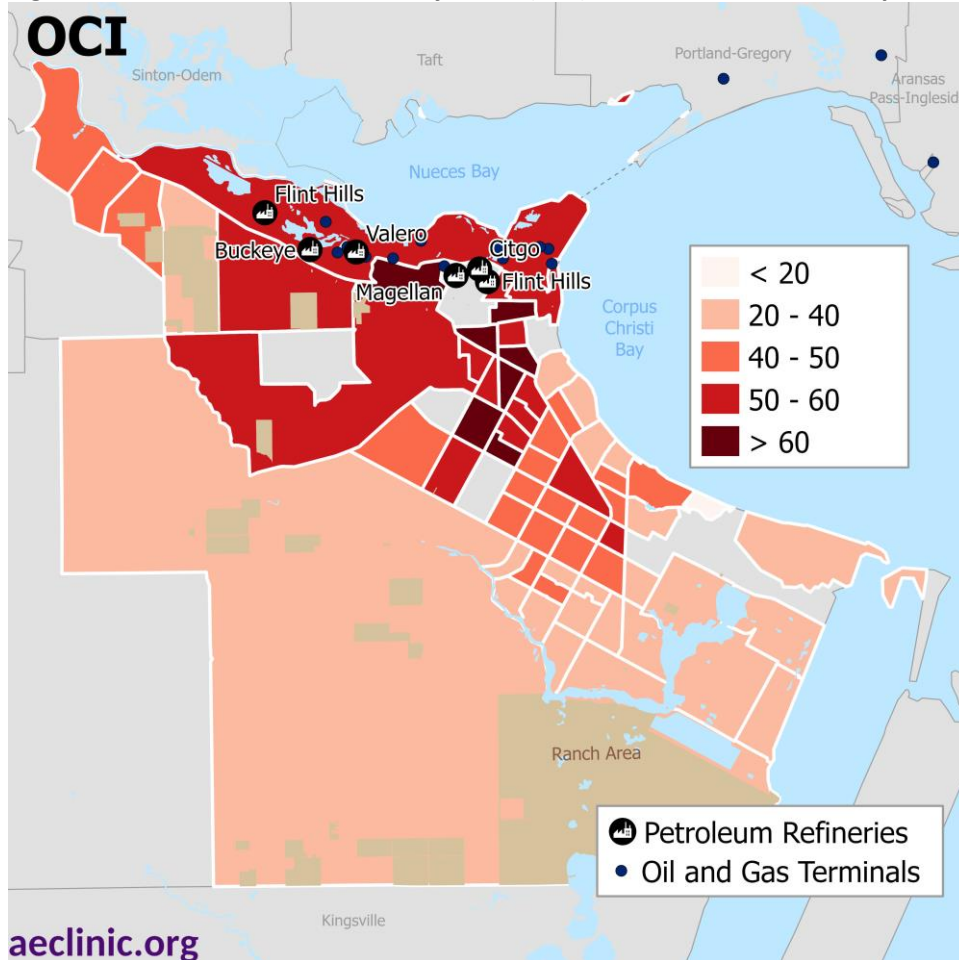
AEC calculated an overburdened community index (OCI)¹⁸ for Corpus Christi combining Census tract-level data on median annual household income and the share of residents or households that are disabled, children, older adults, or limited-English speaking. The communities in Corpus Christi with the highest OCI values—that is, those most likely to host residents overburdened by systemic inequities and bear the brunt of adverse environmental, climate, and health impacts—are those closest to Refinery Row (see Figure 3, where darker reds indicate greater burdens).

¹⁶ Miranda, L. M., Edwards, S. E., Keating, M. H., and Paul, C. J. 2011. “Making the Environmental Justice Grade: The Relative Burden of Air Pollution Exposure in the United States.” *International Journal of Environmental Research and Public Health*, 8(6), 1755-1771. <https://doi.org/10.3390/ijerph8061755>

¹⁷ Alisalad, S., Tavares, E., Stasio, T., and Majumder, M. 2021. “What the COVID-19 Pandemic Can Teach Us About Climate Justice.” Applied Economics Clinic. Available at: <https://aeclinic.org/publicationpages/2021/02/03/what-the-covid19-pandemic-can-teach-us-about-climate-justice>

¹⁸ An important caveat: Where our analysis is based on Census data, the absence of characteristics and experiences of undocumented individuals in the original data skews our results by suggesting that more people are native-born, white, higher-income, and not living in poverty than is actually the case.

Figure 3. Overburdened Community Index (OCI) distributions across Corpus Christi



Data Source: U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables [Table IDs: S1701, B18101, B01001, B03002, S1603].

The OCI combines values from six measures of burden, based on a formula discussed in *Social Equity Analysis of Carbon Free Boston*:¹⁹

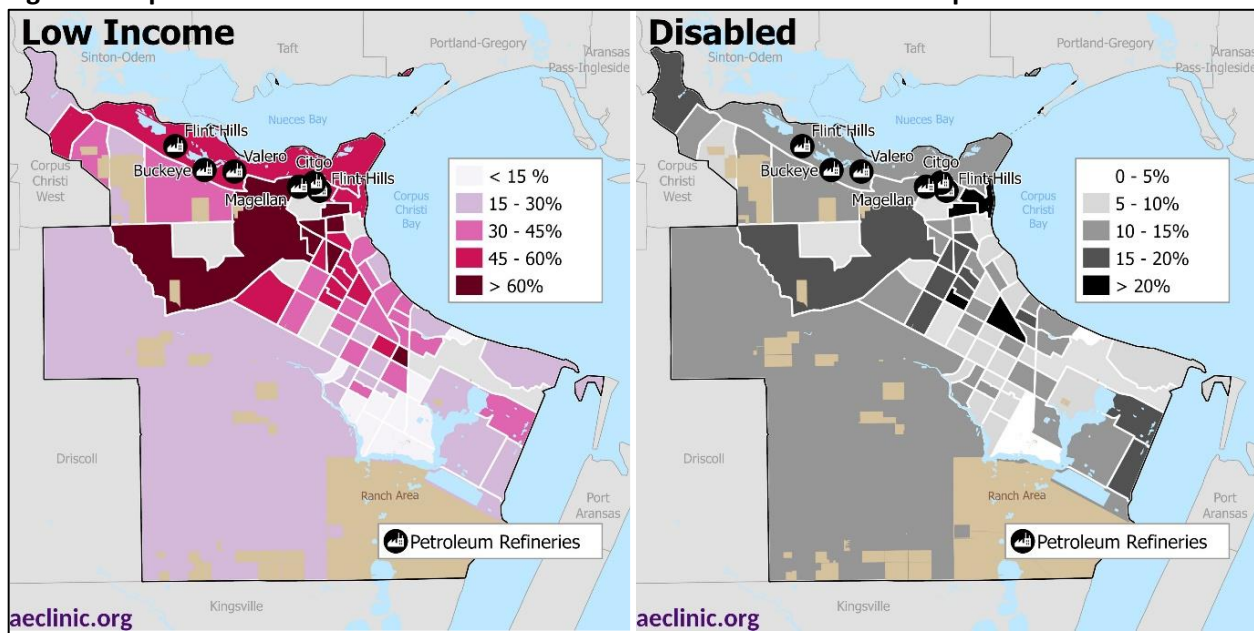
- **Limited English:** the share of households that speak limited English.
- **BIPOC:** the share of the population that identifies as Black, Indigenous, or Persons of Color.
- **Disabled:** the share of the population that is disabled.
- **Low-to-no Income:** the share of the population that earns 150 percent or less of the federal poverty level.
- **Children:** the share of the population that is under the age of 18.

