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Relationships between Environmental Pollution and Corporate Environmental Violence within the Florida Energy Sector

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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2024

Abstract

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by

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MA, University of South Florida, 2015

MM, American Conservatory of Music, 1989

BM, American Conservatory of Music, 1984

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Criminal Justice

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Abstract

Environmental pollution and corporate environmental violence (CEV) have become a primary motivator for research, activism, and policy initiatives. Prior research has involved environmental crime, environmental injustice and racism, its origins, history and applications, and effects on public perceptions leading to recommendations for policy implementation. The purpose of the study was to address environmental pollution in terms of total toxic emissions and CEV through analyses of harm inflicted on life, health, and physical integrity of humans, wildlife, and ecosystems. A quantitative correlational design was used with a Pearson's *r* correlation coefficient to determine significance with a 95% confidence interval. Routine activities, corporate social responsibility, treadmill of production and organizational political economy theories were applied to sample sites and surrounding communities. Via single site analysis, the sample consisted of nine sites representing a variety of communities, wildlife, and ecosystems within Florida. Each site was analyzed for significant relationships, and then a comparative analysis was done between all nine sites. Findings revealed single site analysis led to significant relationships at each site; however, comparative analyses between sites yielded no statistically significant results. This study contributes to existing literature and positive social change by exploring community and corporate involvement through analysis of significant relationships. Policy initiatives driven by stakeholders in affected communities and Florida energy sector actors who provide services and report toxic emission levels can lead to positive rapport.

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Dedication

This study is dedicated to four important people in my educational journey; my parents and the two criminologists who have influenced my studies. To my late parents, Francis Xavier and Barbara Jean Hodalski, who together gave me an appreciation of higher education, along with a lifelong love of learning. Dr. Michael J. Lynch, the educator who introduced me to the fascinating world of environmental criminology and white-collar crime. Dr. Richard J. DeParis, my Committee Chair from 2018 until his retirement in 2023, who allowed me to continue following my passion for environmental crime, and its applications within the spectrum of criminal justice literature.

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Chapter 1: Introduction to the Study

This research involved examining environmental polluters in Florida's energy sector, including primary source facilities that produce the state's electricity supply. The Florida energy sector comprises industries that yield components for the electrical grid. These include coal shipment, coal-burning, natural gas production and distribution, nuclear power, and renewable sources, primarily solar power. While traditional energy sources such as coal, natural gas, and nuclear power create documented environmental pollutants, renewable energy generates pollutants but with significantly less damage to Florida's ecosystems, wildlife, and human health and safety (Long et al., 2023; Turney & Fthenakis, 2011; Environmental Protection Agency [EPA], 2019).

Many of the top polluters in Florida have production facilities that are located within the state. A significant number of these energy actors rely on larger managerial structures, including parent corporations, holding companies, and subsidiary/affiliate satellite companies (Energy Information Administration [EIA], 2024; Sherman, 2018). These can contain multiple environmental hazards that cross jurisdictional lines between different states within the United States (U.S.; Prechel & Istvan, 2016). This research will continue the work of scholars in the field of environmental criminology. Patterns and significant relationships within larger corporate entities must be identified through quantitative research to expose discrepancies between corporate actors and expand current academic literature. This study involved focusing on Florida and identifying corporate environmental violence (CEV) related to the socioeconomic status of affected communities. Many of Florida's top polluters do not have their corporate headquarters

located in Florida as identified in shareholder reports that appear in the public domain and annual federal regulatory reporting (EPA, 2019). Public and private sectors intertwine in energy corporations, with some companies headquartered outside of the U.S. One example is the Tampa Electric Company (TECO), which has several Florida energy production sites. It is an affiliate and wholly owned subsidiary of Emera Energy, a publicly traded electric commodity located in Nova Scotia, Canada which is traded on the Toronto stock market. The impact of this company on Florida consumers does not benefit the economy within the state.

This examination of management structure within Florida's top polluters will build upon prior scholarly works while addressing management structure, U.S. state and federal environmental law, and effects of hazardous pollutants on communities and ecosystems surrounding production facilities.

Current environmental crime literature focuses primarily on environmental harms done to a specific community by the energy actor located in a localized geographic area. However, studies that highlight discrepancies involving relationships that are significant between environmental pollution and socioeconomic status of communities affected by energy sector actors can assist in expanding knowledge of these relationships and contribute to quantitative applications within environmental crime literature. Discrepancies have been identified in a variety of SES demographic data. These SES demographics include but are not limited to poverty level, racial/ethnic categories, and level of education. This study involved addressing significant correlations between management of companies and environmental harm in Florida. I address significant

relationships that can then be compared with corporate data to enhance current academic literature on CEV. This study involved using the routine activities theory to understand the progression of CEV and impacts on communities surrounding production facilities in Florida.

There is literature on merits and responsibilities associated with corporate social responsibility (CSR). CEV can be found where toxic pollutants and hazardous waste are inserted into an ecosystem, creating risks to human health and safety while potentially harming existing wildlife in that ecosystem. Environmental crime scholars consider CEV an injustice to the communities upon which it is perpetrated. Environmental harm (an outside source), the bad actor (corporate point source), the corporate entity under scrutiny (an inside source), or individual white-collar criminal (another inside source) are responsible for environmental malfeasance (Lynch, 2023; Lynch et al., 2014; Maulana et al., 2024). Prechel and Istvan (2016) posited most environmental damage is never reconciled for parent companies which own an affiliate, subsidiary, or holding company involved in environmental malfeasance, leading to injustice for stakeholders within affected communities. This study will continue and expand upon this research and provide new lines of inquiry. Addressing significant correlations between these companies and their effects on consumers in Florida helped to identify relationships that impact CSR standards that parent companies can consistently use, leading to shareholder profit and sustainability, but not at the expense of the environment.

This study may yield additional significant information and provide a basis for enhancement of existing regulatory policies. It may also provide new avenues to pursue

within the environmental justice movement with data supporting new approaches to company management within existing CSR frameworks. This could add to current literature on adherence to basic CSR frameworks in the energy sector.

Background of the Study

There are gaps in regulatory law that lead to differences involving compliance and sentencing of corporate actors that are guilty of CEV. According to Jarrell and Ozymy (2014), 3% of victims identified in 972 coded cases were reported and categorized as harmful to human health and safety.

The EPA criminal caseload against corporate offenders had a low probability of success based on cases (Lynch et al., 2016). Prosecution may not provide a suitable deterrent to CEV, and new policy initiatives should be explored (Lynch et al., 2016).

Continuing this ideology, Prechel and Istvan (2016) maintained corporate actors are politically embedded in social structures in which they work, sectors they operate in, and communities where production facilities are located. Prechel and Istvan (2016) posited this political embeddedness is not static, but fluid as the U.S. political atmosphere during any given election cycle. In addition to transference of ideology within a corporation based on political embeddedness, Prechel and Istvan (2016) theorized parents, subsidiaries, and holding companies display resource dependence based on monies that organizations donate to substantively change the political dialogue or define corporate-state relationships through political influence. Undefined CSR frameworks and lack of ethical behaviors resulting from lax regulatory oversight as well as corporate self-

monitoring practices contribute environmental injustices and legal inequities, putting environmental communities at risk (Boulouta & Pitelis, 2014; Ewall, 2012; Lynch, 2023).

Problem Statement

There is a problem involving inconsistent regulatory compliance of large companies within the energy sector (Ozymy & Ozymy, 2023; Prechel, 2023; Prechel & Istvan, 2016). Specifically, environmental injustices exist within the corporate sector at federal and state levels in terms of geospatial emissions of hazardous pollutants and geographic locations of parent companies, subsidiaries, and holding companies associated with complex corporate energy actors (Bae & Lynch, 2023; Lersch & Hart, 2014; Prechel, 2023; Prechel & Istvan, 2016). Crimes involving the disposal of hazardous waste and release of toxic pollutants are in violation of regulatory law (Bae et al., 2023; Lynch et al., 2015). Despite regulatory requirements, CEV continues to facilitate environmental and social injustices, impacting communities and ecosystems surrounding production facilities (Bae & Lynch, 2023; Canales et al., 2012; Collings et al., 2016; Ozymy & Jarrell, 2020).

Literature identified violations of EPA minimums involving toxic emissions in energy sector companies and production facilities in the U.S. Crossing state boundaries can facilitate re-regulation should corporate actors conduct business in multiple legal jurisdictions with environmental consequences (Brisman, 2013; Long et al., 2012; Ozymy & Jarrell, 2015; Prechel, 2023; Prechel & Istvan, 2016). Corporate actors can avoid regulatory sanctions by using reforms that each state enacts. State environmental laws vary widely throughout the U.S., and state regulatory agencies enlist the aid of the

federal EPA when necessary. CEV can foster environmental injustice when toxic pollutants are unequally distributed across societal demographics (Bae & Lynch, 2023; Lersch & Hart, 2014). Further research regarding how large energy sector actors select production facility sites in Florida may lead to identifying relationships that allow them to avoid potential regulatory infractions. Subsequent data can assist public policy decision-makers in terms of reforming existing regulatory laws to prohibit this type of environmental malfeasance by energy sector actors.

Purpose of the Study

This quantitative correlational study involved examining relationships between corporate energy actors and communities affected by environmental pollution within five miles of production facilities. Energy sector actors have corporate footprints that are measured as total toxic emissions that are produced at each facility (EPA, 2019). Management and organization of parent companies within Florida's energy sector have the potential to commit regulatory improprieties due to the number of facilities and geographic location of these point sources to environmentally sensitive areas. Potential for environmental injustice can begin by crossing state lines using subsidiary/affiliate and holding companies which have differing regulatory statutes (EIP, 2019; EPA, 2019). This study involved examining total toxic emissions of holding and subsidiary/affiliate companies in Florida. I examine relationships in terms of socioeconomic status and health data within five-mile radiuses of production facilities under scrutiny in the sample. The criteria-based sample includes companies based in Florida that may have subsidiary/affiliate, holding, and parent company management operations across multiple

U.S. state lines. A correlational design was used to study nine production sites. The research includes an examination of environmental practices of the EPA and the Department of Environmental Protection (FDEP). I provide the most current data prior to the COVID-19 global pandemic, which is the period ending in December 2019.

Concerning companies located in Florida, location of parent companies leads to data that can evaluate toxic emissions that are produced by energy sector corporations and their effects on Florida in terms of both state and local regulatory laws. I also examine monetary, physical, environmental, and State data containing socioeconomic status (SES) demographic information as well as health statistics that are critical to assessing levels of CEV and associations with corporate energy actors in the sample.

Analysis of multiple secondary datasets highlighting parent company management and implementation of regulatory law was necessary to address significant relationships that occur across the sample. CEV was highlighted using levels of total toxic emissions for parent companies within multiple jurisdictions across Florida. This research includes an examination of corporate energy activity, highlighting conformity to both state and federal regulatory law through Toxics Release Inventory (TRI) reporting by the EPA.

Research Question and Hypotheses

RQ1: What statistically significant relationships exist between environmental pollution and CEV within the Florida energy sector?

$H_0$1: There is no statistically significant relationship that exists between total toxic emissions and number of penalties, monetary fines, or cases brought to litigation in Florida against corporate actors.

H_a1: There is a statistically significant relationship that exists between total toxic emissions and number of penalties, monetary fines, or cases brought to litigation in Florida against corporate actors.

$H_0$2: There is no statistically significant relationship that exists between total toxic emissions and the community census in the sample.

H_a2: There is a statistically significant relationship that exists between total toxic emissions and the community census in the sample.

$H_0$3: There is no statistically significant relationship that exists between total toxic emissions and number of community cardiac/respiratory health issues.

H_a3: There is a statistically significant relationship that exists between total toxic emissions and number of community cardiac/respiratory health issues.

$H_0$4: There is no statistically significant relationship that exists between total toxic emissions and community morbidity.

H_a4: There is a statistically significant relationship that exists between total toxic emissions and community morbidity.

$H_0$5: There is no statistically significant relationship that exists between total toxic emissions and number of ethnic minorities.

H_a5: There is a statistically significant relationship that exists between total toxic emissions and number of ethnic minorities.

$H_0$6: There is no statistically significant relationship that exists between total toxic emissions and number of low-income households.

H_a6: There is a statistically significant relationship that exists between total toxic emissions and number of low-income households.

$H_0$7: There is no statistically significant relationship that exists between total toxic emissions and gender.

H_a7: There is a statistically significant relationship that exists between total toxic emissions and gender.

Theoretical Frameworks

The organizational political economy (OPE) theory is used in environmental research to address relationships between energy sector corporate actors within their economic base and organizational hierarchy and activities or corporate management to steer economic factors using political mobilization (Lynch & Long, 2022; Prechel & Istvan, 2016; Prechel, 2023; Schneider & Ingram, 1988; Wickert et al., 2016). The treadmill of production (ToP) theory involves examining ecological destruction as a continuous process within capitalistic systems embedded in the U.S. energy sector (D'Ambrosio, 2024; Long et al., 2012; Lynch, 2023).

The routine activities theory (RAT) was first introduced by Cohen and Felson in their research of urban crime trends. The RAT can be applied to corporate actors to identify criminogenic behaviors and address acts of malfeasance that harm the environment and affect communities. Corporate identity can impact and shape community identity, promoting a social constructivist view in terms of corporate

citizenship and environmental responsibility (Coffey, 2016; Koh et al., 2023; Lynch & Long, 2022; Schneider & Ingram, 1998; Wickert et al., 2016). I used the RAT to address energy sector corporate hierarchical management structure and white-collar crimes using an expanded corporate platform.

Nature of the Study

I used a quantitative correlational design. This design was used for a robust examination of energy sector environmental pollution across multiple jurisdictions and their relationships with communities that surround production facilities .

This correlational approach was used for unilateral analysis of operational hierarchy of companies in 2019. Examining company compliance history at the federal level and potential for re-regulation across state lines is necessary for exploring potential corporate malfeasance. Using Florida point source information, a complete compliance history of the company was used to generate specific quantified data about the number and scope of infractions involving current regulatory policies and if patterns emerged regarding significant relationships between corporate malfeasance in terms of amount of toxins that are released annually, and health and demographic conditions of communities which surround the point source within the production facility.

I highlighted significant consistencies and discrepancies between the nine production facilities within the sample. Corporate shareholder information can be used to highlight legal differences among parent, holding, and subsidiary/affiliate companies and reveal potential relationships that relate to regulatory noncompliance. I emphasized parent company energy actors and their compliance with existing laws within Florida. I

examined company toxic releases and specific socioeconomic and health factors that could show relationships between energy company practices and environmental targeting of ethnic minorities. I highlighted potential class bias against low-income households with limited educational resources. This level of analysis was used for further investigation into communities where these companies have production facilities that demonstrate CEV and highlight significant relationships. This study involved determining if noncompliance patterns exist among energy sector parent companies due to relationships between environmental pollution output in terms of total toxic emissions and SES and health data from up to a five-mile radius out from the point source.

Definitions

In this study, I used the following terms:

Community Census: Survey that is reported to the U.S. Census Bureau once every 10 years. Census data are gathered and reported to measure the number of human beings who are alive in a specific geographic region per 100,000 residents (U.S. Census Bureau, 2010).

Community Health: Data on community health is gathered by US postal zip code and reported to both the U.S. Census Bureau and Florida Department of Health and Vital Statistics. For this research, health data were measured from human beings with reported cases of respiratory diseases, asthma, and cancer. This data were gathered and reported in terms of number of human beings who were afflicted within households per 100,000 residents in the U.S. census and per 10,000 in Florida per zip code (Florida Department of Health and Vital Statistics, 2019).

Company Classification: Operating hierarchical structure of companies regarding ownership and operations. For purposes of this research, these include parent, holding, and subsidiary/affiliate companies.

Corporate Environmental Violence (CEV): Type of white-collar corporate crime in which harm is inflicted to life, health, and physical integrity of humans, wildlife, and ecosystems (Forti & Visconti, 2019; Long & Lynch, 2022; Lynch & Barrett, 2015; Lynch et al., 2015; Punch, 2000; Stretesky & Lynch, 1999).

Corporate Social Responsibility (CSR): Managerial oversight and positive social changes within corporations which decrease negative ecological footprints and increase positive environmental changes (Abbas, 2020; Aguiliera & Judge, 2018; Boulouta & Ritelis, 2014; Koh et al., 2023; Maulana et al., 2024; Sherer et al., 2016).

Effect Size: Statistical strength or magnitude of independent variables on dependent variables. This is emphasized in quantitative statistical models and subsequent analysis of findings.

Environmental Justice: Beginning in the earliest stages of the Civil Rights Movement in the 1960s, environmental justice refers to the implementation and legal enforcement of laws, regulations, and policies involving equal treatment of humans, wildlife, and ecosystems, regardless of race, color, national origin, or income (EPA, 2020).

Environmental Pollution: as According to Rai (2016), this type of pollution involves deterioration and alteration of habitats, primarily as a byproduct of direct or indirect effects that are created by human actions resulting in changes to energy patterns

on the earth and atmosphere. Rai (2016) stated it is a global problem that is common to both developed and third-world countries.

Environmental Racism: Bullard (2002) defined environmental racism as any environmental injustice that transpires involving policy and practice, law, and regulations within a racialized context.

Gender: A socio-economic demographic marker that is used by the U.S. Census Bureau to indicate whether a human being is male or female at birth. Gender is reported to the U.S. Census Bureau and Florida Department of Health and Vital Statistics for every human being within Florida.

Hazardous Air Pollutants (HAPs): The EPA is charged with protecting from and controlling known HAPs.

Holding Company: Another name for a parent company which controls other firms within its sphere of influence. It is possible to go outside the parent company's original industry and operate other firms (Sherman, 2018).

Morbidity Rate: Number of reported deaths of human beings within a specific geographic location. For this research, I addressed reported deaths in a five-mile area around an energy production facility.

Parent Company: A company that is owned outright or has enough voting stock to control management and operations via influence or election of a specific board of directors (Sherman, 2018).

Point Source: An identifiable and confined source from which a pollutant is discharged or emitted (Brickey, 2008).

Subsidiary/Affiliate Company: A subsidiary/affiliate company can be a company, corporation, or limited liability corporation (LLC). It can be public, private, or government-owned and operated. The subsidiary/affiliate does not own most voting shares but is part of a larger corporate entity (Sherman, 2018).

Poverty Level: Marker that is used to determine socioeconomic demographics of communities within a designated geographic area. It is calculated as household annual income in the U.S. between $0-26,500 in 2019.

Race/Ethnicity: A type of socioeconomic demographic that is reported to the U.S. Census Bureau and the Florida State Department of Health and Vital Statistics.

Total Toxic Emissions: The amount of toxic hazardous pollutants as reported to EPA in terms of pounds annually that are generated by corporations that produce toxic waste as a direct or indirect byproduct of the manufacturing process.

Assumptions

I assumed there was harm to human health and safety, danger to wildlife, and irreparable damage to ecosystems that required data collection and analysis quarterly.

I assumed management within the corporate structure followed EPA regulatory laws at both state and federal levels.

I also assumed that the gathering and review process for Florida regarding households, health information, and state and federal EPA data pertaining to toxic emissions were appropriately evaluated using secondary data analysis along with re-examination of findings.

I also assumed that the EPA measured secondary data accurately and findings were not skewed, either positively or negatively.

I also assumed that the small sample size was generalizable to the population based on the size and expansive nature of corporate entities that were included in the sample.

I assumed corporate management understood concepts that were inclusive in terms of CSR and cooperative interaction with communities through internal leadership strategies, the Internet, social media platforms, television, and satellite radio will create atmospheres that are conducive to successful implementation of CSR.

Scope and Delimitations

This study was focused on Florida in the U.S. Florida's state EPA allows all energy sector corporate actors to apply for site licenses within the state. This made it ideal for an in-depth study of parent companies and management styles related to CSR.

Use of a criteria-based sample in the study allows a focus on types of corporations under scrutiny, including both public and privately-owned companies. The facility was in one of Florida's 67 counties and listed as a significant polluter of some type (air, land, or waterway). The number of people in the company was not a consideration; rather, only number of pounds per annum of total toxic emissions at the point source of emissions.

All types of energy sector companies were considered; no sector was excluded. Prospective companies were required to have a HR manual or company managerial logic model available for examination in the public domain. EPA enforcement compliance, community census, health reporting of serious cardiac/respiratory issues, morbidity rate,

race/ethnicity, poverty level, and gender were addressed for a more robust and unbiased reporting of results, allowing for an analysis of significant relationships that could lead to further investigation regarding environmental injustice and racism. Coding was used to address type of company and internal validity, further reducing any bias. Companies with more than one facility listed in Florida were separated to avoid bias and increase validity of the model. Data were drawn from 2019 to ensure no data prior to COVID-19.

Limitations of the Study

There were nine companies included in this study that ranged in terms of size and scope. Using a criteria-based sample with these nine companies should reduce the possibility of bias. Due to the COVID-19 global pandemic in January 2020, I decided to not include data after 2019. This research and analysis are based on secondary datasets. All efforts were made to have data in all categories match for purposes of integrity of the model and validity.

Significance of the Study

Corporate environmental crimes have been the subject of research and documentation since the inception of the EPA in 1970. Empirical research has focused on types of crime and deterrents to curb criminal activity. Behavioral science researchers continue to investigate CSR and the concept of corporate citizenship along with political influences involving corporate management and government during times of regulatory enactment, reform, and enforcement). These researchers have examined corporate actors, hierarchical structures of corporate management, and applications to fiscal responsibility and EPA regulatory laws. I investigated potential correlations between corporate

management and community health and safety that influence criminogenic behaviors in white collar and corporate America within Florida's energy sector.

Additional research is necessary to understand how CEV sustains relationships which provide a platform for environmental injustice and racism. This study involved highlighting variables involving race and class demographics when correlated with environmental pollution at state and local levels. It includes insights regarding management and political influences that impact CSR and the potential for environmental injustice in Florida through parent, holding, and subsidiary/affiliate company operations of energy actors within the sample.

I aimed to bridge a gap in understanding how discrepancies between energy sector actors that have production facilities in Florida can lead to CEV conditions that have the potential to lead to environmental injustice and racism.

Implications for positive social change include informing policymakers about the importance of responsible corporate citizenship through effective communication between corporate actors, political leaders, lobbyists, and community leaders. By revealing significant correlations between energy sector actors and stakeholders within affected communities, there will be opportunities to revise or change current environmental policies in Florida, which could deter or eradicate CEV and determine acceptable levels of environmental risk in the U.S.

Summary

This research provides a scholarly lens to view white-collar corporate impropriety through both public policy and criminological perspectives. Via the RAT and ToP

theories, I addressed larger corporate malfeasance cases with tools customarily that are used to identify street crime in large urban areas. With this new criminological lens, white-collar crime can be treated equally with street crime that receives media attention. White collar crimes should be considered under the same jurisprudence as other criminal behaviors. The size and wealth of companies should not preclude either media scrutiny or potential criminal sentencing (Cochran et al., 2016; Ozymy & Jarrell, 2020; Ozymy & Ozymy, 2023).

