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Houston After Harvey: The Act of God Defense in the Climate Change Era

By Sarah Martinez

I. INTRODUCTION

On August 25, 2017, Hurricane Harvey made landfall near Corpus Christi, Texas, as a category four hurricane.[1] Most media outlets characterized the enormous amount of rainfall as unprecedented,[2] but this amount of rainfall was not unprecedented at all—a fact that should influence liability resulting from the storm. Delaware-based Arkema's chemical plant experienced an explosion during the hurricane, leading to multitude toxic tort lawsuits. This article argues that Hurricane Harvey was not unprecedented considering climate change science. As such, the court should reconsider Arkema's "act of God" defense in light of attribution science, demonstrating that storms are becoming more frequent and more severe. To apply the act of God defense more justly in the era of climate change, courts need to adjust the baseline for what constitutes an act of God for foreseeability purposes and encourage the implementation of climate adaptation plans to ensure climate resiliency and alleviate inevitable costs of worsening natural disasters.

Hurricane Harvey hit the southeast Texas coast with a ferocity that has been central to subsequent climate change litigation. The massive storm stalled over southeast Texas,

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1 ERIC S. BLAKE & DAVID A. ZELINSKY, NAT'L HURRICANE CTR., NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT: HURRICANE HARVEY 1 (2018), https://www.nhc.noaa.gov/data/tcr/AL092017_Harvey.pdf.

2 *See, e.g.*, Stephanie Ebbs, *Noxious Chemical Fire During Hurricane Harvey Caused by Failure of All Levels of Protection,' Probe Reveals*, ABC NEWS (May 25, 2018, 10:56 AM), https://abcnews.go.com/Politics/noxious-chemical-fire-hurricane-harvey-caused-failure-layers/story?id=55410407.

dropping between fifty and sixty-one inches of rain there and causing catastrophic flooding.[3] However, this giant's origins were not unlike those of Harvey's predecessors. Hurricane Harvey began as wind off the African coast.[4] The mass of swirling air condensed and released multiple times on its trip westward before becoming a tropical depression just east of Barbados.[5] The wind relaxed, and the storm had a chance to absorb the warm moist air, being upgraded to tropical-storm status by the next day.[6] The storm quickly picked up speed and struck the Caribbean islands, where it released most of the moisture it had gathered the day before, returning to tropical-depression status.[7] The weakened storm continued westward and remained convectively active, constantly taking in more warm moisture and gaining strength.[8] By August 23, 2017, the storm had made its way west of the Yucatán Peninsula to the Bay of Campeche, and by August 24, the depression had earned hurricane status.[9] The storm continued to grow, and by August 26, the hurricane christened "Harvey" reached category four status.[10]

Hurricane Harvey was odd for several reasons. Usually, when a hurricane hits land it weakens but continues to sprinkle the country's interior with rain.[11] In this case, however, the wind shear effectively stalled the hurricane, half over land and half over the Gulf of Mexico.[12] Stalling here allowed Harvey to constantly replenish itself, resulting in massive

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3 BLAKE, *supra* note 1, at 6, 9.
4 *Id.* at 2.
5 *Id.*
6 *Id.*
7 *Id.*
8 *Id.* at 2.
9 BLAKE, *supra* note 1, at 2–3.
10 *Id.* at 3.
11 *How Hurricanes Form,* UCAR CTR. FOR SCI. EDUC., https://scied.ucar.edu/learning-zone/storms/how-hurricanes-form (last visited Jan. 6, 2023) ("Storms weaken when they move over areas with cooler ocean water. There isn't nearly as much energy in the water to fuel the storm, nor is there as much humidity in the air. Hurricanes also weaken when they travel over land.").
12 BLAKE, *supra* note 1, at 3.

rain and flooding across southeast Texas. According to CNN, Hurricane Harvey unloaded twenty-seven trillion gallons of rain over the state of Texas.[13] The cities of Beaumont and Port Arthur experienced twenty-six inches of rain in just twenty-four hours.[14] The massive hurricane and ensuing flood event caused catastrophic impacts on communities in southeast Texas.[15] For the energy industry in Houston, hurricanes often pose problems for emergency maintenance and services. For an Arkema chemical plant, these issues and alleged negligence resulted in an explosion that poisoned the neighboring residential land and caused toxicity-related health effects in first responders.

First, this Article describes what occurred at the Arkema chemical plant in Crosby, Texas, during and after Hurricane Harvey, and why. It also examines the three categories of pending lawsuits against Arkema for the explosion that occurred at the plant and the resulting health effects on first responders and property damage.

Second, this Article contemplates whether Hurricane Harvey was an "act of God," or merely the first of many storms to come as climate change begins to take hold of the earth's natural systems.

Third, this Article discusses the role of the act of God defense in climate change-related litigation, such as the lawsuits against Arkema. This analysis includes the legal concept of foreseeability and how it may change in light of emerging attribution science as the climate changes and perceptions of "normal" shift. Finally, it makes suggestions for applying the act of God defense more justly in the era of climate change and attribution

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13 *The Devastation, by the Numbers*, CNN, https://www.cnn.com/specials/us/hurricane-harvey (last visited Jan. 6, 2023).

14 *Id.*

15 *Id.*

science, as well as recommendations on improving climate adaptation plans to improve climate resiliency.

II. HURRICANE HARVEY AND THE LAWSUITS IT SPAWNED IN HOUSTON

Hurricane Harvey's immense rainfall caused extreme flooding throughout Houston, Texas. Even with its many drainage canals and reservoirs, Houston could not control the floodwaters and they inundated entire communities. First, this section addresses constitutional takings claims from homeowners in West Houston who experienced flooding as a result of Harvey. It then explores the toxic tort litigation arising from the Arkema plant explosion.

A. CONSTITUTIONAL TAKINGS CLAIMS AGAINST ARMY CORPS

To establish a viable takings claim, a plaintiff must prove two things: (1) that they have a property interest for purposes of the Fifth Amendment, and (2) that the government's actions amounted to a compensable taking of that property interest.[16]

Houston is no stranger to hurricanes or flooding.[17] The town flooded shortly after it was settled in the 1830s.[18] A little later on, "in response to devastating floods" in the 1920s, both the Texas Legislature and U.S. Congress took action to "implement flood damage reduction projects."[19] The Texas Legislature created the Harris County Flood Control District, while Congress passed the Rivers and Harbors Act of 1938 (RHA).[20] The

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16 U.S. CONST. amend. V.

17 *Flooded From the Beginning,* HARRIS CNTY. FLOOD CONTROL DIST., https://www.hcfcd.org/About/Harris-Countys-FloodingHistory#:~:text=Harris%20County%20suffered%20through%2016,however%2C%20citizens%20clamored%20for%20solutions (last visited Jan. 6, 2023).

18 *Id.* ("Shortly thereafter, every structure in the new settlement flooded. Early settlers documented that after heavy rains, their wagon trips west through the prairie involved days of walking through knee-deep water.").

19 *In re* Downstream Addicks and Barker (Tex.) Flood Control Reservoirs, 147 Fed. Cl. 566, 571 (Fed. Cl. 2020).

20 *Id.*

RHA "authorized construction of the Addicks and Barker Dams and their corresponding Reservoirs as part of the Buffalo Bayou and Tributaries Project."[21] The reservoirs were meant to catch "excessive amounts of rainfall," which would release "into Buffalo Bayou at a controlled rate."[22]

Hurricane Harvey challenged the drainage infrastructure as it stood. On August 27, 2017, two days after the hurricane made landfall, peak inflows to the Addicks Reservoir reached 70,000 cubic feet per second (cfs) and 77,000 cfs in the Barker Reservoir.[23] These new conditions prompted the Army Corps of Engineers (Army Corps) to release water from both reservoirs per the Manual Induced Surcharge Flood Control Regulation.[24] Army Corps engineers said "the controlled releases from the Addicks and Barker reservoirs were necessary after both pools reached record levels."[25] While the releases may have been necessary, they flooded thousands of west Houston homes. Since then, both upstream and downstream property owners have filed lawsuits alleging that the Army Corps violated their fundamental property rights and caused a taking under the Fifth Amendment.[26]

During Harvey, the Army Corps, among other federal and state agencies, had the duty to mitigate the overwhelming flood risk for upstream and downstream property owners. The Army Corps constructed these reservoirs in the 1930s and 1940s when no

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21 *Id.* at 571 ("As a result of those same floods, Congress directed the Corps to study flood protection along the Buffalo Bayou and, through enactment of the Rivers and Harbors Act of June 20, 1938, authorized construction of the Addicks and Barker Dams and their corresponding Reservoirs as part of the Buffalo Bayou and Tributaries Project . . . .").

22 *Id.*

23 *Id.*

24 *Id.*

25 Brittany Taylor, Taisha Walker, & Vincent Crivelli, *Homeowners Respond to Federal Judge Dismissing Lawsuit Over Addicks, Barker Releases During Hurricane Harvey*, CLICK2HOUSTON (Feb. 18, 2020), https://www.click2houston.com/news/local/2020/02/19/federal-judge-dismisses-lawsuit-over-addicks-barker-releases-during-hurricane-harvey/.

26 *In re* Downstream Addicks, 147 Fed. Cl. at 570.

homes or mega-neighborhoods had been built yet.[27] Additionally, the Army Corps began planning for releases as flood mitigation in the 1940s[28]—begging the question, why would the City allow the construction of so many homes within the flood zone downstream of the gates?

Ultimately, the Army Corps could not control the flooding using the reservoirs and decided to release the water downstream, flooding hundreds of homes. The litigation that arose from flooding around the reservoirs was divided by the location of homeowners with respect to the reservoirs—upstream or downstream.

In *In re Upstream Addicks*,[29] property owners sued the federal government alleging that flooding induced by nearby dams, operated by the Army Corps of Engineers, constituted a taking and required compensation.[30] The court held that the upstream owners held a valid property interest, not subject to flowage easement.[31] The Army Corps did not intend the upstream property owners' properties to flood. Thus, the court explained that the upstream flooding was a permanent taking because plaintiffs incurred incredible damage and lower property values, and were likely to experience flooding again.[32]

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27 Thom Patterson, *How Houston's Layout May Have Made its Flooding Worse*, CNN (Aug. 31, 2017, 3:59 PM), https://www.cnn.com/2017/08/31/us/houston-harvey-flooding-urban-planning/index.html.

28 *How do Addicks & Barker Reservoirs Work?*, GREATER HOUSTON FLOOD MITIGATION CONSORTIUM 1, https://capitol.texas.gov/tlodocs/85R/handouts/C2102018020609151/ae8f145c-a2d8-4766-921f-1f8d86fb3cc9.PDF (last visited May 5, 2021).

29 *In re* Upstream Addicks and Barker (Tex.) Flood Control Reservoirs, 146 Fed. Cl. 219 (Fed. Cl. 2020).

30 *Id.* at 227–28.

31 *Id.* at 249 (explaining that the governments misstate the relationship between the takings clause and the Texas Water Code because the Army Corps make an intentional and conscious decision to flood certain properties).

32 *Id.* at 251 ("The flooding at issue here went well beyond a tort and was sufficiently severe to rise to the level of a compensable taking. The government's suggestion that this flooding is not a compensable taking because it was temporary and confined to a single flood event carries no water. Even if a single event of this nature were insufficient to rise to a taking, the sheer frequency of significant storms in the region both before and since construction of the dams—the Hearne storm, the Taylor storm, the 1929

Conversely, in *In re Downstream Addicks*, the court found the opposite. Instead, the court framed the issue as whether "plaintiffs [had] a protected property interest in perfect flood control, under either federal or state law, when a government-owned water control structure erected for the sole purpose of flood control fail[ed] to completely mitigate against flooding created by an Act of God."[33] The court ultimately said no.[34] It explained that, unlike the upstream homes that flooded during the general operation of the reservoirs, the downstream homes flooded when the Army Corps decided to release the water from the reservoirs to mitigate the flooding of upstream areas.[35]

The court turned to Texas state law to answer the initial question of whether there was a property interest in perfect flood control, determining that there are five reasons no such interest exists.[36] First, the court clarified that Texans own property subject to preexisting limits imposed by the state's police power, which encompasses flood control.[37] Second, the court established that a party, or namely the government, cannot be held liable for acts of God or "acts so unusual that it could not have been reasonably expected or provided against."[38] Third, the court explained that even an intentional release of water on the part of the Army Corps does not amount to a taking unless the control structure releases more water than is entering the reservoir.[39] Fourth, imposing takings liability would have

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and 1935 storms, Tropical Storm Claudette in 1979, the 1992 series of storms, Tropical Storm Allison in 2001, and the Tax Day Storm—suggests that this was more than an isolated event, and that it is likely to recur.").

33 *In re* Downstream Addicks, 147 Fed. Cl. at 576.

34 *Id.* at 583–84.

35 *Id.* at 570 ("Of course, the water from the hurricane was not the government's water, unless the storm was also created by the government's wind and air and sun and sky.").

36 *Id.* at 576.

37 *Id.* at 578.

38 *Id.* at 578–79 (citing Gulf, C. & S.F.R. Co. v. Tex. Star Flour Mills, 143 S.W. 1179, 1182 (Tex. Civ. App. 1912)).

39 *In re* Downstream Addicks, 147 Fed. Cl. at 573 (explaining that inflows into each reservoir were 70,000 to 77,000 cfs, while they released up to a total of only roughly 14,000 cfs from both reservoirs).

been impossible unless the flooding would not have otherwise occurred.[40] Finally, somewhat similar to the court's first reason, when a buyer purchases property in Texas, they purchase it subject to all preexisting limitations.[41] In this case, preexisting limitations meant that because owners downstream purchased homes constructed after the erection of the reservoirs, the Army Corps had a superior right to engage in flood mitigation.[42]

This decision raises the question—what does the future of the act of God defense hold as these events become the new norm as climate change progresses?

B. Toxic Tort Lawsuits Against Arkema

In addition to the climate change litigation involving the Army Corps, other litigation has spawned from the destruction left in Hurricane Harvey's wake. Flooded by Harvey's rain, Arkema's chemical plant in Crosby, Texas, exploded and burned for several days. Arkema maintains that the mischaracterized explosions were the result of an act of God and were not in any way contributed to by negligence on its part.[43] However, not many agree with that position. Harris County, the first responders, and nearby community members initiated a series of lawsuits against Arkema to that end. This section discusses the causes of action in two pending lawsuits against Arkema and the criminal indictment of Arkema executives. Plaintiffs who filed the first lawsuits consist of three groups: first responders, personal injury plaintiffs, and property damage or homeowner plaintiffs.