¹⁹ Woods, B. and Stanton, E. A. 2019. *Social Equity Analysis of Carbon Free Boston*. Prepared on behalf of the Green Ribbon Commission. Applied Economics Clinic. Available at: <https://aeclinic.org/publicationpages/2019/4/12/social-equity-analysis-of-carbon-free-boston>

- **Older Adults:** the share of the population that is over the age of 65.²⁰

These six OCI measures are presented individually in Figure 4, Figure 5, and Figure 6 below, which demonstrate that—similarly to the combined OCI results—Corpus Christi residents that live in close proximity to its petroleum refineries have lower incomes, higher rates of disability, and higher shares of children, older adults, BIPOC and English-isolated households than areas farther away. Corpus Christi’s low-income residents’ proximity to hazardous polluting facilities is not coincidental: The City has received criticism for siting affordable housing projects in the neighborhoods in and around Refinery Row.²¹ Children, older adults and disabled populations are all at greater risk for negative health outcomes from fossil-fuel related pollution.²²

Figure 4. Population distributions of low-income and disabled residents in Corpus Christi



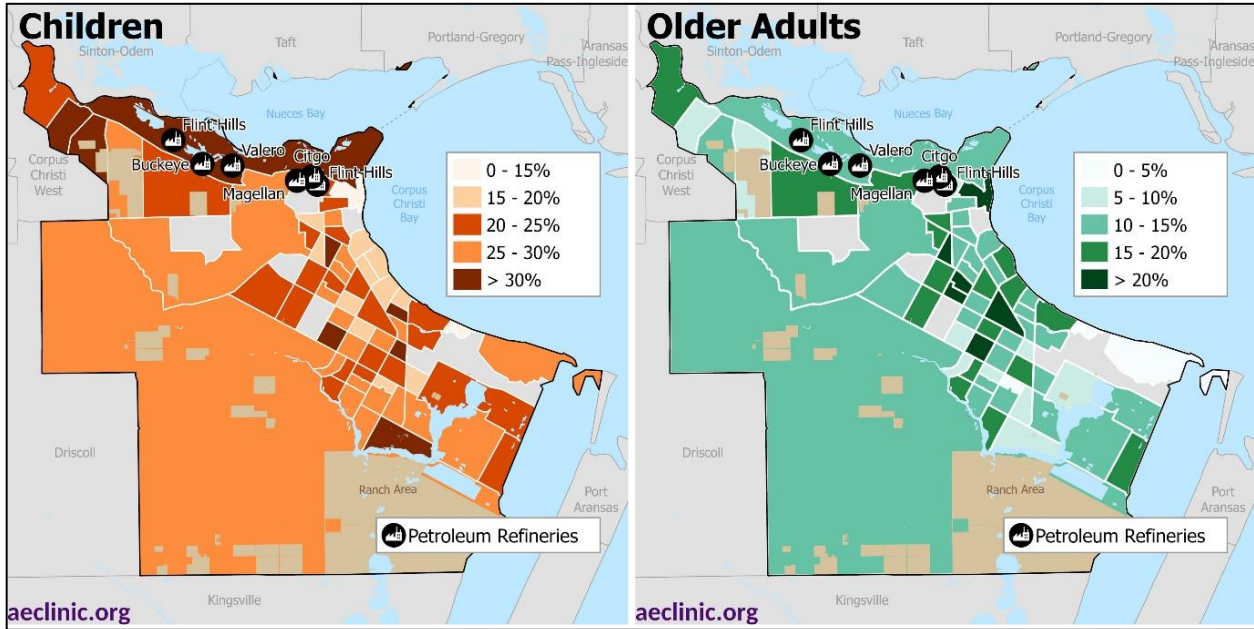
Sources: U.S. Census Bureau. 2020. American Community Survey (ACS) 5-Year Detailed Estimates [Table IDs: S1701, B18101].

²⁰ For each census block group or neighborhood, population shares for the six overburdened groups are converted into six component indices, each ranging from 0 to 100/6 (or 16.7) in value. A higher score indicates a greater degree of burden. The OCI is the sum of these component indices.

²¹ Crow, K. February 4, 2022. "Corpus Christi Housing Authority under scrutiny for homes in Refinery Row neighborhood." *Caller Times*. Available at: <https://web.archive.org/web/20220204193427/http://eu.caller.com/story/news/local/2022/02/04/corpus-christi-housing-authority-new-houses-refinery-row-dona-park/9104075002/>

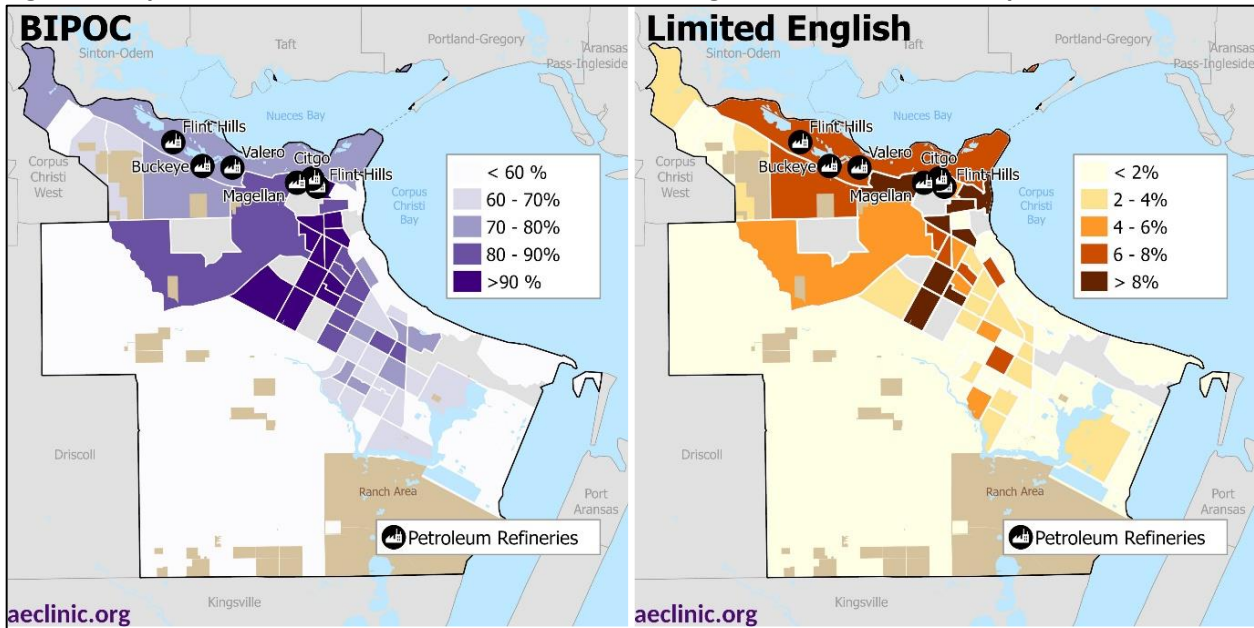
²² 1) Perera, F. 2018. "Pollution from fossil-fuel combustion is the leading environmental threat to global pediatric health and equity: Solutions exist." *International journal of environmental research and public health*, 15(1), p. 16. Available at: <https://www.mdpi.com/1660-4601/15/1/16>; 2) Chakraborty, J. October 2022. "Disparities in exposure to fine particulate air pollution for people with disabilities in the US." *Science of the Total Environment*, 842. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0048969722038888#!>; 3) AirNow. N.d. "Older Adults and Air Quality." Available at: <https://www.airnow.gov/air-quality-and-health/older-adults/>

Figure 5. Population distributions of children and older adults in Corpus Christi



Sources: U.S. Census Bureau. 2020. American Community Survey (ACS) 5-Year Detailed Estimates [Table ID: B01001].

Figure 6. Population distributions of BIPOC and limited-English communities in Corpus Christi



Sources: U.S. Census Bureau. 2020. American Community Survey (ACS) 5-Year Detailed Estimates [Table IDs: B03002, S1603].

Corpus Christi residents are disproportionately exposed to environmental hazards

According to the U.S. EIA, about 14 percent of Texas' petroleum capacity is located within the City of Corpus Christi.²³ These petroleum facilities release harmful air pollutants such as benzene, carbon monoxide (CO), and particulate matter (PM) in addition to greenhouse gas emissions, creating air pollution and direct health hazards for local communities and contributing to climate threats on a global scale.²⁴

In 2020, greenhouse gas emissions from large refineries²⁵ in Texas totaled 52 million metric tons (MMT) of carbon dioxide equivalents (CO₂e); 26 percent, or 13.8 MMT CO₂e, came from just three cities in Nueces County: Corpus Christi, Robstown, and Bishop. On a per-facility basis, petroleum refineries emit more than other polluting facilities in Corpus Christi. According to data from EPA's FLIGHT tool, Corpus Christi's 19 major polluting facilities across all sectors emitted 13 MMT CO₂e in 2020 and the City's eight refineries were responsible for over 60 percent of those emissions. (Just two refineries alone—the Valero Corpus Christi and Flint Hills Resources Corpus Christi West refineries—were responsible for nearly 42 percent of the 13 MMT CO₂e emitted from the City's 19 major polluting facilities (see Figure 7).²⁶)

In addition to greenhouse gas emissions, refineries release various toxic chemicals into the surrounding air and water. In Corpus Christi, several refineries exceeded EPA's "action level" for the toxic chemical benzene in 2019 and 2020. Valero Corpus Christi Refinery East, CITGO Corpus Christi Refinery East, and Flint Hills Resources Corpus Christi West Plant—had actual benzene levels in excess of 9 micrograms per cubic meter, each with majority-BIPOC and disproportionately poor communities within a 3-mile radius.²⁷ The Valero refinery is situated within 3 miles of over 38,000 residents—87 percent of whom are non-white and 59 percent of whom are below the poverty line.²⁸ Illegal levels of air pollution are disproportionately high in Texas—in the Texas Commission on Environmental Quality (TCEQ)'s Midland region, one or more unauthorized air pollution events happened every single day in 2019. That year, the Houston and Corpus Christi regions had air pollution events on 357 and 351 calendar days out of the year, respectively.²⁹

The damage caused by present-day polluting facilities in Corpus Christi is rooted in decades of historical environmental injustices. The federal Superfund Act authorizes EPA to deal with hazardous releases of "any pollutant or contaminant which may present an imminent and substantial danger to public health or welfare"³⁰ at locations set in a National Priorities List, which has been active since 1983. Parties responsible

²³ U.S. EIA. 2021. "Refinery Capacity Report." Available at:

<https://www.eia.gov/petroleum/refinerycapacity/archive/2021/refcap21.pdf>

²⁴ Hazardous Substance Research Centers/South and Southwest Outreach Program. 2003. *Environmental Impact of the Petroleum Industry*. Available at: <https://cfpub.epa.gov/ncer/abstracts/index.cfm/fuseaction/display.files/fileID/14522>. p.2

²⁵ Facilities that are required to participate in the Greenhouse Gas Reporting Program (i.e., those that emit greater than 25,000 metric tons of carbon dioxide equivalent greenhouse gases per year. See: U.S. EPA. n.d. "Using GHG Inventory and GHGRP Data." Available at: https://cfpub.epa.gov/ghgdata/inventoryexplorer/data_explorer_flight.html

²⁶ Ibid.