This study involved addressing studies to provide regulatory legislation in the energy sector. Data from governmental sources, NGOs, and corporate stakeholder reports, is vital in terms of analyzing and identifying pertinent information and providing recommendations for further research and policy implications based on results.

Chapter 2: Literature Review

CSR is related to the environmental justice (EJ) movement through the use of positive social changes within corporations which decrease negative ecological footprints and increase positive environmental changes (Lynch & Long, 2022, Ozymy & Jarrell, 2015). The opposing viewpoint for deregulation as the answer to energy sector problems, and that science providing the impetus for regulatory reform is skewed (Abbas, 2020; Allmendinger, 2017; Idso et al., 2016; Viterito, 2016).

Literature Search Strategy

This chapter includes a review of CSR literature and hierarchical structures of nine parent corporations and their holdings. It includes literature search strategies that focused on energy sector production facilities. I address the organizational structure of large corporations, types of production facilities under scrutiny, and environmental impacts that these facilities cause to stakeholders in communities and within companies. Environmental impacts involve potential harm to health and human safety, wildlife, and ecosystems in Florida.

I then address current EPA regulatory laws and how they have changed over time. The timeline is critical for any examination of corporate relationships with environments. I examined relationships between the EPA and FDEP targets to address how they may complement or impede efficacy of each other in terms of both protections and oversight.

I then analyze the EJ movement and applications to this research. Precisely how racism is measured and operationalized when applied to EJ is clarified within this literature review.

Those authors that posit there are no environmental problems, and the energy sector needs no regulation by the government need to be included in discussion. Viterito (2016) claimed climate science is a global hoax. Allmendinger (2017) provided alternative theories for greenhouse gas emissions, including methane emission by farm animals, particularly cattle. These factors must be considered when looking at the energy sector through a criminological lens.

Lomborg (2010) argued climate change is scientifically proven and man-made problem that needs to be remedied. A 20% reduction in greenhouse gas emissions may not be the most cost-efficient way of eliminating climate issues facing the planet. Arguments by authors who address corporate regulation as well as proponents of deregulatory activity were also analyzed.

Energy Sector Production

Energy sector production in Florida encompasses a multitude of different corporate interests and is not limited in scale or scope to a single type. Energy sector corporations include coal, natural gas, hydroelectric stations, nuclear, and solar energy, in addition to fossil fuels (EIA, 2019). The EIA lists Florida energy sector production as involving crude oil, natural gas, coal, and electricity. Electricity power plants can use these types of fuel with hydroelectricity via water and nuclear plants to assist in energy production. The EIA focuses on those areas which generate the most energy per capita, measured in megawatts. According to the Florida Public Service Commission [FPSC] 2019 report, sources of these power generators for electricity are investor-owned rural

cooperatives and government-owned municipalities importing resources such as coal and natural gas from Georgia, Alabama, and Mississippi.

Other sources include qualifying facilities (those obtaining a site license to produce energy by the state DEP and energy commission) and self-service facilities that are found primarily in rural cooperatives and rural municipalities. Natural gas is the highest single energy source in Florida.

The FPSC (2019) reported that 54% of the entire electric grid in Florida is produced through natural gas and natural gas byproducts. This is followed closely by coal at 21%, and renewable sources at 19%, including fossil fuel and oil, with nuclear products used at a rate of 6% as of October 2019 (FPSC, 2019). Additionally, private and investor-owned utilities provided 75.5% percent of all-electric production compared to all other sectors combined, which provided the remaining 24.5% (FPSC, 2019). The largest investor-owned companies were Duke Energy, Florida Power and Light (FPL), Gulf Power Company, and Tampa Electric Company (EIA, 2019; FPSC, 2019).

The only area of production which does not generate energy in Florida is hydroelectric power, which is listed as a source but does not have functioning production facilities in the state to date (FPSC, 2019). All other energy source materials are generated from within Florida or imported from Georgia, Alabama, and Mississippi through land transport and seaports along Florida's coastline, including pipelines above ground and under coastal waters in Jacksonville, Port Canaveral, Port Everglades, and Tampa (EIA, 2019). All seaports have ecosystems and wildlife that are particular to

Florida and its coastline as well as freshwater and saltwater estuaries that are equally fragile ecosystems that are also unique to the Florida coastline (EIA, 2019).

Types of Production Facilities

Types of production facilities that operate within the energy sector include but are not limited to electrical power stations, gas, natural gas, thermal, nuclear, coal-burning, steam turbines, combustion turbines, gas-fired turbines, waterfall furnaces, fossil fuel steam, and solar farms (EIA, 2019). Some of these units are in areas where ecosystems are unique to Florida, and contamination of any kind would devastate that environment. Examples include Progress Energy's Crystal River power plant, which uses coal and coal-burning point sources. Tampa Electric Company's Big Bend power station uses coal-burning and combustion turbines for natural gas, a potential danger to the Tampa Bay estuary and wildlife along the west-central Florida coastline. FPL and Jacksonville Energy Authority (JEA) operate coal-fired facilities in Jacksonville. FPL also operates a 12-unit facility using gas and oil production in the Port Everglades region (EIA, 2019). Along the space coast and Cape Canaveral port, FPL operates a solar power station and gas and oil turbines with two production units working directly in Cocoa Beach (EIA, 2019). Each region within the state has an ecosystem with at least one or in some cases multiple types of potential hazards to the environment due to nearby energy production facilities (EPA ECHO, 2019; EPA, 2019; FPSC, 2019).

The physical production facility, its land, equipment, and movement of materials within the facility provide what is referred to as the point source of operations (Sherman, 2018). This point source is how HAPs are determined within TRI data. (EPA TRI, 2019;

PERI, 2019). Air, sea, and land are involved, as well as the meteorological effects such as acid rain, groundwater run-off, and particulate matter that can span up to thirty miles given optimal weather and climate conditions (EPA TRI, 2019). The EPA (2019) and PERI (2019) have determined that toxicity and HAP's can be found from a five-to-thirty-mile radius from the point source. EPA produced quarterly reports on the history and compliance of production facilities that measure this toxicity up to five miles from the point source, providing an opportunity to measure potential CEV toxicity in a quantifiable way (EPA TRI, 2019).

Due to the seaport movements as well as the meteorological movement of air current and the jet stream, these facilities can pose a threat to the environment if not managed according to state and federal environmental regulations (Canales et al., 2012; Cochran et al., 2016; Lersch & Hart, 2014; Lynch & Long 2022; Maulana et al., 2024; Ozymy & Jarrell, 2020).

Environmental threats can come in many forms, including maintenance of the production facilities, qualified personnel at both the management and operational levels and certified in specific areas, waste by-products, and the oversight of materials used in the energy production process (EPA ECHO, 2019). Examples would include, coal storage, coal by-products such as coal slurry and coal ash, natural gas storage and containment, nuclear facility and waste management, crude oil storage and containment, and lithium solar battery disposal (Bae et al., 2023; Lersch & Hart, 2014; Long et al., 2023; Long et al., 2019; Prechel, 2023; Prechel & Istvan, 2016; Sludge Safety, 2012; Turney & Fthenakis, 2011).

In addition to these primary materials, the by-products of production also must be appropriately managed and contained to deter environmental harm (EIA, 2019; EPA TRI, 2019; FDEP, 2019; PERI, 2019). These include gypsum storage, slag heaps, coal ash, natural gas by-products, particulate matter, methane emissions, co-pollutants, gas emissions, lithium from solar panel batteries, and nuclear by-products resulting in waste that must be kept separate from ecosystems and populated areas (Bae & Lynch, 2023; Bae et al., 2023; Harder & Krendall, 2014; Lersch & Hart, 2014; Long et al., 2023; Lynch et al., 2014; Ozymy & Jarrell, 2020; PERI, 2019; Prechel & Istvan, 2016; Prechel, 2023).

These production facility dangers should be accompanied by corporate responsibility and managerial oversight of the potential for any toxic release (Koh et al., 2023; Frynas & Yamahaki, 2016). How a company manages these production facilities determines its overall effect on stakeholders within the community surrounding a point source documented to have HAPs or a toxic release history (Brisman, 2013; Carrol & Buchholtz, 2016; Frynas & Yamahaki, 2016; Gonzales & Saarman, 2014; Koh et al., 2023; Maulana et al., 2024; Scherer et al., 2016).

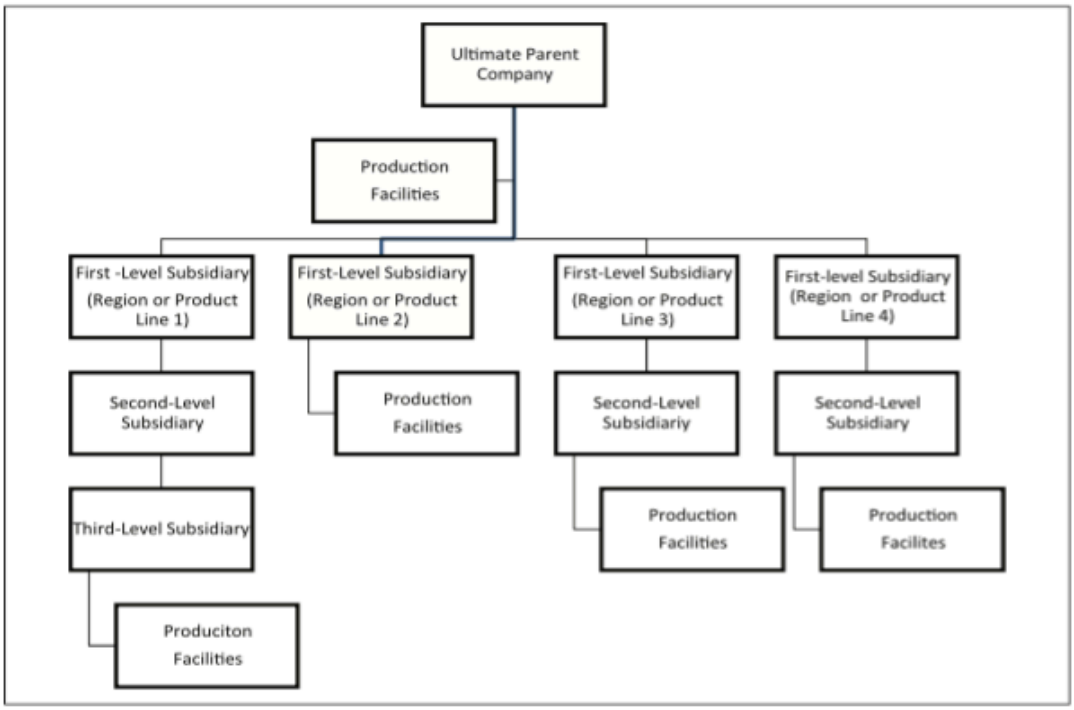
Management of Production Facilities

Management styles differ greatly between small, medium, and large corporate entities. A company managing one facility with fifty employees is far removed from a multi-national corporation with thousands of production facilities across multiple U.S. jurisdictions and countries, employing thousands of employees (Bilouta & Pitelis, 2014; Coffey, 2015, Carroll & Buchholz, 2016; Koh et al., 2023; Prechel, 2023). Prechel (2023)

and Prechel and Istvan (2016) have provided a detailed visual picture of the multiple layers within a large corporate entity. From the parent company to the production facilities, the levels of management can differ in each sector. In Figure 1, the multi-layer subsidiary form, Prechel and Istvan (2016) display an academic view of the corporate model. In Figure 2, Duke Energy Business Structure (multi-layer model), a large multi-national corporation uses this very type of hierarchical managerial style. It displays this figure within their media kits for use to stakeholders within the company, the media, and the public (Duke Energy, 2018). At each level, the management of these facilities, within the canopy of the parent corporation can be applied differently (Prechel 2023; Prechel & Istvan, 2016; Sherman, 2018; Wickert et al., 2016).

Figure 1

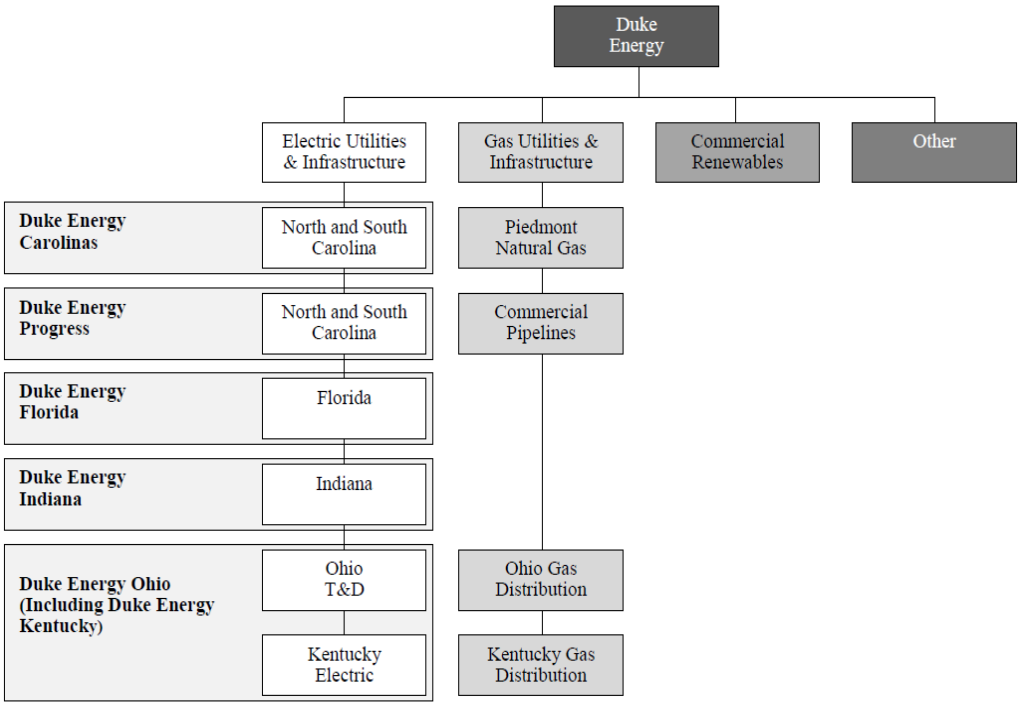
Multilayer-Subsidiary Form



In Energy Corporations, the individual production facility follows overall human resource (HR) guidelines from the parent company. However, the management of each facility has policies and procedures, which the parent company can include or exclude as they see fit within the context of CSR (Abbas, 2020; Carroll & Buchholz, 2016; Cedric et al., 2014; Koh et al., 2023; Prechel, 2023; Scherer et al., 2016). The activities that these authors posit is the intent to exhibit responsible CSR.

Figure 2

Duke Energy Business Structure (Multilayer Model)



Note. Source: Duke Energy Corporation 2018 Q4 – Results: Earnings Call Slide 48
https://seekingalpha.com/article/4240985-duke-energy-corporation-2018-q4-results-earnings-call-slides

Regarding environmental dangers, the larger the parent corporation, the more difficult it becomes for oversight, as each management layer has primary control over

their regulatory compliance (Carroll & Buchholtz, 2016; Koh et al., 2023). The many regulatory agencies that have oversight in the U.S. Energy Market are fluid and differ in many states, depending upon the industry regulated and customers serviced within that geographic area (EIA, 2019; EPA ECHO, 2019).

Regarding geographic distance, the farther away a parent corporate management model exists within individual production facilities across multiple jurisdictions, the potential for lax oversight can increase as the production facility may be reliant on self-auditing procedures in compliance reporting (Bae & Lynch, 2023; Boskovic & Kostic, 2023; Gonzalez & Saarman, 2014; Long, et al., 2023; Lynch & Long, 2022; Lynch et al., 2015; Scherer et al., 2016; Prechel, 2023). Barrett et al., (2018) posits the need for quantifiable research to hold corporate management at the highest levels accountable for actions taken in the company's interests. Without quantifiable data, criminal and civil prosecutions are difficult to pursue with success (Cochran et al., 2016; Kramartz et al., 2017; Long et al., 2023; Lynch et al., 2016; Lynch & Long 2022; Sherman, 2018).

Environmental Law and Regulations

Upon review of environmental regulatory law, looking at the severity of CEV through public policy and criminological lenses, the white-collar crimes discussed in this study should be viewed through a harmful approach, whether intentional or not (Lynch & Long, 2022; Lynch et al., 2015). This represents a green crime that has not been viewed with the same criminality as other traditional white-collar crimes or street crimes (Bullard, 2002; Lynch, 1990). A quantifiable data analysis must be represented throughout research studies to bring this type of environmental crime to the forefront in

criminal justice circles, (Lynch & Long, 2022; Lynch et al., 2015). Only then can the traditional social, economic, and political consequences of corporate actions, along with substantive legal analysis, be on parallel tracks (Long, et al., 2023; Lynch & Long, 2022; Lynch et al., 2015). The legal consequences, whether they are criminal/civil or both, should reflect the severity of the crime and all those responsible for it (Barrett et al., 2018; Brickey, 2008; Long et al., 2023; Lynch & Long, 2022; Lynch et al., 2015; Ozymy & Ozymy, 2023; Potter, 2015).

An overview of all environmental laws would not focus on the specific range of malfeasance within the study parameters. Therefore, a review of previous case law in human health and safety alongside dangers to fragile and irreplaceable ecosystems is necessary. Discussions begin with the establishment of the EPA in 1970, however, before this, the early founders of the U.S. Constitution realized that pollution was a factor in the nation's waterways, which at the time was the mode of transport for most goods and services (Brickey, 2008; Franz, 2015). The Rivers and Harbor Act of 1899 (RHA), called the Refuse Act, was the first legal remedy for those who polluted any waterways belonging to the US. It made it unlawful to throw refuse into waterways of any kind from any type of ship in that era and the future (Franz, 2015). This is an essential distinction in the literature for environmental crime. Before 1970, laws prohibited improper waste removal and destruction of waterways with protections to freshwater aquifers for drinking water (Franz, 2011).

From 1899 to 1970, when the EPA was established, as the regulatory rule of law in the US, RHA was the land's environmental law. Landmark cases were presented before

EPA's induction in 1970 by President Nixon, however, the cases were not resolved until after the EPA was founded. Two such legal landmarks are Kular, settled in 1971, and Picco decided in 1973. The harsh penalties of the RHA were, in a sense, criminally relaxed with the introduction of a governmental body devoted to the environment (EPA, 2019). Franz (2011) posits that perhaps environmental law would have been shaped differently had the RHA not been superseded by the establishment of the EPA as the ruling body for environmental criminal cases. EPA is subservient to state environmental law and must be invited by the state to participate in any legal course of action (EPA Timeline, 2019). This single factor brought many cases that would have been considered criminal into a civil court, as the state then had the right to decide how to proceed legally (Franz, 2015;2011).

With that premise, the founding of the EPA gave substantial guidance for regulatory laws regarding not only waterways but also paved the way for the passage of the Clean Air Act (CAA) in 1970, Federal Water Pollution Control Act in 1972 called the Clean Water Act (CWA). The Resource Conservation and Recovery Act (RCRA) was passed through Congress in 1976, continuing in a more environmentally aware culture, along with the Comprehensive Environmental Response, Conservation and Liability Act (CERCLA) in 1980 (EPA, 2019). These regulatory laws are considered the beginning of the environmental justice movement through legislative responses in the judiciary (Abbas, 2020; Brickey, 2008). Most of these cases were settled in civil court. They could now be taken to a criminal court should the state and federal government decide that was an expeditious remedy for a white-collar crime against the environment (Brickey, 2008;

Franz, 2015, 2011; Ozymy & Ozymy, 2023). These laws provided the legal framework to prosecute the crime, incarcerate, and monetarily fine, those that harm the environment and cause human health and safety to be at risk (Brickey, 2008).

The initial CAA and CWA laws were worded in a complicated fashion and challenging to grasp legally (Franz, 2011). Franz (2011) further posits that the implementation of these laws is not grounded in theoretical constructs, promoting extremely diverse interpretations of the laws between varying states in the US. These laws indicate that although recognized as criminal behavior, environmental crime is not interpreted or prosecuted as other criminal activities (Brickey, 2008; Franz, 2015, 2011; Lynch, 1990). The initial legalese of these reforms were set up to reveal the trajectory of infractions and attempt to regulate pollution and polluters considered criminal (Brickey, 2008). CAA, CWA, RCRA, and CERCLA provided a legal framework for bringing polluters to court, however, without a firm grounding in interpretation and cross-jurisdictional applications, these laws are primarily administrative and provide less criminal prosecution over time, hence the movement to civil courts (Cochran et al., 2016).

Additional reforms and laws have been revised and reworded to include a broader scope of criminal behaviors constituting environmental crime (Brickey, 2008; Franz, 2015, 2011; Long et al., 2023; Lynch & Long, 2022; Lynch et al., 2015). There is a tool in the legal skillset that compels corporate entities to follow state and federal regulatory law or face criminal and civil legal action and potentially punitive damages. This balance has

been described as a controlled balancing act between environmental regulations that must be enforced and the criminological interpretation of those laws (Lynch et al., 2014).

Further environmental laws enacted were the Safe Drinking Water Act (SDWA) (1974), and the Toxic Substances Control Act (TSCA) (1976). Both CAA and CWA had amendments to their original legal wording, making it more comprehensive in scope, requiring a wide variety of inspections and regulatory enforcement and oversight (1977). In addition to these laws, the EPA began aggressively protecting ecosystems, including freshwater aquifers for drinking water, and underground shales. Additional amendments to the SDWA were put into legal reforms in 1986 and federal protection for Wetlands in the environment in 1986 (Fox, 2011; Goodell, 2010). 1990 saw the implementation of the TRI, which now holds companies responsible for all hazardous waste produced per annum (EPA, 2019). That same year, the Toxic Substances and Hazardous Waste Control Act (TSCA) was passed, requiring hazardous waste to be treated before disposal (EPA, 2019).

In 1990, the US Department of Justice (DOJ) filed a lawsuit against the Tampa Electric Company (TECO), on behalf of the FDEP (EPA ECHO, 2019). This lawsuit declared a violation of a section of the CAA (42.U.S.C.xx7470-8492). The DOJ and FDEP alleged that TECO did not have the proper permits to continue operation while new construction was underway at their Apollo Beach, Florida production facility. DOJ and the state of Florida won this case, and it was the most substantive civil penalty assessed on a corporation in the history of environmental crime. Ten million dollars was awarded to the state. TECO was required to clean up the hazardous waste it had produced

over a twenty-year timespan. TECO settled out of court shortly after the lawsuit was filed by signing a final consent document agreeing to the terms the DOJ and FDEP had proposed. This case is noteworthy for another reason. TECO and the EPA, through the auspices of the DOJ, settled their case for the amount described above, but TECO and FDEP had no such agreement, and the docket was closed with no state DEP resolution. TECO set a precedent by then claiming it needed to file with the government for environmental cost recovery, a clause in the CAA amendments to recover their monetary investments. TECO settled its lawsuit, but the costs of that civil settlement were passed onto the Florida TECO consumers through higher rates for energy services (FDEP 2000; EPA vs. TECO, 1999).