1. First Responders' Lawsuit

First responders together with some homeowners sued Arkema, alleging negligence

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40 *Id.* at 580.
41 *Id.*
42 *Id.*
43 *Facts and Resources for Arkema Trial*, ARKEMA, https://www.arkema.com/usa/en/social-responsibility/incident-page-2/ (last visited Jan. 6, 2023).

and several other causes of action.[44] Arkema S.A. and its subsidiary Arkema, Inc., as well as several utility defendants, allegedly negligently failed to act or exercise due diligence, failing to manage environmental risks properly or insist that facilities follow environmental policy.[45] Further, plaintiffs assert that Arkema "chose to manufacture and store hazardous, combustible chemicals on property . . . located in an electrified flood zone."[46] Plaintiffs contend that although Arkema knew their chemicals were highly volatile and required uninterrupted electricity services, Arkema "did nothing to prevent or avoid combustion of the dangerous chemicals," knowing that Hurricane Harvey was forecast to make landfall as a category four hurricane.[47] Thus, plaintiffs maintain that Arkema's inaction constituted negligence, causing first responders to experience adverse health effects and causing property damage to plaintiffs residing in the area.[48] Plaintiffs seek aggregate relief totaling $1,000,000.[49]

In their complaint, plaintiffs state that Arkema had a textured history of mishandling chemicals and misrepresenting the facts.[50] Arkema expressly misrepresented that its Crosby location was in an area away from schools, hospitals, and homes, when in reality, the Crosby facility where the explosion occurred was less than five miles from two schools and one and a half miles from hundreds of homes.[51] Additionally, plaintiffs assert that Arkema consistently mishandled chemicals, pointing to a fire at the Crosby Arkema

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44 Complaint at 31–34, n.1, Graves v. Arkema Inc., No. 2017-58465-7, 2017 Tex. Dist. LEXIS 39285 (333rd Dist. Ct., Harris County, Tex. Sept. 7, 2017).
45 *Id.* at 12.
46 *Id.* at 31.
47 *Id.* at 31–32.
48 *Id.* at 32.
49 *Id.* at 31.
50 *Id.* at 34.
51 *Id.*

facility in 2006, a violation in 2011 for not maintaining proper temperatures to stabilize their chemicals, and ten OSHA violations involving the mishandling of chemicals in 2016.[52]

Furthermore, after Hurricane Ike struck the Gulf Coast in 2008, Arkema "identified floods and hurricanes—as well as power failure and loss of cooling—as threats to its Crosby site."[53] Although Arkema knew its weaknesses in the event of flooding, according to its EPA Risk Management Plan (RMP), Arkema failed to update any of its contingency plans, such as by raising critical equipment or isolating hazardous materials.[54]

Thus, plaintiffs assert that the contingency plans to maintain electricity and stabilize Arkema's chemicals were ineffective.[55] First, in the event of flooding, Arkema planned to switch power to generators.[56] However, Arkema placed the generators too low to the ground and the floodwater overwhelmed them.[57] Second, in the event the generators failed, Arkema's contingency plan was to use "liquid nitrogen to power the refrigeration system."[58] Again, Arkema placed the liquid nitrogen delivery system too low to the ground and floodwater inundated the system.[59] Arkema's site had also flooded three times previously. Thus, plaintiffs assert that Arkema was on notice to maintain facilities against the inbound hurricane.[60]

Reports immediately following the explosion indicated that many burning

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52 *Id.* at 34–35.
53 *Id.* at 40.
54 *Id.*
55 *Id.* at 39.
56 *Id.*
57 *Id.*
58 *Id.*
59 *Id.*
60 *Id.* at 36.

chemicals were carcinogens or highly caustic, "requiring the use of . . . self-contained breathing apparatus."[61] However, without warning, after the explosion occurred, first responders and law enforcement arrived at the scene and were overcome with symptoms including nausea, vomiting, dizziness, high blood pressure, headaches, and nose and throat irritation after inhaling the toxic fumes.[62] Thus, plaintiffs assert that Arkema failed to "properly disclose and warn . . . of the dangers associated with the chemicals at the Crosby facility."[63]

The explosion and fumes forced homeowners to evacuate and remain away from their homes longer than they might have needed to were it not for the explosion.[64] Then, Arkema "intentionally ignited the remaining containers of chemicals," which sent debris as well as plumes of ash and smoke into the air.[65] The explosion and fire affected those plaintiffs well outside of the one and a half-mile evacuation perimeter, causing local authorities to encourage plaintiffs "to use protective clothing and drink bottled water until further notice."[66]

Currently, Arkema publicly maintains that Hurricane Harvey was an act of God and that there was no way it could have prepared for the flooding.[67]

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61 *Id.* at 43.

62 *Id.* at 44.

63 *Id.* at 42, n.7 ("Reports indicate that Arkema officials never directly notified the local government officials of the pending failures of the refrigerated storage units. Instead, information came by way of the plant's worker who told the Crosby Volunteer Fire Department when they were rescued and evacuated from the Crosby facility.").

64 *Id.* at 46–47.

65 *Id.* at 47.

66 *Id.* at 48; *see also Residents Return Around Arkema Plant, Told to Drink Bottled Water*, ABC 13 (Sept. 4, 2017), https://abc13.com/arkema-crosby-chemical-plant-fire/2372451/.

67 Complaint, *Graves*, No. 2017-58465-7, s*upra* note 44, at 14; *see also Facts and Resources for Arkema Trial*, *supra* note 46.

2. CLASS ACTION

In addition to the first responders' lawsuit, members of the Crosby community filed a class-action lawsuit—*Wheeler et al. v. Arkema*.[68] Plaintiffs in *Wheeler* define the class of individuals represented as "all residents and real property owners located within a seven-mile radius of the Crosby, Texas, Arkema Chemical Plant."[69] In addition to damages caused by displacement, remediation, and other expenses, plaintiffs seek injunctive relief to protect from "further unreasonable dangers."[70] Finally, plaintiffs are also suing over another toxic release in addition to the explosion.

Plaintiffs contend that on August 29, 2017, over 20,000 pounds of toxic liquid contaminants overflowed two storage tanks and their containment dikes.[71] The overflowing liquid escaped with floodwater and inundated the community.[72] According to the second amended complaint, the Texas Commission on Environmental Quality (TCEQ) characterized the overflow from the storage tanks as having mineral spirits and residual organics, including naphthalene and organic peroxides, among other toxic materials and heavy metals.[73]

Additionally, plaintiffs allege causes of action for two violations of the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[74] This section will focus on the

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68 Ted Oberg, *Homeowners File Federal Lawsuit Against Arkema Plant in Crosby*, ABC 13 (Oct. 3, 2017), https://abc13.com/2484965/.

69 Prantil v. Arkema France S.A., No. 4:17-CV-02960, 2022 U.S. Dist. LEXIS 89217, at *162 (S.D. Tex. May 18, 2022).

70 Second Amended Class Action Complaint at 4, Wheeler v. Arkema France S.A., No. 4:17-cv-02960, 2022 U.S. Dist. LEXIS 89217 (S.D. Tex. May 18, 2022).

71 *Id.* at 14.

72 *Id.*

73 *Id.*

74 *Id.* at 28–33.

plaintiffs' expert testimony contradicting official TCEQ and Chemical Safety Board (CSB) reports.

Plaintiffs first allege that Arkema violated RCRA by handling both solid and hazardous wastes and subsequently abandoning them.[75] They contend that Arkema's storage and disposal of their hazardous waste contributed to the presence of hazardous toxins, such as dioxins, polycyclic aromatic hydrocarbons,[76] volatiles, and metals that contaminated the surrounding area and created "ongoing environmental harms."[77] As a remedy, plaintiffs seek injunctive relief, as well as "appropriate civil penalties."[78]

Second, plaintiffs assert that Arkema, as the owner of the facility that released hazardous substances, is liable under CERCLA for the costs of the response incurred, damages to natural resources, and the cost of necessary health assessments or health effect studies.[79] In their complaint, plaintiffs allege that Arkema is liable under CERCLA because the "explosion and spilling of . . . hazardous substances . . . constitute 'emitting,' 'escaping,' and/or 'disposing into the environment', [sic] and are thus 'releases' as defined under 42 U.S.C. § 9601(22)."[80] Plaintiffs seek to "recover response costs from Arkema and

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75 42 U.S.C. § 6972(a)(1)(B) (2021); *see also* 40 C.F.R. § 261.2 (2015) (explaining that a "discarded material" is any material which is abandoned, including material that is "burned or incinerated," "accumulated," or "stored" before "being abandoned by being disposed of, or burned, or incinerated").

76 *Polycyclic Aromatic Hydrocarbons (PAHs) Factsheet*, CTR. FOR DISEASE CONTROL AND PREVENTION, https://www.cdc.gov/biomonitoring/PAHs_FactSheet.html (last visited Jan. 6, 2023) ("Human health effects from environmental exposure to low levels of PAHs are unknown. Large amounts of naphthalene in air can irritate eyes and breathing passages. Workers who have been exposed to large amounts of naphthalene from skin contact with the liquid form and from breathing naphthalene vapor have developed blood and liver abnormalities. Several of the PAHs and some specific mixtures of PAHs are considered to be cancer-causing chemicals.").

77 Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 70, at 31.

78 *Id.*

79 *Id.* at 32; *see also* 42 U.S.C. § 9706(a) (2021) (governing liability under CERCLA for release of hazardous substances).

80 Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 70, at 32.

any other available relief under CERCLA Section 107(a)."[81]

In response, Arkema has denied most of the plaintiffs' factual assertions and claims a lack of knowledge about the toxicity of samples taken from the surrounding communities.[82] Additionally, Arkema denies plaintiffs' allegations that the facility "predictably los[t] power and flooded" during the hurricane.[83] Furthermore, Arkema denies that loss of power led to the deterioration of their chemicals and has claimed to lack knowledge regarding the "unidentified" TCEQ reports that plaintiffs relied on in their allegations.[84] Citing the same issue, Arkema denied the amount of toxic chemicals released into the atmosphere[85] and claimed to lack knowledge about the results of studies and analyses suggesting that ash and air samples "revealed the presence of metals and chemicals linked to the products stored . . . at the Arkema facility."[86] Finally, Arkema denies knowing that the overflow spill from their storage tanks containing toxins and heavy

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81 *Id.* at 33.

82 *See* Defendant's Answers and Defenses to Plaintiffs' Second Amended Class Action Complaint at 2, Wheeler v. Arkema France S.A., No. 4:17-cv-02960, 2022 U.S. Dist. LEXIS 89217 (S.D. Tex. May 18, 2022) (answering that defendant lacked sufficient knowledge to admit or deny plaintiffs' allegation that toxins were found in soil, ash, and dust samples taken from plaintiffs' property); *see also* Oberg, *supra* note 68 (explaining that Arkema issued the following statement: "Based on testing results received to date, Arkema has not detected chemicals in off-site ash, soil, surface or drinking water samples that exceeded Residential Protective Concentration Levels established by TCEQ for soil and groundwater. We do not know what these lawyers tested for.").

83 Defendant's Answers and Defenses to Plaintiff's Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 82, at 5 (denying plaintiffs' allegation); *see also* Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 70, at 11 ("During Hurricane Harvey, the Arkema facility predictably lost power and flooded.").

84 Defendant's Answers and Defenses to Plaintiff's Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 82, at 6; Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 70, at 12 (citing TEX. COMM'N ON ENV'T QUALITY, ARKEMA FACILITY POST-HARVEY SAMPLING (2017), https://www.tceq.texas.gov/assets/public/response/hurricanes/arkema/arkema-sampling-report.pdf ("The Arkema Inc. organic peroxide facility is located in Crosby, TX. Flooding at the Arkema facility caused loss of power and ultimate failure of refrigeration needed for organic peroxide stabilization. Without refrigeration, organic peroxides degrade and spontaneously combust, creating a fire hazard.").

85 Defendant's Answers and Defenses to Plaintiff's Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 82, at 7; Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 70, at 6.

86 Second Amended Class Action Complaint, *Wheeler*, No. 4:17-cv-02960, *supra* note 70, at 8.

metals.[87]

Plaintiffs, however, filed expert reports from several scientists that showed high concentrations of toxins and other hazardous materials in the community with markers linking the toxins to Arkema's facility. TCEQ's Arkema Post-Harvey Sampling Report[88] explained that "Arkema hired Environmental Resources Management (ERM) to prepare a Sampling and Analysis Plan." [89] Arkema agreed to develop a site clean-up plan, but only if an investigation by Arkema concluded that "representative chemicals of concern (COCs) were shown to be above acceptable levels according to the Texas Risk Reduction Program (TRRP) Protective Concentration Levels (PCLs)."[90] Each sample—air, ash, and water—except for one, proved above the PCL standard.[91] Furthermore, sampling from a private drinking well was the only one to show above acceptable standards for lead.[92] Arkema denied responsibility for unacceptable levels of lead, pointing to TCEQ's finding that "lead is ubiquitous in the environment."[93] Instead, TCEQ suggested "that the lead may have come from household plumbing rather than from the Arkema facility."[94]

However, the plaintiffs in *Wheeler* gathered scientific evidence to the contrary. One of the plaintiff's toxicology reports found various toxins from Arkema's facility in the air, soil, and water in the surrounding community.[95] The report concluded that toxins found outside the facility were hazardous, caused acute symptoms in first responders, and put

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87 *Id.* at 7.
88 ARKEMA FACILITY POST-HARVEY SAMPLING: CROSBY, TX, *supra* note 84.
89 *Id.* at 3.
90 *Id.*
91 *Id.* at 2–4.
92 *Id.* at 4.
93 *Id.*
94 ARKEMA FACILITY POST-HARVEY SAMPLING: CROSBY, TX, *supra* note 84, at 4.
95 Plaintiff's Expert Report & Resume at 17–18, Wheeler v. Arkema France S.A., No. 4:17-cv-02960, 2022 U.S. Dist. LEXIS 89217 (S.D. Tex. 2018).

plaintiffs at long-term risk of multiple chemical exposures.[96] An additional expert evaluated the findings and similarly concluded that contaminants, while they had now dispersed, still caused concern because no one had mitigated the situation.[97]

Ultimately, in June 2019, the District Court ordered to stay the case until the state's criminal trial against various Arkema executives rendered a verdict.[98] In early October 2019, the District Court acquitted the last of the Arkema executives, and the court granted Arkema's motion in *Wheeler* for leave to appeal to the Fifth Circuit.[99]

On appeal, Arkema attacked the certification of the class as well as logistical issues regarding exposure, causation, and injury.[100] Arkema also reasserted the belief that the COCs plaintiffs relied on were not actual proof of Arkema's failure to protect the community.[101] Arkema argued that the court "disregarded individualized issues of exposure, causation, and injury," certified the plaintiffs as an injunctive-relief class, and raised other questions worthy of review, like presenting a complete *Daubert* analysis for plaintiffs' experts.[102] After vacatur and remand from the 5th Circuit, the District Court granted in part and denied in part motions to exclude expert testimony and granted a

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96 *Id.* at 8, 18.

97 *Id.* at 16.

98 Order, Wheeler v. Arkema France S.A., No. 4:17-cv-02960, 2022 U.S. Dist. LEXIS 89217 (S.D. Tex. June 12, 2019).

99 Samantha Ketterer, *High-Profile Arkema Trial Ends With No Convictions as Harris County Judge Acquits Final Defendants*, HOUS. CHRON. (Oct. 1, 2020), https://www.houstonchronicle.com/news/houston- texas/crime/article/Arkema-trial-judge-defendants-no-convictions-15612235.php; Prantil v. Arkema Inc., 986 F.3d 570, 573 (5th Cir. 2021).

100 Defendant's Petition at 1, Wheeler v. Arkema France S.A., No. 4:17-cv-02960, 2022 U.S. Dist. LEXIS 89217 (S.D. Tex. June 12, 2019).

101 *Id.* at 4 ("Emissions from vehicles, burning trash, and many other things contain all three; they are ubiquitous in the environment.").