²⁷ Environmental Integrity Project. 2021. "Environmental Justice and Refinery Pollution: Benzene Monitoring Around Oil Refineries Showed More Communities at Risk in 2020". Available at: <https://environmentalintegrity.org/wp-content/uploads/2021/04/Benzene-report-4.28.21.pdf>

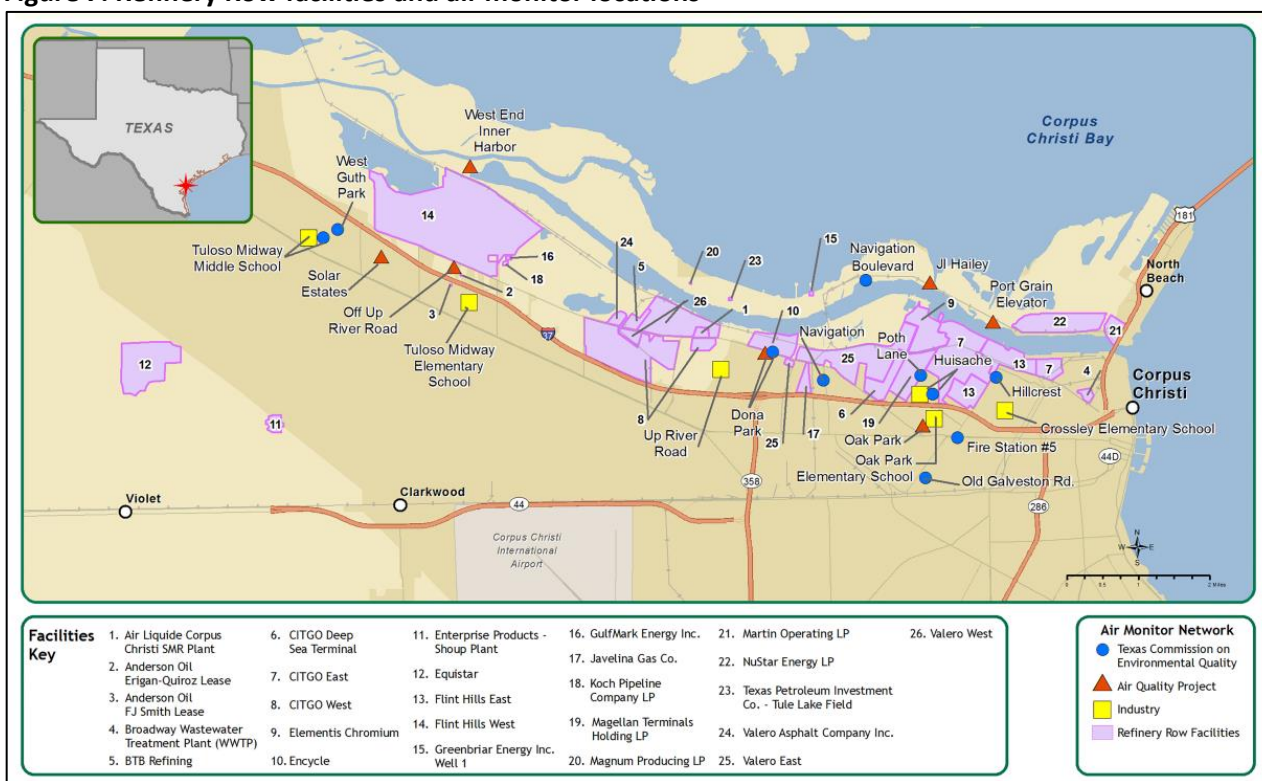
²⁸ Ibid.

²⁹ Fraser, C. 2020. "Illegal Air Pollution in Texas 2020. Prepared for Environment Texas." Available at: https://environmenttexas.org/sites/environment/files/reports/TX_Pollution_2020_scrn.pdf

³⁰ Encyclopedia. N.d. "Superfund Site." Available at: <https://www.encyclopedia.com/environment/energy-government-and-defense-magazines/superfund-site>

for creating dangerous sites are required to pay for cleanup, when possible, and a trust fund (the Superfund) was established to pay for the remaining sites, funded by a tax on crude oil and some industrial chemicals as well as an income tax on some corporations.³¹ In Nueces County, there are five Superfund sites, two of which are located within Corpus Christi proper—Brine Service Company and Industrial Road/Industrial Metals³²—while the remaining three are located in Robstown³³ and Banquete.³⁴ The Brine Service Company Superfund Site is located at the northeast corner of the intersection of IH-37 and Goldston Road.³⁵ The Site contains former waste disposal pits that were determined contaminated in 2000.³⁶ The Industrial Road/Industrial Metals Superfund Site is a former lead-battery recycling and copper salvage facility located in a residential, light industrial, and commercial area of Corpus Christi.³⁷

Figure 7. Refinery Row facilities and air monitor locations



Source: ATSDR. 2016. "Corpus Christi Refinery Row." CDC. Available at: https://www.atsdr.cdc.gov/HAC/pha/CorpusChristi/Brochure_Fact_Sheet_508.pdf

³¹ Ibid

³² TCEQ. June 20, 2022. "Superfund Sites in Nueces County." Available at: <https://www.tceq.texas.gov/remediation/superfund/sites/county/nueces.html>

³³ Ibid.

³⁴ TCEQ. June 16, 2022. "South Texas Solvents." Available at: <https://www.tceq.texas.gov/remediation/superfund/state/sotxsol.html>

³⁵ U.S. EPA. N.a. "BRINE SERVICE COMPANY CORPUS CHRISTI, TX." Available at: <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0605264#bkground>

³⁶ Ibid

³⁷ TCEQ. April 14, 2021. "Industrial Road/Industrial Metals." Available at: <https://www.tceq.texas.gov/remediation/superfund/state/indroad.html>

IV. Health Outcomes

Hazardous facilities like petroleum refineries and fossil fuel plants release harmful air pollution and emissions that are linked to a myriad of health issues, including respiratory and cardiovascular disease and cancer. According to EPA’s Power Plants and Neighboring Communities Mapping Tool, Black, Indigenous, and low-income populations often experience disproportionate adverse health outcomes caused by the environmental issues presented by fossil fuel facilities, including higher incidences of heart and lung diseases and increased number of hospitalizations and premature deaths.³⁸ Ten percent of Black Texans live within half a mile of an oil or gas facility.³⁹ Black residents of Jefferson County, home to one of the world’s largest refineries, have a 15 percent higher cancer rate than the Texas average and a cancer mortality rate that is 40 percent higher.⁴⁰ According to a 2013 study from the Massachusetts Institute of Technology, more than 14,000 Texans die each year due to air pollution, including 3,583 premature deaths.⁴¹

Adverse health outcomes from industrial pollution disproportionately impact groups that are more susceptible to air pollution, like children, pregnant people, older adults, and individuals with pre-existing heart and lung disease. Children residing within two miles of the Houston Ship Channel live with a 56 percent higher risk of contracting leukemia that is linked to oil refineries and chemical plants.⁴² In a systematic review of the association between oil and gas extraction processes and human reproductive health, moderate to ample evidence was found for the following reproductive issues: increased risk of preterm birth, miscarriage, birth defects, decreased semen quality, disruption of hormone receptors, and prostate cancer.⁴³ People in low-income neighborhoods and communities may be more vulnerable to negative effects from air pollution, due to closer proximity to sources of air pollution, underlying health problems, poor nutrition, and stress.⁴⁴

Corpus Christi residents have greater risk of adverse health outcomes

In areas dominated by fossil fuel industries—like Corpus Christi—health conditions caused or worsened by pollution such as cancer, asthma, respiratory illness, birth complications, mental health conditions, and premature death are likely to be more prevalent.⁴⁵ People who live and work near Refinery Row have

³⁸ (1) U.S. EPA. n.d. “Power Plants and Neighboring Communities.” Available at: <https://www.epa.gov/airmarkets/power-plants-and-neighboring-communities>; (2) Earthjustice. N.d. Fact Sheet: Oil Refineries and Toxic Air Pollution. Available at: https://earthjustice.org/sites/default/files/files/Refineries-Fact-Sheet_04-08.pdf.