Following this landmark case, Congress passed CAA amendments in 1993 and regulated that sulfur dioxide is an acid rain ingredient, allowing it to be traded between companies and across state jurisdictions. In other words, emission rights may be treated as a commodity for trade and barter between companies (EPA, 2019). In 1994, President Clinton formally recognized environmental injustices against minorities and low-income populations and established an Internet presence and digital platform for the EPA.

With a new administration in 2000, EPA underwent radical changes. Opposition to regulatory reforms brought the Energy Act of 2005 to Congress. It gave corporations the ability to lease federally protected land for up to ten years. Additionally, it created the 'Halliburton loophole,' allowing companies to invoke proprietary claims on any chemicals used in hydraulic fracturing or 'fracking' in facilities producing natural gas (Fox, 2011). The Energy Commission is populated, during this period, with CEO's and businesspeople

within the energy sector (Fox, 2011). EPA has no knowledge of the chemical makeup of fracking solution to obtain the natural gas (Fox, 2013, 2011). This has restricted EPA enforcement of the CWA and SDWA (Fox, 2013, 2011).

In 2008, another shift in White House policy established new national lead standards, decreasing the amount allowable ten-fold. Regulation of greenhouse gas emissions was introduced in 2009 and become mandatory reporting in 2010 as part of regulatory law. The Cross-State Air Pollution Act (CSAP) was enacted in 2011 and, in 2012, proposed the first carbon pollution standards for power plants in the energy sector (EPA, 2019). Calendar year 2012 saw updates to current laws, including standards for oil and natural gas HAPs. More stringent regulation for particulate matter (PM) was put into law through the regulatory arm of the EPA (EPA, 2019).

The Supreme Court ruled in 2014 that under CAA, the EPA has the authority to regulate coal fire power plants across state lines. President Obama proposed by executive order the Climate Action Plan to reduce emissions and HAPs in the atmosphere by twenty percent. It was first implemented at the beginning of the Obama Administration in 2008 and updated every two years. The last Climate Action Plan was updated in 2013. It continued the reduction of domestic carbon emission and implemented changes nationally and provided the U.S. a leadership role in the global reduction of harmful emissions (EPA Timeline, 2019; U.S. Department of Energy, 2021). In December 2016, the U.S. Congress signed the Paris Climate Accords for environmental decreases in greenhouse gas emissions and overall carbon dioxide emissions. The U.S. has been the leader in global environmental change and reductions in HAPs and water contaminants

globally and retained this distinction by brokering the Paris Climate Accords (EPA, 2019).

The environmental wheel shifted again in early 2017. This action was taken by President Trump, withdrawing from the Paris Agreement and declaring that climate change was not scientifically proven (EPA, 2018, 2017; FDEP, 2018; Gore, 2016). Obama's Climate Action Plan was canceled on the first day of the new administration by Presidential Executive Order (EPA, 2019). In 2017, the America First Energy Plan was implemented by EPA administrator, Scott Pruitt. This de-regulated greenhouse gas and carbon dioxide emission to their pre-2012 levels and President Trump extended the 10-year land lease options for corporations to be federally subsidized on taxpayer lands, including national parks and forests (EPA, 2019). These are all extensions of the 2005 Energy Act enacted by the G.W. Bush administration and called the America First Energy Plan (EPA, 2018, 2017). The EPA released its greenhouse gas emissions reporting and assessment of global climate change in 2018, with results that indicated that the science of global climate change was academically sound (EPA Climate Report, 2018). The Biden Administration in 2020 brought a return to the Paris Climate Accords and acknowledgment of climate change as scientifically sound (EPA, 2024). What the future holds beyond 2024 is uncertain from an environmental standpoint, however, the EPA Climate Reports speak loudly for a return to stricter regulatory law for corporate polluters (EPA 2024, 2018).

Florida DEP

In reviewing this department's background and history, its timeline is like the Federal EPA. In the mid-1850s, the Trustees of Internal Improvement Trust Fund, combined with the US Federal Government, had over twenty-one million acres of land, sea, and coastal regions under its control and protection in Florida (FDEP: History of State Lands, 2019). This accumulation of delicate and profitable lands came as a direct result of the US Government's grant to each state in the union of five hundred thousand acres of land, with the additional twenty-plus million acres acquired through the Swamp and Overflowed Lands Act of 1850. The government put the Trustees of the Internal Improvement Fund into place as the first environmental agency within the state of Florida (FDEP: History of State Lands, 2019). Again, following the federal EPA's footprints, the 1960s saw the establishment of the Florida Department of Air and Water Pollution Control, under the supervision of Governor C.R. Kirk, Jr. Staff was recruited from the Department of Health and Human Services as well as Sanitary Engineering for the state of Florida. Eventually, the name was condensed to form the Florida Department of Pollution Control from 1960 to 1975 (FDEP: History of State Lands, 2019).

There are four main areas involved in the protection of Florida lands and waterways during this time including beaches, wetlands, freshwater aquifers, treatment of water for human consumption, state parks and recreational areas, hunting and fishing on state lands (FDEP, 2019).

In the mid-1970s, this department became the Florida Department of Environmental Regulation (FDER). Tsked with oversight of the state's air and water

quality and major land management regulatory decisions, to include those involving shoreland, coastal beaches and wetlands. Any sensitive ecosystem native to Florida potentially damaged by toxic waste and HAPs was included in the oversight of this department (FDEP, 2019). In 1992 the state Department of Environmental Regulation and the larger and well-funded Department of Natural Resources combined to create what we know today as the FDEP (FDEP, 2019).

The FDEP is divided into three main categories. Regulatory oversight, targeting noncompliance in air, and water, the use of wetlands and shorelines, and monitoring of hazardous waste facilities, power plants, and natural gas pipelines. Management of Florida's State Park system, trails, wildlife control, and the Everglades ecosystem. In addition to the Park System, this branch of FDEP oversees Florida's reef system with coral reef conservation programs along the coastline. The final mission is a planning agency to survey the state's geological mapping, and management of water resources within Florida's water districts. Containment of invasive species, aquatic plants while monitoring the environmental quality of the state side-by-side with restoration and reclamation of mined lands deemed unfit for human and wildlife. The sustainability of all of Florida's ecosystems. (FDEP, 2019). FDEP has six primary regions, staffed to each unique location. Regional offices are found in Orlando (Central), Jacksonville (Northeast), Pensacola (Northwest), Fort Myers (South), West Palm Beach (Southeast), and Tampa (Southwest) (FDEP, 2019).

FDEP changed as political standards shift, parallel to EPA shifts. Presidential executive orders in 2002 resulted in a U.S. Coral Reef Task Force created and

implemented by FDEP for the state. The Coral Reef Conservation Program was intact until 2015 when political change affected programs and budgeting for FDEP (FDEP, 2019). Governor Rick Scott took office in 2011, regional FDEP administrators were told not to use the terms 'climate change, global warming or global sustainability' in publications, educational materials or website references, and links to the FDEP (Korten, 2015). Governor Scott recommended reductions in budget and staff for the FDEP and assigned the FDEP environmental crime enforcement unit to Florida Fish and Wildlife (Korten, 2015). Florida filled leading DEP positions with personnel with experience as consultants for developers and polluting industries, in a regulatory climate that has changed from deterrence to assistance (Korten, 2015).

Governor Ron DeSantis and the current Secretary of the FDEP, Noah Valenstein, reviewed and, in some cases, reversed the Scott administration's policies in 2018. The agenda of the current administration appears to be back on a Florida-clean environmental track. DeSantis issued an executive order within 48 hours of his inauguration, focused on transparency and accountability. The newly elected Governor created a Blue-Green Algae Task Force, and a new Red Tide Task Force in addition to the pre-existing Coral Reef Task Force (FDEP, 2019). Governor DeSantis has appointed a Chief Science Officer for the FDEP and re-established the environmental crime enforcement unit from Florida Fish and Wildlife. The Governor created an Office of Coastal Protection for the coastline and potential effects of sea-level rise and opposes all offshore oil and gas activities along all Florida coastlines and banned the use of hydraulic fracturing (fracking) off Florida's coasts (FDEP, 2019).

As political pendulums swing and political cycles revolve, the state's accountability to the environment was impacted (Prechel, 2023; Prechel & Istvan, 2016). Early in the first term, the DeSantis administration seemed to view the FDEP as the regulatory agency it was created to be, a regulatory arm of the government for oversight on entities that affect the fragile ecosystems and wildlife, protecting health and human safety concerns within the state and its coastal waterways. In 2024 the administration's view on the role of the FDEP and the federal EPA is not clear (FDEP 2024, 2019).

Environmental Injustice

It is vital that the term environmental justice be defined to determine what is and what is not an injustice. Environmental justice has been identified as the fair treatment of all races, cultures, incomes, and educational levels with respect to the development, implementation and enforcement of environmental laws, regulations, and policies.(Beckman, et al. 2016; EPA, 2019; Lynch, 2023; Lynch & Long 2022; Lynch, et al., 2008). These environmental justice issues and legal cases have been foremost in community planning and campaigns to force government acknowledgment and focus on the unequal distribution of hazardous pollutants (Bae, et al., 2023; Lynch, et al., 2016).

Environmental injustices occur when documented instances of unequal distribution of hazardous pollutants can be produced (Bullard, 2002). To take a case beyond civil court required the plaintiff to show criminal intent on the part of the energy sector actor (Bae et al., 2023; Lynch et al., 2016). This study highlights environmental crime, potential environmental injustice, and current legislation to deter criminogenic behaviors (Bae et al., 2023; Lynch et al., 2016). White-collar crimes often are not

associated with high profile criminal cases in the judiciary. The unlawful distribution of toxins primarily are resolved through settlements between the affected parties (Brickey, 2008, Barrett, et al., 2018., Lynch, et al., 2015). The scrutiny on regulatory history and compliance could signal increased ability to apply cases in criminal courts. The Flint, Michigan water management case between the residents of Flint Michigan and the Michigan state department of environmental protection (National Resources Defense Council [NRDC]; 2018).

Research cites three potential physical harms that can be found to identify the injustice in the environmental movement (Lynch, 1990). Green criminologists have focused their attention on these three basic elements to determine if an injustice has been committed and if it is a 'green' crime. Lynch (1990) and academics refer to the act as an environmental crime leading to CEV perpetrated on a community of individual beings (Brickey, 2008; Koh et al., 2023; Lynch et al., 2014; Lynch & Barrett, 2015; Lynch & Long, 2023; Sherman, 2018).

Green crime is harm inflicted to the ecosystem by the pollutants themselves, initiated by a human perpetrator(s).. Any ecologically harmful act executed by human behavior, which can affect humans' health, welfare, and safety within that ecosystem in both social and physical atmospheres. Harm caused to non-human animal or plant species living within the affected ecosystem (Lynch, 1990). The pollutants introduced into these habitats have the same physical and social impacts that are defined as victimization in human habitation, however, the non-human counterparts have no contributing role in the accumulation and distribution of toxic, hazardous pollutants into the ecosystem they

depend on for survival (Long et al., 2023, 2012; Lynch, 1990; Lynch & Long, 2022; Lynch et al., 2015).

Environmental crime and injustice, along with CEV are present when a corporate energy sector actor polluted an ecosystem by the introduction of toxins, and the withdrawal of critical raw materials from ecosystem (Lynch, 2023; Lynch, 1990; Lynch et al., 2015; Stretesky et al., 2013; Prechel, 2023). Indirect CEVs occurs when the pollutants affect a population or ecosystem through exposure to toxic by-products, groundwater run-off, and damage to food supplies leading to a decline in the population of species within that ecosystem (Bae & Lynch 2023; Bae et al., 2023; Lynch & Long, 2022; Long et al., 2023; Lynch & Barrett, 2015; Stretesky & Lynch, 1999).

Environmental Racism

Environmental injustices expand to include environmental racism and is tangible in our current societal structure (Bullard, 2002). Defined by Bullard (2018, 2002) as "…environmental policies, practices, or directives that differentially affect or disadvantage (whether intentionally or unintentionally) individuals, groups, or communities based on race, color, or ethnicity. Environmental racism is reinforced by governmental, legal, economic, political, and military institutions…" (Bullard, 2018, 2002).

By Executive Order 12898, the EPA is directed to consider environmental justice concerns, including claims of environmental racism (EPA. 2019). EPA was investigated in 1992 for allegations of environmental racism, based on race and class by the National Law Journal [NLJ]. Regulatory agencies are tasked with oversight of energy sector

actors. The question became whether they effectively monitored those same corporate entities for CEV. If the agency cannot police its employees and hierarchy at corporate management levels (Lavell & Coyle; NLJ, 1992). The NLJ questioned the EPA's commitment to environmental justice and racism in a civil suit. In 2012 a legal article appeared providing background information on the environmental racism that the EPA had been accused of and concluded that "…the fox is now guarding the henhouse…" due to the inability to prove discriminatory actions by corporate entities (Ewall, 2012). Ewall (2012) concludes that if that inability exists, they cannot hold themselves accountable for any act of environmental racism or criminally negligent injustice.

Theoretical Frameworks

The concurrent criminological theories of treadmill of production (ToP) and corporate environmental violence (CEV) are more prevalent within the literature, becoming parallel tracks within the environmental justice movement (Bullard, 2002; Lynch 2023; Lynch, 1990; Lynch et al., 2018, Ozymy & Jarrell, 2020, 2015; Ozymy & Ozymy, 2023; Prechel, 2023; Prechel & Istvan, 2016; Scherer et al., 2016; Sherman, 2018). These theories are in addition to the innovative and substantive research on the atmosphere of a corporation and how it may do the least amount of harm to health and human safety, and ecosystems surrounding production facilities, using a framework known as CSR (Abbas, 2020; Schneider & Ingram, 2007; Ingram et al., 1988; Matten & Moon, 2020; Schnaiberg, 1980).

CSR - Corporate Social Responsibility

The concepts of CSR have followed closely and synchronized with those of the environmental justice (EJ) movement (Matten & Moon, 2020). The scholarly literature contains many primary source documents in books and first author presentations (Cohen & Felson, 1979; Lynch, 1990; Lynch et al., 2014; Michalowski, 1985; Schnaiberg 1980). These authors provided the initial impetus to look more closely at how our corporate entities view their duty to protect their "human capital" (Rodrigues & Leitao, 2018) and the surrounding environment. These included potential environmental hazards surrounding production facilities and the internal components of their corporate hierarchy (Rodrigues & Leitao, 2018).

Schneider and Ingram (2019, 2007,1988) provided the first conceptual look into CSR and its implementation into public policy laying the foundation for governmental regulatory reform. Academic discussions revolved around ecological systems and stakeholder theories in the CSR literature with OPE. The parallel track of criminological theories of ToP and the innovative use of RAT to explain criminogenic behaviors in the white-collar energy sector suggest CSR influence in public policy (Prechel, 2023; Prechel & Istvan, 2016). The philosophical background of these criminological theories runs parallel to the CSR framework (Abbas, 2020). Sherman (2018) posits that corporate entities would be well advised to consider and manage human rights within their management structure to avoid damage to the business hierarchy.

Reviewing CSR and the background of a responsible corporate employer involves concepts conceived in the mid-18th century. In his work, *The Spirit of Laws,* Charles-Louis de Secondat, Baron de la Brede et de Montesquieu (1869-1755), a French political philosopher and metaphysician, provided a significant contribution to philosophy, political theory, and the emergence of corporate social consciousness. In this massive volume of work, Montesquieu first uniquely classified different governments, labeling them as virtuous, honorable, or fearful. The government's manner of conducting policy and business translated those labels into the democratic, monarchy, or dictatorship models, which correspond with the original labels attributed to styles of governance. The second element is identifying the separation of powers within government and how business is conducted within that style. These patterns within political science are the foundation upon which the U.S. founding fathers designed the Constitution and Bill of Rights exemplified by the separate but co-equal branches of governance within a larger state. This doctrine is used in political and business hierarchical models as well (Sherman, 2018).

Montesquieu's influence of climate on policy was a literal interpretation. The effect of governmental climate on policymakers, and judicial decision-makers, the physical effects, and stresses on the individuals who must carry out political strategies in government, need to be identified and absorbed into the social responsibilities of governing parties. Montesquieu posited that society must be considered a whole, intact unit and maintain a belief in humankind's dignity. He sowed the constructs that are

known as *the rule of law*. The U.S. is governed by the rule of law and the premise that no man is above it (Sherman, 2018).

In the introduction to the book, *Trumpocrosy*, the author refers to Montesquieu's influence on the founding fathers of the Constitution in this way, '…a free society must guard not only again "crimes" by powerful leaders, but also against negligence, mistakes, a certain slackness in the love of the homeland, dangerous examples, the seeds of corruption, that which does not run counter to the laws but eludes them, which does not destroy but weakens them…' (Frum, 2018).

This is yet another version of the tenets inherent in any CSR framework. These include any initiatives or policies implemented by corporate actors to assuage negative policy and practices that influence production and improve overall societal welfare, emphasizing positive social decision-making practices (Abbas, 2020; Matten & Moon, 2020). CSR policy designs affect target populations and how those social constructs impact that society. This study involved toxic pollutants, HAPs, and resultant policy decisions culminating in regulatory law and reforms imposed on corporate actors (Crifo & Forget, 2015; Koh et al, 2023; Ozymy & Ozymy, 2023; Prechel, 2023; Sabatier & Weible, 2014).

ToP Theory

ToP theory connects the depletion of resources for stakeholder gains and the recurring, ongoing capitalism relating to environmental resources such as fossil fuel, natural gas, and coal mining as a constant cyclic, repetitive, and destructive environmental danger (Long et al., 2012; Lynch, 2023; Schnaiberg, 1980). In the early

work, Schnaiberg (1975) makes the connection between the societal-environmental debate, in other words, how the interactions between the two, the effect on both sides, and introduces concepts of modern social environmentalism. Scholarly publication of his 1980 article, Schnaiberg presented the constructs that would eventually form the ToP theoretical base, writing about environmental surplus and scarcity resulting from over-production by corporate capitalists. ToP carries this further by positing that the policies in the realm of CSR, when enacted before environmental harms occur, may deter the cyclic surplus to scarcity activity, which causes a depletion of natural resources with no immediate remedies (Long et al., 2023, 2012; Lynch, 2023; Lynch & Long, 2022). While this initial identification, other environmental and social scientists studied the ToP phenomenon and applied it to branches of the energy sector, particularly coal and coal mining, as depletion of raw materials is monitored and analyzed in this branch of energy production (Barrett et al., 2018; Bullard, 2002; Coffey, 2015; Goodell, 2010; Lynch, 2023,1990; Lynch & Long, 2022; Lynch, et al., 2017; Lynch & Long, 2013; Stretesky et al., 2013).

OPE Theory

Prechel and Istvan (2016) use a component of the OPE theory to explain a lack of CSR within the corporate hierarchy of energy sector actors. The energy lobby at state and congressional levels is a powerful motivator for policymakers and legislators to enact initiatives that are positive, negative, or a combination if the two (Guidi, Guardianchich & Levi-Faur, 2020; Gupta & Briscoe, 2020; Prechel, 2023). Looking back on the history of this theory, March and Olsen (1983) give a comparative analysis of political trends

that reflect the society in which they operate. The authors list the aggregate consequences of politics in individual behaviors, actions, and decision-making that influence policy in the long term (March & Olsen, 1983). They further discuss the macro consequences of micro behaviors in policy decisions and vice-versa. These are not necessarily historically accurate versions of the politics within a nation, or the politics within a company (March & Olsen, 1983). The conclusions drawn March and Olsen (1983) suggest that the power of an individual or company depends on its' place within a defined social network. In other words, the institutionalism we think of as political, may have significance or it may not, depending on the individual or company's role within a larger institution (Guidi et al., 2020; Gupta & Briscoe, 2020; March & Olsen, 1983; Prechel, 2023; Prechel & Istvan, 2016). These larger institutions would parallel the FDEP, Florida's state legislature, and Congressional representation in Washington DC. The power conferred on a politician by a lobby can affect the company and the community (March & Olsen, 1983).

Prechel and Istvan (2016) further posit that OPE is embedded in corporate society, but that it is not static. It shifts and balances with the economy. They also explain that resource dependence drives the political organizational concept. The resources needed by company A are dependent on company B, and so on (Prechel, 2023; Prechel & Istvan, 2016). It is a form of dependence theory in public policy and political science. Their final thought was that organizations would either change their structure or attempt to change their environment to create a better hierarchy, a better environmental

fit for the company as an entity (Prechel, 2023; Prechel & Istvan, 2016; Salancik & Pfeffer, 1978).

RAT – Routine Activities Theory

The final criminogenic theory that is essentially part of the overall deterrence models of crime and deviance is RAT (Cohen & Felson, 1979). RAT stems from an original human ecological theory presented by Hawley (1950) which identified three components of any community structure, its rhythm, tempo, and timing. The rhythmic element refers to the regularity of an event's occurrence. The tempo is the number of events within a given timeframe, and timing would be the coordination of activities that are interdependent upon both offender and victim movements (Hawley, 1950). This coordination of activities is the basis upon which Cohen and Felson (1979) coined the term routine activities. It is also the basis for what is referred to as the crime triangle and is used in the current training of law enforcement personnel (Florida Department of Law Enforcement [FDLE], 2020). The Cohen and Felson (1979) theory provided a type of deterrence model that could assess criminological behaviors in an urban setting using street crime data from that geographic area. The components that make up RAT come directly from the research provided on human ecology by Hawley (1950), primarily the rhythm, tempo, and timing of a criminal act with accompanying aggregate criminogenic behaviors. The Cohen and Felson (1979) model were primarily interested in studying macro level crime rate trends in a post WWII American culture. They noticed a shift in the routine activities of Americans that took them away from the home and the family unit. These included but were not limited to women entering the workforce permanently

and not wartime initiatives, an increase in the number of single person households with no children, and an increase in travel away from home or hometown areas where everyone knows your name (Cohen & Felson, 1979). Thus, Cohen and Felson (1979) defined a routine activity as a recurrent and prevalent activity that provides for the basic population and the individual needs of society; this includes work, school, and leisure activities. Crime trends could then be examined through the routine activities of individuals within a community (Cohen & Felson 1979).