102 *Id.* at 8–36.

renewed motion for class certification.[103] The case is currently in mediation.[104]

3. CRIMINAL PROSECUTIONS OF ARKEMA

As the court briefly mentioned in *Wheeler*, Houston prosecutors indicted Arkema and several executives on criminal charges of assault[105] and "reckless emission of air containment and endangerment of persons under the Texas Water Code."[106] The court ultimately issued directed verdicts for the defendants and dismissed the claims against Arkema and its executives.

Arkema criticized the litigation as an attempt to "criminalize the impact of [an act of God] that Harris County itself was not prepared for."[107] The court reasoned that there was prosecutorial misconduct that impaired the impartiality of the jury. For instance, the prosecutor displayed "massive poster boards with a transcript from the prosecutor's opening statements in front of the jury box."[108] According to defense attorneys, these poster boards contained "inaccuracies meant to scare the jury."[109] More than misconduct, the court found that prosecutors failed to prove the facts they outlined in their indictment. Specifically, the court could not find enough evidence that Arkema or those in charge

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103 *Prantil*, *supra* note 69, at *161.

104 Order Setting Mediation, Wheeler v. Arkema France S.A., No. 4:17-cv-02960, 2022 U.S. Dist. LEXIS 89217 (S.D. Tex. Sept. 29, 2022).

105 Press Release, Harris Co. Dist. Att'y, Arkema indicted for toxic cloud (Aug. 3, 2018) (on file with author); Christopher Mele, *Chemical Maker and Its Chief Indicted for Explosions During Hurricane Harvey*, N.Y. TIMES (Aug. 3, 3018), https://www.nytimes.com/2018/08/03/business/arkema-chemical-plant-explosion-texas.html?searchResultPosition=23.

106 Mele, *supra* note 105.

107 *Facts and Resources for Arkema Trial*, *supra* note 43 ("Harris County prosecutors are making an unprecedented and outrageous attempt to criminalize a natural disaster. They have filed charges trying to prosecute a company and its employees for the Act of God that was Hurricane Harvey.").

108 Michelle Casady, *Defense Blasts Prosecutor Statement in Arkema Criminal Trial*, LAW360 (Mar. 2, 2020), https://www.law360.com/articles/1249092/defense-blasts-prosecutor-statement-in-arkema-criminal-trial?copied=.

109 *Id.*

intentionally left the chemicals to explode.[110] Thus, the court had to dismiss the claims.[111]

Thus, as an energy hub, Houston industry leaders followed the Arkema cases closely.[112] At its simplest, criminal liability requires a bad act and a guilty conscience. Here though, anything that defeats the *mens rea* requirement defeats the act of God defense because the bar for determining whether a defendant acted with a guilty mind is much higher than the determination of an act of God.

Nevertheless, the Arkema criminal prosecutions scared people. Thus, "[i]f there's going to be a heightened risk of criminal liability for anticipating and responding to natural disasters . . . [companies are] going to have to change the way they approach planning. . . [and] the way they respond to [the natural disasters]."[113] Criminal convictions would send a "strong message," but even without convictions, the conversation about preparedness in the petrochemical industry is far from over.[114]

III. THE ACT OF GOD DEFENSE

A. OVERVIEW OF THE ACT OF GOD DEFENSE

The act of God defense does not have a precise definition; instead, the definition

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[110] Michelle Casady, *Arkema Fully Cleared in Criminal Emissions Trial*, LAW360 (Mar. 2, 2020), https://www.law360.com/articles/1315816 ("Judge Hill . . . could find no direct evidence that [Arkema's manager] made the deliberate decision to leave [the chemicals] on site before Harvey made landfall . . . .").

[111] Katie Watkins & Paul Debenedetto, *No Convictions in Arkema Trial After Judge Drops Remaining Charges*, HOUS. PUB. MEDIA (Oct. 1, 2020, 11:25 AM), https://www.houstonpublicmedia.org/articles/news/energy-environment/2020/10/01/383091/no-convictions-in-arkema-trial-after-judge-drops-remaining-charges/.

[112] Watkins & Debenedetto, *supra* note 111.

[113] Katie Watkins, *Harris County DA Moves to Drop 2 Criminal Charges in Arkema Trial*, HOUS. PUB. MEDIA (Sept. 12, 2020, 3:15 PM), https://www.houstonpublicmedia.org/articles/news/energy-environment/2020/09/12/381717/das-office- moves-to-drop-2-of-the-criminal-charges-against-arkema (quoting University of Houston environmental law professor Tracy Hester).

[114] Watkins & Debenedetto, *supra* note 111 ("University of Houston environmental law Professor Tracy Hester . . . said if the case had resulted in a conviction it would have sent a strong signal to the petrochemical industry about how they need to prepare for disasters. But the fact that the case fell apart doesn't mean the dialogue is over.").

varies by court and statute.[115] For instance, under the Clean Water Act (CWA), an act of God is "an act occasioned by an unanticipated grave natural disaster."[116] Another statute defines it as a "violence of nature in which no human agency participates by act or omission."[117]

Thankfully, academics have narrowed the common denominators. Most definitions for an act of God include an abnormal occurrence, naturally occurring "with no human assistance or influence," where the event is so severe that "human prudence or precaution could not have avoided the damage thereby caused."[118] Thus, an act of God analysis requires a determination that the abnormal occurrence was: (1) unforeseeable, (2) naturally occurring with no human assistance or influence, and (3) so severe that human prudence or precaution could not have avoided the damage caused. This section examines each of the three common prongs.

1. FORESEEABILITY OF ABNORMAL OCCURRENCE

Generally, to prove abnormality, the party asserting the defense must show that the occurrence was "unprecedented within the particular locality," compared to what is "normal" there.[119] Determining abnormality requires careful examination of historical patterns. For example, the classic case of an act of God is a hurricane that causes more destruction than any on record and has unprecedented winds and surges.[120] Whereas, in some cases of flooding, courts required that flooding must simply be unprecedented to

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115 6 AM. JUR. 3d *Proof of Facts* § 1 (2022).
116 33 U.S.C. § 1321(a)(12) (2021).
117 6 AM. JUR. 3d *Proof of Facts* § 1 (2021) (citing 45 U.S.C. § 64a(d) (2021)).
118 *Id.*
119 6 AM. JUR. 3d *Proof of Facts* § 2, (2020).
120 *Id.* ("For example, while storms that are usual for particular waters at a particular time of year are clearly not acts of God, a hurricane that causes more devastation than any on record, with unprecedented wind velocity, tidal rise, and upriver tidal surge, has been described as a 'classic case' of an act of God.").

qualify as an act of God.[121]

Often, courts deny the act of God defense because they find that the event should have been anticipated.[122] Courts divide these storms into two groups: storms that regularly occur in the same region and those that are forecast.[123] Legislators also tend to agree with this idea. According to a 1986 House Report, the act of God defense "is more nebulous, and many occurrences asserted as 'acts of God' would not qualify as 'exceptional natural phenomenon.'" [124] The House Report further explains that a hurricane that occurs in an area and at a time "where [it] should not be unexpected . . . would not qualify as a 'phenomenon of exceptional character.'"[125] Additionally, a Congressional Report before the passage of the CWA states that an act of God should include "only those acts about which the owner could have had no foreknowledge, could have made no plans to avoid, or could not predict would be included."[126] To reach the act of God classification, a natural disaster should significantly deviate from past patterns.[127]

2. NATURAL DISASTER WITHOUT HUMAN INFLUENCE

A court will deny the act of God defense if it finds that another factor contributed "even slightly." [128] Case law demonstrates that this element requires a tedious fact analysis. For instance, in one case the court denied the act of God defense where the Alcan

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121 *Id.* ("Indeed, there are cases which seem to hold that at least one type of casualty, a flood, *must* have been unprecedented if it is to be classified as an act of God.").

122 Joel Eagle, *Divine Intervention: Re-Examining the Act of God Defense*, 82 CHI.-KENT L. REV. 459, 479–80 (2007).

123 *Id.*

124 *See* H.R. Rep. No. 99-253, at 71 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3068, 3101.

125 *Id.*

126 Eagle, *supra* note 122, at 479.

127 6 AM. JUR. 3d *Proof of Facts* § 2, (2020) ("No casualty will be classified as an act of God if the party claiming such status is unable to show that the occurrence represented a significant deviation from phenomena or patterns of phenomena that had been experienced on a routine or chronic basis in the locality during earlier years.").

128 Eagle, *supra* note 122, at 483.

Aluminum company had dumped hazardous waste down an air shaft which led to tunnels bordering the Susquehanna River but blamed the resulting release on a hurricane.[129] The court reasoned that the hazardous release was not "dumped into the borehole" by an act of God, and thus that the act of God could not have been the sole reason for the release.[130]

3. Severity and Due Care

The severity of the abnormal occurrence is hard to quantify, though statutory interpretation lends some help. Remember, an act of God is loosely defined as a "grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character."[131] The inclusion of "grave" in the definition suggests that not every natural disaster qualifies as an act of God.[132] Congress intended for natural disasters to reach a "heightened level of severity" before a defendant can successfully leverage the defense.

A determination of due care depends on a factual analysis of activities before, during, and after the event. In hurricane-prone regions, this may mean that defendants must prove they made a "concerted effort to prepare their facility . . . to endure a natural disaster."[133] Thus, theoretically, it should be much more difficult to succeed on the act of God defense in low-lying, hurricane, and flood-prone regions.[134]

B. The Act of God Defense and Tort Law

When argued successfully, the act of God defense shields defendants from tort liability; however, where negligence or some other tort contributes to the proximate cause

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129 United States v. Alcan Aluminum Corp., 892 F.Supp. 648, 651 (M.D. Pa. 1995).
130 *Id.* at 658.
131 33 U.S.C. § 2701(1) (2021); *see also* 42 U.S.C. § 9601(1) (2021).
132 Eagle, *supra* note 122, at 476.
133 *Id.* at 486.
134 *Id.* at 486–87.

of the injury, the defense will provide nothing for the defendant.[135] Several cases in and around Texas help discern how the act of God defense operates in tort law.

First, in *National Liability & Fire Ins. v. R & R Marine,* the court found no act of God where the defendant's negligence partially caused a vessel to sink.[136] The court reasoned that rainfall did not exceed the forecast, and winds never reached hurricane force at the location of the port.[137]

Second, in *Uniroyal v. Hood*, the court allowed an act of God defense and found no negligence where, after extreme rainfall, a nearby ditch overflowed and flooded the plaintiffs' newly constructed facility.[138] The plaintiffs argued that there was not enough evidence to submit the defense to the jury.[139] However, the court disagreed and affirmed the jury's assessment that the act of God was the sole cause of damage.[140]

In a third case, *Tex-Jersey Oil Corp. v. Beck*, the court found no act of God where the plaintiff's home burned down and caused a death after lightning struck an oil storage tank that then exploded.[141] The court reasoned that the tank exploded because the oil company did not exercise due care, because it was neither equipped with open holes nor was it vapor-proof.[142] Thus, the proximate cause of the fire and wrongful death was the explosion, not lightning.[143]

Fourth, in *Ethridge v. Hamilton Co. Elec*., a plaintiff's home caught fire from a

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135 RESTATEMENT (SECOND) OF TORTS § 451 (Am. L. Inst. 1965).
136 Nat'l Liability & Fire Ins. Co. v. R & R Marine, Inc., 756 F.3d 825, 832 (5th Cir. 2014).
137 *Id.*
138 *See* Uniroyal, Inc. v. Hood, 588 F.2d 454, 458 (5th Cir. 1979).
139 *Id.* at 466–67.
140 *Id.*
141 *See* Tex-Jersey Oil Corp. v. Beck, 292 S.W.2d 803 (Tex. App.—Texarkana 1956), *rev'd on other grounds*, 305 S.W.2d 162 (Tex. 1957).
142 *Id.* at 807.
143 *Id.* at 809.

lightning strike to a nearby electrical meter, which killed one person.[144] The defendants asserted that the lightning that struck the grounding rod and ignited the fire was an act of God.[145] Ultimately, the court granted summary judgment in favor of the defendant electric utility, with the act of God defense still intact.[146] The court reasoned that the plaintiffs failed to establish sufficient evidence that a detached ground wire constituted negligence on the defendant's part.[147]

In yet another case, *Eubanks v. Bayou D'Arbonne Lake Watershed Dist*., the court found that extreme rainfall which caused the flooding and overflow of artificial lakes was an act of God.[148] The court denied the plaintiffs' tort claims because the dangers of flooding should have been apparent.[149] The court affirmed the trial court's explanation that plaintiffs "should have known that the dam and spillway were not flood control structures."[150]

Finally, after Hurricane Katrina, lawsuits sought compensation from the government and alleged negligence on the part of the Army Corps under the Federal Tort Claims Act (FTCA) and the Flood Control Act (FCA).[151] The plaintiffs in *In re Katrina Canal Breaches* suffered massive flooding damage after the levees of the Mississippi River Gulf Outlet broke during Hurricane Katrina, completely drowning parts of New Orleans.[152] After years of complex litigation, the Fifth Circuit held: (1) there was no government immunity for dredging claims relating to the Mississippi River Gulf Outlet, (2) the

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144 *See* Ethridge v. Hamilton Cnty. Elec. Coop. Ass'n, 995 S.W.2d 292 (Tex. App.—Waco 1999).
145 *Id.* at 293.
146 *Id.* at 295.
147 *Id.*
148 Eubanks v. Bayou D'Arbonne Lake Watershed Dist., 742 So.2d 113 (La. Ct. App. 1999).
149 *Id.* at 117.
150 *Id.* at 116.
151 *In re* Katrina Canal Breaches Consol. Litig., 696 F.3d 436, 441–44 (5th Cir. 2012).
152 *Id.*

government was immune under the FCA against levee breaches due to inadequate dredging, (3) the government was also immune under the discretionary function exception of the FTCA against all remaining claims, and (4) there was no government duty to construct storm surge barriers.[153]

Thus, there is no clear precedent for what makes or breaks an act of God defense in tort law. As case law suggests, an act of God defense on a tort claim depends heavily on a factual analysis of the circumstances before, during, and after the natural disaster.