³⁹ Earthjustice. N.d. Fact Sheet: Oil Refineries and Toxic Air Pollution. Available at: https://earthjustice.org/sites/default/files/files/Refineries-Fact-Sheet_04-08.pdf. p. 11.

⁴⁰ Clean Air Task Force. 2017. *Fumes Across the Fence Line*. Prepared for the National Association for the Advancement of Colored People. Available at: https://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf. P. 23-24.

⁴¹ Fraser, 2020, p. 5.

⁴² Fraser, 2020, p. 11.

⁴³ Balise, V.D., et al. 2016. “Systematic review of the association between oil and natural gas extraction processes and human reproduction.” *Fertility and Sterility*, 106(4), p. 795-819. Available at: <https://www.sciencedirect.com/science/article/pii/S0015028216625293>

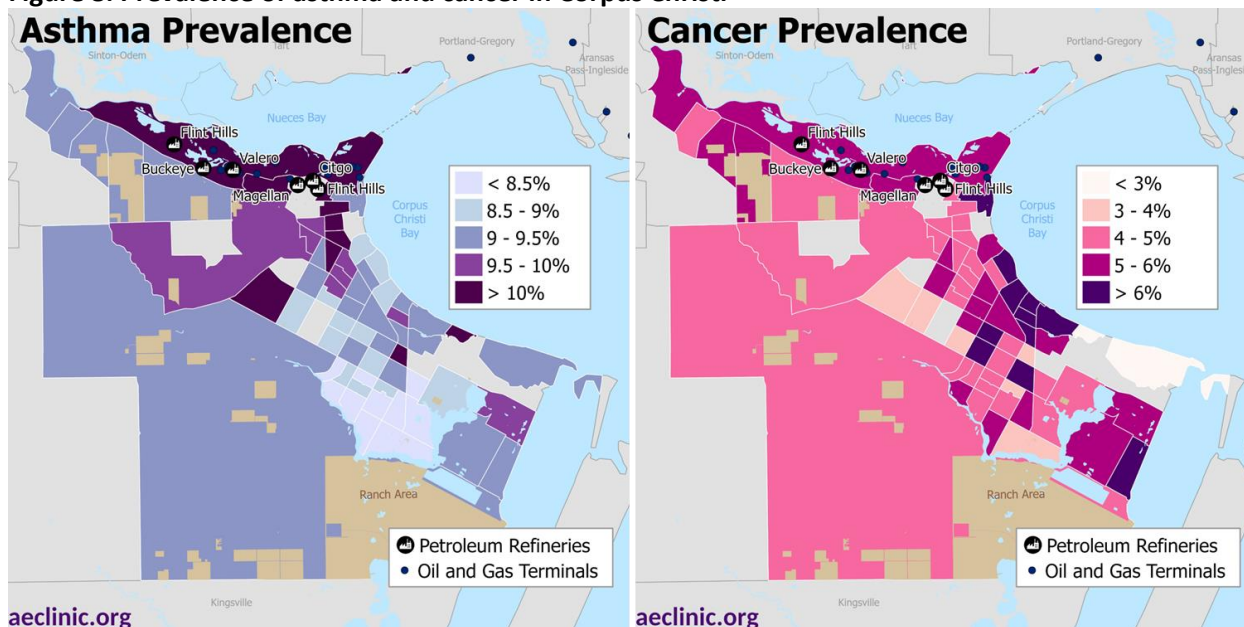
⁴⁴ United States Environmental Protection Agency. Updated: February 16, 2022. “Research on Health Effects from Air Pollution.” EPA. Available at: <https://www.epa.gov/air-research/research-health-effects-air-pollution>

⁴⁵ Clean Air Task Force. 2017. *Fumes Across the Fence Line*. Prepared for the National Association for the Advancement of Colored People. Available at: https://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf. p.12

higher rates of asthma, two types of birth defects, and cancer compared with other areas (see Figure 8).

Nueces County has a higher rate of child asthma hospitalizations than Texas as a whole, and in a study by the U.S. Centers for Disease Control (CDC), two heart defects were more common among children of mothers living within 2 miles of Refinery Row compared with those living 10 or more miles away.⁴⁶ In a cancer study conducted by the Texas Department of State Health Services, it was found that, within a 5-mile radius of Refinery Row, a disproportionately high rate of all-age bladder, colorectal, esophageal, kidney, liver, and lung cancers occur compared to the rest of the state.⁴⁷ Moreover, a Natural Resources Defense Council NRDC study on disease clusters in Texas found that mothers living near refineries and chemical plants had higher rates of birth defects and Nueces County had an 84 percent higher rate of birth defects than the rest of Texas.⁴⁸

Figure 8. Prevalence of asthma and cancer in Corpus Christi



Data source: CDC. 2022. PLACES: Census Tract Data (GIS Friendly Format), 2022 release. Available at: <https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Census-Tract-Data-GIS-Friendly-Format-2022-/yjkw-uj5s>

The U.S. CDC also found that male colorectal, bladder, kidney, and liver cancers were statistically greater than expected for the Refinery Row area, while there was no increase in cancer rates observed among women.⁴⁹ These findings can be attributed to the overrepresentation of men in mining, fossil fuel extraction, and manufacturing (including petroleum product manufacturing) jobs where one would be more exposed to toxic chemicals: In Corpus Christi, these industries employ more than four times as many

⁴⁶ U.S. CDC Agency for Toxic Substances and Disease Registry (ATSDR). 2016. *Corpus Christi Refinery Row*. Available at: https://www.atsdr.cdc.gov/HAC/pha/CorpusChristi/Brochure_Fact_Sheet_508.pdf

⁴⁷ Texas Department of State Health Services. 2017. *Assessment of the Occurrence of Cancer, Corpus Christi, Texas, 2000-2014*. Available at: <https://www.dshs.texas.gov/epitox/CancerClusters/Csum17007.pdf>

⁴⁸ National Disease Clusters Alliance. n.d. *Disease Clusters in Texas*. Available at: https://www.nrdc.org/sites/default/files/texas_diseaseclusters.pdf

⁴⁹ U.S. CDC ATSDR 2016.

men as women.⁵⁰

The adverse health effects caused by refinery pollution in Corpus Christi add to the disparate, cumulative impacts that are most acutely felt by the City's most overburdened communities. A 2021 EPA report revealed that low-income BIPOC residents are more susceptible to higher concentrations of air pollutants, leading to adverse health effects such as premature mortality and childhood asthma.⁵¹ EPA's Particulate Matter Integrated Science Assessment concluded Black individuals face a higher risk for adverse health effects from air pollutants in part due to disparities in exposure;⁵² EPA-funded research has found similar racial and ethnic disparities for most major pollutants.⁵³

Corpus Christi residents in Census tracts closer to Refinery Row report higher levels of uninsurance than those in tracts farther away (see Figure 9). According to the CDC, 37 percent of adults aged 18 to 64 lacked health insurance in Nueces County in 2020, compared to just 15 percent in the United States as a whole.⁵⁴ Residents in these neighborhoods have disproportionately lower incomes than those living farther away from Refinery Row, and without insurance, suffer heightened burdens from the costs of medical expenses related to the effects of petrochemical industry pollution.

Recent studies from the Kaiser Family Foundation and the Urban Institute reveal that 60 percent of uninsured people are forced to postpone necessary healthcare due to cost barriers, and that some 30 percent of residents in the Corpus Christi area owe medical debt.⁵⁵ Neighborhoods near Refinery Row also report a higher prevalence of poor mental health in residents eighteen and older—consistent with the growing body of scientific evidence linking air pollution exposure to oxidative stress, which can damage cells and lead to psychiatric and neurodegenerative conditions such as major depression, schizophrenia, and Alzheimer's disease.⁵⁶

⁵⁰ U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables [S2403]. Available at:

[https://data.census.gov/table?q=industry&g=0500000US48355\\$1400000&tid=ACSST5Y2020.S2403](https://data.census.gov/table?q=industry&g=0500000US48355$1400000&tid=ACSST5Y2020.S2403)

⁵¹ EPA. September 2021. "Climate Change and Social Vulnerability in the United States." Available at: [Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts \(epa.gov\)](#)

⁵² EPA. September 2021. "Climate Change and Social Vulnerability in the United States." Available at: [Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts \(epa.gov\)](#) p. 21

⁵³ EPA. September 7, 2022. "Study Finds Exposure to Air Pollution Higher for People of Color Regardless of Region or Income." Available at: <https://www.epa.gov/sciencematters/study-finds-exposure-air-pollution-higher-people-color-regardless-region-or-income>

⁵⁴ CDC. 2020. *PLACES: Local Data for Better Health*. Available at: <https://places.cdc.gov/?locationIds=48355>

⁵⁵ (1) Montero, A., et al. July 14, 2022. "Americans' Challenges with Healthcare Costs" [Issue Brief]. Kaiser Family Foundation.