Cohen and Felson's (1979) definition of routine activity theory requires the intersection in time and space of three distinct elements. A motivated offender, a suitable target, and the absence of a capable guardian to deter the crime. The motivated offender is an offender willing and able to commit the crime; the suitable target must be perceived as vulnerable and/or attractive to be a potential victim (Cohen & Felson, 1979). The victimology must contain either vulnerability or some attraction for the motivated offender, i.e., sex, money, status, peer-associations associated with status, elevation of the event, to name a few (Cohen & Felson, 1979). Absence of capable guardianship requires that a person/object that would prevent the crime from occurring is absent. This capable guardian could be physical entity, (friend, neighbor, security personnel, law enforcement), or an object within geo-spatial areas (i.e., well-lit parking lot or garage, security cameras, drones, cybersecurity measures)(Groff, 2007). In other words, a motivated offender needs to encounter a suitable target with an absence of a capable guardian that presents a deterrence to the criminal act (Cohen & Felson, 1979).

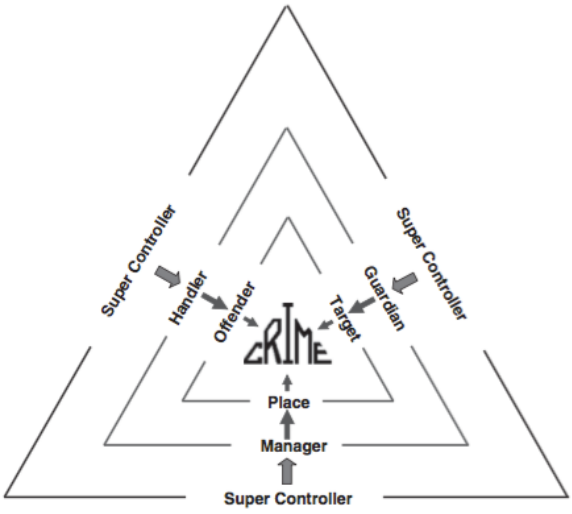
Cohen and Felson (1979) further posited that all three of these aggregates happen in space and time simultaneously. They may be pre-arranged or spontaneous, but all three must be present for a crime to occur. Their studies focused on urban settings where street crimes were prevalent. For many decades in criminology, RAT was considered a theory of victimization, not criminological (Cohen & Felson, 1979; Eck, 1995; Reyns, 2013; Sampson et al., 2010). The examination of the individuals being targeted rather than the motivated offenders change the perception of the theory (Kubrin et al., 2009). Cohen and Felson (1979) noted that all three concepts can influence crime rates and crime trends. They posited that motivated offenders are a constant in society. Therefore, an increase in suitable targets and absence of capable guardians is all that would be needed to increase crime rates. The number of motivated offenders does not affect the outcome (Cohen & Felson, 1979) They also posited in this theory that a decrease in urban crime rates would happen when there was an absence of any of the three constructs of the theory (Cohen & Felson, 1979).

Macro versus micro level activities were then the source of multiple studies by Cohen and Felson (1979) as well as many other criminologists of the 1970's and 1980's (Cohen & Cantor, 1980). Macro level events influenced crime rates of burglary, aggravated assault, and violent crimes while micro level criminal acts were focused on individual socio-economic characteristics (SES) that perpetuate the idea that this theory is grounded in victimization. SES data such as age, sex, race and ethnicity as well as employment status and class status influence the routine of daytime and evening activities within an urban population dictating potential crime statistics (Cohen & Cantor, 1980;

Cohen & Felson, 1979; Hollis et al., 2013; Sampson et al., 2010; Tillyer, & Eck, 2011). Over the course of the past forty years, RAT has undergone significant applications (Groff, 2007; Reyns, 2013; Sampson et al., 2010; Yar, 2005). Not only are crime trends in the urban/street sector analyzed and defined, but it has expanded into the realm of white-collar crime with corporate entities categorized as the motivated offender (Hollis et al., 2013; Sampson et al., 2010). Figure 3, Super-Controllers and Crime, present a different view of RAT theory using a white-collar criminal base and a triangle that requires only two of three elements to be present for crime to occur. Super controllers are corporate entities that can be small businesses or large corporations (Sampson et al., 2010). This is a vastly different version of RAT theory than that posited originally by Cohen and Felson (1979).

Figure 3

Super-Controllers and Crime



Note. From "Super controllers and crime prevention: A routine activities explanation of crime prevention success and failure," by Sampson, Eck, & Dunham, 2010, *Security Journal, 23:1,* p. 40. Reprinted with permission, 2019.

Sampson et al. (2010) have triangles of crime within triangles, simulating a corporate environment's hierarchy. The super-controller is constant in all three as well as the final objective which is the criminal act. Super-controllers can affect a manager, a handler, or a guardian of some type, and from there, it reverts to a Cohen and Felson (1979) model which has offender, place, and target. Sampson et al. (2010) posit that the Super-Controller is the ultimate motivated offender, and only two of the three sides of the triangle need to be in place for the crime to occur. They also posit that the crime is the interior of the triangle, the outcome of the criminogenic act, not the initial impetus for any criminal intent (Sampson et al., 2010). The Super-Controller has every side of the triangle as a starting point. This study was a macro look at policing strategies to diagnose a street crime once again using problem-oriented policing techniques. For the first time in academic circles, white-collar crime uses a RAT triangle to explain the criminality of the Super-Controller (Sampson et al., 2010).

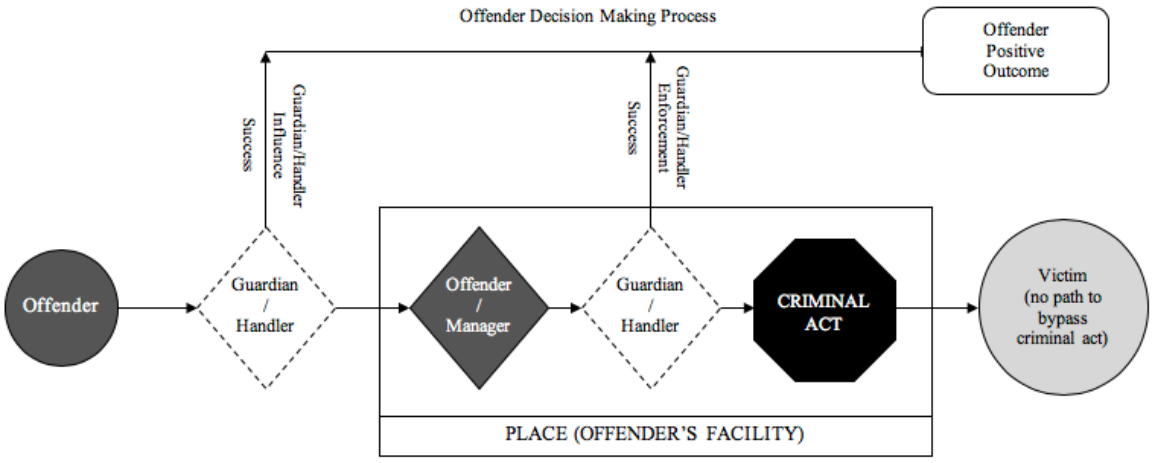
Figure 4, A New Vision of RAT Application, shows how white-collar crime and routine activities use the original theory in a different application. This model is used for those crimes with a corporate white-collar emphasis, not an individual but a corporate entity as the motivated offender. The representation is not a triangle, but the flowchart of an electrical circuit that can be tripped by a breaker which requires only one item to be employed. The motivated offender (corporate entity) and the capable guardian (originally EPA or state DEP) become synonymous through de-regulation and mismanagement of

the self-auditing system (Koh et al., 2023; Prechel, 2023). The motivated offender and the capable guardian are now joined.

As Ewall (2012) posited, "…the fox is guarding the henhouse…" How can a company self-audit accurately with no oversight by a third party (Ewall, 2012). If a third party is engaged to do an audit, it is at the expense of the company being audited. Once again, the auditor is a potential extension of the motivated offender. EPA and state-level DEPs were to be the capable guardians of our environment, not the companies that need to be audited for emission control or TRI compliance. If this is the case, the breaker will be tripped by a single act. The suitable target is represented by a community or land in use by the company. No entity protects them if the EPA has no power to control or regulate through oversight of the corporate actor.

Figure 4

RAT Diagram



Alternate Viewpoints

In looking at the literature devoted to all sides of the environmental issues being scrutinized, there seem to be two readily identifiable positions. These scholars view HAPs and CEV as scientifically legitimate concerns (Long, et al., 2023; Lynch, 2023; Lynch & Stretesky, 1999; Lynch et al., 2014; Lynch, et al., 2015, 2013; Michalowski, 1985; Ozymy & Jarrell, 2020; Ozymy & Ozymy 2023; Stretesky et al., 2013).

Academics with an alternative viewpoint posit that HAPs, Greenhouse Gas emissions, CO2 emissions, and any toxins involved in CEV cannot be credibly identified nor connected with a corporate actor (Allmendinger, 2017; Idso et al., 2016; Viterito, 2016). Viterito (2016) posits that the dangers do not exist and are fabricated by others within the scientific community, constituting a scientific 'hoax' (Viterito, 2016).

A third viewpoint is one that is centrist and embraces elements of both sides of this argument. However, there do not appear to be many scholarly books, articles, or documentaries that espouse this centrist viewpoint (Lomborg, 2010). Academics and corporate think-tanks advocating the alternative view do not take the position that waste by-products from the energy sector could contribute to any environmental injustice or cause climate change (Allmendinger, 2017; Viterito, 2016). The centrist viewpoint, in which both sides are represented equally in scholarly publications, is rare (Lomborg, 2010). In researching the opposing view from both the absence of a problem and a centrist perspective, the variety of academic literature available to read and analyze for content was challenging to authenticate (Allmendinger, 2017; Viterito, 2016; Lomborg, 2010).

Throughout this chapter, the exploration of both the current literature on CEV and the importance of holding energy sector corporations accountable for any toxins emitted during the correlational study of data through 2019 has been reviewed. The articles cited within this narrative are from the peer-reviewed academic base, or verifiable databases monitored by government personnel or academics within NGOs. These datasets and the reports generated by these NGOs such as Political Economic Research Institute [PERI] in its TRI Toxic 100, Top 100 Greenhouse Gas Emitters, and Top 100 Water Polluters use databases and source materials gathered by the EPA, state DEPs or self-auditing reports provided by companies to the EPA (EPA, 2019; PERI, 2019). The datasets used for these publications are considered reliable and unobtrusive sources, neither partisan nor skewed in any direction for research purposes. The literature cited in this review contained is comprehensive and passes assumptions of validity for purposes of the study.

Research that provided the opposing viewpoint from a neutral, unbiased position was not as abundant (Allmendinger, 2017; Idso et al., 2016; Viterito, 2016). The amount of scientific and peer-reviewed journals are not readily accessible; however, it is incumbent upon the scholar to find resources representing the differing views on the topic (Warner, 2013; Shadish et al., 2002). What scholars present within these source materials is pertinent to the unbiased nature of this study. In attempting to locate source material, the Guardian newspaper published an article indicating that the peer review process, between groups of scholars with differing views, could be skewed. The articles published in the Guardian newspaper on 26.August. 2018 list quite a few academic sources that were found researching the opposing viewpoint in this discussion. Many of the Journals

have a readership comprised of climate-deniers or those that do not believe in a carbon footprint from humans, into the broader climate change discussions (Guardian Online, 2018). Two web-based organizations were bookmarked for research in this chapter on environmental crimes and CEV but are also mentioned in this article by Readrearn (2018). Many of the foundations and entities which fund or produce the academic journals were mentioned in this article. The first is Omics International, followed by the CO2 Coalition, The Heartland Institute, the Competitive Enterprise Institute, and the Nongovernmental International Panel on Climate Change (NIPCC), an opposition NGO to the United Nations' Intergovernmental Panel on Climate Change (IPCC).

Readrearn (2018) suggested that scientific journals in which a researcher expects to find peer-reviewed materials are now being offered online as "open access" repositories for manuscripts and articles that may or may not pass a more stringent peer-review process. Some of the foundations and corporate entities already listed have been identified as predatory in that they target inexperienced, previously unpublished academics. These organizations or journals charged academics or institutions a fee for the peer-review process. Many reputable journals also provide these services, however, some in the academic community are now concerned with "questionable quality controls…in what publisher's claim are "peer-reviewed journals," but are not..." (Readrearn, 2018). The Federal Trade Commission [FTC] has deception charges pending against Omics International for their "open access" publishing practices. According to FTC allegations, Omics International fails to carry out genuine peer review and uses

names of authors without their consent, and to promote conferences in which they have not agreed to participate or present in any fashion (Readrearn, 2018).

The following academic articles highlight the differing viewpoints contained within a discussion of environmental crime. Allmendinger (2017) presents an article refuting the greenhouse gas emissions theory developed and measurements created by John Tyndall. Tyndall's theories are widely accepted within the scientific community and used in Gore (2006, 2017). Still, Allmendinger denies that Tyndall's theories have been proven and offers an alternative to the greenhouse gas theory in the form of "natural variations of solar radiation" (Allmendinger, 2017). The author proceeds to list mistakes in previous theory and research. A lack of academic citations made this argument difficult to defend. The author posited his InfraRed (IR) radiation absorption theory as a viable alternative to the Tyndall theory (Allmendinger, 2017). In the study, the author quotes test results; however, the scientific standard for this experimentation to quantify causation could be challenged. Citing preliminary tests using Styrofoam tubes with thermometers attached and attaching figures representing the testing process. This article is difficult to follow, does not appear to support a known theoretical framework, and with 34 figures introduced, created a narrative interrupted throughout the methodology section. There are no tables or quantitative measures to confirm the author's research queries and subsequent hypotheses on IR absorption and increasing albedo theories to explain climate change and carbon footprints (Allmendinger, 2017). This article is found in the Journal of Environment Pollution and Climate Change, Volume 1 (Allmendinger, 2017). This Journal is part of the Omics International series of academic publications.

Another interesting article appears in the March 2007 edition of *In Point* released by the Competitive Enterprise Institute (CEI) . This document is a sixteen-page critique of the claims made in the book, *Our Choice* (Gore, 2005) and subsequent documentary *An Inconvenient Truth* (Gore, 2006). It does not follow an academic style. The author does not attempt to take an impartial look at both sides but attempted to devalue all the science findings revealed in Gore's research efforts on greenhouse gases and global climate change (CEI, 2007). No effort is made to recommend further research or suggest improvements to current research but relegated the argument for Carbon emissions as a moral evaluation by the readership. In scientific and academic review of another author's work, the morality of the author, or the reader, is not a relevant question. It neither adds nor detracts from an academic discussion (SUNY LibGuides, 2019).

Other authors of note with differing views, within the climate and academic environmental literature, are Viterito (2016) and Singer (2016). Viterito (2016) posited in an article for the Opic International Journal of Earth Science and Climate Change, suggesting a correlation existed between global warming and seismic activity within the planet. The article presents this hypothesis and contains a section that does not adequately explain the methodology used to garner the results (Viterito, 2016). The language within the article suggested a quantitative study; however, no quantitative model is explained in the narrative (Viterito, 2016). Later in the article, a multiple regression analysis table is presented but not explained in the narrative (Viterito, 2016). The measurement and operationalization of the variables are not adequately explained before conclusions presented in the article. This article attempted to draw a statistically significant

correlation between rising global temperatures and geothermal activity from seismic events from 1979-2015 (Viterito, 2016). The multiple regression model explains each variable and how it has been operationalized are necessary to understand the results. (Warner, 2013). Viterito (2016) concludes that while seismic activity and global warming have a significant correlation, CO2 emissions and global warming do not explain a significant percentage of the total variance. At the end of this argument, the author discussed predictor variables in research design to ascertain a significant correlation (Viterito, 2016). A correlation is not a predictor of causality (Warner, 2013). In addition to academic modeling questions, the author used various statistical and geological terminology not defined in the narrative and challenging to understand (Viterito, 2016). Quantitative analysis in this instance needed to be predicated by a thorough explanation of the model's variables. The discussion and conclusion sections of this article are not definitive, and the author's research argument did not connect to any theoretical framework in a traditional academic style (Viterito, 2016; Warner, 2013).

The NIPCC (2018) published a summary for policymakers entitled Climate Change Reconsidered II: Fossil Fuels, which is labeled a comprehensive and authoritative review of environmental economics, climate science, and policy analysis regarding the use of fossil fuels. It is listed as the fifth critique of the United Nation's IPCC fifth Global Climate Assessment Report (2018). It is produced by NIPCC and published by the Heartland Institute - an American conservative and libertarian public policy think-tank that questions the reality and importance of climate change, second-hand smoke health hazards, and other policy issues requiring government regulation (NIPCC, 2018). Many

mainstream academic journals have called out the group's lack of credibility. In 2014, a Texas court ruling determined that President and CEO Joseph Bast lacked credibility and reliability in describing himself as an economist, as he holds neither undergraduate nor graduate degrees in economics but has completed a high school curriculum.

Singer's contribution was listing the benefits of fossil fuel consumption as an economic plus for human health and prosperity, along with the environmental 'benefits' of this consumption, claiming they are "cleaner and produce fewer emissions than the fuels they replaced" (Singer, et al., 2018; NIPCC, 2018). It is interesting to note that Joseph Blast is a contributing author to the NIPCC (2018) publication and an editor for the report. Academic research should be unbiased in its efforts; the list of Heartland Foundation funding was disturbing. They listed the Koch Foundation, Mercer Family Foundation, and Exxon Mobil as major contributors with over $700,000 between 1998 and 2006, according to Heartland (Global Energy Monitor, 2024). Until 2006, Heartland openly identified funding sources, but now claims that "…by not disclosing our donors, we keep the focus on the issue…" (Global Energy Monitor, 2024, 2019).

The author of *Cool It, The Skeptical Environmentalist's Guide to Global Warming,* Bjorn Lomborg (2010), presents the challenges of scientific facts, opinion, and cultural differences in a unique middle-of-the-road approach to climate science and environmental concerns (Lomborg, 2010). This is the only book that presented both sides of the argument and made no recommendations either way, just presented the material. Other authors, who take one side or the other of the argument for environmental change can use this book to bolster their theory or hypothesis. That makes for an unbiased view

of the issue and applicable ideas for both sides. Lomborg (2010) approaches this topic from a position of environmental responsibility and economic development, similar to the OPE theory posited by Prechel and Istvan (2016). Lomborg (2010) does not try to separate these items into categories straddled the middle of the argument by agreeing with both sides within the larger issue of problem-solving. Global warming is happening, but is the outcome represented by the negative predictions of Gore (2006, 2016) or abdication of scientific data presented in Journals published through Opics International and the Heartland Foundation (NIPCC, 2019; SourceWatch, 2019). Lomborg (2010) posited that both sides have a viable argument but notes that climate change is scientifically identifiable as a human-made environmental problem. His book looks at the potential solutions from both sides of the argument (Lomborg, 2010). Solutions included farming, tree repopulation, to research and development dollars allocated to renewable energy sources, such as wind-farming and solar power (Lomborg, 2010).

Film and Documentary Depictions of CEV

Another viable method for acquiring knowledge and data on a subject such as global warming, carbon emissions, and fossil fuels, resides in the world of film and the emergence of environmental documentaries (Hedemann, 2019). Ahn (2018) posits there is a significant role that the media, through film and documentaries, has in the education of audiences to act in sustainable ways. In reviewing over 30 hours of documentary film, both in mainstream media and on social media platforms, this venue provided a multi-dimensional view of the problems posited in environmental research questions. One can

find a documentary with images appealing to mass audiences that defended any side of an environmental argument (Ahn, 2018).

The same can be done in documentaries on the same subject matter, paralleled with academic research. In the 30 hours of material, there are documentaries focused on global CEV activity and those with a specific environmental target (Fox, 2011; Gore, 2006; Lomborg 2010; Page-Daniel, 2019). The focus of each introduced specific visual and auditory material to enforce their arguments. Some academics believe it is a cinematic form of political advocacy (Hedemann, 2019). This study is not intended to advocate any form of political influence or advocacy of any topic. The following is a representation of the three arguments discussed within the academic review of CEV; whether it does or does not exist in the corporate environment, and does it represent a fabrication of climate change activism. Does a centrist view of the argument for environmental justice and government regulatory oversight exist (Barbas & Paraskevopoulos, 2009).

For the environmental crimes present in CEV, several films depict a variety of corporate activities presented in the following documentary films, *Gasland* (2010), *Coal Rush* (2012), *There's Something in the Water* (2019), and *The Devil We Know* (2018). These documentaries focus on environmental crimes committed through CEV by actors in a wide variety of industrial and energy-driven corporate entities.

Gasland (2010) follows the progression of natural gas production and hydraulic fracturing that crisscrosses the U.S. from Delaware to the initial gas production fields through the Southwest and east along the Sun Belt and returning eventually to

underground aquifers, suitable for hydraulic fracking along the east coast and Midwest of the U.S. (Fox, 2010). *Coal Rush* (2012) explores mountaintop mining and traditional coal mining in Appalachia, particularly the mountaintops of West Virginia. Based on an article from Newsweek, Goodell (2011) takes the viewer on a tour of the excavation of the rural mountainsides in West Virginia coal country, exposing the harm to natural ecosystems as well as the health and welfare of the residents within a five-mile radius of the excavations (Goodell, 2010, 2011).

The film *There's Something in the Water* (2019), Ellen Page and Ian Daniel take the viewer on a tour of Nova Scotia, exposing the environmentally racist tactics against minority communities and the indigenous peoples of southeastern Canada. The camera tours a minority population in Shelburne targeted with a landfill that created fouled waterways, wells, and groundwater, impacting cancer rates within the black community. The indigenous people of Nova Scotia's middle and northeastern sections were inundated with the wastewater from a nearby paper mill impacting the waterways in Boat Harbor. Alton Gas Company impacted the Mi'kmaw tribal lands with waste by-products of the natural gas production process. The film is based on the book on environmental racism of the same name authored by Ingrid Waldron (2019). Finally, the film *The Devil We Know* (2018) follows the activities of the DuPont Corporation's attempt to conceal environmental damage caused by an alleged decade's long coverup of the chemical by-products used in the production of Teflon products. The film alleges that DuPont committed CEV by disposing of hazardous waste in the waterways surrounding a plant in West Virginia. The legal process of taking a corporate entity to civil court is dissected

through witness testimony, depositions by both sides in the dispute and interviews with community stakeholders impacted by the hazards of perfluorooctanoic acid (PFOA, also known by the name C8), the key ingredient in Teflon (Soechtig, 2018).