C. THE ACT OF GOD DEFENSE AND OIL POLLUTION ACT

While RCRA does not allow for an act of God defense, the Oil Pollution Act does.[154] For example, a Louisiana district court denied the act of God defense in a case where an oil barge collided with a tugboat during massive flooding, causing the oil barge to spill thousands of gallons.[155] The court reasoned that the oil barge should have anticipated spring flooding and could have chosen another route but instead chose to navigate the flood.[156]

D. THE ACT OF GOD DEFENSE AND CERCLA

Passed in 1980, CERCLA[157] is a strict liability federal statute that provides for the cleanup of sites contaminated by hazardous substances.[158] Unlike RCRA, CERCLA provides for the act of God defense.[159] CERCLA defines an act of God as a "grave natural disaster with an exceptional and irresistible character, the effects of which could not have

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153 *Id.* at 453.
154 33 U.S.C. § 2703(a)(1) (2021).
155 *See* Apex Oil Co., Inc. v. United States, 208 F. Supp. 2d 642 (E.D. La. 2002).
156 *Id.* at 656–57.
157 42 U.S.C. § 9607 (2021).
158 Eagle, *supra* note 122, at 466.
159 *Id.* at 468; *see also* 42 U.S.C. § 9601(1) (2021).

been prevented or avoided by the exercise of due care or foresight."[160]

Often, courts do not allow the act of God defense in CERCLA cases. For instance, in the district court of Puerto Rico, the United States sued a Puerto Rican utility provider to clean contaminated groundwater.[161] The Puerto Rican utility asserted that an act of God caused the contamination.[162] Ultimately, the court held that the act of God defense was not allowed because the utility presented no evidence to establish that an act of God occurred and made no reference to the defense in its response to the United States' motion for summary judgment.[163]

In another case, company Grace sold some of its vermiculite-producing property to Kootenai Development Corporation (KDC).[164] After the sale, the EPA began investigations around the region and determined that "action was necessary to address the releases or threatened releases of asbestos."[165] The federal government incurred roughly $55 million in cleanup and removal costs, suing both Grace and KDC to collect.[166] KDC asserted that the vermiculite and asbestos were naturally occurring.[167] In light of CERCLA's definition, the court ultimately held that the act of God defense did not

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160 42 U.S.C. § 9601(1) (2021); *see also* Derrick Carson & Gerry Pels, *Lesson Learned?,* 71 TEX. B. J. 232 (2018).

161 United States v. P.R. Indust. Dev. Co., 287 F. Supp. 3d 133, 137 (D. P.R. 2017).

162 *Id.* at 147.

163 *Id*.

164 United States v. W.R. Grace & Co., 280 F. Supp. 2d 1135, 1139 (D. Mont. 2002) ("In the mid–1990s, Grace sold several of the properties associated with its former vermiculite operations around Libby. In separate transactions in 1994, Defendant Kootenai Development Corporation ('KDC') purchased approximately 3,600 acres of mountainous land that includes the former vermiculite mine (the 'Mine Site') and an approximately 20–acre parcel known as the 'Kootenai Flyway' located between Highway 37 and the Kootenai River, part of a former vermiculite processing facility known as the 'Screening Plant.'").

165 *Id.*

166 *Id.* at 1140.

167 *Id.* at 1148.

apply.[168] The court reasoned that asbestos near the abandoned mine was not due to the EPA's removal efforts nor to a "natural phenomenon" within the definition.[169] The Ninth Circuit determined that the EPA's decision to approve removal actions was not arbitrary and capricious.[170]

A court again evaluated whether the act of God defense applied to a defendant in 1995.[171] The court did not allow for the defense where containers filled with arsenic trioxide allegedly spilled because of a storm.[172] The court reasoned that bad weather was forecast, which the defendants acknowledged.[173] The court held that "even a poorly forecasted storm" was not an act of God "because it was predicted and was avoidable."[174]

Finally, the court considered whether the act of God defense applied where defendants alleged that extreme rainfall caused the release of a hazardous substance.[175] The court explained that the defense did not apply and reasoned that the rain was foreseeable "based on normal climatic conditions and any harm caused by rain could have been prevented through design of proper drainage channels."[176]

Thus, as case law suggests, the act of God defense is usually not allowed under CERCLA where the occurrence simply does not meet the definition or where the extreme or bad weather events were forecasted, even poorly so. The purpose of CERCLA to provide accountability for hazardous waste stakeholders appears to outweigh the act of God

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168 *Id.*
169 *Id.* at 1148.
170 United States v. W.R. Grace & Co., 429 F.3d 1224, 1233 (9th Cir. 2005).
171 *See* United States v. M/V Santa Clara I, 887 F. Supp. 825 (D.S.C. 1995).
172 *Id.* at 830.
173 *Id.* at 843.
174 *Id.*
175 United States v. Stringfellow, 661 F. Supp. 1053, 1061 (C.D. Cal. 1987).
176 *Id.*

defense.

E. THE ACT OF GOD DEFENSE AND CONSTITUTIONAL TAKINGS

The final provision of the Fifth Amendment states that no "private property shall be taken for public use, without just compensation."[177] Plaintiffs often invoke the takings clause to recover costs after extreme weather events.

A recent U.S. Supreme Court case changed the process for takings claims. In *Knick v. Township of Scott,* a property owner fought an ordinance that would have required her to keep her property open during the daytime because she had a small graveyard.[178] The district court had dismissed her case because she did not seek compensation in state court first, as was customary.[179] However, the Supreme Court overruled long-standing precedent that required takings plaintiffs to first litigate in state court, instead holding that a property owner can bring a taking claim under the Fifth Amendment directly to federal court when the government takes the property without compensation.[180] Moreover, the Supreme Court has ruled that both government-induced flooding[181] and seasonal flooding[182] can constitute compensable takings. Since then, the Supreme Court has repeatedly held the government liable when it has flooded property.[183]

In a more recent Supreme Court case, the Arkansas Game and Fish Commission

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177 U.S. CONST. amend V.

178 *See* Knick v. Township of Scott, 139 S. Ct. 2162 (2019).

179 *Id.* at 2169.

180 *Id.* at 2167, (*abrogating* Williamson Co. Reg'l Plan. Comm'n v. Hamilton Bank of Johnson City, 473 U.S. 172 (1985).

181 Pumpelly v. Green Bay Co., 80 U.S. 166, 181 (1871).

182 United States v. Cress, 243 U.S. 316, 328 (1917) ("There is no difference of kind, but only of degree, between a permanent condition of continual overflow by backwater and a permanent liability to intermittent but inevitably recurring overflows; and, on principle, the right to compensation must arise in the one case as in the other.").

183 *See, e.g.*, United States v. Dickinson, 331 U.S. 745 (1947); United States v. Kansas City Life Ins. Co., 339 U.S. 799 (1950).

operated a wildlife management area downstream from an Army Corps dam.[184] At the request of farmers benefitting from the dam-provided water, the Army Corps deviated from the manual to extend flooding for farmers, which negatively impacted the Commission's management area.[185] The Commission sued the U.S. government, alleging that by deviating from the manual and flooding the area, the Corps committed a taking and the Commission was entitled to compensation.[186] The Supreme Court held that temporary government-induced flooding is not automatically excluded from takings review.[187]

In 2005, Hurricane Katrina incited several constitutional takings and tort suits.[188] Notably, in *St. Bernard Parrish*, plaintiffs alleged that flooding that destroyed their homes after the Mississippi River Gulf Outlet levees failed constituted a taking under the Fifth Amendment and thus required just compensation.[189] The court ultimately held that the government was not liable.[190] The court explained that the causation analysis should have taken government flood control projects into account.[191] The analysis veered away from the *Arkansas* tort-like analysis of takings claims and instead required holistic review of the

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184 Arkansas Game and Fish Comm'n v. United States, 568 U.S. 23, 27 (2012).

185 *Id.* at 29.

186 *Id.*

187 *Id.* at 38–39 ("We rule today, simply and only, that government-induced flooding temporary in duration gains no automatic exemption from Takings Clause inspection. When regulation or temporary physical invasion by government interferes with private property, our decisions recognize, time is indeed a factor in determining the existence *vel non* of a compensable taking.").

188 *See, e.g.*, St. Bernard Parish Gov't. v. United States, 887 F.3d 1354 (Fed. Cir. 2018).

189 Thor Hearne, Stephen S. Davis, & Ilya Shapiro, *St. Bernard Parish v. United States*, CATO INST. (Oct. 19, 2018), https://www.cato.org/legal-briefs/st-bernard-parish-v-united-states.

190 *St. Bernard Parish,* 887 F.3d at 1357 ("[T]he government cannot be liable on a takings theory for inaction and that the government action in constructing and operating MRGO was not shown to have been the cause of the flooding. This is so because both the plaintiffs and the Claims Court failed to apply the correct legal standard, which required that the causation analysis account for government flood control projects that reduced the risk of flooding. There was accordingly a failure of proof on a key legal issue. We reverse.").

191 *Id.* at 1367 ("When government action mitigates the type of adverse impact that is alleged to be a taking, it must be considered in the causation analysis, regardless of whether it was formally related to the government project that contributed to the harm.").

government's action. This may mean that going forward, plaintiffs who benefit from flood mitigation efforts by the Army Corps or the state will have to prove that the harm from flooding was greater than the benefit of the government's flood mitigation efforts. Even still, some argue that regardless of action or inaction, the Supreme Court, as well as numerous state courts, have established that if the government floods private property, it constitutes a taking.[192] Thus, there is some friction between current precedent on this issue.

After several flood events in the early 2000s, Harris County residents sued Harris County and the Harris County Flood Control District (collectively the County), among other defendants, alleging a constitutional taking from flooding events.[193] The issue was "whether governmental entities that engage in flood-control efforts are liable to homeowners who suffer flood damage, on the theory that the governments effected a taking of the homeowners' property by approving private development without fully implementing a previously approved flood-control plan."[194] Both the federal claims court and the Texas Supreme Court said no.[195]

The Texas Supreme Court explained that government entities that engage in flood control efforts were not liable to homeowners who suffered flood damage on a takings theory. First, the Court reasoned that finding for the plaintiffs on a takings theory would "unwisely expand the liability of governmental entities," because their claim lacked any limiting principles.[196] Second, the Court explained that the homeowners' claim essentially

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192 Amicus Brief For Plaintiffs at 16, *St. Bernard Parish*, 887 F.3d 1354 (No. 18-359); Arkansas Game & Fish Comm'n, 568 U.S. at 27.
193 Harris Cnty. Flood Control Dist. v. Kerr, 499 S.W.3d 793, 795 (Tex. 2016).
194 *Id.*
195 *Id.*
196 *Id.*at 807.

failed on the question of intent; takings do not apply to inaction, thus the Court focused on the County's affirmative actions.[197] Because flood mitigation efforts are affirmative action, it worked against the element of intent in this case; the homeowners were unable to provide any proof "that the County was substantially certain that the homeowners' particularly properties would flood if the County approved new housing developments."[198]

However, the dissent took a different approach and delved further into the history of the case before determining that the homeowners did raise an issue of fact for their takings claim. The dissenting justices noted that the slow federal funding and half-implemented flood-control plans led FEMA to "update the bayou's flood-plain maps."[199] These updates uncovered an expanding flood plain and explained that by 1999, all the homeowners' homes were within the 100-year flood plain.[200] The homeowners "presented evidence that the government entities knew unmitigated development would lead to flooding, that they approved development without appropriately mitigating it, and that this caused the flooding."[201]

Thus, unlike CERCLA cases, the act of God defense is usually allowed in constitutional taking cases unless plaintiffs can prove that the harm was more significant than the benefits provided by the government.

F. The Act of God Defense and Texas Environmental Law

Several Texas environmental tort laws allow for the act of God defense or something similar, like a force majeure. This section discusses some of these relevant

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197 *Id.*
198 *Id.* at 805.
199 *Harris Cnty. Flood Control Dist.*, 499 S.W.3d at 815.
200 *Id.*
201 *Id.* at 814.

exceptions to Texas environmental laws that may apply in the wake of an act of God. There is limited case law on these environmental laws, but it is important to note them.

For instance, TCEQ has enforcement provisions that provide for a force majeure defense, defined in part as an act of God.[202] Additionally, the Texas Water Code expressly allows for the defense and has several other provisions related to specific emergencies.[203] The Texas Government Code also provides that the "governor of Texas may suspend the provisions of any regulatory statute prescribing the procedures for conduct of state business or the orders or rules of a state agency if strict compliance with the provisions, orders, or rules would in any way prevent, hinder, or delay necessary action in coping with a disaster."[204]

IV. LOOKING FORWARD: FORESEEING "ACTS OF GOD" IN THE CLIMATE CHANGE ERA

A. HARVEY'S TIES TO CLIMATE CHANGE

Defendants in the Arkema line of cases argued that Hurricane Harvey was unprecedented.[205] However, this assessment is not entirely accurate. The combined scientific data demonstrate that a changing climate creates more moisture, which creates more extreme weather events and thus greater quantities of rainfall.[206] Because Hurricane Harvey dumped an impressive amount of rain, scientists wanted to quantify the natural odds of a weather event like Harvey occurring and measure that against today's weather to

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202 30 Tex. Admin. Code § 70.7(a–c) (1994).

203 Tex. Water Code § 7.251 (1997); *see also* Tex. Water Code §§ 5.506–5.507, 5.509–5.510, 5.512– 5.513, 5.515; Tex. Health & Safety Code § 382.063 (1997).

204 *Hurricane Harvey Client Alert: Addressing Environmental Release and Obligations*, MORGAN LEWIS (Sept. 8, 2017), https://www.morganlewis.com/pubs/2017/09/hurricane-harvey-client-alert-addressing-environmental-releases-and-obligations (citing Tex. Gov't Code § 418.016 (2013)).

205 *See* Ebbs, *supra* note 2.

206 Oldenborgh et al., *Corrigendum: Attribution of Extreme Rainfall from Hurricane Harvey*, *August 2017,* 13 ENV'T RSCH. LETTERS 1 (2018).

determine whether there were any differences. Mark Risser at the Lawrence Berkley National Laboratory spearheaded the first of two post-Harvey studies.[207] Risser's study examined data from Houston-area weather stations from 1950 to 2016 to pinpoint the area's heavy rainfall events.[208] Risser then compared the Harvey data to the climate change data, accounting for carbon dioxide (CO_2) levels and El Niño.[209] The team found that rainfall "was as much as 38 percent higher than would be expected in a world that was not warming."[210] Risser and his team concluded that "the amount of precipitation increase [was] worse than [they] expected."[211] Furthermore, researchers concluded that climate change might have made Hurricane Harvey at least three times more likely to occur.[212] So, in some regard, cities should expect to experience a higher percentage of hurricanes like Harvey.

The second study yielded similar results. Conducted by Geert Jan van Oldenborgh of the Royal Netherlands Meteorological Institute, the second study reviewed Gulf Coast rainfall records going back to 1880.[213] Oldenborgh found that extreme rainfall has become much more intense.[214] Additionally, Oldenborgh's climate models show that climate change driven by human activity was the likely cause of the staggering increase in

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207 Mark D. Risser & Michal F. Wehner, *Attributable Human-Induced Changes in the Likelihood and Magnitude of the Observed Extreme Precipitation During Hurricane Harvey*, 44 GEOPHYSICAL RSCH. LETTERS 12457 (2017).

208 *Id.*

209 *Id.*

210 Henry Fountain, *Scientists Link Hurricane Harvey's Record Rainfall to Climate Change*, N.Y. TIMES (Dec. 13, 2017), https://www.nytimes.com/2017/12/13/climate/hurricane-harvey-climate-change. html (citing Michael J. Wehner).

211 *Id.*

212 *Id.*

213 Oldenborgh, *supra* note 206, at 1.

214 *Id.* at 2 ("In general, the maximum moisture content of air increases with 6%–8.5% per degree warming, according to the Clausius-Clapeyron (CC) relationship. . . .").

rainfall.[215] The study's results confirm that climate change made Harvey roughly three times more likely to occur and 15% more intense.[216]

Notably, these studies only isolated one factor—rainfall. Scientists in those studies examined the "impact of climate change on rainfall, not whether climate change affected Harvey's formation or strength" or whether climate change contributed to Harvey's slow speed.[217] Those issues remain hotly debated, with some researchers suggesting that strong hurricanes "will become more frequent as the world continues to warm."[218] Therefore, there is an urgent need for coastal cities to adapt to a new standard of weather events and rainfall and for courts to more carefully consider the relationship between the act of God defense and a new norm for natural disasters.[219]

B. WAS THE FLOODING DURING HARVEY *REALLY* UNPRECEDENTED?

Hurricane Harvey spurred a flurry of new studies into climate change and extreme rainfall. These studies conclude that Hurricane Harvey should not be categorized as "unprecedented" in light of attribution science and modern climate change science. Since before 2013, scientists have published on the increasing occurrence and intensity of tropical rain events in what we now call attribution science.[220] Attribution science contemplates

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215 *Id.* at 1 ("[W]e conclude that global warming made the precipitation about 15% (8%–19%) more intense, or equivalently made such an event three (1.5–5) times more likely.").