Available at: <https://www.kff.org/health-costs/issue-brief/americans-challenges-with-health-care-costs/>. (2) Gangopadhyaya, A., et al. 2022. *Which Hospital Financial Characteristics Are Associated with Medical Debt?* Urban Institute. Available at:

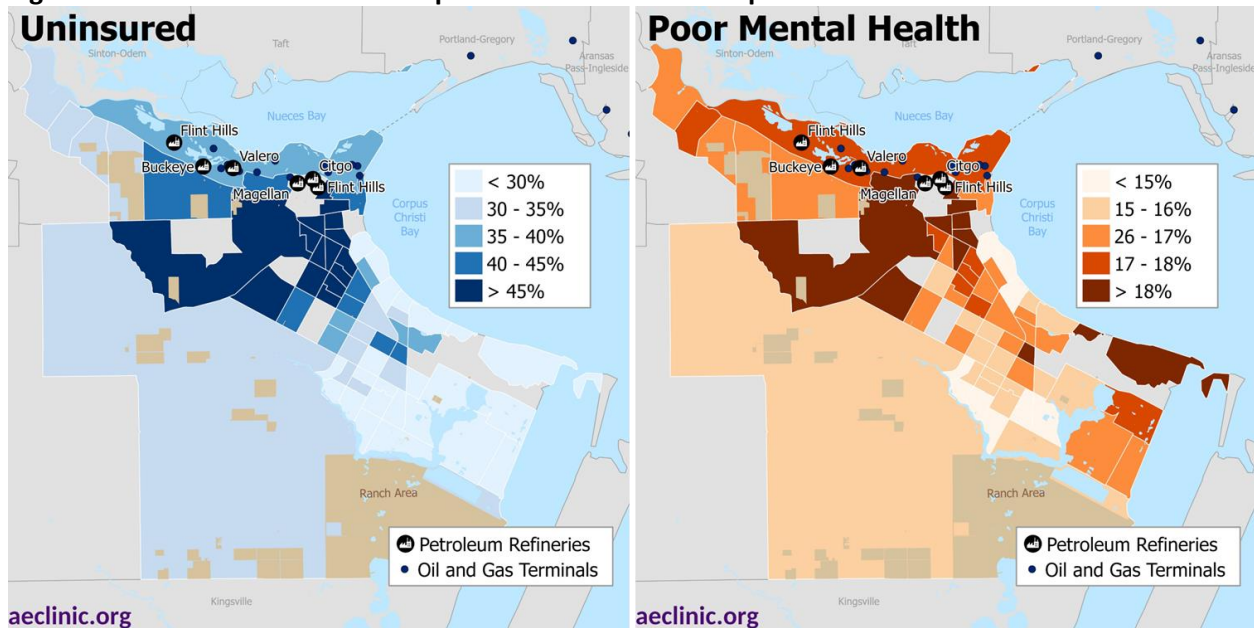
<https://www.urban.org/sites/default/files/2022-09/Which%20Hospital%20Financial%20Characteristics%20Are%20Associated%20with%20Medical%20Debt.pdf>

⁵⁶ (1) Hollander, J., et al. 2020. "Beyond the looking glass: recent advances in understanding the impact of environmental exposures on neuropsychiatric disease." *Neuropsychopharmacology* (45), p. 1086–1096. Available at:

<https://doi.org/10.1038/s41386-020-0648-5> (2) Costa, L. G., et al. 2017. "Neurotoxicity of traffic-related air

pollution." *Neurotoxicology*, 59, p. 133-139. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4875879/>

Figure 9. Rates of uninsurance and poor mental health in Corpus Christi



Data source: CDC. 2022. PLACES: Census Tract Data (GIS Friendly Format), 2022 release. Available at: <https://chronicdata.cdc.gov/500-Cities-Places/PLACES-Census-Tract-Data-GIS-Friendly-Format-2022-/yjkw-uj5s>

V. Roles and Responsibilities of Decision-Makers

Despite existing evidence of fossil fuel industry pollution and its harmful impacts on Corpus Christi’s residents, regulators of fossil fuel industry activities in Texas have to date largely declined to assess and enforce penalties on polluting facilities. Existing legislation has not curtailed emissions (or their resulting health impacts) in Texas, in Corpus Christi, or in EJ communities specifically. Important structural flaws in existing regulation schemes include the lack of emission reporting requirements and exemptions from various pollution-related regulations for polluting facilities like refineries.

Regulatory agencies have declined to intervene in a majority of refineries’ environmental violations

Despite clear violations of water and air quality standards, refineries pay little for their illegal polluting activities. Across the State of Texas, there were 4,086 reported unauthorized air pollution events in 2019, resulting in the emission of hundreds of millions of pounds of harmful pollutants. In that same year, TCEQ and the State of Texas financially penalized companies for 119 air pollution events. Over the past eight years, TCEQ has filed enforcement orders for less than 3 percent of the total number of unauthorized air pollution events recorded.⁵⁷ Despite evidence suggesting that increasing numbers of communities are at risk of benzene exposure from refineries, research from the Texas-based Environmental Integrity Project

⁵⁷ Fraser, C. 2020. *Illegal Air Pollution in Texas 2020*. Prepared for Environment Texas. Available at: https://environmenttexas.org/sites/environment/files/reports/TX_Pollution_2020_scrn.pdf

has found that refineries have largely avoided accountability for their emissions violations.⁵⁸

From 2013 to 2020, Corpus Christi’s refineries released greenhouse gas emissions totaling 64 million metric tons (MMT) of CO₂-equivalent (CO₂e) and faced 104 wastewater quality violations and 49 air quality violations. As a result of poor environmental performance over this time period, Corpus Christi refineries faced enforcement actions from federal and state agencies for 17 percent of wastewater violations and 50 percent of air violations , amounting to \$2.3 million in total fines over the eight year period (see Table 3). In addition, emissions estimates may underrepresent the true extent of refinery pollution in Corpus Christi: According to research from Purdue University, U.S. refineries reported about 161 MMT CO₂e to the EPA in 2020⁵⁹ but actual emissions from refineries were as much as 90 times higher than reported.⁶⁰

Table 3. Corpus Christi refinery emissions and water/air quality-related regulatory actions, 2013-2020

Company Name	Greenhouse Gas Emissions (MMT CO ₂ e)	Water			Air		
		Violations	Enforcements	Penalties	Violations	Enforcements	Penalties
Buckeye	0.5	9	7	\$4,000	4	2	\$764,000
Citgo	12.8	26	0	\$0	12	7	\$1,328,000
Flint Hills	24.1	25	2	\$0	9	11	\$136,000
Magellan	0.3	28	2	\$21,000	5	1	\$4,000
Valero	26.0	16	7	\$8,000	19	4	\$69,000
TOTAL	63.7	104	18	\$33,000	49	25	\$2,301,000

Sources: (1) U.S. EPA. 2020. FLIGHT. Available at: <https://ghgdata.epa.gov/ghgp/main.do>. (2) U.S. EPA. 2020. ECHO. Available at: <https://echo.epa.gov/trends/comparative-maps-dashboards/state-water-dashboard?state=National&view=activity>

Texas lacks sufficient state climate goals and environmental regulations

Texas has no statutory law requiring greenhouse gas reductions or any requirements for emissions reporting. There is no state-level policy that sets emissions-related targets, but some cities within Texas, including Austin and Houston, have set goals for reducing local emissions. There is also an incentive-based plan referred to as the Texas Emissions Reduction Plan (TERP), in which eligible individuals, businesses, or local governments receive incentives or grants for reducing vehicle and equipment emissions or for purchasing or upgrading equipment that operates with less emissions output.