In researching the opposing arguments, the film *Truthland: Dispatches from the Real Gasland* (2012) responded to Fox's 2010 release of *Gasland* about the harmful effects of natural gas production on the environment and underground water aquifers. *Truthland* was a rebuttal of the facts presented in *Gasland,* with the narrator Shelley providing a first-hand account of hydraulic fracturing of natural gas on her farm in Pennsylvania. She presents the argument that natural gas production is safe and highly regulated and does not have the harmful environmental impacts depicted in *Gasland.*

Two films that present a centrist viewpoint for the audience are the film adaptation of Longrom's book *Cool It!* (2010). The film shows all Longrom's positions on the environment and his recommendations for potential research and development projects in the renewable energy sector. It is a faithful representation of the ideas presented in the original book. Another centrist documentary series was introduced in 2017 on Netflix, a streaming video service, featuring Bill Nye, famous for the ‘science guy’ series, which concluded the 100th and final episode of the series in 2016. He presented one episode focused on climate science and the research that supports it. In a different episode, he featured climate science skepticism and the research that supports those views. These two episodes presented differing viewpoints with no bias by the narrator, Bill Nye (2017).

To conclude this section about documentaries, it would be remiss not to mention Al Gore's, *An Inconvenient Truth* (2006) and *An Inconvenient Sequel: Truth to Power* (2016). These two films presented all the arguments and academic research that support Gore's view that global climate change is an environmental disaster that has global impacts. The first film concentrated on global warming and climate change with the ever-present carbon footprint responsible for global environmental challenges. The follow-up film focused on the activism surrounding global warming and the science of climate change that influenced the Paris Climate Accords of 2015 in France (Gore, 2016). The film ended as President Trump rescinded the U.S. participation in the Worldwide Climate Change movement (Gore, 2016). The end provided an impetus for further activism within the environmental climate change movement worldwide (Gore, 2016).

Summary

Literature shows a gap regarding two strategic areas of environmental research, the implementation of CSR and use of RAT for cases of environmental injustice caused by CEV. Race and class biases have been studied exhaustively using qualitative methods. The need for continued quantitative research in environmental crimes, particularly those cases involved in environmental racism, provide an additional lens to examine criminological trends.

Use of a purposive criteria-based sample led to generalizable information regarding the energy sector. This study provided a firm basis for larger and more comprehensive research addressing a variety of energy sector corporations. In Chapter 3, I address the methodology and reliability of research results.

Chapter 3: Research Method

This quantitative correlational research involved describing and measuring statistically significant relationships between environmental pollution and CEV. For purposes of this study, environmental pollution, identified as total toxic emissions that are reported in the EPA's TRI annual report and CEV, identified seven correlates. These were represented by six socioeconomic demographic and health markers and one EPA regulatory marker. These correlates provided insights regarding relationships that are of significance and the strength of those relationships. Comparisons between sample corporate actors reveal relationships that highlight specific geographic regions in Florida.

This study can be used for future research in order to probe the effects of total toxic emissions on affected communities. This would provide a foundation for future studies involving relationships that exist between environmental pollution and CEV, exposing environmental injustices, particularly environmental racism. Via this study, gaps involving quantitative environmental criminology can be rectified. Corporate actors and white-collar environmental crimes that are perpetrated by corporations should be analyzed in the same fashion as other criminal activities (Maulana et al., 2024; Ozymy & Jarrell, 2020; Ozymy & Ozymy, 2023).

This study can assist policymakers, corporate stakeholders, and residents of communities to rectify environmental injustices involving racism. Of particular concern are communities that are affected by toxic emissions and HAPs.

A quantitative study design was selected for this correlational analysis. The accumulation of more quantitative literature will provide further analyses and

recommendation for policy and best practices. Additionally, this study involved addressing applications of traditional criminological theories to corporate environmental crime, expanding theoretical applications in terms of environmental and green criminology.

I used a criteria-based sample with data that were put into a correlational matrix for analysis of nine individual corporate energy actors and affected communities. Toxic emissions are harmful to health and human safety, wildlife, and ecosystems (Barrett et al., 2018; Brisman, 2013; Lersch & Hart, 2014; Lynch, 1990; Lynch & Long, 2022; Lynch et al., 2014; Lynch et al., 2023; Lynch et al., 2015; Stretesky & Lynch, 1999; Potter, 2015; Prechel, 2023; Prechel & Istvan, 2016; EPA, 2018; WHO, 2018).

This research involved identifying variables that were pertinent to environmental injustice and racism in order to identify significant relationships resulting from the management and geographic placement of operational energy sector production facilities. The regulatory legal system in Florida and its compliance history along with SES and health data should provide sound basis for analysis, discussion, and recommendations for future research. This should provide additional information on the significance across a wide variety of geographic areas within Florida.

Research Design and Rationale

Using a correlational design, I identified statistically significant relationships between environmental pollution according to both state and federal environmental protection annual reporting, and CEV and environmental injustice, particularly in terms of environmental racism. This is reported as total toxic emissions cited according to the

EPA's TRI and U.S. Census Bureau with Florida Health and Vital Statistics data showing appropriate community socioeconomic and demographic markers,.

I used a criteria-based sample to address existing differences within the energy sector. I used Florida health and geographic data and federal databases through the U.S. Census Bureau and EPA. I identified and highlighted significant relationships that were relevant to this study, in both an individual geographic region and throughout nine unique Florida ecosystems. Each corporation was located in a different region of Florida and exemplified a wide variety of topographies and environments for humans and wildlife. This will expose significant relationships between CEV and environmental injustices, particularly in terms of environmental racism.

This design and subsequent correlation matrices cannot make predictions or establish any causal effects between independent variables and the outcome variable. Still, it should establish significant relationships through correlates of interest that can be studied and used in future research to identify and infer potential links for future research inquiries. As this is a snapshot in time, using the data from reporting year 2019, the results may have the potential for change.

The optimal outcome for this research is to locate and identify the significance of relationships in the correlation matrices. Any examination of those associations found to be significant can be applied to further research into CEV producing environmental injustice and racism as a by-product of corporate malfeasance. The researcher intends to present information that can be used to enhance the existing literature base and provide an impetus to continue research into the areas of CEV and environmental injustices,

particularly racism, within the energy sector in Florida. There is no follow-up to a correlational design, however, if the relationships prove significant, both within and between the corporations in the sample, it is hoped that further study would be undertaken to solidify the findings and results of this study and expand upon them (Shadish et al., 2002; FrankFort-Nachmias & Leon-Guerrero, 2015; Hall, 2008; O'Sullivan et al., 2017; Warner, 2013).

Data Collection

The data for inclusion is from a wide variety of governmental and non-governmental (NGO) datasets. The time frame selected is the reporting year 2019, January 1st through December 31st. Information on all variables in the study appear in Table 1, Data Collection: Variables and Sources.

The EPA's TRI database uses information gathered through the year ending 2019. The ECHO database reviewed all compliance issues in 2019 compiled by the EPA released through December 31st of 2019. Each production facility's reporting information is used to gather data on reported emissions, with correlates then corroborated with NGO reporting from the same period. Data on all independent variables were garnered from secondary datasets from the EPA (all data published through 2019), FDEP, as well as the Florida Department of Health and Vital Statistics and Florida Department of Health and Human Services (data current through 2019) with corroborating data from PERI (data published through 2019) and U.S. Census Bureau (2010 available dataset). NGO data from Environment America Research and Policy Center (2019), the Florida Research and Policy Center, (reports from 2024 and 2013) and

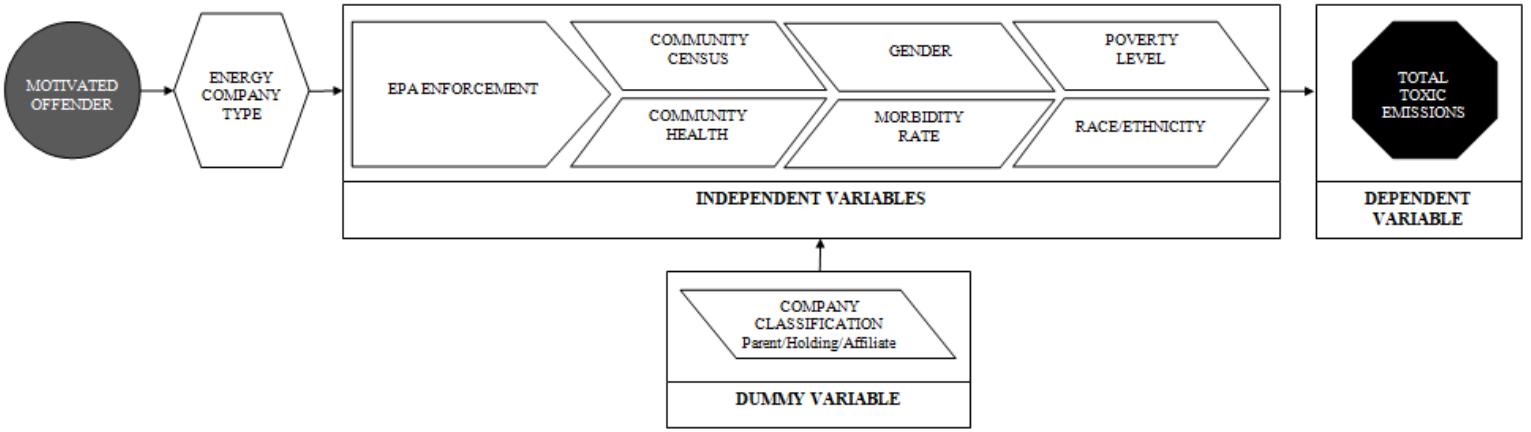
supplemental information provided by the American Community Survey (ACS) to obtain updated census information for 2019, as reported to U.S. Census Bureau annually.

Table 1 *Data Collection: Variables and Sources*

Variable	Measurement	Operationalization	Source
Dependent			
Total toxic emissions	Toxic hazardous emissions per Toxic Release Inventory classified as Environmental Pollution	Pounds per annum	EPA Databases/TRI Report
Independent			
EPA Enforcement	Number of penalties, monetary fines or cases brought to litigation in Florida against corporation	Toxic Release Inventory Number of cases	EPA Echo Database, Environment America Research & Policy Center 2018
Community Census	Communities (Counties) within five miles of point source	Per 100,000	U.S. Census 2010, Florida Department of Health & Human Services, PERI
Community Health	Reported cases of respiratory disease, asthma, and cancer within five miles of point source	Per 100,000	Florida Department of Health & Human Services
Morbidity Rate	Reported deaths within five miles of point source	Per 100,000	Florida Department of Health & Human Services
Race/Ethnicity	Caucasian and Non-Caucasian	Per 100,000	PERI, U.S. Census 2010, Florida Department of Vital Statistics Database
Poverty Level	Household income above/below $26,500 per annum	Per 100,000	PERI, EPA TRI Database, Florida Department of Health & Human Services, Florida Department of Vital Statistics Database
Gender	Male or Female	Per 100,000	U.S. Census 2010, Florida Department of Vital Statistics Database
Dummy			
Company Classification	parent, holding or subsidiary company	Corporate documentation P=0, H=1, S/A=2	Company Stakeholder Reports, 2019

Figure 5

Logic Model of Variables



Documentation available online from the corporations within the sample group. Corporate fact sheets and hierarchical managerial structures were garnered from social media and media kits provided by the corporate management to apprise stakeholders informed of activities. Any of these used within the research study are cited to the specific corporation, and the information retrieved used for background research to create a corporate profile on individual energy sector actors in the sample i.e., Emera corporate factsheet, 2019.

Criteria-Based Sample Characteristics

The use of a criteria-based sample gives the correlation design the ability to produce generalizable correlates to the population of energy sector corporations. Florida has corporate interests beyond the energy sector, therefore providing a criterion for energy sector corporations is vital. An example may be found in manufacturing techniques in the energy sector versus fertilizer production facilities. Florida has an abundance of both types of actors in both corporate specialty areas (Environment Florida, 2018). The criteria being used for the Florida energy sector are elements that can be found in any production facility within states operating energy production facilities. The criteria used are listed in the following section. Each element of the criteria is used to provide the researcher with unbiased results in a correlation design using one designated dependent variable, seven independent variables, and one dummy-coded variable on company classification, to protect against bias. The design is intended to provide insight into the relationships between the variables with no prediction as to causal effect.

Dummy coding will be used to indicate the company classification within the criteria-based sample of Florida energy sector production facilities. These will be coded as parent, holding, or subsidiary/affiliate corporate structures of the energy sector actor in the sample. This prevents bias in the examination and interpretation of the data and subsequent correlation analyses.

Every precaution is taken to reduce researcher bias within the sample. Figure 5, Logic Model of Variables and Measurements is a visual representation of Table 1, Data Collection: Variables and Sources. Table 2, Florida Energy Sector Company Sample, represents the nine sample companies, displaying seven corporate actors.

Table 2

Florida Energy Sector Company Sample

Company Name	Corporate Affiliation	Corporate Listing
Florida Power & Light	NextEra Corporation	NYSE Public
Georgia Pacific	Georgia Pacific Consumer Operations, LLC	NYSE Public
JEA/Jackson Energy Authority	The Energy Authority	Private*
Progress Energy Florida	Duke Energy	NYSE Public
Seminole Electric Cooperative/Tampa	Seminole Electric	Co-op
Stanton Energy Center	Southern Power Company	NYSE Public
TECO/Polk	Emera Corporation	Toronto Stock Exchange
TECO/Hillsborough	Emera Corporation	Toronto Stock Exchange
West County Energy Center	NextEra Corporation	NYSE Public**

*Privately owned. Attempted to go public in 2018 but blocked from transfer in court.
**West County Energy is a wholly owned subsidiary of Florida Power & Light.

Important in both tables are how the companies are sold, traded, and listed to consumers (see Table 2). Table 2 identifies the company, the corporate entity affiliated with the company, and how it is traded within the energy market. These are relevant items for the model and are shown here in Table 2 but will be masked within the data presented in the model, to ensure that no bias is contained in the results and subsequent conclusions of the research. The nine criteria-based items for inclusion in the sample are those elements that are consistent between companies and contain the sample to the state of Florida and are represented in Table 2. Having the criteria noted in all energy sector facilities and used in the reporting data on all facilities nationwide, this sample from Florida is generalizable to the U.S. corporate energy sector population. Table 1, Column 4, provides lists of each data point, how the data was collected for analysis, and the source of the database or data collection.

The population under study are energy production facilities located in Florida. The company did not have to be headquartered in Florida, just have a production facility providing residential or commercial energy use in Florida. The sample sites are representative of the wide variety of ecosystems within Florida (FDEP, 2024; FFIEC, 2019) such as Tampa Bay, Cape Canaveral, Central Florida wetlands, Orlando, and Jacksonville areas, which have aquifers and ecosystems specific to Florida's land, water, and meteorological patterns. Each site was considered a potential point source for the emission of toxic pollutants in either land, waterways, or by air. The measurable distance from the center of the point source was considered at five miles. Certain non-

governmental agencies, such as PERI, have expanded their metrics to a 10-mile radius with the release of 2020 Census information (PERI, 2019).

For this study, a five-mile radius was used, as the EPA uses this, as well as Florida's DEP and Vital Statistics databases. University of Missouri's Circular Area Profile [CAPS] and PERI data were used for comparative analyses to EPA's TRI (CAPS, 2019; EPA ECHO, 2019; PERI, 2019). The demographic data required on each site was taken from 2010 Census data and the American Community Survey (2019) data that is used between Census years. For consistency and construct validity, data from 2019 report year was used, to reduce the potential outliers in health and morbidity statistics in the U.S., due to the COVID-19 pandemic . Recorded deaths and reported health conditions in 2020 data would include those from the COVID-19 pandemic and had the potential to negatively skew the results in this area of the study (Warner, 2013).

The specific categories used within each sample include the following within a five-mile radius of the point source of emissions: zip codes within the five-mile radius provided accurate mapping of the facility along with precise Longitude and Latitude for each energy production site. Five miles was considered the consistent measurement between databases. Some data can be calculated at 10-miles however, these are not reproduced in government sources. One, three, and five miles are calculated in governmental reporting documents surrounding point sources of emission. Census track data matching the longitude and latitude of the point source provided the number of persons within that five-mile radius based on census data, number of recorded deaths, number of reported respiratory and critical care hospitalizations, including those for

cardiac issues, reported of number of households with annual income above or below $26,500 USD which is the 2019 poverty guideline as reported by the U.S. Department of Health and Human Services (USHHS 2019), number of reported minorities, and gender in the identified census tracts. These can be confirmed through both governmental databases in reporting year 2019 through ACS, EPA, FFIEC, HHS, HUD, and U.S. Census, along with the Florida Department of Health databases which include vital statistics for hospitalizations and death queries.

The last correlate information reported is regulatory infractions occurring in reporting year 2019 by the EPA and FDEP. These reports are generated and released three years after the reporting year ends. The data for 2019 was released at the end of the first quarter of 2022 and subsequently archived. The research was able to begin when Walden IRB gave permission in August 2021 to begin to collect data to support the research Proposal presented in July 2021. Sources were identified for data retrieval and permission granted by Walden University IRB #08-26-21-0639380.

EPA TRI reports are archived every year and non-governmental databases often use this data to compile additional demographic material to their reports (PERI, 2019). PERI data includes the percentages for poor share (low income) and minority share (racial/ethnic background). The TRI data gives the toxic emissions by type and by number of pounds produced annually, as reported by EPA. HAPs, water pollutant discharges and toxic greenhouse gas emissions are calculated in the same fashion by the EPA for each reporting facility. The report details regulatory infractions and monetary fines incurred by the facility, that are due to the EPA and state DEP in Florida. For any

site listed by EPA with a case reported, the state DEP would file claim that the company had a compliance issue (FDEP, 2019) Each site in the sample underwent analysis of the compiled data with a final between site analysis. A correlation matrix with Pearson's correlation coefficient and a report of 95% CI pairwise between sites. Significance determined at $p < .05, .01,$ and .001 for certain census data, with correlates measured using a Pearson's *r*. The type of hazardous waste and facility type, such as parent, holding, or subsidiary/affiliate and identifiers of each sample site are nominal variables and were examined using in SPSS v.28.01 Descriptive Analysis. Research was conducted using SPSS v. 28.01 for all tables, figures, and graphs.

All computations of pollution emissions have been calculated up to two decimals points and then rounded. Longitude and Latitude are given as well as the pounds produced per annum for air and water hazardous pollutants, with greenhouse gasses calculated by the metric ton. To gather the data into a uniform measurement, all greenhouse gas emissions were converted to pounds using the following mathematical calculation. One metric ton is mathematically equal to 2204.62 pounds. For purposes of the study, a list of chemicals and breakdown of the environmental justice information on minority and poor shares can be found at both the EPA's ECHO site as well as PERI's TRI reports on each facility reported to the EPA and archived from 2019. Examples of these are also included in databases found in the CAPS five mile data from 2019. Violations of regulatory law, penalties assessed, and subsidy tracking for any local, state, and federal government organizations are also found through the EPA and PERI databases. In addition to the hazardous compounds released in pounds per annum, the

parent company data with all facilities producing toxic releases are listed by production site and state and is compiled by the PERI database using EPA and 2010 U.S. Census data, along with supplemental data from the ACS 2019 survey instrument. Multiple sites utilize compatible data sources if owned or regulated by the same parent company. Air, surface water and greenhouse gas discharges are calculated and compiled as pounds per annum.

Heath data for reporting year 2019 in the areas of concern (respiratory health, emergency room and hospitalizations reported for census tracts within the five-mile radius of each production facility) were compiled from Florida Department of Health and Vital Statistics; the morbidity data for reporting year 2019 compiled through the Florida Department of Health and using census tract and zip code Crosswalks information from the areas within five-miles of the production facility using information specific zip codes in Florida. The triangulation of database information between zip codes and census tract information provided by the FDOH, the Census Bureau, and the FFIEC data, was calculated using HUD's Office of Policy Development and Research zip code crosswalks file with data from the U.S. Postal Service [USPS](ACS, 2019; CAPS, 2019; EPA, 2019; FDEP, 2019; FDOH, 2019; FFIEC, 2019; HUD, 2019; USPS, 2019; Warner, 2013).

Data Analysis Plan

The research study will use IBM SPSS statistical software, v. 28.01

The statistical software will provide the ability to run a model using the Analyze function within SPSS v. 28.01. This will produce a correlation matrix with one dependent variable and seven independent variables. The correlation matrix will include a dummy coded

variable for the type of corporate structure (parent, holding or subsidiary) of the energy actor within the criteria-based sample. The descriptions of each variable can be found in Chapter 3. The criteria for characteristics within the sample of the Florida energy sector actors can be found in Chapter 3 and is also visually represented in Table 2. The list of Date Collection: Variables and Sources can be reviewed, seen in Table 1, and visually represented in Figure 5's logic model. The data screening and collection of databases for this research study can be found in Table 1, Column 4, listed as Data Collection: Variables and Sources.

The research question and hypotheses reproduced from those seen in Chapter 1.

Research Question

RQ1: What statistically significant relationships exist between environmental pollution and CEV within the Florida energy sector?

$H_0$1: There is no statistically significant relationship that exists between total toxic emissions and number of penalties, monetary fines, or cases brought to litigation in Florida against corporate actors.

H_a1: There is a statistically significant relationship that exists between total toxic emissions and number of penalties, monetary fines, or cases brought to litigation in Florida against corporate actors.

$H_0$2: There is no statistically significant relationship that exists between total toxic emissions and the community census in the sample.

H_a2: There is a statistically significant relationship that exists between total toxic emissions and the community census in the sample.

$H_0$3: There is no statistically significant relationship that exists between total toxic emissions and number of community cardiac/respiratory health issues.

H_a3: There is a statistically significant relationship that exists between total toxic emissions and number of community cardiac/respiratory health issues.

$H_0$4: There is no statistically significant relationship that exists between total toxic emissions and community morbidity.

H_a4: There is a statistically significant relationship that exists between total toxic emissions and community morbidity.

$H_0$5: There is no statistically significant relationship that exists between total toxic emissions and number of ethnic minorities.

H_a5: There is a statistically significant relationship that exists between total toxic emissions and number of ethnic minorities.

$H_0$6: There is no statistically significant relationship that exists between total toxic emissions and number of low-income households.

H_a6: There is a statistically significant relationship that exists between total toxic emissions and number of low-income households.

$H_0$7: There is no statistically significant relationship that exists between total toxic emissions and gender.

H_a7: There is a statistically significant relationship that exists between total toxic emissions and gender.

Threats to Validity

The analysis of the correlational design produced in SPSS allowed generalizability to the population from the sample of Florida's top energy producers. This design worked on a larger sample size with greater efficacy (Shadish et al., 2002; Warner, 2013). While there are only nine companies in the sample, each company has multiple point source facilities and will have a considerable impact on the communities surrounding each facility within the five-mile radius in all directions. As noted earlier in the chapter, this incorporated multiple census statistics by postal zip code using a five-mile circumference from the point source of the total toxic emissions, assuring generalizability. Pearson's *r* used as correlation coefficient due to multiple independent variables for correlates. Pearson correlation utilized due to the many standards in units of measurement. The Pearson correlation assisted in standardizing covariance between variables (Warner, 2013).