216 *Id.*

217 Fountain, *supra* note 210.

218 *Id.*

219 *Id.* (quoting David W. Titley, a meteorologist at Pennsylvania State University: "Communities all along the Gulf Coast need to adapt to a world where the heaviest rains are more than we have ever seen.").

220 Laiyin Zhu, Steven M. Quiring, & Kerry A. Emanuel, *Estimating Tropical Cyclone Precipitation Risk in Texas,* 40 GEOPHYSICAL RSCH. LETTERS 6225, 6225–30 (2013) ("Knight and Davis [2009] showed that extreme precipitation from [tropical cyclones] has been increasing in the U.S. due to increases in TC frequency and the amount of precipitation associated with each TC. Model simulations predict that TC precipitation (TCP) may increase 20% during the 21st century.").

climate change's role in extreme weather events.[221] For instance, a 2009 study assessed several approaches to determine how tropical cyclones and similar weather events contribute to extreme precipitation. The study concluded that "extreme rainfall magnitudes, frequency, and contributions to overall extreme rainfall have increased since 1972."[222] Generally speaking, the metrics in the study "all showed that extreme precipitation from [tropical cyclones] is increasing across the southeastern United States."[223] Additionally, in 2010, another study concluded that storms will likely become stronger and more intense.[224] The study's models also foresaw an increase in the frequency of the most intense storms, with a roughly a 20% increase in precipitation during these storms.[225]

Since Harvey, extreme flood and precipitation events have continued to occur. In August 2017, Bangladesh suffered one of its worst flooding events in history.[226] A study conducted after the event effectively concluded that the rainfall could be attributed to

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221 Jane C. Hu, *The Decade of Attribution Science*, SLATE (Dec 19, 2019, 11:00 AM), https://slate.com/technology/2019/12/attribution-science-field-explosion-2010s-climate-change.html ("[National Oceanic and Atmospheric Administration] researchers started wondering if maybe there could be a way to explain climate change's role in particular cases. The relatively new field of attribution science sought to do exactly that. In a 2004 paper published in Nature, widely regarded as the first attribution science paper, three British researchers modeled how much human activities increased the likelihood for the record-setting summer 2003 heat wave in Europe.").

222 David B. Knight & Robert E. Davis, *Contribution of Tropical Cyclones to Extreme Rainfall in the Southeastern United States*, 114 J. OF GEOPHYSICAL RSCH. ATMOSPHERE 1, 15 (2009).

223 *Id.*

224 Tomas R. Knutson et al., *Tropical Cyclones and Climate Change*, 3 NATURE GEOSCIENCE 157, 157–63 (2010) ("[F]uture projections based on theory and high-resolution dynamical models consistently indicate that greenhouse warming will cause the globally averaged intensity of tropical cyclones to shift towards stronger storms, with intensity increases of 2–11% by 2100.").

225 *Id.* at 157 ("Existing modelling studies also consistently project decreases in the globally averaged frequency of tropical cyclones, by 6–34%. Balanced against this, higher resolution modelling studies typically project substantial increases in the frequency of the most intense cyclones, and increases of the order of 20% in the precipitation rate within 100 km of the storm centre.").

226 Sjoukje Philip et al., *Attributing the 2017 Bangladesh Floods from Meteorological and Hydrological Perspectives*, 13 HYDROLOGY & EARTH SYS. SCI. 23, 1409–29 (2019), https://hess.copernicus.org/articles/23/1409/2019/.

climate change, using two climate models and three observational datasets.[227] In 2018, extreme rainfall caused flash floods and landslides in Japan.[228] Subsequent studies of the event qualitatively concluded that "climate change increased the probability of extreme rain."[229] These recent examples and subsequent research indicate that extreme rainfall events will continue to occur more frequently and with greater intensity, not just in the United States but across the globe.

Finally, a separate study focused on the predictability of Hurricane Harvey found that statistic-based risk assessment suffers from short, poor-quality records and constantly changing underlying statistics.[230] The statistic-based method of predicting hurricane rainfall relies on streamflow measurements, but this data changes over time with changes in land use and topography.[231] Instead, the study uses a newly developed, physics-based method that is better suited to assessing the probability of hurricane rainfall. This method simulates hurricanes by using large-scale global climate data.[232] It then incorporates simulated storms between 1979 and 2015 and calculates the total rainfall for each event

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227 *Id.* at 1426 ("From the precipitation perspective, we find that two out of three of the observed series show an increased probability for extreme precipitation like observed in August 2017 . . . [and] both climate models agree that the risk will increase significantly in the future, by more than 1.7, with 2 ∘C of global heating since pre-industrial times.").

228 *Extreme Rainfall in Japan, 2018 – A Quick Look*, WORLD WEATHER ATTRIBUTION (July 17, 2018), https://www.worldweatherattribution.org/a-quick-look-at-the-extreme-rainfall-in-japan/ ("The Fire and Disaster Management Agency estimates that over 200 houses have been damaged fully or partially, and 5,000 more have been affected by the floods and landslides. Evacuation orders were issued to 1.9 million people and advisory notices to 2.3 million people as of 8 July 2018.").

229 *Id.* ("Here we report a quick look at the event, analyzing observations and the one model available, resulting in the qualitative conclusion that, based on these lines of evidence only, climate change increased the probability of extreme rains such as observed at the beginning of July in Japan.").

230 Kerry Emanuel, *Assessing the Present and Future Probability of Hurricane Harvey's Rainfall*, 114 PNAS 12681 (2017), https://www.pnas.org/content/114/48/12681.full ("[T]here are serious limitations to [using a statistical approach based on the past]. First, the record of past events may be short, incomplete, and/or inaccurate. And second, if the underlying statistics are changing, the past may not be a good guide to the future.").

231 *Id.* ("Streamflow measurements integrate over area and provide a more robust measure of floods, but changing land use may introduce streamflow trends unrelated to rainfall.").

232 *Id.*

at 78 points to predict and simulate future storms.[233] The results of this kind of physics-based study suggest that "rainfall in excess of [19 inches], which is around a once in 2,000-[year] event in the late 20th century, becomes a once in a 100-[year] event by the end of this century."[234]

Thus, considering recent scientific studies concluding Hurricane Harvey was a product of climate change and therefore not necessarily unprecedented, courts should reconsider the baseline for what constitutes an act of God.

C. IS THE ACT OF GOD DEFENSE APPROPRIATE IN *ANY* OF THE POST-HARVEY HOUSTON LITIGATION?

Considering the increased intensity of tropical storm events,[235] it is fair to say that the act of God defense is beginning to appear more often and should look different depending on the legal context. This Article generally suggests that the act of God defense fails in CERCLA cases, survives in constitutional takings cases, and has inconsistent results in tort and criminal cases. Recent decisions indicate that the purpose of CERCLA and the act of God defense are fundamentally at odds with each other.

On the other hand, contrary to the finding in *Kerr*, the court should adjust the baseline for what constitutes an act of God in constitutional takings cases and do away with the mitigation effort threshold. As the dissenters in *Kerr* pointed out, FEMA floodplain maps demonstrated an expanding floodplain. There is a two-fold solution: compensate

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233 *Id.* at 12682-83 ("To assess the probability of Harvey-like rains in Texas as a whole, we used the same method to create another set of 3,700 synthetic tracks driven by NCAR/NCEP reanalyses over the period 1979–2015 and crossing any part of the Texas coastline. . . . We then calculated storm total rainfall for each event at each of 78 points constituting a grid extending from 26° N to 31° N and from 99° W to 94° W, at increments of 0.5°, but excluding points over the Gulf. For each event we determined the maximum storm total rainfall among the points on this grid.").

234 *Id.* at 12683.

235 Mark Fischetti, *New Data: Hurricanes Will Get Worse*, SCI. AM. (May 16, 2018), https://www.scientificamerican.com/article/new-data-hurricanes-will-get-worse/.

homeowners for the shortcomings of land-use planners by adjusting the baseline for an act of God, and implement more intentional and climate-resilient land-use planning based on projected expansions of the southeastern floodplains.

This Article offers two suggestions: (1) that courts adjust the baseline for what constitutes an act of God for liability purposes based on climate change science and attribution studies, and (2) that states begin implementing effective adaptation plans to ensure climate resiliency. There are several downsides to failing to blend new science and law, including the enormous costs and time consumption of litigation, as well as the infrastructure costs and damages from increasingly severe natural disasters.[236] To remedy the problem of litigation time and costs, this section encourages courts to use climate change science and attribution studies to help inform what constitutes an act-of-God for questions of foreseeability. Then, to remedy the problem of increasing infrastructure damage, this section offers a vision for climate resiliency and how it might help avoid the expensive costs of inevitable and worsening natural disasters.

1. Adjusting the Baseline for Acts of God Using Attribution and Climate Change Science

Attribution studies, which have demonstrated that Harvey was a product of increasingly frequent and severe storms, can be valuable in litigation because they may help evaluate causation issues as well as "establish the foreseeability of weather events that were previously regarded as unpredictable."[237] Similar to climate change science,

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[236] Kara Dapena, *The Rising Costs of Hurricanes*, WALL STREET J. (Sept. 29, 2018, 8:00 AM), https:/www.wsj.com/articles/the-rising-costs-of-hurricanes-1538222400 ("The trio of Harvey, Maria and Irma in 2017 combined to cost $268 billion, 31% of the damage since 1980, making it the most expensive year in 38 seasons.").

[237] Sophie Marjanac & Lindie Patton, *Extreme Weather Event Attribution Science and Climate Change Litigation: An Essential Step in the Causal Chain?*, 36 J. ENERGY & NAT. RES. L. 265, 266 (2018).

attribution science effectively studies the way people experience climate change by asking how human influence has impacted the characteristics of natural disasters and events.[238] In other words, "[h]ow has human activity changed the likelihood of this event occurring or its magnitude?'"[239]

Thus, this type of science can be valuable in promoting the "consideration of the legal implications [in] a world where more frequent and severe extreme weather events are . . . demonstrably reasonably foreseeable."[240] Note though, this type of science is only valuable when "the climate has changed so much that an extreme event is no longer extreme relative to the baseline because the baseline has shifted."[241] Because baseline shifts based on heat-related events are not yet "typical," attribution science is "most frequently the study of changing probabilities rather than a deterministic yes or no expression of causality."[242] Regardless, attribution studies in the past have proven helpful in determining the causal connection between extreme weather events and human activity and will continue to do so as climate change goes unchecked.[243]

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238 *Id.* at 268, 273 ("The technical definition of attribution is 'the process of evaluating the relative contributions of multiple causal factors to a change or event with an assignment of statistical confidence.'").

239 *Id.* For instance, consider that "[t]he European Court of Human Rights has found that states have violated their human rights obligations under the European Convention on Human Rights (ECHR) by allowing environmental harm to occur through failures to follow environmental standards, or to provide citizens with appropriate information regarding environmental risks." *Id.* at 288.

240 *Id.* at 266.

241 *Id.* at 273.

242 *Id.*

243 Marjanac & Patton, *supra* note 237, at 284. ("For example, a 2016 rapid event attribution study found that anthropogenic climate change made temperature anomalies in the Coral Sea (which led to widespread bleaching of coral in the Great Barrier Reef) 175 times more likely to occur. This study may therefore satisfy the 'doubling of the risk' test with such damage having been clearly 'caused' by anthropogenic emissions. We therefore agree with Hannart and others' conclusion that event attribution scientists could more confidently express their findings as proving a causal relationship between human influence and weather, when communicating with certain non-scientific stakeholders.").

2. Creating Effective Adaptation Plans to Promote Climate Resiliency

In addition to adjusting baselines for extreme weather events, this section suggests implementing climate adaptation plans and climate-resilient infrastructure to withstand the inevitably more frequent and severe storms to come.

Creating effective adaptation plans can be tricky. Research suggests that adaptation or resiliency plans, as currently written and implemented, fail because there are no affirmative duties for cities to protect their citizens from climate change risks like more extreme storms and the resulting increase in insurance premiums.[244] A city's affirmative duty would only arise if it decided to make changes to protect itself; however, if the city violates its duty to protect citizens from an extreme storm, it may be held liable for negligence for not creating an effective solution to the problem.[245] However, research shows that the likelihood of liability under tort law for failure to protect would more than likely fail.[246]

The act of God defense is a flawed way of understanding climate and weather. Current adaptation laws protect cities from doing what is proper and necessary in the face of a changing climate. With modern advances in technology and greater foresight, federal and state law should require cities to better protect citizens from climate-change-related storms and risks. Moreover, "scholars anticipate that as more suits are filed, cities will be

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[244] Jenna Shweitzer, *Climate Change Legal Remedies: Hurricane Sandy and New York City Coastal Adaptation*, 16 VT. J. ENV'T L. 243, 169 n.164 (2014) ("Courts have generally held that landowners and governments have no affirmative duty to remedy naturally occurring hazards.").

[245] *Id.* at 270 ("While there is no affirmative duty to act to reduce naturally occurring flooding, for example, a municipality's ultimate decision to act triggers the duty to act reasonably. . . .").

[246] *Id.* at 280 ("This analysis is hypothetical in nature, since there is no actual storm to measure the City's adaptation efforts against. It assumes that a future storm will be at least as strong, if not stronger, than Sandy given the expected increase in storm magnitude going forward.").

held liable for their adaptation measures."[247]

In addition to effective adaptation plans, infrastructure must begin to meet the challenges of climate change. Climate-resilient infrastructure is "planned, designed[,] built[,] and operated in a way that anticipates, prepares for, and adapts to changing climate conditions."[248] Cities and states can combat risks to infrastructure in two ways: (1) locate assets to lower-risk areas, or (2) transform infrastructure to be more able to cope with climate change risks like sea-level rise or more severe storms.[249] This Article focuses on structural adaptation measures, although managerial adaptation measures, such as early warning systems, are a possible parallel solution.[250]

Countries around the world are considering what resilient architecture looks like. Some have created hurricane-resistant homes that incorporate circular building shapes and clear-span roofing to better disperse and deflect rain and debris,[251] while other countries have created entirely new building materials such as bendable glass.[252] Other adaptations might include using material resistant to corrosion or locating new facilities outside high-risk zones for energy infrastructure. To successfully implement and encourage innovations such as these, governments should enact the appropriate building codes and support these

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247 *Id.* at 288.

248 *Climate-Resilient Infrastructure: Policy Perspectives*, 14 OECD ENV'T POL'Y PAPER 4 (2018), https://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf.

249 *Id.*

250 *Id.* ("Management (or non-structural) adaptation measures: e.g., changing the timing of maintenance to account for changing patterns of energy demand and supply, investment in early warning systems or purchasing insurance to address financial consequences of climate variability.").