Oil and gas facilities in Texas are subject to the authority to various regulatory agencies, including federal, state and city level actors (see Table 4). The Army Corps of Engineers is responsible for approving permits for fossil fuel infrastructure projects, including oil refineries. The Texas Commission on Environmental Quality (TCEQ) is the in-state counterpart to the federal EPA and is tasked with monitoring air quality and environmental pollution in Texas, including testing for excess emissions in oil and gas production

⁵⁸ Environmental Integrity Project. 2021. *Environmental Justice and Refinery Pollution: Benzene Monitoring Around Oil Refineries Showed More Communities at Risk in 2020*. Available at: <https://environmentalintegrity.org/wp-content/uploads/2021/04/Benzene-report-4.28.21.pdf>

⁵⁹ EPA FLIGHT. 2022. “2021 Greenhouse Gas Emissions from Large Facilities” Available at: <https://ghgdata.epa.gov/ghgp/main.do>

⁶⁰ Lavoie, T.N., et al. 2017. “Assessing the Methane Emissions from Natural Gas-Fired Power Plants and Oil Refineries.” *Environmental Science and Technology*, 51, p.3373-3381. Available at:

<https://pubs.acs.org/doi/full/10.1021/acs.est.6b05531? ga=2.71564251.937190882.1670016545-996469548.1670016545>

processes, examining water quality, and managing waste disposal.⁶¹ TCEQ and EPA administer Superfund sites in the state. The Railroad Commission of Texas (RRC) is primarily responsible for the regulation of fossil fuel production and management in the state of Texas, while TCEQ governs environmental regulations. In Corpus Christi, the City controls permitting and zoning laws that plants must follow during construction. The Port of Corpus Christi houses docks and terminals that receive shipments of petroleum for transport to refineries.

Table 4. Summary of institutional decision-makers in Corpus Christi oil and gas activities

Entity	Jurisdiction	Has the regulatory authority to...
Army Corps of Engineers	Federal	Issue approval of general and individual permits for fossil fuel infrastructure projects, including pipelines, compressor stations, storage, transport, and export facilities, refineries, and petrochemical plants.
Railroad Commission of Texas (RRC)	Texas	Regulate the exploration, production and transportation of oil and natural gas and set regulations to: prevent waste of natural resources, protect the correlative rights of different interest owners, prevent pollution, and provide safety in matters such as hydrogen sulfide pollution.
Texas Commission on Environmental Quality (TCEQ)	Texas	Set policies to protect the state's public health and natural resources.
City of Corpus Christi	Corpus Christi	Create and uphold zoning and permitting laws over fossil fuel plants.
Port of Corpus Christi	Corpus Christi	Operate public oil docks and tank storage for Corpus Christi's petrochemical companies.

Sources: See Table 7 in the Appendix.

At the state level, the Texas Administrative Code (TAC) requires TCEQ authorization prior to the construction of facilities that may emit air contaminants and requires emissions inventories for sites that have the potential to release 100 tons per year of any regulated pollutant or facilities operating in ozone nonattainment areas⁶² that emit 10 tons per year of any single hazardous air pollutant.⁶³ Hazardous and nonhazardous wastes associated with the exploration, development, or production of oil and gas are

⁶¹ Johnson, B. April 30, 2021. "Texas Governmental Agency Launches 'Environmental Justice' Initiative." *The Texan*. Available at: <https://thetexan.news/texas-governmental-agency-launches-environmental-justice-initiative/>

⁶² An "ozone nonattainment area" is any area that emits more ozone than allowed by national ambient air quality standards. Source: U.S. EPA. September 21, 2022. "Ozone Designation and Classification Information." Available at: <https://www.epa.gov/green-book/ozone-designation-and-classification-information>

⁶³ Texas Commission on Environmental Quality (TCEQ). N.d. "Oil and Gas Facilities: Air Compliance Information." Available at: https://www.tceq.texas.gov/assistance/industry/oil-and-gas/oilgas_air.html

regulated by RRC, and any waste not regulated by RRC is regulated by TCEQ.⁶⁴ However, RRC itself acknowledges that the “majority of waste produced at [oil and gas] exploration and production sites is exempt from regulation under the Resource Conservation and Recovery Act (RCRA), Subtitle C.”⁶⁵ Certain oil and gas facilities are also subject to Title 40 of the Code of Federal Regulations, Part 63, which sets national emissions standards for hazardous air pollutants for different pollution sources, including oil and gas production facilities (Subpart HH).⁶⁶

Texas is behind the curve on environmental justice protections

Despite the burdens created by fossil fuel facilities such as petroleum refineries in Corpus Christi, particularly for BIPOC, low-income, and other marginalized communities, Texas has no statewide EJ laws. In April 2021, TCEQ announced the creation of an EJ task force. However, no further announcements have been made, and to date TCEQ has allocated zero dollars to the task force’s budget.⁶⁷ Moreover, EJ advocates contend that TCEQ has a long history of neglecting EJ measures—including failing to provide announcements in Spanish and refusing to consider the disproportionate and cumulative impacts of pollution on BIPOC communities—resulting in multiple discrimination (Title VI) complaints against TCEQ.⁶⁸ Currently, TCEQ is under investigation by the U.S. EPA for its concrete batch plant permitting processes, which advocates allege discriminate against BIPOC and limited-English communities.⁶⁹

Texas State Senate Bills 1294 and 365 both sought to improve protections for EJ communities, defined (in Senate Bill 1294) as a U.S. Census block group in which 30 percent or more of the noninstitutionalized population have an income below 200 percent of the federal poverty level or 50 percent or more of the population are BIPOC.⁷⁰ Senate Bill 1294 proposed the creation of an Environmental Justice Office that would advise TCEQ when determining whether to issue a permit for a polluting facility within 3 miles of an EJ community. Senate Bill 365 proposed increased public participation and additional filing requirements and certifications at TCEQ related to permit applications located in EJ communities.⁷¹ Both bills aimed to add protection to EJ communities by increasing the requirements for permitting standards as they relate to EJ, as well as provide public and agency feedback on EJ impacts. However, both bills failed to pass the State Senate.

⁶⁴ TCEQ. N.d. “Oil and Gas Facilities: Waste Compliance Information.” Available at:

https://www.tceq.texas.gov/assistance/industry/oil-and-gas/oilgas_waste.html

⁶⁵ RRC. N.d. “Hazardous Waste.” Available at: <https://www.rrc.texas.gov/oil-and-gas/applications-and-permits/environmental-permit-types/hazardous-waste/>

⁶⁶ TCEQ. N.d. “40 CFR Part 63.” Available at: <https://www.tceq.texas.gov/permitting/air/rules/federal/63/63hmpg.html>

⁶⁷ Rasp, G. April 29, 2021. “TCEQ launches new environmental justice initiative.” *We Were Wondering: A TCEQ Blog*. Available at: <https://blog.tceq.texas.gov/2021/04/29/tceq-launches-new-environmental-justice-initiative/>

⁶⁸ Pskowski, M. June 28, 2022. “Environmental groups petition EPA, say TCEQ overlooks air pollution impact on minorities.” *El Paso Times*. Available at: <https://www.elpasotimes.com/story/news/2022/06/28/environmental-justice-tceq-epa-air-pollution/7756458001/>

⁶⁹ Melhado, W. August 9, 2022. “EPA launches investigation into Texas environment agency’s permitting process for concrete batch plants.” *Texas Tribune*. Available at: <https://www.texastribune.org/2022/08/09/epa-investigation-tceq-houston/>

⁷⁰ Texas State Senate Bill No. 1294. 2021. *An Act relating to the creation of the Office of Environmental Justice within the Texas Commission on Environmental Quality*. Available at: <https://legiscan.com/TX/bill/SB1294/2021>

⁷¹ Texas State Senate Bill No. 365. 2021. *An Act relating to applications for permits issued by the Texas Commission on Environmental Quality for certain new or expanded facilities in certain low-income and minority communities*. Available at: <https://legiscan.com/TX/bill/SB365/2021>

VI. Recommendations for Strategic Advocacy

The health and environmental impacts of oil refineries and other fossil fuel infrastructure pollution in Corpus Christi's overburdened communities illustrate a conflict between industrial activities and community wellbeing. This conflict is not unprecedented: Battles against industrial expansion and institutional pollution are rooted in a history of struggles—particularly in Indigenous and Black communities. Historic, recent, and ongoing EJ battles within Texas and across the United States offer several strategic lessons for Corpus Christi's communities in working to address and remediate the inequitable harms of the fossil fuel industry.