The correlation matrix will allow for single site analysis of each facility within the sample and between-site analysis of the entire sample, allowing for greater ease in interpretation of results for discussion. The correlation matrices provide an exact *p-value* for each correlation, if found significant. Critical values of *F* can be gleaned from the model for the statistical significance of each correlate under review (Warner, 2013). Identification of the direction, form, degree, and strength of each correlate is provided (Warner, 2013). The use of visual elements to identify the characteristics of the correlates using SPSS results should provide a further reduction of error in the analysis. This methodology is suitable for a correlation model as data produced can be used for further

analyses in future research in similar populations. The overall generalizability of the sample of Florida corporations to the population of U.S. energy sector companies should make this a robust study of the data accumulated for reporting year 2019.

Ethical Procedures

The Manual of the American Psychological Association (APA, 7th edition) guides scholarly writing and publishing principles (p. 3-24). I filled out the IRB request for expedited review. It was submitted upon approval of this research (IRB# 08-26-21-0639380).

Summary

Chapter 3 included descriptions of correlational matrices and how the research design was implemented to garner results and discussions that add to the current environmental criminology literature. I identified and highlighted significant relationships between total toxic emissions and socioeconomic demographic, health markers, and regulatory laws. These markers applied to human beings within five miles of the point source of toxic emissions among a sample of corporate energy actors in Florida. My focus was on point source facility toxic emissions, SES demographic, health data, and regulatory compliance, to identify potential CEV within affected communities within five miles. I addressed output of environmental pollution (dependent variable), and SES characteristics of communities and regulatory compliance of companies (independent variables) in which the point source facility was located. To avoid bias during analysis of sample results, company classifications were dummy-coded.

This chapter also provided steps for data analysis and discussion. Chapter 4 includes interpretations of strengths of results and relationships between variables. I address the research question and hypotheses to address CEV and particularly environmental racism.

Chapter 4: Results

The purpose of this quantitative study was to identify the significance and strength of relationships between environmental pollution and CEV within Florida's energy sector by examining total toxic emissions and health of human and wildlife ecosystems surrounding energy production facilities in Florida. I examined regulatory oversights, community census, health, morbidity, race/ethnicity, income, and gender. I used secondary data from governmental sources, nongovernmental databases, and corporate shareholder information via the public domain for each of the nine energy production facilities. I identified those relationships that have statistical significance to understand CEV and environmental pollution. Researchers use secondary data to examine and analyze information from existing databases that is compiled by other researchers and organizations.

I used secondary data from the U.S. Census Bureau and EPA, as well as corroborating secondary data from nongovernmental sources such as the PERI, CAPS and documentation on Florida energy producers through both federal and state governmental agencies, such as the ACS, EIC, FDEP, FDOH, FFIEC, and HUD. For this study, nine production facilities were selected in Florida. Each site impacts a community and sections of the Florida environmental ecosystem.

I addressed regulatory oversight, community census, health, morbidity, race/ethnicity, income, and gender and their relationship to reported toxic pollutants released at energy production facility. A comparative correlation matrix between all nine

sample sites examined any significant relationships within the Florida energy sector with a discussion of outliers.

Descriptives

The population under study are energy production facilities located in Florida and surrounding communities within a five-mile radius of each. Sample sites had to maintain a production facility that provided residential or commercial energy for the surrounding community. U.S. census data were reported in tracts that correspond to specific geographic locations and demographic information on number of persons located within those tracts. Each census tract contained individual cases and demographic information. The correlation matrix for each single site analysis can be found in Appendix D.

TECO Big Bend is located at latitude 27.795252 and longitude -82.403209 at 13031 Wyandotte Road, Apollo Beach, Florida, in Hillsborough County. This is a publicly traded multinational energy company based out of Halifax, Nova Scotia, Canada. TECO is a wholly owned subsidiary of Emera, Inc. and is listed as an affiliate. TECO Big Bend has 21 reporting census tracts for all zip codes, representing 122,597 cases in the five-mile radius.

TECO Polk Power Station is an affiliate of Emera Corporation. This station is located at latitude 27.727015 and longitude -81.989774 along 9995 State Route 37 South, Mulberry, Florida in Polk County. The TECO Polk station has two reporting census tracts that include 4,936 cases.

Georgia-Pacific-Palatka Station is a wholly owned subsidiary of Koch Industries Inc. that is located in Wichita, Kansas. It has a privately held ownership structure and is

located at latitude 29.69009 and longitude -81.66153 at 215 County Road 216, Palatka, Florida in Putnam County. The Georgia Pacific Sawmill and Paper plant in Palatka is modeled on the company's Brewton, Alabama facility which maintain proprietary rights on certain toxic wastes as byproducts of the paper mill and has a separate electric production facility for operations. The Georgia Pacific Plant has seven census tracts representing 31,251 cases.

OUC is a municipal-owned public utility providing water and electric services to citizens of Orlando and adjacent areas. Stanton is a subsidiary of the city of Orlando, Florida through the OUC. Stanton Energy Center is located at latitude 28.482828 and longitude -81.167583 at 5150 Alafaya Trail, Orlando, Florida in Orange County. Each municipality is regulated independently for customers in their regions. The OUC has 22 census tracts, with four tracts reporting that represent a total of 20,415 cases.

Progress Energy-Crystal River Station, a subsidiary of Duke Energy headquartered in Charlotte, North Carolina, is one of the nation's largest energy utility companies. It is located at latitude 28.95913 and longitude -82.68498, at 15760 West Powerline Road, Crystal, River, Florida, in Citrus County. Duke Energy Florida, formerly Florida Power, distributed power for much of central and north Florida. Their service area covers approximately 13,000 square miles of Florida ecosystem. Progress Energy Crystal River has five census tracts with two tracts reporting, representing 10,739 cases.

FPL West County Station is a wholly owned subsidiary of NextEra Energy, Inc. This facility is located at latitude 26.698606 and longitude -80.374872 at 20505 State

Road 80, Loxahatchee, FL in Palm Beach County. FPL owns and operates natural gas and fossil fuel pipelines as well as energy production facilities in central FL. NextEra is headquartered in Juno Beach, FL and operates in the U.S. and Canada. This station contains six census tracts with two reporting tracts representing 7,535 cases.

FPL Cape Canaveral Station, another wholly owned subsidiary of NextEra Energy, located at latitude 28.468103 and longitude -80.767385 located at 6000 North US Highway 1, Cocoa, FL 32927 in Brevard County. FPL Cape Canaveral Station has 20 Census Tracts with 10 Tracts reporting representing 59,590 cases.

Seminole Electric Cooperative, Inc. is one of the largest generation and transmission cooperatives in the U.S. located at latitude 29.733333 and longitude -81.633333 at 890 Hwy 17, Palatka, FL 32177 in Putnam County, near the St. John's River, south of Jacksonville. Seminole Generating Station (SGS) has five census tracts representing 21,578 cases.

JEA Northside Station is one of three generating power stations owned and operated by the municipal utility in Jacksonville, Florida. Located at latitude 30.42509 and longitude -81.5525, at 4377 Heckscher Dr., Jacksonville, FL 32226 in Duval County. JEA Northside Station has 19 census tracts with 11 tracks reporting representing 58,270 cases.

Assumptions of Pearson Correlations with Sample Sites

All nine production facilities meet the criteria-based sample requirement; all are within Florida's 67 counties. Each facility has recorded data reported to the EPA and FDEP. These statistics are then disseminated to agencies within federal, state, and local

databases to assess for any impacts to demographic populations within the five-mile radius around the point source of emissions (ASC, 2019; CAPS 2019; FDOH, 2019; HUD, 2019; PERI 2019; U.S. Census Bureau 2010; USPS, 2019). Each of the nine facility's reported data include U.S. Census and demographic data provided by both state and federal agencies, supplemented by the ACS data for 2019 including gender within census tracts. Florida Health and Vital Statistics for health data and hospitalizations along with Death Query data on morbidity rates for each demographic area surrounding a production facility within the sample. Each production facility has recorded the number of violations for TRI for 2019 with both EPA and FDEP. All facilities listed have archived data from TRI reporting year 2019. All energy sectors represented within the sample with all production sites statistically analyzed individually, regardless of ownership. Emissions reporting on each facility that has toxic pollutants by multiple governmental and non-governmental agencies with data that supported their reported TRIs for triangulation with a variety of secondary sources. Company size and classification were not used as determining factors for inclusion or exclusion from the sample set.

Each production facility in the sample set had a corporate entity which produced annual reporting and published a mission/vision statement, with a human resources department in the corporate structure. Each site disclosed annual reports and made them available to community stakeholders and investors, if applicable. Required regulatory reports were filed and found at EPA and multiple governmental and non-governmental sites. The assumptions for criteria-based sample can be found in Chapter 3.

Comparative Analysis of Correlation Matrices

Table 3 presents descriptive statistics for variables with the mean and standard deviation for each variable. The comparative table lists totals in each variable category for the available census tract information at each sample site. Table 4 presents statistically significant relationships between all nine sample sites. This table presented the data in a combined correlation matrix that compared all the sample site totals against one another with all variables using bivariate pairwise correlations between sites. Table 4 also presents data that made a comparison between each site the totals for emissions produced to determine if the totals between variables were statistically significant between the sample sites. A complete pairwise listing of all Pearson's *r* with significance levels at $p = < .05$, .01, and $p = < .001$ and, CI at 95% are presented in Appendix E.

Table 3

Descriptive Statistics of Variables for All Sample Sites

Variable	Mean	Std. Deviation	N
Total Toxic Emissions	9858543284.14	6400383659.078	9
Census	37434.56	37781.850	9
Gender Male	18378.78	18423.514	9
Gender Female	19055.77	19374.083	9
Race White	26076.22	24197.014	9
Race Nonwhite	11462.20	14232.036	9
Poverty Level	26742.31	62769.334	9
Health Asthma ER	557.5026	594.54038	9
Health Asthma Hospital	62.7585	66.39289	9
Health COPD ER	580.7258	677.64682	9
Health COPD Hospital	139.9253	157.62435	9
Health Heart Attack ER	152.1085	163.58799	9
Health Heart Attack Hospital	147.3393	165.07653	9
Morbidity CANCER	38.58	41.524	9
Morbidity HEART ATTACK	14.51	18.809	9
Morbidity EMPHYSEMA	2.32	5.013	9
Morbidity OTHER COPD	38.79	44.181	9
Morbidity ASTHMA	0.11	0.333	9
EPA EnfComp2019	26.89	31.530	9

The data revealed that there are no statistically significant relationships that appear between all nine sample sites. If comparison is made between corporate actors and total toxic emissions between companies, data indicates that there are no relationships between different sites and companies within a five-mile radius between total toxic emission and EPA compliance and enforcement, census, hospitalizations, morbidity, ethnicity, income, or gender in comparative analysis. Using EPA reporting and site information the data indicated that the null hypotheses are accepted for a between site comparative analysis.

Table 4

Comparative Correlation Matrices of All Sample Sites

		Census	Gender Male	Gender Female	Race White	Race Nonwhite	Poverty Level
Total Toxic Emissions	Pearson Correlation	-0.424	-0.428	-0.421	-0.453	-0.347	0.448
	Sig. (2-tailed)	0.255	0.251	0.259	0.220	0.360	0.227
	N	9	9	9	9	9	9

		Health					
		Asthma ER	Asthma Hospital	COPD ER	COPD Hospital	Heart Attack ER	Heart Attack Hospital
Total Toxic Emissions	Pearson Correlation	-0.271	-0.286	-0.266	-0.271	-0.244	-0.239
	Sig. (2-tailed)	0.480	0.455	0.488	0.481	0.528	0.536
	N	9	9	9	9	9	9

		Morbidity					
		CANCER	HEART ATTACK	EMPHYSEMA	OTHER COPD	ASTHMA	EPA EnfComp 2019
Total Toxic Emissions	Pearson Correlation	-0.274	-0.121	-0.060	-0.267	-0.007	0.220
	Sig. (2-tailed)	0.476	0.756	0.879	0.487	0.987	0.570
	N	9	9	9	9	9	9

Research Question

RQ1: What statistically significant relationships exist between environmental pollution and CEV within the Florida energy sector?

For hypotheses testing, the environmental pollution is referenced as total toxic emissions and corporate environmental violence are the variables EPA enforcement, community census, community health, morbidity rate, race/ethnicity, poverty level and gender. The company classification is identified in description provided on each company in Chapter 3 as well as briefly prior to the presentation of findings in Chapter 4.

Based on single site analysis of correlates within the sample of nine production facilities, there are statistically significant relationships that exist between environmental pollution and CEV within the Florida energy sector. In a between site analysis there were no relationships of significance.

Hypotheses

Hypotheses were as follows:

$H_0$1: There is no statistically significant relationship that exists between total toxic emissions and number of penalties, monetary fines, or cases brought to litigation in Florida against corporate actors.

H_a1: There is a statistically significant relationship that exists between total toxic emissions and number of penalties, monetary fines, or cases brought to litigation in Florida against corporate actors.

Within single site examination, the null is rejected for the following sites: TECO Big Bend, TECO Polk, both had a perfect, positive correlations ($r = 1.00$, $p < .001$);

Progress Energy Crystal River. FPL West County Station, FPL Cape Canaveral, Seminole Electric Cooperative, and JEA Northside, all these sites had a perfect, positive, correlation ($r = 1.00$, $p < .01$) with an increase in reported total toxic emissions would lead to an increase in EPA enforcement and compliance; Georgia Pacific Palatka revealed a perfect negative correlation ($r = -1.00$, $p < .001$) for this site would to a decrease in effect of EPA enforcement and compliance issues.

$H_0$2: There is no statistically significant relationship that exists between total toxic emissions and the community census in the sample.

H_a2: There is a statistically significant relationship that exists between total toxic emissions and the community census in the sample.

The null is rejected for Progress Energy Crystal River, and FPL West County with both sites reporting a perfect, positive relationship between total toxic emissions and Community Census reporting at ($r = 1.00$, $p < .01$) revealing that an increase in total toxic emissions would lead to an increase in reported effects on community census. Seminole Electric Cooperative revealed a strong, positive relationship ($r = .999$, $p < .05$)

$H_0$3: There is no statistically significant relationship that exists between total toxic emissions and number of community cardiac/respiratory health issues.

H_a3: There is a statistically significant relationship that exists between total toxic emissions and number of community cardiac/respiratory health issues.

There is a statistically significant relationship that exists between total toxic emissions and community heath, reported as hospitalizations and ER visits for cardiac and respiratory concerns as a perfect, negative correlation ($r = -1.00$, $p < .01$) for FPL

West County, indicating that an increase in total toxic emissions has a decreased effect on community health. At OUC, Stanton Energy Center the same result, however, the perfect, negative correlation reports at the $p < .001$ level. TECO Big Bend ($r = 1.00, p < .001$) and Seminole Electric Cooperative ($r = 1.00, p < .01$) results showed a perfect, positive correlation between total toxic emissions and community health exist with an increase in total toxic emissions resulted in a corresponding increase in community health hospitalizations for cardiac and respiratory issues.

$H_0$4: There is no statistically significant relationship that exists between total toxic emissions and community morbidity.

H_a4: There is a statistically significant relationship that exists between total toxic emissions and community morbidity.

The following sites show statistical significance in the relationships between total toxic emissions and morbidity due to cardiac and respiratory health concerns. TECO Big Bend and OUC, Stanton Energy Center, both have perfect, positive correlations ($r = 1.00, p < .001$) with an increase in total toxic emissions having an increased effect on morbidity rates. At Seminole Electric Cooperative the same perfect, positive correlation exists as well, however $p < .01$ reported. FPL West County, the data show a perfect negative correlation ($r = -1.00, p < .01$) between total toxic emissions and morbidity rates, specifically in COPD deaths. The increase in total toxic emissions would have a reduced effect on COPD deaths in the affected community.

$H_0$5: There is no statistically significant relationship that exists between total toxic emissions and number of ethnic minorities.

H_a5: There is a statistically significant relationship that exists between total toxic emissions and number of ethnic minorities.

Statistically significant relationships exist between total toxic emissions and the number of minority population within the affected community within five miles of the production facility. A perfect, positive correlation is reported at TECO Big Bend, TECO Polk, Progress Energy Crystal River, FPL West County Station, and Seminole Electric Cooperative, ($r = 1.00$, $p < .01$); Georgia Pacific Palatka displays a strong, positive correlation between total toxic emissions and race/ethnicity ($r = .996$, $p < .05$) This shows that an increase in total toxic emissions would lead to an increase in impacts on minorities within the sample population.

H_06: There is no statistically significant relationship that exists between total toxic emissions and number of low-income households.

H_a6: There is a statistically significant relationship that exists between total toxic emissions and number of low-income households.

The data revealed statistically significant relationships between total toxic emissions and poverty level at the following site locations with a rejection of the null; TECO Polk, Progress Energy Crystal River, FPL West County Station, Seminole Electric Cooperative, with perfect, positive correlations ($r = 1.00$, $p < .001$) and Georgia Pacific Palatka with strong, positive correlation ($r = .996$, $p < .05$) with these relationships indicating that an increase in total toxic emissions will have an increased impact on those in the sample population with low-incomes at 2019 poverty levels. JEA Northside Station revealed a perfect, negative correlation between total toxic emissions and poverty level in

the affected community within 5-miles at (r = -1.00, p < .01) indicating when total toxic emissions increase the effect on persons in poverty will decrease.

$H_0$7: There is no statistically significant relationship that exists between total toxic emissions and gender.

H_a7: There is a statistically significant relationship that exists between total toxic emissions and gender.

The following sample sites will reject the null hypothesis and find there is a statistically significant relationship between total toxic emissions and gender. TECO Big Bend has a perfect, positive correlation (r = 1.00, p < .05), TECO Polk, Progress Energy Crystal River, FPL West County, Seminole Electric Cooperative, also shows a perfect, positive correlation with p < .01) showing that an increase in total toxic emissions would lead to an increase in higher impacts on gender within the sample.

Although each of the hypotheses revealed significant relationships at specific sites in the sample, the comparative analysis between sites did not reveal any statistically significant relationships as noted in Table 4.

The null hypothesis was accepted for the comparison between sample sites. however, it should be noted that each sample site did show rejection of the null hypotheses on different variable relationships when examined as individual corporate actors interacting with the affected areas within five miles of their respective production facility sites. Individual site correlation matrices can be found in Appendix D.

Summary

I rejected the null hypotheses for every category in individual sample site analysis. The results for significance in single site correlation matrices can be found in Appendix C. Every variable had a site with statistical significance for the various correlates. I accepted null hypotheses for every category for the between site analyses. There were no statistically significant findings between the nine production sites for any of the variable relationships and total toxic emissions.

Each site has multiple buildings that are attached to their property, and many have separate reporting of EPA emissions based on the type of corporate entity that controls the site. All these energy actors produce for either residential or commercial use; however, current Florida law does not require reporting to FDEP and EPA regulatory agencies if the corporate actor produces energy for itself. If the production of energy is used in a for-profit capacity, either commercial or residential, TRI reports are filed with both the EPA and FDEP. Both of these agencies continued quarterly self-reporting as the standard for review of all hazardous waste and toxic releases within one, three, and five miles of the point sources of emissions.

Chapter 5 includes information about how data were obtained as well as the collection process. How variables are examined as they relate to total toxic emissions and specific relationships related to CEV through variable and pairwise correlations. I identified areas for further research regarding variables that influence EJ within communities and corporate actors who are part of those communities. This may help with identification of relationships for further research and positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative correlational research was to examine relationships between corporate energy actors and communities affected by environmental pollutants within five miles of a production facility. The corporate entity, whether it is public, private, or municipally owned, is the owner/operator of the production facility producing the environmental pollutant, while the community affected is the recipient of toxic byproducts which can affect persons, wildlife, and ultimately ecosystems within a documented circumference surrounding the point source of those emissions. The EPA calculates these at one, three and five-mile radius points. NGOs and academic institutions have expanded this to 10 miles, but this is not reflected in EPA databases, and five miles was the distance from the point source at which unobtrusive and verifiable documentation was obtained to authenticate data.

I used a correlational design to assess whether significant relationships existed between total toxic emissions and EPA enforcement and compliance along with community health, morbidity, race/ethnicity, poverty level, and gender. I used data from 2019 only to look at total toxic emissions that were produced at a specific point and time which allowed for data collection prior to the COVID-19 pandemic in January 2020. Community health data, recorded as hospitalizations and ER visits, as well as morbidity rates could have skewed results and led to a biased view of the data. A sample of nine production facilities providing commercial and residential electrical power to consumers in Florida were chosen based on location and impacts to coastal and inland ecosystems that are unique to the state.

The correlational approach was used for an analysis of corporate actors within the energy sector while assessing vision and mission statements that were provided to all stakeholders as well as published documents such as corporate sustainability reports and annual financial statements considering federal, state, and local regulations at each site. EJ issues are of concern to communities, including environmental racism in minority and low-income communities, particularly the effects of toxic byproducts on community health and morbidity to humans, wildlife, and ecosystems in affected areas around energy production facilities. Florida has wetlands, the Everglades, complex coastal beaches and accompanying inland waterways, indigenous tribal lands located throughout the state, and wildlife dependent on those ecosystems. Production of excessive toxic waste can lead to CEV in which harm is inflicted to life, health, and physical integrity of humans, wildlife, and ecosystems.

Each individual site produced a wide variety of results, and I rejected null hypotheses. Results were varied and dependent on the specific single site and its geographic locations as well as community demographics for that specific area (see Appendix D). No relationships were found to be significant between all nine of the sites; however, there were significant pairwise correlations between demographic variables, but none between total toxic emissions and the seven independent variables (see Appendix E).

Interpretation of the Findings

Energy actors in Florida have mission/vision statements as well as HR guidelines and a division that addresses environmental concerns and corporate sustainability. They

maintain public awareness of these guidelines through public documentation and are able to communicate with their community partners and stakeholders on a wider scale. Larger U.S.-based companies such as NextEra and Duke Energy had materials available, and multinational corporations such as Emera, Inc., provided documentation. Municipally owned energy companies such as JEA Northside and the OUC Stanton Energy Center and SGS were more accessible but required more diligence to find and locate specific information. Records produced by the FDEP and companion Internet sites as well as social media platforms were at times difficult to navigate in order to locate very specific information. General information can be found readily. Government reporting on companies through the EPA and U.S. Census Bureau are readily available; however, accessing documents was time consuming due to the sheer volume of material. All companies addressed CSR in their documentation, with all providing mission and/or vision statements, financial reports and detailed plans regarding environmental sustainability. Not all corporate actors in the energy sector had designs or plans for how to implement those strategic objectives regarding environmental sustainability. The parent organization, corporate representative, or chief operating officer of a municipal-owned utility or cooperative generally designates those responsible for reporting to government agencies such as the EPA and FDEP for regulatory purposes. Government oversight and potential regulatory penalties are usually only followed up if there is an inspection or media attention brought to a problem that had been reported by the company (Brickey, 2008; Ewall, 2012; Kramartz et al., 2017; Lynch et al., 2015; Sherman, 2018). Ewall (2012) said:

> "A large company with financial, civil, and criminal penalties at stake, to be relied upon to self-report accurately and consistently, and EPA's inability to prove discriminatory actions conclusively and if that inability exists, cannot hold themselves accountable for any act of environmental racism or criminally negligent environmental injustice." (p. 17-18).