251 *The Science of Hurricane-Proof Buildings*, BIGRENTZ (Aug. 12, 2019), https://www.bigrentz.com/blog/hurricane-proof-buildings#:~:text=How%20Do%20Buildings%20Withstand%20Hurricanes%3F&text=Aerodynamic%20design%20helps%20to%20disperse,%2C%20rain%2C%20and%20storm%20debris.

252 Blaine Brownwell, *McGill Researchers Develop Bendable Glass*, ARCHITECT MAG. (Feb. 25, 2014), https://www.architectmagazine.com/technology/mcgill-researchers-develop-bendable-glass_o.

endeavors.[253]

V. CONCLUSION

The act of God defense is slowly changing as climate-change-related litigation becomes more common. The only consistency in case law is that toxic tort defendants and negligent government entities escape liability more often than not. The foreseeability prong under the current act of God analysis does not allow for global changes in weather patterns. The Army Corps in *In Re Katrina Canal Breaches* and Arkema in Houston escaped liability because the courts determined that flooding constituted an act of God only after it reached levels only seen every 500 to 1,000 years. What happens when 500-year floods begin occurring every 100 years, or every 50 years, or in even shorter increments? How much more research is needed before courts consider these occurrences commonplace?

Alongside other post-hurricane actions like reconsidering zoning laws or building higher sea walls, this Article strongly encourages two courses of action. First, courts should begin using both science-based risk assessment through attribution studies to determine whether a storm was foreseeable. Second, state governments must begin building resilient climate infrastructure to better protect cities from more frequent and severe weather events. These changes will allow the act of God defense to be used more justly in the future.

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[253] Robin Kundis Craig, *Cleaning Up Our Toxic Coasts: A Precautionary and Human-Health Based Approach to Coastal Adaptation*, 36 PACE ENV'T L. REV. 47 (2018).

guided her as this article took shape. She dedicates this article to those students who suffer from imposter syndrome - you are worthy.

Technology Agnosticism and Carbon Capture:

A practical Effort Against Climate Change in an Era of Polarized Policymaking

By Carl Stenberg & Alexander Lawson

I. CLIMATE CHANGE AND THE CHALLENGES AHEAD

It is unlikely that adequate substitutes to replace the hydrocarbon economy will exist within the timeframe to reach global net-zero by 2050. Negative emissions technology enabling atmospheric and point-source reduction of greenhouse gas emissions is critical to meeting the Paris Agreement's climate goal of keeping planetary warming to 1.5°C. However, except for minor successes such as the 45Q tax credit, carbon capture and sequestration (CCS) projects remain to a large extent economically unfeasible. The political polarization in American policy creates hurdles to necessary bipartisan support for developing a policy-driven market favoring negative emissions technology. Oil- and gas-producing states now face the complex problem of continuing the production of hydrocarbons while reducing emissions to align with climate change goals. Considering the current regulatory and policy landscapes, Texas, the largest oil-producing state in the United States, is identified as a potential cluster for driving investment and operating large-scale carbon capture projects onshore and offshore.

Since the industrial revolution, the emission of greenhouse gases (GHGs) has been accelerating destructive changes in the global climate.[1] The continuous burning of fossil fuels for industry, transport, and electricity has led to a significant increase in the concentration of heat-trapping carbon dioxide (CO_2) in the atmosphere, inducing increases

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[1] *See generally* MYLES ALLEN ET AL., SUMMARY FOR POLICYMAKERS: IPCC SPECIAL REPORT ON IMPACTS OF GLOBAL WARMING OF 1.5°C ABOVE PRE-INDUSTRIAL LEVELS IN CONTEXT OF STRENGTHENING RESPONSE TO CLIMATE CHANGE, SUSTAINABLE DEVELOPMENT, AND EFFORTS TO ERADICATE POVERTY (Valerie Masson-Delmotte et al. eds., 2018) [hereinafter POLICY SUMMARY 2018], https://doi.org/10.1017/9781009157940.001 (noting there is no dispute over whether climate change is caused by anthropogenic emissions sources); *see also* FOURTH NATIONAL CLIMATE ASSESSMENT VOLUME II: IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES (David Reidmiller et al. eds., 2018), https://nca2018.globalchange.gov/ (contextualizing climate change in the United States).

in global mean temperatures.[2] To mitigate the most severe effects of climate change, the International Panel on Climate Change (IPCC) stated that the world should limit global mean temperature increase to 1.5 degrees Celsius above pre-industrial levels.[3] Meeting that goal, in turn, requires the world's economies to reach net-zero carbon emissions by 2050.[4]

Fortunately, there now seems to be a consensus among climate scientists regarding the central conclusions about climate change, and a corresponding acceptance by nations, the private sector, and other stakeholders that decarbonization is necessary to mitigate the effects of global climate change.[5] As a result, the world is now contemplating an "energy transition"—a deep decarbonization effort to reduce fossil-fuel dependency and decrease emission outputs, which entails much faster CO_2 emissions reductions than are currently occurring.[6] Limiting temperature rise to 1.5 degrees Celsius requires a decarbonization rate

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2 *See* POLICY SUMMARY 2018, *supra* note 1, at 5.

3 *Id.* at 5. There exists a wide range of effects from the increased heating of Earth through GHG emissions. *Id.* These changes vary according to region and depend upon governmental, international, and private sector responses. *Id. See also* CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY: CONTRIBUTION OF WORKING GROUP II TO THE SIXTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Hans-Otto Portner et al. eds., 2022), https://www.ipcc.ch/report/ar6/wg2/.

4 POLICY SUMMARY 2018, *supra* note 1, at 12; STEPHANIE BOUCKAERT ET AL., INT'L ENERGY AGENCY, NET ZERO BY 2050: A ROADMAP FOR THE GLOBAL ENERGY SECTOR 79 (Edmund Hosker & Debra Justus eds., 2021) [hereinafter NET ZERO BY 2050], https://www.iea.org/reports/net-zero-by-2050 (recognizing the importance of carbon capture technologies to enhance the energy transition and global decarbonization).

5 *See, e.g.*, Emma Newburger, *John Kerry Says Private Sector Can Win Climate Change Battle*, CNBC (Dec. 1, 2021, 4:26 PM), https://www.cnbc.com/2021/12/01/john-kerry-says-private-sector-can-win-climate-change-battle.html; Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104 [hereinafter Paris Agreement].

6 *See* BRAD PAGE ET AL., GLOB. CCS INST., GLOBAL STATUS OF CCS 2020 26 (2020) [hereinafter GLOB. CCS], https://www.globalccsinstitute.com/wp-content/uploads/2021/03/Global-Status-of-CCS-Report-English.pdf; *see also* NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 24 (Cambridge Univ. Press ed., 2007) ("By 2050, models suggest a plausible range of costs from –2% (net gains) to +5% of GDP, with this range growing towards the end of the century, because of the uncertainties about the required amount of mitigation, the pace of technological innovation and the efficiency with which policy is applied across the globe. Critically, these costs rise sharply as mitigation becomes more ambitious or sudden."); *see* Paris Agreement, *supra* note 5, art. 2, ¶ 1 (aiming to keep long-term temperature rise to well below 2 degrees Celsius above pre-industrial levels, and preferably limit the increase to 1.5 degrees Celsius).

of 15.2% per year, whereas in 2021 the decarbonization rate was just 0.5%.[7]

The 2021 IPCC report concluded with little doubt that the global climate situation is, on balance, worsening; human influence has warmed the climate to such an extent that widespread severe weather events will take place in the near future with increasing frequency if GHG emissions are not managed.[8] As of February 2022, the IPCC warned that the world is on track to hit the 1.5 degrees Celsius limit within the next two decades (2022–2040); only significant emission cuts will mitigate this disaster.[9] To avoid this outcome, the IPCC advises that the world would need to reduce emissions by 43% overall by 2030, with GHG emissions peaking no later than 2025.[10]

Global decarbonization is an enormous and complex task. Despite increased efficiency, world demand for fossil fuels is projected to increase into the near future.[11] The 2022 global energy crisis, rising from the conflict in Ukraine, sent European countries scrambling to find alternatives to Russian gas, with most countries reverting to other fossil

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7 *Net Zero Economy Index 2020*, PWC, https://www.pwc.co.uk/services/sustainability-climate-change/insights/net-zero-economy-index.html (last visited Jan. 14, 2023).

8 Richard P. Allan et al., SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS 8–9 (Valerie Masson-Delmotte et al. eds., 2021), https://report.ipcc.ch/ar6/wg1/IPCC_AR6_WGI_FullReport.pdf.

9 Richard P. Allan et al., SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2022: IMPACTS, ADAPTATION, AND VULNERABILITY 13 (Hans-Otto Portner et al. eds., 2022), https://www.researchgate.net/publication/362431578_Summary_for_Policymakers_Climate_Change_2022_Impacts_Adaptation_and_Vulnerability_Contribution_of_Working_Group_II_to_the_Sixth_Assessment_Report_of_the_Intergovernmental_Panel_on_Climate_Change.

10 Press Release, IPCC, The Evidence is Clear: The Time for Action is Now. We Can Halve Emissions by 2030., U.N. Press Release 2022/15/PR (Apr. 4, 2022), https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_PressRelease-English.pdf.

11 *World Energy Outlook 2022 Shows the Global Energy Crisis Can be a Historic Turning Point Towards a Cleaner and More Secure Future*, INT'L ENERGY AGENCY (Oct. 27, 2022), https://www.iea.org/news/world-energy-outlook-2022-shows-the-global-energy-crisis-can-be-a-historic-turning-point-towards-a-cleaner-and-more-secure-future; Max Hall, *China and India to Drive Record World Coal Demand Next Year*, PV MAGAZINE (Dec. 20, 2021), https://www.pv-magazine.com/2021/12/20/china-and-india-to-drive-record-world-coal-demand-next-year/ (noting that much of recent demand has been driven by emerging economies such as India and China, as well as continued global population growth).

fuels such as coal in Germany.[12] The transition away from these fuels may not be cheap,[13] and there is considerable uncertainty about the costs of such a rapid transition. As reliance on renewables expands, the safety net of fossil fuels will shrink, requiring further investment in integrating various renewable energy resources into a grid built on fossil fuel infrastructure.[14] Hence, some individual nations are pursuing the energy transition more eagerly than others. For example, the European Union enacted the first elements of its Green New Deal in July 2021 to kickstart the bloc's energy transition for the coming decade.[15]

The United States has lagged behind other western industrialized democracies in climate policy, mainly due to congressional gridlock and Republican Party opposition to GHG emission regulation.[16] The Obama Administration's Clean Power Plan, an attempt to regulate GHG emissions from the power sector using existing authority under the Clean Air

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12 Jonah Fisher, *Climate Change: Ukraine War Prompts Fossil Fuel 'Gold Rush'*, BBC NEWS (June 8, 2022), https://www.bbc.com/news/science-environment-61723252.

13 Lucas Toh, *Let's Come Clean: The Renewable Energy Transition Will Be Expensive*, COLUM. CLIMATE SCH.: STATE OF THE PLANET (Oct. 26, 2021), https://news.climate.columbia.edu/2021/10/26/ lets-come-clean-the-renewable-energy-transition-will-be-expensive/#:~:text=Let's%20Come%20Clean%3A%20The%20Renewable%20Energy%20Transition%20Will%20Be%20Expensive,-by%20Lucas%20Toh&text=The%20head%20of%20the%20International,the%20continent's%20shift%20toward%20renewables.

14 *See id.*

15 *See A European Green Deal*, EUROPEAN COMM'N, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (last visited Jan. 14, 2023); *Climate Action and the Green Deal*, EUROPEAN COMM'N https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/climate-action-and-green-deal_en#:~:text=The%20European%20Green%20Deal%20aims,2030%2C%20compared%20to%201990%20levels (last visited Jan. 14, 2023). As will be discussed in Part III, similar proposals have been put forth in the United States but without similar uniform support or success. *See, e.g.*, Lisa Friedman, *What Is the Green New Deal? A Climate Proposal, Explained*, N.Y. TIMES (Feb. 21, 2019), https://www.nytimes.com/2019/02/21/climate/green-new-deal-questions-answers.html.

16 *See* John M. Broder, *'Cap and Trade' Loses Its Standing as Energy Policy of Choice*, N.Y. TIMES (Mar. 25, 2010), https://www.nytimes.com/2010/03/26/science/earth/26climate.html (exploring the American Clean Energy and Security Act, or Waxman–Markey Bill, which Congress narrowly failed to pass and which would have established national GHG emissions goals).

Act,[17] was challenged by Republican politicians in court and repealed by the Trump Administration before it could take effect.[18] Despite the repeal, the U.S. Supreme Court ruled in 2022 that the Environmental Protection Agency (EPA) does not have "clear congressional authorization" to regulate and apply the Clean Power Plan.[19] The EPA may have had a clear and attainable goal with its application and regulation of the Clean Power Plan, but federal regulatory bodies are given set mandates by Congress within which they must to operate.[20]

While the 117th Congress addressed climate change with a significant legislative package,[21] most of the pressure toward cleaner energy in the U.S. has come from subnational governments and the private sector.[22] A significant, growing minority of states have taken substantial steps toward realizing a net-zero emission economy by the middle

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17 *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60). This plan comprised several new Environmental Protection Agency rules that claimed authorization by section 111 of the Clean Air Act. *Id.* at 64,700–02; *see* 42 U.S.C. § 7411; *see also* West Virginia v. Env't Prot. Agency, 142 S. Ct. 2587, 2592 (2022) (noting that this was a rarely utilized portion of the statute).

18 *See* David E. Adelman & David B. Spence, *Ideology vs. Interest Group Politics in U.S. Energy Policy*, 95 N.C. L. REV. 339 (2017) (discussing the partisan political nature of these challenges); *see also* Repeal of the Clean Power Plan, 84 Fed. Reg. 32,520 (July 8, 2019) (to be codified at 40 C.F.R. pt. 60).

19 *See West Virginia*, 142 S. Ct. at 2614–15.

20 *Id.* at 2607–09 (delineating the "major questions" doctrine and the underlying separation of powers principals); *see also* Lisa Soronin, *Supreme Court Strikes Down Clean Power Plan*, NAT'L LEAGUE OF CITIES (July 1, 2022), https://www.nlc.org/article/2022/07/01/supreme-court-strikes-down-clean-power-plan/.

21 *See* Federal Inflation Reduction Act of 2022, Pub. L. No. 117–169, 136 Stat. 1818 (2022).