Strategy 1: Legal battles

EJ advocacy organizations can mount challenges against fossil fuel industry activity by pursuing petitions, taking legal action, or requesting regulatory intervention. For instance, in June 2022, thirteen EJ organizations in Texas—including Port Arthur Community Action Network, the Sierra Club Lone Star Chapter, and T.E.J.A.S.—filed a complaint with EPA to intervene in Texas' state air permitting program, which has consistently failed to meet public participation and EJ obligations under the Clean Air Act, the Civil Rights Act, and Executive Order 12898 (issued in 1994) requiring all agencies receiving federal financial support to incorporate environmental justice into their missions, in accordance with Title VI of the Civil Rights Act of 1964.⁷² Citing the Administrative Procedure Act, the petition urges EPA to conduct a Title VI compliance review of Texas' State Implementation Plan (SIP) to demonstrate the absence of EJ reviews in TCEQ's processes and unlawful barriers to public participation in the state's air permitting program. The complainants cite discrepancies between Texas' EPA-approved SIP and the actual air permitting program being implemented by the state, as well as between the EPA-approved SIP and the Clean Air Act and EPA guidance itself. EPA, write the petitioners, "has a continuing obligation to oversee Texas' Clean Air Act air permitting programs to assure they comply with the [Clean Air Act] and that they are being properly implemented and enforced by the state."⁷³

Legal challenges, petitions, and requests for regulatory intervention can invoke federal and state-level anti-discrimination and air/water quality legislation to demonstrate agencies' and industries' noncompliance with established policy. However, legal challenges can be slow, unsuccessful, or otherwise ineffective to result in benefits to EJ communities: The same petition recognizes that many of the issues raised had been raised in prior petitions submitted to the EPA—the most recent of which was filed in September 2021 and was still pending with EPA a year later. Historically, many EJ cases against instances of industrial pollution have been litigated and achieved stronger environmental protections in the legal domain;⁷⁴ however, such challenges traditionally focus on settling individual cases of harm due to pollution rather than fundamentally changing the systems and policies that enable this pollution.

⁷² Executive Order 12898. February 11, 1994. *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. Available at: <https://www.archives.gov/files/federal-register/executiveorders/pdf/12898.pdf>.

⁷³ Port Arthur Community Action Network, et al. June 28, 2022. "Petition for Action Regarding Deficiencies in the Texas Air Permitting Program Related to Environmental Justice & Public Participation." Submitted to U.S. EPA. Available at: <https://aboutblaw.com/3Hx>. Page 7.

⁷⁴ Earthjustice. September 15, 2021. "Landmark Legal Cases to Secure Clean Water and Clean Air as a Right For All." Available at: <https://earthjustice.org/features/landmark-cases/air-water>

Strategy 2: Organized labor

Refinery and other fossil fuel industry workers can organize, mobilizing sizable resistance to actions taken and harms created by energy companies. Unsafe working conditions and inadequate wages have driven refinery workers to strike across the country for decades, and again in recent years—including several led by United Steelworkers in Texas in 2015 and another in California in the Spring of 2022—effectively disrupting production at these refineries for weeks or months at a time.⁷⁵ Within Corpus Christi, the United Steelworkers union (Local 5022) has a history of organizing refinery workers against the environmental hazards created by their employers—with success in shutting the refineries down.⁷⁶ Furthermore, in 1971, 25 Latinx and Black workers in the USW Local 5022 filed—and won—a suit against the Corpus Christi school district for illegal segregation of Mexican-American and Black students in classes.⁷⁷

Labor mobilization can also lead organized workers to engage in policy advocacy beyond immediate union negotiations. At the 2021 Texas convention of the American Federation of Labor and Congress of Industrial Organizations (AFL-CIO)—the largest federation of labor unions in the United States—121 unions (including those representing fossil fuel workers) voted to support a resolution for a green jobs plan that “would create more than 1.1 million jobs to decarbonize Texas over the next 25 years if implemented,” passing with an overwhelming majority of support.⁷⁸ The plan would overhaul Texas’ energy economy by increasing wind and solar capacity by factors of three and six, respectively, and creating new infrastructure for transit and energy efficiency, while also including strategies for labor leaders to ensure that new jobs are unionized and well-paid. The green jobs plan also suggests that unions develop a certification program for electric vehicle charging station installation and maintenance to ensure the availability of these jobs to unionized workers and to offer workers a voice in workplace decisions.

In order to successfully organize workers behind a common vision of decarbonization and industrial overhaul, it is important to emphasize prevailing wages, expanded protections, and stability in these workers’ future clean energy jobs. As noted by a lead organizer of the International Brotherhood of Electrical Workers (IBEW) Local 520 in Austin, environmentalists can achieve greater success in their campaigns by collaborating with fossil fuel sector workers themselves to expand their advocacy goals beyond just “shutting down a fossil plant and count[ing] that as a win” without offering material benefits and job security to the workers who lose their jobs following the closure of polluting facilities.⁷⁹ Advocacy campaigns that offer greater benefits and protections to workers in targeted industries may achieve greater success in recruiting worker support. Recent reporting from *Reuters* suggests that labor leaders are beginning to support clean energy agendas: In August 2022, the head of the United Steelworkers union

⁷⁵ (1) Aulds, T.J. February 22, 2015. “USW strike expands.” *Galveston County Daily News*. Available at: https://www.galvnews.com/news/free/article_5cdc0a78-ba5d-11e4-a407-b3b870760cef.html. (2) Rodriguez, O.R. March 21, 2022. “Workers strike at Chevron’s Northern California refinery. What will it mean for gas prices?” *L.A. Times*. Available at: <https://www.latimes.com/business/story/2022-03-21/refinery-workers-strike-chevron-california>

⁷⁶ Valdez, M. 2020. “Grandpa and the United Steelworkers” [Podcast episode]. *South Texas Stories*. Available at: <https://www.tamucc.edu/library/exhibits/s/sts/item/1458>

⁷⁷ U.S. District Court for the Southern District of Texas. 1971. *Cisneros v. Corpus Christi Independent School District*. Justia. Available at: <https://law.justia.com/cases/federal/district-courts/FSupp/330/1377/2126406/>

⁷⁸ Skinner, L.R., et al. 2021. *Combating Climate Change, Reversing Inequality: A Climate Jobs Program for Texas*. Prepared by ILR Worker Institute at Cornell University for Texas Climate Jobs Project. Available at: <https://www.txclimatejobs.org/reports>

⁷⁹ Noor, D. August 18, 2021. “‘Everyone Wants a Good Job’: The Texas Union Fighting for a Green New Deal.” *Gizmodo*. Available at: <https://gizmodo.com/the-texas-unions-fighting-for-a-green-new-deal-1847432841>

(USW) announced his intention to recruit employees in clean energy and retail industries to join the union.⁸⁰

Strategy 3: Community mobilization

Direct action from community coalitions can also achieve success in EJ advocacy campaigns through sustained community engagement, as evidenced by recent successes across the country. Research from the Indigenous Environmental Network reveals that grassroots mobilization of Indigenous communities in the United States and Canada generated victories in shutting down fossil fuel projects responsible for 12 percent of the countries' total emissions, and that ongoing battles fought by Indigenous communities accounted for another 12 percent of total emissions.⁸¹

In Montana, South Dakota, and Nebraska, the controversial Keystone XL pipeline was shut down after years of grassroots-led resistance to the project.⁸² In New York, a coalition of community leaders, activists, and residents blocked the construction of four interstate pipelines at the Pennsylvania border, after years of extensive community outreach through public forums and door-knocking, education on the harms of the pipelines, and targeted advocacy to government officials requesting intervention.⁸³ Organizers in New York highlighted the importance of building a broad-based, multiracial coalition of community members drawing upon the shared, direct impacts of the pipelines on their health, safety, and wellbeing and centering the experiences of the communities' most overburdened members. As with legal battles, community-led battles can often be slow to generate EJ benefits, and their successes hinge upon the long-term engagement of a critical mass of community members.

Advocacy efforts can achieve concrete EJ gains by employing these strategies in conjunction with one another, beyond just pursuing them in isolation. For instance, the synthesis of community advocacy and organized labor through community-labor coalitions—coalitions of community members alongside unionized workers—has achieved improved EJ conditions across the country. In downtown Minneapolis, 4,000 janitors went on strike in 2020, demanding not only better pay but also the elimination of pollutant-releasing cleaning products in schools in response to health concerns voiced by students and community members; they won these demands in a new contract within a week.⁸⁴ Since the Minneapolis janitors' strike—the first-ever U.S. union climate strike—labor unions and community EJ groups have collaborated in several other states such as Connecticut, where a community-labor coalition—the Connecticut Roundtable on Climate and Jobs—successfully pushed the State government to guarantee prevailing wages and benefits for clean energy jobs in 2021 and is working on advocacy campaigns for carbon-free schools

⁸⁰ Seba, E. August 8, 2022. "USW chief vows to organize clean energy, electric car and retail workers." *Reuters*. Available at: <https://www.reuters.com/world/us/united-steelworkers-chief-vows-organize-clean-energy-electric-cars-retail-2022-08-08/>

⁸¹ Indigenous Environmental Network. August 2021. *Indigenous Resistance Against Oil*. Published by Oil Change International. Available at: <https://www.ienearth.org/wp-content/uploads/2021/09/Indigenous-Resistance-Against-Carbon-2021.pdf>. p.12

⁸² Brady, J. and Banerjee, N. June 9, 2021. "Developer Abandons Keystone XL Pipeline Project, Ending Decade-Long Battle." *NPR*. Available at: <https://www.npr.org/2021/06/09/1004908006/developer-abandons-keystone-xl-pipeline-project-ending-decade-long-battle>

⁸³ Moran, G. January 4, 2021. "How activists successfully shut down key pipeline projects in New York." *Grist*. Available at: <https://grist.org/fix/advocacy/how-activists-shut-down-key-pipeline-projects-new-york/>