A recent development has been the addition of the Office of Environmental Justice in May 2022 which works in tandem with the Office of Climate Change and Health within the Department of Health and Human Services. These departments can research and investigate civil and criminal negligence cases which violate regulatory laws in the U.S. and address environmental justice issues. The Office of Environmental Justice (OEJ) exists within the DOJ, and the EPA has a long-established Department of Environmental Justice [DEJ] that work with federal agencies, state governments, academicians, and NGOs to address effective policy changes and social justice for humans, wildlife, and environments. In October 2023, the OEJ through the Justice Department released its first Environmental Justice Enforcement Strategy Report for 2023 detailing interagency strategies for assisting communities with EJ issues.

Research findings in the correlational design indicate that companies are making attempts follow regulatory laws, however, all nine sample sites had monetary and civil penalties since 2000. In reporting year 2019, five of the nine corporate energy actors had CAA, CWA, RCRA or SDWA infractions for their Florida production sites.

Applications of criminological theory to the research design can be looked at through both the statistical findings and the public domain documentation available

regarding corporate sustainability and public transparency on financial reports and the TRIs provided to the public. In the area of CSR, this has already been discussed at length in the introductory comments with all companies reporting their earnings and providing access to their plans for corporate and environmental sustainability, with some companies having strategic plans and other who have plan but not strategies on how to implement those plans. In most of the documentation provided through the Internet, media kits, and social media platforms, most of the nine energy actors have plans to phase out their coal-fire operations in the state of Florida. Natural gas production and nuclear energy, along with renewable energy sources such as solar and wind are either in production or strategic planning by all companies within the sample. Implementation plans vary widely, but the aspect of CSR regarding 'protection of human capital,' mentioned by Rodrigues and Leitao (2018) and the surrounding environment is evident in current corporate planning. Synchronizing corporate actions parallel with Environmental Justice activities in the state are also evident and (Matten & Moon, 2020). Corporate reporting and acquisition of companies such as TECO by Canadian-based Emera corporation, as well as Duke Energy's expansion into multi-state energy production with Progress Energy and Duke Energy Florida, and NextEra's acquisition of Florida Power and Light's production facilities in Florida, and private company Koch Industry's Georgia Pacific Plant in Palatka, Florida provided excellent examples of criminological theories of treadmill of production and routine activities theory.

The findings in chapter four show that all the energy actors in the sample that maintain company holdings in Florida do have statistically significant relationships

between their total toxic emissions and the other six demographic variables along with the regulatory compliance, that relate specifically to affected communities, wildlife, and ecosystems within that five-mile radius (Barrett et al., 2018; Bullard, 2002; Gupta & Briscoe, 2020; Prechel & Istvan, 2016). The ToP theory that depleted resources is a continuous and revolving cycle to maintain stakeholder gains using fossil fuels, natural gas, and coal in a constant cycle with repetitive and destructive environmental danger, as stated in Chapter 2 and showcased by all nine sample sites having individual statistically significant relationships between total toxic emissions and one or more of the seven variables relating to community, and effects on that community indicate that the relationship does exist between environmental pollution and CEV.

OPE Theory incorporates corporate capitalism with regulatory and environmental policy and political influence. Prechel and Istvan (2016) posit that the power of the company is dependent on its' place with the hierarchical structure of political, cultural and social networking. They liken this in company hierarchy to state and local policymakers and politicians that represent their constituencies but that a lobby or influence of political lobbying can affect the outcomes of policy on the community. Prechel (2023) further posits that this OPE theory is embedded in corporate business models and is not static but constantly shifting as the economy balances and is dependent on public policy and current political trends (Guidi et al., 2020; Gupta & Briscoe, 2020; Prechel, 2023; Prechel and Istvan, 2016).

Finally, Cohen and Felson's (1979) routine activities theory requires the intersection in time and space of three distinct elements. A motivated offender, a suitable

target, and the absence of a capable guardian to deter the crime. This theory can be applied to a criminological application of CEV between the corporate energy actor that created the environmental pollutants (total toxic emissions) and affected communities. This energy supplier in corporate form is the 'motivated offender' with the motivating factor provided as annual profit through production and distribution of energy sector products such as electricity through coal-fire, natural gas, nuclear power and solar energy sources. The 'suitable target' in this research application would be the energy consumer, whether that is a business, household, private person, or a private company producing electricity to maintain production of other products for the consumer, such as paper mills.

In the case of George-Pacific Palatka, the consumer is the paper mill, also part of Georgia Pacific Palatka, however, the energy production facility is only creating the electricity to power its' own production at the paper mill. It is exempt from reporting to FDEP, but does report to the EPA as part of Koch Industries, Inc. For the EPA to penalize Koch Industries, Inc. and Georgia Pacific for any non-compliance issues, the FDEP must bring this to the attention of the EPA. FDEP does not require Georgia Pacific Palatka to report due to the nature and type of electricity it is producing and for whom (Koch Industries, Inc., 2019; National Energy Technology Laboratory [NETL], 2024). The third element of RAT is the 'absence of a suitable guardian'. For environmental justice and regulatory adherence these guardians are our regulatory agencies at federal, state, and local levels. Primarily these would refer to the EPA, the FDEP, and local agencies that work with these organizations, as well as environmental activists that attempt to provide guardianship for their community.

The absence of EPA compliance and history or company noncompliance to reporting their total toxic emissions for CAA, CWA, RCRA, and SDWA, as well as providing reporting on wastewater and landfills provided the basis for the 'absence of suitable guardians' for the communities affected within five miles of a point source of total toxic emissions. EPA cannot become involved without the invitation of state/local DEPs, so the FDEP played a role as 'suitable guardian' in the sample. In reporting year 2019 there were infractions in five of nine sample sites in the research study, with few fines and no monetary penalties imposed and no criminal cases pending at the end of that year. The elements to apply criminological theory RAT to CEV by energy sector actors on their communities can be implemented, if reliable guardianship can be evaluated.

Cohen and Felson's (1979) theory posit that all three elements must be in place to have a crime take place, however, Prechel and Istvan (2016) and Sampson, et al. (2010) maintained that only two of the elements needed to be in place as the corporate actor and managerial hierarchy affects all elements within the offender/target/guardian triangle. They refer to these corporate actors as "Super Controllers" as they can infiltrate all sectors. The manager of a corporate entity can be the "motivated offender", as a member of the corporate hierarchy; the "target" as they are also a member of community and a consumer of the product; and the "guardian" as the company is required to self-report to the EPA and state/local DEP, if required. This application posits that only two of the three elements are required to commit the 'crime' when the corporate entity infiltrates all three of the portions of the triangle, the crime can be committed, as the offender and the target merge, or the offender and the guardian merge. In the research model and

correlation matrix for each company and the wide variety of community variables that presented as statistically significant to total toxic emissions. The findings crafted a case for this application of the RAT criminological theory to be an effective explanation for ongoing CEV within a community. The victim of the criminal act , the 'target', has no path to bypass the criminal act. See Figure 4 in Chapter 2 for a visual representation of the RAT theory as applied to the CEV of a potential energy actor.

Limitations of the Study

In reviewing limitations originally presented in Chapter 1 for the quantitative correlational design, there were five areas of potential concern for the researcher. The first was protecting against bias. The sample size, of nine energy production facilities was small, however, each site represented a unique Florida ecosystem with an equally unique surrounding community within five miles of the point source of toxic emissions. To ensure no bias was made, the sites were given numbers to execute the correlation matrices in SPSS. If a company had more than one site in the sample, due to geographic location differences, it was assigned a different number and treated as a separate company for purposes of the research design.

The second limitation was implementation of a criteria-based sample for each of the energy production facilities which included six Assumptions that had to be met for inclusion in the sample. The 10-mile assumption was reduced to five miles, to match the data compiled from all government databases. The five-mile radius is the standard for all governmental reporting. 10 miles is a new standard being used at the academic level in university research facilities and NGOs who produce independent reporting, it is not

standard across any of the governmental databases at the 10-mile radius in 2024. Assumptions of Florida data and government data from federal agencies such as EPA and EIA were available for reporting year 2019 at the time of study completion. The assumption that the sample would be generalizable to the population was met, as each site represented a significant ecosystem in Florida and substantial census in number of persons within the five-mile radius of each sample site. CSR and managerial reporting were confirmed on each site and the assumption of CSR met by each of the sample companies through their use of stakeholder reporting, Internet and online accessibility to corporate contacts and reports as well as transparency in financial documentation and annual reports, was met for reporting year 2019. Each site location was documented, located and verified. Each had a mission or vision statement posted and HR department that could be contacted with appropriate materials provided for review online or could be requested by the public. Variables listed for inclusion in the research design were selected to highlight elements within the community such as gender, race/ethnicity, poverty level, community health, morbidity rate, community census and EPA enforcement and compliance, as these were those variables that related to CEV and environmental justice concerns within the affected community within the five-mile radius around the production facility.

Finally, the assumption that the databases would be compatible proved to be challenging. How the data collection proceeded was successful but required comparisons that were problematic, but eventually resolved. With this assumption of database

compatibility, as this research design required multiple secondary sources and databases for comparison, the following limitations are discussed.

Originally, as indicated in Chapters 1 and 3, the secondary sources would be used primarily through the EPA's ECHO database, which is extensive. It is used in conjunction with data obtained from other government databases including the U.S. Census Bureau and updated with information from the ACS during years between census updates. Additionally, data would be needed on Health and Vital Statistics through the FDOH, which provides databases on health, hospitalizations, and death statistics. The original intent was to obtain this data through these sources and verify it with materials gathered through NGO's and academic institutions such as PERI and CAPS which also uses the same census data from 2010. A list of all zip codes relevant to the area under study was also needed. Due to the COVID-19 pandemic and to ensure accuracy without bias, the 2010 census data supplemented with 2019 ACS data excluded any hospitalizations or death statistics related to the pandemic from skewing the results. The data on each sample site was retrieved from EPA ECHO reporting for 2019. This included reported toxic emissions with companion compliance and history reporting. Each site is specific to a geo-spatial location and facility reporting number given to each production facility required to report. Originally the 10-mile radius was thought to give the most comprehensive view of impacts on affected communities, however, only NGO's PERI and CAPS had begun to use this metric. The primary government database sources were using the metrics at one, three, and five miles to assess toxic releases for inventory purposes. EPA refers to this as the TRI reporting documents, also available through the

EPA and ECHO databases. The CAPS application permits the user to enter specific longitude and latitude marks from any point and specify a specific radius or circumference from that point. This subsequent report created census data for the specified circular area requested. Geographic units of aggregation offered are limited to census blocks, block groups or census tracts. In the CAPS database, the notes indicate the difficulties in determining what percentage of population in a particular area are counted within the circumference pinpointed and how they are counted in the specified area (CAPS, 2019).

Initially, an accurate method was thought to be the utilization of data from the smallest unit of measurement reporting cases (individual). In this case that unit was the census block. This data is available from the 2010 census data , but not the corresponding ACS supplemental data for off-year recording of the census numbers. Further research into the dataset provided by CAPS, indicated that their profiles were limited to 2010 and 2020 census information with no access to the ACS supplement data, providing no data to support results in official archival reports from 2019. The University of Missouri site does provide ACS data from 2005-2022, however, the geographic units of measurement are not compatible with census data CAPS uses, specifically census blocks, block groups, tracts, or even zip codes. The database notes include a note that any method to apportion populations of census blocks, or census tracts into the radius of a CAPS report would produce rounding errors that would skew results and cause issues of validity within a study. The decision was made at that point to not use a formula to apportion population,

but to use the entire population of the geographic unit any portion of that unit fell within the radius of the sample site's geo-spatial location.

With this information, the decision was made to use the unit of measurement most consistent between the wide variety of databases that did not apportion any part of the population within the desired location of a production facility; the census tract information was consistent and provided the same information between datasets. Each census tract produced a number of individuals within that tract (cases). This was consistent between EPA, CAPS, and PERI and the FDEP and FDOH, as all use U.S. Census Bureau data for census tracts and these all update that census tract information with data from the ACS annual update. Triangulation of financial demographic data was available at FFIEC (Federal Financial Institutions Examination Council), Census Data System, also using the U.S. Census Bureau database. The ACS data for race and gender were taken from their database, connected with the U.S. Census Bureau site for 2010 and ACS 2019 respectively.

Health data were acquired the FDOH database, for hospitalizations and ER visits in recording year 2019. Death queries provided data for morbidity within the sample site locations were acquired through the Florida Death Count Query System for 2019. Initially, these two databases appeared to offer the data by census tract as indicated above, however, while 'Census Tract' is an option available for inquiry, all attempts to retrieve this data were unsuccessful at both sites through the FDOH. FDOH indicated that not all data offered on the Heath Tracker or Death Query sites were available by census tract, even though they are options listed in drop down menus through the FDOH

database portal. Through the Florida Health Department system, zip codes became the smallest, consistent, and most reliable unit of measurement that were compatible with census tract data reporting on individuals (cases). Florida data by zip code and the census tract obtained from U.S. Census Bureau, CAPS, ACS and FFIEC data, the use of a zip code CrossWalk file was used to determine was zip code areas were relevant to the study and the geo-spatial locations already identified as site locations for each of the nine production facilities. These zip code CrossWalk files were located from the Office of Policy Development and Research through the HUD database for archived records from 2019.

The single limitation that was most time consuming was the incompatibility of these databases and no clear consistent unit of measurement between them. Some sites will use the different units as indicated above. Zip codes were not a unit used in census data as a unit to gather data on individual cases, nor was the data from census by groups available through the Florida database system. None of these were compatible with a single source unit to measure the number of persons by case. CAPS at the University of Missouri did provide an algorithm to determine the zip code match to their circumference, as no zip code could be assumed as part of the five-mile radius required, and the crucial health and morbidity data could only be acquired using zip codes within the census tracts identified.

Finally, while reviewing reporting documents provided by both EPA ECHO and the individual TRIs with CAPS and PERI documents, triangulated results on each of the nine facilities were obtained. Discrepancies occur when comparing numbers of cases

within five miles, as well as confirming data that related to percentages of minority and poverty levels among the affected individual cases within the affected areas around production facilities.

No published algorithms could be found to confirm the statistical conclusions in published government reports. All reports identified the units of measurement to choose from, but not the algorithm used to garner the statistical conclusion(s) reported. The Florida databases did not provide a mathematical algorithm for use of the zip codes via the CrossWalks application, only how to obtain the zip codes necessary to align with census tract information. CAPS provided the only algorithm to convert zip code areas to the circumference required by the five-mile radius around the specific location. Further complications were noted in that certain areas of zip codes overlap with one another. For instance, a trauma center needed for medical emergencies may not be in an individual's home zip code area. The reporting hospital for this will then obviously not be related to the individual who reports the injury. The health and death query data were reported by trauma centers, hospitals, and individuals through the ACS survey instrument. Consistency between and collaboration on defined algorithms that are readily available would make the research less prone to error and provide the researcher with unbiased access to reproduce results from published reporting through triangulation of reported data and ability to repeat the statistical methods used in that reporting.

To conclude this section, the information was obtained and converted, using the census tracts as the most reliable and consistent of all the options between databases, as well as the zip code CrossWalks function applied to the Florida databases, using the same

census tract information. CAPS provided the only statistical method to gather the final data from FDOH for 2019 and was labor intensive and a challenge for the researcher. In a similar methodological problem attempting to evaluate Florida sites using distance through a geo-spatial location, Kerney and Kiros (2009) found similar issues in compatibility and access to information between databases and reported statistical information. Specifically, inequities related to data on minority populations near environmentally hazardous production facilities. As indicated in their research, this does not appear to be a new issue for those doing studies that involve the attempt to verify reported data or triangulate information from published data sources, particularly specific mathematical algorithms used for data reports. This author had similar incompatibility issues in 2015 gathering data from government sources for a different research query. Compilation of data for this study indicated that database incompatibilities still exist in 2024 and no solutions to these issues have been published in the literature.

Recommendations

The findings of this study confirmed a wide variety of significant relationships at the single site level. The type of production facility, nature of the parent organization, municipality or cooperative, produced a sample that was varied in type, location, and regions within the state of Florida. The ecosystems in the regions where the sample sites are located represent the unique balance of wildlife in all forms that successfully cohabitate with humans. While the variables used primarily focus on demographics relating to human health and welfare, the wildlife and surrounding ecosystems are cohabitants with humanity in these areas around the production facilities. An example

would be the facility at Apollo Beach, TECO's Big Bend production site. Contained within the five-mile radius of this facility, which is located on the southwest side of the Tampa Bay Estuary is DeSoto National Park, where many forms of wildlife indigenous to Florida are located on the coastline in the middle of the state, referred to as the Suncoast Region. This is also a gathering place for manatees, another species which is native to Florida. The warm waters produced by the TECO Big Bend facility attract manatees to congregate in a waterway directly below the stacks that spew toxic pollutants into the air. Air currents then travel and may drop into the waterway. The manatees are then at risk for exposure to these toxins, the same as their human counterparts. This is one example of the intersection of human, wildlife, and ecosystem environmental interests.

The nine sample sites encompass many of the geographic areas of Florida's unique landscape and fragile ecosystems, research including additional sample sites in other geographic areas would enable more inclusive studies, representative of Florida's population. The larger sample size would enable the use of not only a correlational research design that establishes significant relationships, but also would enable regression models to pursue the cause and effect of relationships that are found to be significant.

Environmental justice (EJ) advocates have established through research and reporting that in many geographic regions, minority and low-income members of the population are at-risk for environmental crimes, particularly that of environmental racism. Expanding the findings in this study to a larger sample of production facility sites, would increase understanding of the variables that contribute most to environmental racism and CEV in communities that surround a production facility that produces toxic

emissions. Expansion of the research area beyond the five-mile radius is recommended and government agency reports to include a circumference to 10 miles, would allow for additional variables to be considered and allow for magnification of effects on the increased sample population. The quantitative methodologies available for larger sample sizes would provide answers to causation that a correlational design is not intended to establish. Effective policy may require an established problem, such as toxic emissions that can cause harm, and a variable(s) that can be verified as causal to that problem.

While the current study produced findings of significance for individual production sites, the analyses of data between the nine sample sites found no relationships of significance that could be attributed to all nine in tandem. While all the sample sites had extensive total toxic emissions, no significant relationship could be established between them. Further research with an expanded sample size should identify and define potential significant relationships between all sample sites. The present study indicated that individual sample site analysis will identify significant relationships and the application of identified relationships to the larger site sample would be beneficial to the generalization of findings to the population of affected communities within five miles of any energy facility producing toxic emissions, but also to the 'community' of energy sector actors operating within Florida, regardless of company affiliation, size, or corporate structure. This would assist in identifying and defining the connections between the community and those businesses that co-exist within that community, to the benefit of both.

Recommendations for research into database compatibility, particularly when research involves environmental issues just as EJ and environmental racism between business entities and all community stakeholders would benefit the academic community. This issue has been studied in the past with no resolution to date. Measurements within reporting surveys as well as details of mathematical algorithms that produced the reported results should be made readily available to any researcher looking to validate and replicate the data in any given governmental report, particularly those used in academia and peer-reviewed articles, journals, and books. Countless hours of comparative analyses with data that cannot be replicated is a serious academic issue that should be addressed in future research. Kerney and Kiros (2009) highlighted these abnormalities within databases produced from governmental agencies, NGOs, and independent academic sources, and showcased the discrepancies between them. This was relevant at the time of their publication in 2009 and remains unanswered today. Further study in this area would be beneficial to students, researchers, academicians, and produce valuable contributions to criminological literature.

Implications for Positive Social Change

EJ issues have an impact across the spectrum of society and impact all levels of societal norms (Bullard 2002, Lynch, 1990). This is an established segment of the environmental movement that includes policy, activism, lobbying and grassroots involvement in the community. The establishment of EJ in the 1970's and continuing to the current day, confirms that environmental racism exists, targeting minority and low-income communities. From Bullard's review in *Dumping in Dixie,* referring to toxic

waste and landfills in minority areas in the U.S. southern states, to Lynch (1990) establishing the idea of green criminology and holding those actors who perpetrate the crime of environmental injustice, accountable both civilly and legally in our courts. These movements have all incentivized students, teachers, academicians, community leaders, politicians, and those who are instrumental in making policy decisions. Most importantly, policy initiatives to continue to research, provide verifiable data and change policy through regulatory action and reform when essential to preserve the health, safety and welfare of human beings, wildlife, ecosystems, and our planet is the embodiment of positive social change.

Identifying issues that need study is the job of the researcher, our broader mission to provide meaningful additions to the academic literature and reach as many readers as possible. To inspire those who wish to study environmental crime and make positive changes to existing policy or provide impetus to alter the regulatory laws that govern environmental justice in the U.S. This study contributed to that continuing effort to provide data required to initiate positive social change within the EJ movement and broader applications to white-collar and environmental crime. Acknowledging those energy sector actors who implement positive social changes to their managerial and production hierarchies, while holding those who are abusing the regulatory system and employ practices that can lead to environmental crimes accountable, is a step toward lasting positive social change. These changes are made with the presentation of verifiable, unbiased data collection and analysis.

Recent actions by the Biden Administration in 2023-24 accelerated the environmental justice movement and addressed some areas of concern that the environmental and white-collar crime community in academia and law enforcement have long acknowledged. Addressed in this study are the limitations of inter-agency data compatibility. The Biden Administration has implemented two important Executive Orders; EO# 14091 uses a multi-tiered approach to the advancement of equity in environment justice through the multi-agency cooperation in the federal government, defines equity-related terminology including equitable development, community wealth building mechanisms and equitable data and algorithmic discrimination in reporting data. Signed on April 21, 2023, this addresses the multi-agency cooperation already described in this study and the limitations of databases that are not compatible across different agency platforms and the absence of published algorithms to replicate published reporting of that data. This is a vital step in providing a mechanism for positive social change through transparency and accuracy in reported data, without bias (Executive Order #14091, 2023).

Executive Order #14096 signed by President Biden on April 23, 2023, directed the federal government to address the identification and employ measures to revitalize the nation's commitment to EJ for all and is described as a policy to pursue a whole-government approach to EJ.

It also establishes the creation of a permanent office under the Council of Environmental Quality and expanded inter-agency teaming to implement EJ and equity in tandem with EO 14091 signed on the same day. The administration is addressing concerns raised by

all segments of the EJ community and provided reliable inter-agency cooperation for the acquisition and sharing of data sources and distribution of data for research and reporting to initiate meaningful environmental policies in the future.