22 *U.S. Subnational Action on Climate*, CLIMATE ADVISERS (July 27, 2022), https://www.climateadvisers.org/insightsfeed/u-s-subnational-action-on-climate/; Brian Eckhouse, *U.S. Clean Energy Draws Record $105 Billion in Private Investment*, BLOOMBERG (Mar. 3, 2022, 3:00 PM), https://www.bloomberg.com/news/articles/2022-03-03/u-s-clean-energy-draws-record-105-billion-private-investment?leadSource=uverify%20wall.

of the 21st century,[23] as have some cities.[24] At the same time, rapid price declines have stimulated market demand for clean energy, particularly among commercial and industrial customers.[25] This, in turn, has triggered decarbonization efforts by some electric utilities.[26] However, these efforts are still not drastic enough to meet net-zero by 2050.[27]

Nevertheless, there is a surplus of policy proposals designed to hasten the transition. Some proposals favor specific technologies or regulatory policy instruments over others. This article argues from a technology-agnostic perspective in that we propose there is no silver bullet when it comes to climate change and that every approach that brings the American economy closer to the net-zero target should be considered beneficial.[28] More specifically,

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23 *See, e.g.*, CAL. PUB. UTIL. CODE §§ 399.11, .15, .30 (West 2022) (mandating 50% of California's electricity be powered by renewable resources by 2025 and 60% by 2030, while calling for a "bold path" toward 100% zero-carbon electricity by 2045); HAW. REV. STAT. § 269-92 (2022) (establishing a goal of 100% renewable electricity sources by 2045); N.Y. ENV'T CONSERV. LAW § 75-0103 (McKinney 2022) (calling for all the state's electricity to come from carbon-free sources by 2030, 70% of which must come from renewable sources); WASH. REV. CODE ANN. § 19.285.040 (2022) (requiring all electric utilities in the state to transition to carbon-neutral electricity by 2030); N.M. STAT. ANN. § 62-18-1 to -23 (West 2022) (mandating that the state's publicly regulated utilities receive all electricity from carbon-free sources by 2045).

24 *See* Stephanie Steinbrecher, *100 U.S. Cities are Committed to 100 Percent Clean, Renewable Energy* (Dec. 5, 2018), https://www.sierraclub.org/press-releases/2019/03/100-us-cities-are-committed-100-percent-clean-renewable-energy (highlighting that Denver, Chicago, and more than 100 other American cities have pledged to meet their electricity needs using "100 percent renewable" energy).

25 *See* Julia Pyper, *The Latest Trends in Corporate Renewable Energy Procurement*, GREENTECH MEDIA (June 30, 2017), https://www.greentechmedia.com/articles/read/the-latest-trends-in-corporate-renewable-energy-procurement (describing exponential growth in demand recently); DAVID GARDINER & ASSOCIATES, THE GROWING DEMAND FOR RENEWABLE ENERGY AMONG MAJOR U.S. AND GLOBAL MANUFACTURERS (2017), www.dgardiner.com/wp-content/uploads/2017/09/ Renewable-Energy-and-Climate-Commitments-in-the-Manufacturing-Sector_FINAL9.19.2017FINAL. pdf (describing the prevalence of clean energy goals among major manufacturers).

26 *See, e.g.*, XCEL ENERGY, BUILDING A CARBON FREE FUTURE (2019), https://www.xcelenergy. com/staticfiles/xe/PDF/Xcel%20Energy%20Carbon%20Report%20-%20Mar%202019.pdf (showing that a company that operates in eight states said it "aspire[s]" to provide its customers with 100% carbon-free electricity by 2050).

27 Oliver Milman et al., *The Race to Zero: Can America Reach Net-Zero Emissions by 2050*, THE GUARDIAN (Mar. 15, 2021), https://www.theguardian.com/us-news/2021/mar/15/race-to-zero-america-emissions-climate-crisis.

28 *See* Christian Azar & Bjorn A. Sanden, *The Elusive Quest for Technology-Neutral Policies*, 1 ENV'T INNOVATION & SOCIETAL TRANSITIONS 135 (2011) (highlighting that a guiding principle for policies to curb climate change should be technology neutrality).

we argue against ruling out the use of negative emissions technologies, particularly carbon sequestration, from the menu of potential solutions to the climate problem. Part II explains the importance of negative emissions technologies (NETs) to the energy transition, including a detailed explanation and relative merits of various methods of carbon capture and sequestration (CCS). Part III explains the existing policy environment for CCS and why it is currently inadequate to trigger the investment in sequestration project capacity necessary to serve a net-zero economy. Part IV focuses on the regulatory environment of CCS and Texas as an environment for CCS project investment, and Part V explores the policy options that could jump-start investment in CCS capacity in Texas.

II. THE ENERGY TRANSITION AND THE ROLE OF NETS

A. HYDROCARBON DEPENDENCY AND THE NEED FOR NETS

Creating a low-carbon future is a highly complex and challenging problem that requires both reducing emissions and transitioning the economy without risking the level of economic prosperity enjoyed and generated by hydrocarbons. Fossil fuels still make up a large majority of the world's energy supply,[29] and many U.S. economic sectors remain dependent on emissions-heavy energy sources, including electricity production.[30] Until readily available and cost-sensible replacements exist, the U.S., like many other

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[29] *See Greenhouse Gas Emissions from Energy Data Explorer*, INT'L ENERGY AGENCY, https://www.iea.org/data-and-statistics/data-tools/greenhouse-gas-emissions-from-energy-data-explorer (last visited Jan. 14, 2023); *see also* Hannah Ritchie & Max Roser, *Energy Mix*, OUR WORLD IN DATA, https://ourworldindata.org/energy-mix (last visited Jan. 14, 2023); *The United States Uses a Mix of Energy Sources*, ENERGY INFO. AGENCY [hereinafter *U.S. Energy Mix*], https://www.eia.gov/energyexplained/us-energy-facts/#:~:text=Download%20image%20U.S.%20primary%20energy,natural%20gas%2032%25%20petroleum%2036%25 (last visited Jan. 14, 2023).

[30] *See U.S. Energy Mix*, *supra* note 29*; Products Made from Petroleum*, RANKEN ENERGY CORP., https://www.ranken-energy.com/index.php/products-made-from-petroleum/ (last visited Jan. 14, 2023) (showing over 6,000 items and consumer good are made from petroleum today).

economies, will continue to depend on emissions-based technology.[31] This is not to say that society will always remain dependent on fossil fuels. Science has shown that specific sectors of the economy can, in theory, function without hydrocarbons. However, these technologies are not yet scalable or cost-efficient enough to replace current hydrocarbon dependency.[32] Thus, the question is not whether fossil fuels will ever be replaced, but rather to what extent society will stop its reliance on hydrocarbons and, in the meantime, what can be done to reduce current emissions.

Striving toward a low-carbon economy is not only a question of technical feasibility; it requires a solution to multifaceted and wide-ranging problems from political, economic, energy security, grid reliability, and other factors.[33] The U.S. oil and gas industry creates and supports millions of jobs in the economy.[34] The recent shale revolution and resulting low-cost natural gas resources have increased domestic production of petrochemicals, industrial products, and liquified natural gas exports.[35] After decades of production moving overseas, the shale revolution has led to a "manufacturing renaissance" in the U.S., particularly in the Gulf Region.[36] For the first

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31 *See* NET ZERO BY 2050, *supra* note 4, at 36.

32 *See, e.g.*, Ben Brehmer et al., *Maximum Fossil Fuel Feedstock Replacement Potential of Petrochemicals Via Biorefineries*, 87 ENG'G RSCH. & DESIGN 1103, 1119 (2009); Robert F. Service, *Can the World Make the Chemicals it Needs Without Oil?*, SCIENCE (Sep. 19, 2019), https://www.science.org/content/article/can-world-make-chemicals-it-needs-without-oil#:~:text=Giving%20up%20those%20fuels%20doesn,is%20to%20do%20so%20economically; Phil De Luna et al., *What Would it Take for Renewably Powered Electrosynthesis to Displace Petrochemical Processes?*, SCIENCE (Apr. 26, 2019), https://www.science.org/doi/10.1126/science.aav3506.

33 *Climate Change Puts Energy Security at Risk*, WORLD METEOROLOGICAL ORG. (Oct. 11, 2022), https://public.wmo.int/en/media/press-release/climate-change-puts-energy-security-risk.

34 DANIEL YERGIN, THE NEW MAP: ENERGY, CLIMATE, AND THE CLASH OF NATIONS 27 (2020).

35 *See* Sandy Fielden, *The Economic Bounty of Shale Oil & Gas*, GLOB. ENERGY INST.: U.S. CHAMBER OF COM. (Apr. 10, 2013), https://www.globalenergyinstitute.org/economic-bounty-shale-oil-gas.

36 *See* YERGIN, *supra* note 34, at 25–30.

time in decades, the U.S. is now also a net exporter of energy.[37] It is evident that shifting the energy landscape toward a low-carbon future is exceptionally complex and will require long-term strategic planning.

Sectors of the economy that remain difficult to decarbonize due to their industrial processes, or where a readily available fossil-fuel replacement does not exist, are considered hard-to-abate industries.[38] It is unlikely and should not be assumed that these sectors will reduce emissions according to global climate targets.[39] An example of such an industry is the U.S. petrochemical industry, where industrial processes and technology have not yet found a readily available and scalable alternative to reduce emissions at scale.[40] Hard-to-abate industries need technology and innovation to reduce emissions effectively.[41] Unless there are radical changes to human behavior and consumption patterns, NETs are critical to achieving mid-century climate goals.[42] Large-scale state-driven intervention and support for NETs are necessary to ensure a just

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37 *Despite the U.S. Becoming a Net Petroleum Exporter, Most Regions are Still Net Importers*, ENERGY INFO. ADMIN.: TODAY IN ENERGY (Feb. 6, 2020), https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php (noting that the U.S. became a net petroleum exporter for the first time in November 2019).

38 Mekala Krishnan, *Sectors Are Unevenly Exposed in the Net-Zero Transition*, MCKINSEY SUSTAINABILITY (Jan. 25, 2022), https://www.mckinsey.com/capabilities/sustainability/our-insights/sectors-are-unevenly-exposed-in-the-net-zero-transition (describing hard-to-abate industries as including cement, iron, and steel production; chemical sectors; and petrochemical manufacturing); GLOB. CCS, *supra* note 6, at 12; *see also Consultation Papers on Harder-to-Abate Sectors*, ENERGY TRANSITIONS COMM'N, https://www.energy-transitions.org/consultation-papers-on-harder-to-abate-sectors/ (last visited Jan. 14, 2023).

44. GLOB. CCS, *supra* note 6, at 12 ("They are among the hardest to decarbonize. Several reports, including from the Energy Transition Commission and International Energy Agency (IEA) conclude that achieving net-zero emissions in hard-to-abate industries like these may be impossible and, at best, more expensive without CCS. CCS is one of the most mature and cost-effective options.").

40 *See generally* Brehmer, *supra* note 32.

41 *See* GLOB. CCS, *supra* note 6.

42 JOERI ROGELI ET AL., *Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development*, *in* GLOBAL WARMING OF 1.5°C 93, 112 (Valerie Masson-Delmotte et al. eds., 2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf; *see also Climate Change Puts Energy Security at Risk*, *supra* note 33 (noting that a radical shift in human behavior and consumption patterns is necessary to reach net-zero emissions by 2050).

and economically feasible energy transition by enabling the continued use of hydrocarbons at a net-zero level.

B. CARBON CAPTURE: OVERVIEW

There are two ways to reduce atmospheric CO_2: (1) reducing actual emissions, and (2) reducing atmospheric output of emissions. To meet climate goals, a significant reduction of both is necessary.[43] In effect, the world needs to stop emitting carbon molecules and, at the same time, reduce the amount that already exists in the atmosphere. For these reasons, NETs, a collective phrase for technologies designed to reduce carbon emissions or atmospheric levels of CO_2, including carbon capture, have been recognized as critical for reaching mid-century climate goals.[44] However, many industrial processes are not capable of capturing emissions due to costs or technological challenges.[45] Carbon capture technologies includes carbon capture and sequestration (CCS), carbon capture and utilization (CCU), direct air capture (DAC), and biological carbon capture (BCC).[46] Many carbon capture technologies will likely apply to power plants, but they could also be used in industrial processes that are challenging to decarbonize.[47]

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43 Elizabeth Kolbert, *Climate Solutions: Is it Feasible to Remove Enough CO_2 from the Air?*, YALE ENV'T 360 (Nov. 15, 2018), https://e360.yale.edu/features/negative-emissions-is-it-feasible-to-remove-co2-from-the-air; *see also* POLICY SUMMARY 2018, *supra* note 1, at 17 (demonstrating that emissions reduction scenarios to achieve 1.5°C require NETs); *see generally* Jerome Hilaire et al., *Negative Emissions Technology and International Climate Goals—Learning From and About Mitigation Scenarios,* 157 CLIMATE CHANGE 189 (2019) (discussing negative emissions technology and international climate goals).

44 *See* POLICY SUMMARY 2018, *supra* note 1, at 17 (noting that a low-carbon future will not likely be achieved without CCS).

45 Andrew Moseman & Howard Herzog, *How Efficient is Carbon Capture and Storage?*, MIT CLIMATE PORTAL (Feb. 23, 2021), https://climate.mit.edu/ask-mit/how-efficient-carbon-capture-and-storage.

46 PETER FOLGER, CONG. RSCH. SERV., R44902, CARBON CAPTURE AND SEQUESTRATION (CCS) IN THE UNITED STATES 1, 11 (2018); *see also Carbon Sequestration*, UNIV. OF CAL. DAVIS, https://climatechange.ucdavis.edu/climate/definitions/carbon-sequestration (last visited Jan. 14, 2023).

47 KELLY THAMBIMUTHU ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CARBON DIOXIDE CAPTURE AND STORAGE 112–13 (Bert Metz et al. eds., Cambridge University Press, 2005), https://www.ipcc.ch/report/carbon-dioxide-capture-and-storage/.

BCC refers to the sequestration of CO_2 through biological pathways, including reforestation—a valuable tool for atmospheric carbon reduction since trees' and plants' natural carbon capture mechanisms can significantly reduce CO_2 concentration.[48] Apart from reforestation, other BCC techniques include the storage of CO_2 in grasslands, forests, soils, and the ocean.[49]

In DAC, CO_2 is removed directly from the atmosphere rather than captured at the point source.[50] Limited concentrations of CO_2 in the atmosphere make DAC technology more expensive to use and hinders the utilization capacity of CO_2 compared to other carbon capture strategies, though recent estimates show lower costs than previously expected for DAC plants.[51] While promising, DAC technology has struggled to commercialize due to high costs and, as a result, to reach the significant levels of scale required to have a tangible impact on reducing atmospheric levels of CO_2.[52] Though DAC technology is becoming more affordable, it remains to be seen whether it will play a significant part in the global

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48 *See* Jean-Francois Bastin et al., *The Global Tree Restoration Potential*, 365 SCIENCE 76 (2019).

49 *See Carbon Sequestration*, *supra* note 46.

50 FOLGER, *supra* note 46, at 11 ("DAC systems typically employ a chemical capture system to separate CO_2 from ambient air, addition of energy to separate the captured CO_2 from the chemical substrate, and removal of the purified CO_2 to be stored permanently or utilized for other purposes.").

51 Robert F. Service, *Cost Plunges for Capturing Carbon Dioxide from the Air*, SCIENCE (June 7, 2018), http://www.sciencemag.org/news/2018/06/cost-plunges-capturing-carbon-dioxide-air (projecting lower costs for developing DAC technology, potentially between $94 and $232 per ton); *See Carbon Conversion Program*, DEP'T OF ENERGY: NAT'L ENERGY TECH. LAB'Y, https://netl.doe.gov/carbon-management/carbon-conversion (last visited Jan. 14, 2023) (examining how CO_2 could be used in several industrial processes); 26 U.S.C. § 45Q(f)(5)(A) (2022) (defining carbon utilization as ""(i) the fixation of such qualified carbon oxide through photosynthesis or chemosynthesis, such as through the growing of algae of bacteria, (ii) the chemical conversion of such qualified carbon oxide to a material or chemical compound in which such qualified carbon oxide is securely stored, or (iii) the use of such qualified carbon oxide for any other purpose for which a commercial market exists (with the exception of use as a tertiary injectant in a qualified enhanced oil or natural gas recovery project), as determined by the Secretary [of the Treasury].").