⁸⁴ Altamirano, I., G. Nammacher, and P. Dalal-Whelan. April 30, 2020. "Lessons from the First Union Climate Strike in the U.S." *LaborNotes*. Available at: <https://labornotes.org/2020/04/lessons-first-union-climate-strike-us>

and public transit equity.⁸⁵ In Texas, the Texas Climate Jobs Project—a joint initiative between Fair Shot Texas and the Texas AFL-CIO—is advocating for community-centered initiatives including a carbon-free schools program, signaling a willingness on fossil fuel workers’ parts to collaborate with communities and EJ groups to generate collective wins both for workers and for community members.⁸⁶

Appendix: Analysis Methodology

AEC assessed the size and influence of the petroleum industry within Nueces County relative to the rest of Texas using 2021 Quarterly Census of Employment and Wages (QCEW) summary data with annual average data by industry.⁸⁷

- “2021.annual 10 10 Total, all industries.xlsx”
- “2021.annual 324 NAICS 324 Petroleum and coal products manufacturing”

Using these data, AEC calculated workers in the petroleum and coal products manufacturing industry in Nueces County as a share of petroleum and coal products workers in Texas:

- Monthly average number of employees working within the petroleum and coal products manufacturing industry in Texas was 20,153 in 2021 (19.1 percent of United States total employment in this industry).
- Monthly average number of employees working within the petroleum and coal products manufacturing industry in Nueces County was 2,392 in 2021 (11.9 percent of Texas total employment in this industry and just 2 percent of Nueces County total employment).

AEC assessed the size and influence of the petroleum industry within Nueces County relative to other industries using QCEW) summary data with annual average data by area.⁸⁸

- “2021.annual 48355 Nueces County, Texas.xlsx”

Using these data, AEC calculated workers in the petroleum and coal products manufacturing industry as a share of the total Nueces County workforce, as well as the workforce shares of other industries in Corpus Christi to understand the size of the petroleum and coal products manufacturing industry:

- Monthly average number of employees in Nueces County in 2021 was 152,319. Only 2 percent, or 2,392, of these employees are working within the petroleum and coal products manufacturing industry.

⁸⁵ Sainato, M. September 20, 2021. “How the US labor movement is getting to grips with the climate crisis.” *The Guardian*.

Available at: <https://www.theguardian.com/money/2021/sep/20/labor-climate-allies-green-union-jobs>

⁸⁶ Skinner, L.R., et al. 2021. *Combatting Climate Change, Reversing Inequality: A Climate Jobs Program for Texas*. Prepared by ILR Worker Institute at Cornell University for Texas Climate Jobs Project. Available at: <https://www.txclimatejobs.org/reports>

⁸⁷ U.S. BLS. 2021. “QCEW NAICS-Based Data files (1975 – most recent).”

⁸⁸ Ibid.

- The top five employers in Nueces County are: Healthcare and Social Assistance, Accommodation and Food Services, Retail Trade, Construction, and Educational Services (see Table 5).

Table 5. Nueces County employment, number of establishments, and average annual pay by sector

Industry name	Number of employees	Share of employees	Number of Establishments	Average annual pay
10 Total, all industries	152,319	100%	16,983	\$52,145
NAICS 11 Agriculture, forestry, fishing and hunting	483	0%	112	\$38,616
NAICS 21 Mining, quarrying, and oil and gas extraction	1,823	1%	153	\$96,236
NAICS 22 Utilities	1,315	1%	35	\$81,833
NAICS 23 Construction	11,482	8%	649	\$39,182
NAICS 31-33 Manufacturing	9,605	6%	234	\$83,723
NAICS 324 Petroleum and coal products manufacturing	2,392	2%	12	\$132,848
NAICS 42 Wholesale trade	5,162	3%	437	\$67,620
NAICS 44-45 Retail trade	17,730	12%	1,043	\$31,964
NAICS 48-49 Transportation and warehousing	5,700	4%	305	\$67,083
NAICS 51 Information	1,212	1%	94	\$32,850
NAICS 52 Finance and insurance	4,255	3%	550	\$67,595
NAICS 53 Real estate and rental and leasing	2,981	2%	469	\$27,911
NAICS 54 Professional and technical services	7,811	5%	892	\$51,354
NAICS 55 Management of companies and enterprises	998	1%	27	\$133,497
NAICS 56 Administrative and waste services	7,123	5%	422	\$21,533
NAICS 61 Educational services	10,749	7%	101	\$25,919
NAICS 62 Health care and social assistance	28,844	19%	1,154	\$41,944
NAICS 71 Arts, entertainment, and recreation	1,899	1%	107	\$23,676
NAICS 72 Accommodation and food services	18,660	12%	919	\$38,295
NAICS 81 Other services, except public administration	4,093	3%	652	\$20,558
NAICS 92 Public administration	4,717	3%	93	\$47,079
NAICS 99 Unclassified	64	0%	44	\$36,712

AEC assessed the demographic characteristics and health outcomes of those living within Corpus Christi using data from the 2020 American Community Survey 5-Year Estimates Detailed Tables⁸⁹ and the 2022 CDC PLACES⁹⁰ data file.

Data Sources

Table 6. U.S. Census Bureau Annual Community Survey tables used for calculations in Table 2

Measure	ACS Table ID
Median household income (\$)	S1903
Residents below federal poverty level	S1701
Residents above 65	B01001
Residents under 18	B01001
BIPOC residents	B03002
Spanish-speaking households	S1603
Limited English speaking households	S1603
Disabled residents	B18101
Residents with no high school diploma	S1603
Residents with college degree	S1603
Uninsured residents	S2701

⁸⁹ U.S. Census Bureau. 2020. ACS 5-Year Estimates Detailed Tables. [Table IDs: S1903, S1701, B01001, B03002, S1603, B18101, S1603, S2701].

⁹⁰ CDC. 2022. PLACES: Census Tract Data (GIS Friendly Format), 2022 release.

Table 7. Source Articles for Entity Jurisdiction and Responsibilities in Table 3

Entity	Source(s)
Army Corps of Engineers	<p>(1) Lakewood, C., Siegel, K., Teel, J., Wolf, S. October 2021. Petition to halt the approval of fossil fuel infrastructure permits as contrary to the public interest and for associated actions and rulemaking. Submitted by 383 environmental justice, climate, conservation, public health, indigenous, faith-based, and community organizations. Available at: https://www.biologicaldiversity.org/programs/climate_law_institute/energy_and_global_warming/pdfs/Petition-to-Halt-Army-Corps-Re-Fossil-Fuel-Infrastructure-Permits.pdf</p> <p>(2) EveryCRSR.com. 2017. Oil and Natural Gas Pipelines: Role of the U.S. Army Corps of Engineers. Available at: https://www.everycrsreport.com/reports/R44880.html</p> <p>(3) The Port of Corpus Christi. December 2020. Annual Report. Available at: https://portofcc.com/annual-report/. P.22.</p>
Railroad Commission of Texas (RRC)	<p>(1) Railroad Commission of Texas. N.d. "Oil and Gas." RRC Texas. Available at: https://www.rrc.texas.gov/oil-and-gas/#:~:text=The%20Railroad%20Commission%2C%20through%20its,and%20natural%20gas%20in%20Texas.</p> <p>(2) Railroad Commission of Texas. N.d. "Current Rules." RRC Texas. Available at: https://www.rrc.texas.gov/general-counsel/rules/current-rules/</p> <p>(3) Railroad Commission of Texas. N.d. "Enforcement Activity." RRC Texas. Available at: https://www.rrc.texas.gov/oil-and-gas/compliance-enforcement/enforcement-activities/</p>
Texas Commission on Environmental Quality (TCEQ)	<p>(1) Texas Administrative Code Chapter 3 (30), (2020). Memorandum of Understanding between the Railroad Commission of Texas (RRC) and the Texas Commission on Environmental Quality (TCEQ). Available online: https://texreg.sos.state.tx.us/public/readtac%24ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=16&pt=1&ch=3&rl=30</p> <p>(2) Texas House Bill Chapter 965, Section 18.01 (2001). An Act Establishing the Change of Agency Names. Available online: https://lrl.texas.gov/scanned/sessionLaws/77-0/HB_2912_CH_965.pdf. pg. 53</p>
City of Corpus Christi	<p>(1) Texas Campaign for the Environment. N.d. "desalination." Available at: https://www.texasenvironment.org/local-campaigns/coastal-bend/.</p> <p>(2) Coastal Alliance to Protect Our Environment. N.d. "BAYWATER DESALINATION." CAPE. Available at: http://capetx.com/desalination/</p>
Port of Corpus Christi	<p>(1) Port of Corpus Christi. Nd. "Big Port. Big Service." Available at: https://portofcc.com/images/brochures/General-Brochure-web.pdf</p>