Another meaningful positive social change directly related to the current study is the passing of the Environmental Just for All Act initiated in the 117th Congress (2021-22) by the Senate after President Joe Biden first took office. This act establishes several environmental justice requirements, advisory bodies, and programs to address the disproportionate negative effects on human health and environmental effects of laws at federal level or programs relating to communities of color, low-income, or tribal/indigenous communities. Once again, this legislation passed as Bill S.872 this addressed positive social change in several ways; it lists requirements for providing communities EJ in an equitable fashion across jurisdictions of the federal government, as there are EJ offices at DOJ, HHS and EPA. This bill requires that inter-agency adopt equitable and consistent best practices between the agencies. It addresses those communities that have experienced environmental injustices such as environmental racism. This has been discussed in this study and a welcome positive social change initiative enacted into law by the 117th Congress and moved forward to Senate Committee on the Environment and Public Works on 3/18/2021. These adaptations and executive orders provide the basis for meaningful discussion, research, data collection and policy implementation for those working toward equity and justice for all immersed in environmental concerns.

Conclusions

As techniques improved to locate and document total toxic emissions at production facilities within Florida, additional research is needed, expanding on significant relationships between toxic emissions and disproportionate negative effects of those toxins on the communities residing with a five-mile radius of the production facility. The point-source of those emissions and the data collection methodologies used to assess the toxic releases need to continue to accurately report those findings to regulatory agencies, community stakeholders, and the public. This reporting is imperative to maintain equitable distribution of potential harmful, toxic waste in affected communities. Energy sector companies in Florida must consider their roles in maintaining sustainable procedures to ensure the continued health of Florida ecosystems within their company boundaries at these production facilities. This ensures equitable EJ and fundamental CSR on the part of the corporate energy actor. Florida's ecosystems are fragile, unique, and sustainable with proper care. Human health and welfare side-by-side with the ecosystems that maintain the multitude of wildlife unique to Florida, can provides a strong, vigorous atmosphere for environmental sustainability inclusive to all living things. The important air, land, coastal, and inland waterways, along with Florida's wetlands, provide an abundance of sustainable ecological environments.

The acknowledgment that environmental pollution has a relationship with CEV within the Florida energy sector is the foundation for a positive social change as the history of past environmental damage is well documented in the academic literature.

The expectation that this research provided a meaningful contribution to the exiting literature and triggers future studies to expand upon the existing sample size is encouraging. This would include more energy production facility sites and an examination of additional variables for inclusion in future research designs. These variables may have relationships that have yet to be explored between communities surrounding those facilities and the corporations that provide energy production and distribution in Florida that are beneficial to all.

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Appendix A: List of Abbreviations and Acronyms

CAA	Clean Air Act
CAP	Climate Action Plan
CERCLA	Comprehensive Environmental Response, Conservation and Liability Act
CEV	Corporate Environmental Violence
CFJ	Consent Final Judgment
CFPP	Coal Fired Power Plant
CO	Carbon Monoxide
CSR	Corporate Social Responsibility
CWA	Clean Water Act
DE	Duke Energy
DOJ	Department of Justice
ECHO	Enforcement and Compliance History Online
ECRC	Environmental Cost Recovery Clause
EH&E	Environmental and Engineering Report
EJ	Environmental Justice
EPA	Environmental Protection Agency
ER	Environmental Racism
FLDEP	Florida Department of Environmental Protection
FPL	Florida Power and Light Company
GP	Georgia Pacific
HAP	Hazardous Air Pollutant
IRB	Institutional Review Board
JEA	Jacksonville Energy Association
kg	kilogram
lb	pound
LLC	Limited Liability Company
MCL	Maximum Contaminant Level
mg	milligram
mg/L	milligram per liter
mt	metric tons
MWh	Megawatts per hour
NAAQS	National Ambient Air Quality Standards
nm	nanoparticle
NMMPS	National Morbidity, Mortality and Air Pollution Study
NRC	Nuclear Regulatory Commission
OPE	Organizational Political Economy Theory
OUC	Orlando Utilities Commission
O_3	Ozone
PERI	Political Economic Research Institute
PM	Particulate Matter
ppm	parts per million
RAT	Routine Activities Theory

RCRA	Resource Conservation and Recovery Act
RHA	Rivers and Harbors Act
SEC	Seminole Electric Cooperative
SNC	Significant Noncompliance
TECO	Tampa Electric Company
ToP	Treadmill of Production
TRI	Toxic Release Inventory
US	United States
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
wt%	Weight in Percentage

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Appendix D: Sample Site Correlation Matrices

TECO Big Bend

		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	Comm. Health	Morbidity	EPAEnfComp2019
Total Toxic Emissions	Pearson Correlation	0.993	1.000**	0.978	-0.855	1.000*	0.532	1.000**	1.000**	1.000**
	Sig. (2-tailed)	0.077	0.004	0.133	0.347	0.017	0.643			
	N	3	3	3	3	3	3	2	2	2

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

TECO Polk Station

		Census	Gender Male	Gender Female	Race White	Race Non White	Poverty Level	EPAEnf Comp 2019
Total Toxic Emissions	Pearson Correlation	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**
	Sig. (2-tailed)							
	N	2.00	2.00	2.00	2.00	2.00	2.00	2.00

**. Correlation is significant at the 0.01 level (2-tailed).

Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

Georgia Pacific Palatka Facility

		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	EPA EnfComp 2019
Total Toxic Emissions	Pearson Correlation	0.434	0.736	-0.263	-0.732	0.996	-0.839	-1.000**
	Sig. (2-tailed)	0.714	0.474	0.830	0.477	0.054	0.367	0.000
	N	3	3	3	3	3	3	3

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

Stanton Energy Center-Orlando Utilities Commission

								Health			
		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	Asthma ER	Asthma Hospital	COPD ER	COPD Hospital
Total Toxic Emissions	Pearson Correlation	0.959	0.980	0.928	0.962	0.900	0.048	-0.021	-0.245	-0.373	-0.504
	Sig. (2-tailed)	0.184	0.128	0.244	0.177	0.287	0.969	0.987	0.843	0.756	0.663
	N	3	3	3	3	3	3	3	3	3	3

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

		Health		Morbidity					
		Heart Attack ER	Heart Attack Hospital	CANCER	HEART ATTACK	EMPHYSEMA	OTHER COPD	Asthma	EPA EnfComp 2019
Total Toxic Emissions	Pearson Correlation	-1.000**	-1.000**	-0.076	0.988	-0.068	-0.443	1.000**	-0.866
	Sig. (2-tailed)	0.000	0.000	0.952	0.099	0.957	0.708	0.000	0.333
	N	3	3	3	3	3	3	3	3

Progress Energy Crystal River Station

		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	EPA EnfComp2019
Total Toxic Emissions	Pearson Correlation	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**
	Sig. (2-tailed)							
	N	2	2	2	2	2	2	2

**. Correlation is significant at the 0.01 level (2-tailed).
Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

Florida Power and Light West County Station

								Health	
		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	Asthma ER	Asthma Hospital
Total Toxic Emissions	Pearson Correlation	1.000**	1.000**	1.000**	1.000**	-1.000**	-1.000**	-1.000**	1.000**
	Sig. (2-tailed)								
	N	2	2	2	2	2	2	2	2

**. Correlation is significant at the 0.01 level (2-tailed).
Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

		Health				Morbidity			
		COPD ER	COPD Hospital	Heart Attack ER	Heart Attack Hospital	CANCER	HEART ATTACK	OTHER COPD	EPA EnfComp 2019
Total Toxic Emissions	Pearson Correlation	-1.000**	1.000**	1.000**	-1.000**	-0.693	-0.500	-1.000**	1.000**
	Sig. (2-tailed)					0.512	0.667		
	N	2	2	2	2	3	3	2	2

Florida Power and Light Cape Canaveral Station

		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	EPA EnfComp 2019
Total Toxic Emissions	Pearson Correlation	-0.637	-0.642	-0.633	-0.836	-0.371	-0.973	1.000**
	Sig. (2-tailed)	0.561	0.556	0.563	0.370	0.758	0.147	
	N	3	3	3	3	3	3	2

Seminole Electric Cooperative

								Health	
		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	Asthma ER	Asthma Hospital
Total Toxic Emissions	Pearson Correlation	.999*	0.860	0.972	0.620	0.545	1.000**	1.000**	1.000**
	Sig. (2-tailed)	0.030	0.341	0.152	0.574	0.633	0.001		
	N	3	3	3	3	3	3	2	2

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

		Health				Morbidity			
		COPD ER	COPD Hospital	Heart Attack ER	Heart Attack Hospital	CANCER	HEART ATTACK	OTHER COPD	EPA EnfComp 2019
Total Toxic Emissions	Pearson Correlation	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**
	Sig. (2-tailed)								
	N	2	2	2	2	2	2	2	2

Jacksonville Energy Authority Northside Station

		Census	Gender Male	Gender Female	Race White	Race NonWhite	Poverty Level	Community Health	Morbidity Rate	EPAEnfComp2019
Total Toxic Emissions	Pearson Correlation	0.993	1.000**	0.978	-0.855	1.000*	0.532	1.000**	1.000**	1.000**
	Sig. (2-tailed)	0.077	0.004	0.133	0.347	0.017	0.643			
	N	3	3	3	3	3	3	2	2	2

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Confidence Intervals cannot be computed because the number of valid cases does not exceed 3.

Appendix E: Sample Site Pairwise Statistics and Confidence Intervals

	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed)[a] Lower	Upper
Total toxic emissions - Census	-0.424	0.255	-0.842	0.357
Total Toxic Emissions – Gender Male	-0.428	0.251	-0.843	0.354
Total Toxic Emissions – Gender Female	-0.421	0.259	-0.840	0.361
Total Toxic Emissions – Race White	-0.453	0.220	-0.851	0.327
Total Toxic Emissions – Race Nonwhite	-0.347	0.360	-0.815	0.430
Total Toxic Emissions – Poverty Level	0.448	0.227	-0.333	0.849
Total Toxic Emissions - Asthma ER	-0.271	0.480	-0.786	0.492
Total Toxic Emissions - Asthma Hospital	-0.286	0.455	-0.792	0.481
Total Toxic Emissions - COPD ER	-0.266	0.488	-0.784	0.496
Total Toxic Emissions - COPD Hospital	-0.271	0.481	-0.786	0.492
Total Toxic Emissions - Heart Attack ER	-0.244	0.528	-0.775	0.513
Total Toxic Emissions - Heart Attack Hospital	-0.239	0.536	-0.773	0.516
Total Toxic Emissions - CANCER	-0.274	0.476	-0.787	0.490
Total Toxic Emissions - HEART ATTACK	-0.121	0.756	-0.723	0.595
Total Toxic Emissions - EMPHYSEMA	-0.060	0.879	-0.694	0.632
Total Toxic Emissions - OTHER COPD	-0.267	0.487	-0.785	0.495
Total Toxic Emissions - Asthma	-0.007	0.987	-0.668	0.661
Total Toxic Emissions - EPA EnfComp 2019	0.220	0.570	-0.530	0.766
Census - Male	1.000	0.000	0.998	1.000
Census - Female	1.000	0.000	0.998	1.000
Census - White	0.989	0.000	0.940	0.998
Census - Nonwhite	0.967	0.000	0.826	0.992
Census - Population in Poverty	-0.080	0.838	-0.704	0.620
Census - Asthma ER	0.316	0.407	-0.456	0.803
Census - Asthma Hospital	0.448	0.227	-0.333	0.849
Census - COPD ER	0.252	0.513	-0.507	0.779
Census - COPD Hospital	0.215	0.578	-0.533	0.764
Census - Heart Attack ER	0.213	0.582	-0.535	0.763
Census - Heart Attack Hospital	0.218	0.573	-0.532	0.765
Census - CANCER	0.347	0.360	-0.430	0.815
Census - HEART ATTACK	0.047	0.905	-0.639	0.688
Census - EMPHYSEMA	-0.074	0.851	-0.701	0.624
Census - OTHER COPD	0.293	0.444	-0.475	0.795
Census - Asthma	-0.169	0.664	-0.744	0.565
Census - EPA EnfComp 2019	-0.016	0.967	-0.673	0.656

	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed)[a] Lower	Upper
Male - Female	0.998	0.000	0.991	1.000
Male - White	0.990	0.000	0.945	0.998
Male - Nonwhite	0.964	0.000	0.812	0.992
Male - Population in Poverty	-0.085	0.827	-0.707	0.617
Male - Asthma ER	0.313	0.413	-0.459	0.802
Male - Asthma Hospital	0.446	0.229	-0.335	0.849
Male - COPD ER	0.240	0.534	-0.516	0.774
Male - COPD Hospital	0.204	0.599	-0.541	0.759
Male - Heart Attack ER	0.203	0.600	-0.542	0.759
Male - Heart Attack Hospital	0.207	0.593	-0.539	0.761
Male - CANCER	0.337	0.375	-0.439	0.811
Male - HEART ATTACK	0.036	0.927	-0.645	0.682
Male - EMPHYSEMA	-0.051	0.896	-0.690	0.636
Male - OTHER COPD	0.281	0.464	-0.485	0.790
Male - Asthma	-0.144	0.713	-0.733	0.581
Male - EPA EnfComp 2019	-0.025	0.950	-0.677	0.651
Female - White	0.987	0.000	0.931	0.997
Female - Nonwhite	0.969	0.000	0.836	0.993
Female - Population in Poverty	-0.074	0.849	-0.701	0.623
Female - Asthma ER	0.319	0.403	-0.454	0.804
Female - Asthma Hospital	0.449	0.226	-0.332	0.850
Female - COPD ER	0.263	0.494	-0.498	0.783
Female - COPD Hospital	0.226	0.559	-0.526	0.768
Female - Heart Attack ER	0.222	0.566	-0.529	0.767
Female - Heart Attack Hospital	0.228	0.556	-0.525	0.769
Female - CANCER	0.357	0.346	-0.421	0.818
Female - HEART ATTACK	0.057	0.885	-0.633	0.693
Female - EMPHYSEMA	-0.095	0.808	-0.711	0.611
Female - OTHER COPD	0.305	0.425	-0.466	0.799
Female - Asthma	-0.193	0.619	-0.755	0.549
Female - EPA EnfComp 2019	-0.008	0.983	-0.668	0.660

	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed)[a] Lower	Upper
White - Nonwhite	0.918	0.000	0.618	0.981
White - Population in Poverty	-0.099	0.800	-0.713	0.609
White - Asthma ER	0.275	0.474	-0.489	0.788
White - Asthma Hospital	0.397	0.290	-0.384	0.832
White - COPD ER	0.218	0.573	-0.531	0.765
White - COPD Hospital	0.180	0.643	-0.558	0.749
White - Heart Attack ER	0.176	0.650	-0.560	0.747
White - Heart Attack Hospital	0.184	0.636	-0.555	0.751
White - CANCER	0.304	0.426	-0.466	0.799
White - HEART ATTACK	0.026	0.948	-0.650	0.677
White - EMPHYSEMA	-0.088	0.821	-0.708	0.615
White - OTHER COPD	0.256	0.507	-0.504	0.780
White - Asthma	-0.183	0.638	-0.750	0.556
White - EPA EnfComp 2019	-0.029	0.940	-0.679	0.648
Nonwhite - Population in Poverty	-0.046	0.906	-0.688	0.639
Nonwhite - Asthma ER	0.366	0.333	-0.413	0.821
Nonwhite - Asthma Hospital	0.507	0.164	-0.267	0.868
Nonwhite - COPD ER	0.292	0.446	-0.476	0.794
Nonwhite - COPD Hospital	0.259	0.501	-0.501	0.781
Nonwhite - Heart Attack ER	0.261	0.498	-0.500	0.782
Nonwhite - Heart Attack Hospital	0.261	0.497	-0.500	0.782
Nonwhite - CANCER	0.400	0.287	-0.382	0.833
Nonwhite - HEART ATTACK	0.079	0.839	-0.620	0.704
Nonwhite - EMPHYSEMA	-0.049	0.900	-0.689	0.638
Nonwhite - OTHER COPD	0.338	0.374	-0.438	0.811
Nonwhite - Asthma	-0.140	0.719	-0.732	0.583
Nonwhite - EPA EnfComp 2019	0.000	1.000	-0.664	0.664

	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed)[a] Lower	Upper
Population in Poverty - Asthma ER	0.164	0.674	-0.568	0.742
Population in Poverty - Asthma Hospital	0.082	0.834	-0.619	0.705
Population in Poverty - COPD ER	0.343	0.366	-0.434	0.813
Population in Poverty - COPD Hospital	0.382	0.311	-0.399	0.827
Population in Poverty - Heart Attack ER	0.295	0.440	-0.473	0.795
Population in Poverty - Heart Attack Hospital	0.274	0.476	-0.490	0.787
Population in Poverty - CANCER	0.252	0.513	-0.507	0.779
Population in Poverty - HEART ATTACK	0.171	0.660	-0.564	0.745
Population in Poverty - EMPHYSEMA	-0.196	0.613	-0.756	0.547
Population in Poverty - OTHER COPD	0.321	0.399	-0.452	0.805
Population in Poverty - Asthma	-0.148	0.704	-0.735	0.578
Population in Poverty - EPA EnfComp 2019	-0.258	0.503	-0.781	0.502
Asthma ER - Asthma Hospital	0.980	0.000	0.891	0.995
Asthma ER - COPD ER	0.913	0.001	0.597	0.980
Asthma ER - COPD Hospital	0.886	0.001	0.499	0.973
Asthma ER - Heart Attack ER	0.953	0.000	0.762	0.989
Asthma ER - Heart Attack Hospital	0.950	0.000	0.751	0.988
Asthma ER - CANCER	0.963	0.000	0.808	0.991
Asthma ER - HEART ATTACK	0.887	0.001	0.501	0.973
Asthma ER - EMPHYSEMA	0.430	0.248	-0.352	0.843
Asthma ER - OTHER COPD	0.923	0.000	0.634	0.982
Asthma ER - Asthma	0.121	0.757	-0.596	0.723
Asthma ER - EPA EnfComp 2019	-0.031	0.937	-0.680	0.648
Asthma Hospital - COPD ER	0.840	0.005	0.353	0.962
Asthma Hospital - COPD Hospital	0.803	0.009	0.251	0.952
Asthma Hospital - Heart Attack ER	0.885	0.002	0.496	0.973
Asthma Hospital - Heart Attack Hospital	0.884	0.002	0.493	0.973
Asthma Hospital - CANCER	0.923	0.000	0.637	0.982
Asthma Hospital - HEART ATTACK	0.813	0.008	0.277	0.955
Asthma Hospital - EMPHYSEMA	0.471	0.201	-0.308	0.857
Asthma Hospital - OTHER COPD	0.860	0.003	0.414	0.967
Asthma Hospital - Asthma	0.159	0.682	-0.571	0.740
Asthma Hospital - EPA EnfComp 2019	0.000	1.000	-0.664	0.664

	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed)[a] Lower	Upper
COPD ER - COPD Hospital	0.991	0.000	0.952	0.998
COPD ER - Heart Attack ER	0.989	0.000	0.938	0.997
COPD ER - Heart Attack Hospital	0.987	0.000	0.928	0.997
COPD ER - CANCER	0.981	0.000	0.896	0.996
COPD ER - HEART ATTACK	0.888	0.001	0.504	0.973
COPD ER - EMPHYSEMA	0.075	0.847	-0.623	0.702
COPD ER - OTHER COPD	0.998	0.000	0.989	1.000
COPD ER - Asthma	-0.182	0.640	-0.750	0.557
COPD ER - EPA EnfComp 2019	-0.041	0.917	-0.685	0.642
COPD Hospital - Heart Attack ER	0.977	0.000	0.878	0.995
COPD Hospital - Heart Attack Hospital	0.966	0.000	0.825	0.992
COPD Hospital - CANCER	0.957	0.000	0.781	0.990
COPD Hospital - HEART ATTACK	0.842	0.004	0.357	0.962
COPD Hospital - EMPHYSEMA	0.079	0.840	-0.620	0.704
COPD Hospital - OTHER COPD	0.984	0.000	0.912	0.996
COPD Hospital - Asthma	-0.132	0.735	-0.728	0.589
COPD Hospital - EPA EnfComp 2019	-0.098	0.802	-0.713	0.609
Heart Attack ER - Heart Attack Hospital	0.997	0.000	0.984	0.999
Heart Attack ER - CANCER	0.987	0.000	0.928	0.997
Heart Attack ER - HEART ATTACK	0.923	0.000	0.638	0.982
Heart Attack ER - EMPHYSEMA	0.204	0.599	-0.541	0.759
Heart Attack ER - OTHER COPD	0.988	0.000	0.936	0.997
Heart Attack ER - Asthma	-0.071	0.856	-0.700	0.625
Heart Attack ER - EPA EnfComp 2019	-0.075	0.848	-0.702	0.623
Heart Attack Hospital - CANCER	0.989	0.000	0.937	0.997
Heart Attack Hospital - HEART ATTACK	0.943	0.000	0.720	0.987
Heart Attack Hospital - EMPHYSEMA	0.177	0.648	-0.560	0.748
Heart Attack Hospital - OTHER COPD	0.989	0.000	0.937	0.997
Heart Attack Hospital - Asthma	-0.119	0.760	-0.722	0.597
Heart Attack Hospital - EPA EnfComp 2019	-0.042	0.914	-0.686	0.641

	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed)[a] Lower	Upper
CANCER - HEART ATTACK	0.903	0.001	0.560	0.977
CANCER - EMPHYSEMA	0.176	0.651	-0.560	0.747
CANCER - OTHER COPD	0.989	0.000	0.941	0.998
CANCER - Asthma	-0.118	0.763	-0.722	0.597
CANCER - EPA EnfComp 2019	-0.022	0.956	-0.675	0.653
HEART ATTACK - EMPHYSEMA	0.208	0.591	-0.538	0.761
HEART ATTACK - OTHER COPD	0.892	0.001	0.520	0.975
HEART ATTACK - Asthma	-0.147	0.707	-0.735	0.580
HEART ATTACK - EPA EnfComp 2019	-0.010	0.980	-0.669	0.659
EMPHYSEMA - OTHER COPD	0.075	0.847	-0.623	0.702
EMPHYSEMA - Asthma	0.906	0.001	0.569	0.978
EMPHYSEMA - EPA EnfComp 2019	-0.160	0.681	-0.741	0.571
OTHER COPD - Asthma	-0.193	0.619	-0.755	0.549
OTHER COPD - EPA EnfComp 2019	-0.031	0.938	-0.680	0.648
Asthma - EPA EnfComp 2019	-0.284	0.459	-0.791	0.482

a. Estimation is based on Fisher's r-to-z transformation with bias adjustment.