52 *See* John Larsen et al., *Capturing Leadership: Policies for the U.S. to Advance Direct Air Capture Technology*, RHODIUM GRP. (May 9, 2019), https://rhg.com/research/capturing-leadership-policies-for-the-us-to-advance-direct-air-capture-technology/ (suggesting that more use of DAC is necessary to meet U.S. climate goals).

energy transition.[53]

Geological sequestration refers to the concept of reducing emissions at point sources by capturing CO_2 for sequestration into geological formations.[54] CO_2 sequestration is not a novel idea.[55] There are three essential components of a CCS project: (1) the actual capturing of CO_2 from the point source, (2) the transportation of CO_2 emissions to the sequestration site, and (3) the final sequestration of the CO_2.[56] Actually capturing the emissions is the costliest and most challenging part of the CCS process;[57] it is important to produce a concentrated, high-pressure stream of CO_2 for efficient transportation.[58] There are different ways to capture CO_2, including post-combustion, pre-combustion, and oxy-fueling.[59] Post-combustion technology separates flue gases from CO_2 by using a stripper system with chemical solvents.[60] A benefit of post-combustion capture technology is that

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53 *See, e.g.*, USE IT Act, S. 383, 116th Cong. (2019) (including the purpose of "support[ing] carbon dioxide utilization and direct air capture research" and funding for a technology prize awarded to DAC projects that can capture 10,000 tons per year or more and cost less than $200 per ton of CO_2); FOLGER, *supra* note 46, at 11–12*; see also* Carbon Capture Prize Act, H.R. 3282, 116th Cong. (2019) (offering a prize for technology that reduces atmospheric CO_2—including DAC).

54 FOLGER, *supra* note 46, at 7–9.

55 *See, e.g.*, Arshad Raza et al*., Significant Aspects of Carbon Capture and Storage – A Review*, 5 PETROLEUM 335, 335 (2019) (citing Cesare Marchetti, *On Geoengineering and the CO2 Problem*, 1 CLIMATIC CHANGE 59 (1977)) ("The concept of CCS was introduced in 1977, when it was suggested that CO_2 could be captured from the coal power plant and injected into suitable geological formations.").

56 Larry Nettles & Mary Conner, *Carbon Dioxide Sequestration – Transportation, Storage, and Other Infrastructure Issues*, 4 TEX. J. OF OIL, GAS & ENERGY L. 27, 30 (2008). Capturing CO_2 from a point source usually includes the capture of emissions from a facility such as a gas- or coal-fired power plant; the CO_2 is then compressed into a fluid state for transportation, most often through pipelines. *Id.* FOLGER, *supra* note 46, at 1 (noting the most expensive part of the CCS process is the actual capturing of emissions).

57 FOLGER, *supra* note 46, at 1.

58 Nettles & Conner*, supra* note 56, at 30.

59 Rosa M. Cuéllar-Franca & Adisa Azapagic, *Carbon Capture, Storage and Utilisation Technologies: A Critical Analysis and Comparison of Their Life Cycle Environmental Impacts*, 9 J. OF CO_2 UTILIZATION 82, 83–85 (2015) (including technological options like post-combustion, pre-combustion, and oxy-fueling); ZHIEN ZHANG ET AL., *Carbon Capture*, *in* EXEGETIC, ENERGETIC AND ENVIRONMENTAL DIMENSIONS 999–1002 (Ibrahim Dincer et al. eds., Elsevier 2018).

60 Nettles & Conner, *supra* note 56, at 30 ("The CO_2 is typically separated by passing the CO_2-containing gas through a stripper system with chemical solvents to trap the CO_2. Often the CO_2 concentration in the flue gas stream is relatively small (3 to 15% by volume).").

it can be added to existing facilities without significant modifications, and is commercially available and applied within specific industries.[61] In pre-combustion capture, the primary fuel is stripped of CO_2 before combustion is completed.[62] Pre-combustion capture produces a higher concentration of CO_2 for sequestration, and is the most commercially developed technology because it has previously been used in ammonia and hydrogen production.[63] In systems where oxy-fuel is used, oxygen rather than air is used in the combustion process, producing mainly water vapor and CO_2.[64] This is the least developed capturing system, but has the potential to produce high concentrations of CO_2.[65] Geological sequestration technologies remain expensive, and operating a facility with a CCS system will require more energy, which may increase the cost of electricity by over 80% in a power plant and reduce net capacity by 20%.[66]

The second step of the CCS process is transportation of the CO_2 to its eventual place of sequestration. Before transport, CO_2 is usually compressed from its natural gaseous form into a dense liquid.[67] CO_2 can be shipped by pipeline, ships, trucks, or rail.[68] Because of their efficiency and already existing infrastructure, pipelines are likely to remain the

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61 *Id.* at 30–31.

62 See THAMBIMUTHU ET AL., *supra* note 47, at 25 (reviewing and summarizing how post-combustion, pre-combustion, and oxy-fuel systems work).

63 Nettles & Conner, *supra* note 56, at 31.

64 *Id.*

65 *Id.*

66 THAMBIMUTHU ET AL., *supra* note 47, at 67.

67 FOLGER, *supra* note 46, at 6; *see also* Nettles & Conner, *supra* note 56, at 32 (explaining that CO_2 is often processed by gas compression technology used by the natural gas industry).

68 THAMBIMUTHU ET AL., *supra* note 47, at 29–30 ("In some situations or locations, transport of CO_2 by ship may be economically more attractive, particularly when the CO_2 has to be moved over large distances or overseas. Liquefied petroleum gases . . . are transported on a large commercial scale by marine tankers. CO_2 can be transported by ship in much the same way (typically at 0.7 MPa pressure), but this currently takes place on a small scale because of limited demand. The properties of liquefied CO_2 are similar to those of LPG, and the technology could be scaled up to large CO_2 carriers if a demand for such systems were to materialize. Road and rail tankers also are technically feasible options.").

preferred method.[69] However, a broader pipeline network will likely be necessary for large-scale CCS projects, which will probably require federal support.[70] Another viable option for the transportation of CO_2 is shipping, but without a readily available market, pipelines remain the most likely mode of transportation.[71]

C. SEQUESTRATION: OVERVIEW

The final step of the CCS process is actual sequestration, meaning the long-term underground containment of CO_2 in subsurface geological formations.[72] There are different ways that CO_2 can be sequestered underground, depending on geophysical and technical conditions.[73] Far below ground, the CO_2 can reach a "supercritical" state, maximizing storage space as it occupies less of the geological pore space.[74]

Underground injections are not novel to CCS; they have been used for years to dispose of a wide range of products from different industries.[75] According to the EPA, there

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69 MATTHEW WALLACE ET AL., U.S. DEP'T OF ENERGY, ENERGY SECTOR PLANNING AND ANALYSIS, A REVIEW OF THE CO_2 PIPELINE INFRASTRUCTURE IN THE U.S. 1–2 (2015), https://www.energy.gov/sites/prod/files/2015/04/f22/QER%20Analysis%20-%20A%20Review%20of%20the%20CO2%20Pipeline%20Infrastructure%20in%20the%20U.S_0.pdf (explaining that there are approximately 4,500 miles of pipelines transporting CO_2 in the U.S., predominately to oil fields where it is used for enhanced oil recovery).

70 *Id.* at 1; *see* Nat'l Petroleum Council, *CO_2 Transport*, *in* 3 MEETING THE DUAL CHALLENGE: A ROADMAP TO AT-SCALE DEPLOYMENT OF CARBON CAPTURE, USE, AND STORAGE 6-1 (2019), https://dualchallenge.npc.org/downloads.php (roadmapping how to scale carbon capture development and finding that there are no existing alternatives to pipelines for long transport and scaling).

71 THAMBIMUTHU ET AL., *supra* note 47, at 181. Shipping costs can be cheaper at longer distances and with fewer amounts of tons of CO_2. *Id.* at 31.

72 ANGELA C. JONES, CONG. RSCH. SERV., R46192, INJECTION AND GEOLOGICAL SEQUESTRATION OF CARBON DIOXIDE: FEDERAL ROLE AND ISSUES FOR CONGRESS 2 (2020).

73 *Id.* at 3 ("CO_2 can be physically trapped in the pore space, trapped through a chemical reaction of the CO_2 with rock and water, dissolved into the existing fluid within the formation, or absorbed onto organic material or go through other chemical transformations. Researchers expect that geologic sequestration will take place over hundreds of years after injection, which may ultimately result in permanent storage of the CO_2.").

74 THAMBIMUTHU ET AL., *supra* note 47, at 31.

75 JONES, *supra* note 72, at 2.

are more than 734,000 permitted injection wells in the U.S.[76] For example, the U.S. oil and gas industry injects billions of gallons of oil field brine each year into disposal wells.[77] Given the currently large volumes of oil field brine injected into U.S. disposal wells, proponents of CCS should work to marshal public opinion on CCS by advising people of its similarity to current practices and the considerable environmental benefits of CCS operations as a whole.

The geology of the U.S. holds great capacity to sequester CO_2 both on land and offshore in deep ocean waters or mineralized under the seabed.[78] Estimates conclude that storage capacity in the U.S. ranges between 2.6 trillion and 22 trillion metric tons.[79] In effect, the CO_2 storage capacity in the U.S. could sequester centuries' worth of emissions.[80] The Department of Energy (DOE) estimated that Texas alone holds between 661 million and 2.4 billion tons of onshore CO_2 storage capacity.[81] The selection of geological sites for the sequestration and storage of CO_2 depends on various parameters, including the physical properties of the CO_2 and how it changes under different pressures and temperatures.[82] Popular underground formations include deep saline formations, depleted oil and gas

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76 *UIC Injection Well Inventory*, ENV'T PROT. AGENCY, https://www.epa.gov/uic/uic-injection-well-inventory (last visited Jan. 14, 2023) (download the spreadsheet; then add the totals of Classes I to VI).

77 THAMBIMUTHU ET AL., *supra* note 48, at 212.

78 JONES, *supra* note 72, at 3. Harry Vidas et al., *Analysis of the Costs and Benefits of Co_2 Sequestration on the U.S. Outer Continental Shelf*, ICF INT'L 1, 70 (2012) (noting sedimentary basins are the best geological formations for carbon storage).

79 U.S. DEP'T OF ENERGY: NAT'L ENERGY TECH. LAB'Y, CARBON STORAGE ATLAS 18–20 (5th ed. 2015), https://www.netl.doe.gov/sites/default/files/2018-10/ATLAS-V-2015.pdf.

80 *Id.* at 50; CONG. BUDGET OFF., THE POTENTIAL FOR CARBON SEQUESTRATION IN THE UNITED STATES 2 (2007), https://www.cbo.gov/sites/default/files/110th-congress-2007-2008/reports/09-12-carbonsequestration.pdf.

81 Elizabeth George, *Carbon Storage In Texas: Who Owns the Underground Pore Space?*, FORBES (Oct. 29, 2019, 1:42 PM), https://www.forbes.com/sites/uhenergy/2019/10/29/carbon-storage-in-texas-who-owns-the-underground-pore-space/?sh=5e8fc3e22e4b.

82 Arshad Raza et al., *A Screening Criterion for Selection of Suitable CO_2 Storage Sites*, 28 J. NAT. GAS SCI. & ENG. 317, 318 (2016).

reservoirs, and unusable coal seams.[83] To date, deep saline formations have shown the most promising CO_2 sequestration capacity.[84] Both depleted and comparatively active oil and gas reservoirs have also shown promising results for large-scale sequestration of CO_2.[85] How CO_2 will be sequestered often depends on physical and chemical differences in geological formations.[86] Usually, these projects are initiated by basin- and regional-scale suitability assessments.[87] CO_2 wells tend to be deeper than conventional disposal wells because the depth creates the necessary pressure to keep CO_2 in a supercritical state, making it less likely to migrate out of the geological formation.[88] Due to the risks of CO_2 migration, an essential aspect of injecting CO_2 is the long-term monitoring of sequestered carbon to ensure that it remains confined to the specific place of sequestration.[89] Hence, the siting of a CCS project requires significant surface and subsurface characterization that can, in some instances, be limited by costs and available data.[90] Plenty of research has been done on CO_2 monitoring, but stakeholders remain concerned by the risk associated with the practice. For this reason, policymakers should invest time and resources to ensure the safe

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83 *See* THAMBIMUTHU ET AL., *supra* note 47, at 22, 204 (analyzing a pilot project that is the first demonstration project to analyze economic and technical feasibility of storing CO_2 in coal seams); FOLGER, *supra* note 46, at 15.

84 FOLGER, *supra* note 46, at 16.

85 *See* Arshad Raza et al., *Assessment of CO_2 Residual Trapping in Depleted Reservoirs Used for Geosequestration*, 43 J. NAT. GAS SCI. & ENG. 137, 151 (2017).

86 CO_2 can be sequestered in underground formations in several different ways. CO_2 can be physically trapped in the pore space, trapped through a chemical reaction of the CO_2 with rock and water, dissolved into the existing fluid within the formation, absorbed onto organic material, or put through other chemical transformations. THAMBIMUTHU ET AL., *supra* note 47, at 197. Researchers expect that geologic sequestration will take place over hundreds of years after injection, ultimately resulting in permanent storage of the CO_2. *Id.* According to one analysis from the IPCC, almost all of the CO_2 will remain in the formation for 1,000 years after injection. *Id.*

87 *See generally* Vidas et al., *supra* note 78.

88 JONES, *supra* note 72, at 2–3.

89 *See* THAMBIMUTHU ET AL., *supra* note 47, at 14–15.

90 Nettles & Conner, *supra* note 56, at 34.

use and structure of CCS frameworks.[91]

Since geological sequestration of CO_2 is a readily available technology that can simultaneously reduce emissions while enabling the continued use of fossil fuels, it has been recognized to have phenomenal potential benefits.[92] However, despite the recent growth of CCS projects, more than a hundredfold increase of worldwide capacity is necessary to achieve a real climate impact.[93] Furthermore, deployment of carbon capture infrastructure at the scale needed to meet the Paris goal of limiting warming to 1.5°C will be far from cheap.[94] On the other hand, it will likely be even more expensive to meet climate goals without utilizing carbon capture.[95]

D. CCS, ENHANCED OIL RECOVERY, AND THE RE-USE OF CO_2

The oil and gas industry has been injecting CO_2 into reservoirs for decades using a process similar to CCS called enhanced oil recovery (EOR).[96] Prior Experience with EOR

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91 *See, e.g.*, Cal Cooper, *A Technical Basis for Carbon Dioxide Storage*, 1 ENERGY PROCEDIA 1727, 1730–31 (2009); *see also* Juerg M. Matter et al., *Monitoring Permanent CO_2 Storage by In Situ Mineral Carbonation Using a Reactive Tracer Technique*, 63 ENERGY PROCEDIA 4180, 4184 (2014) (summarizing the potential of environmentally sound long-term storage of CO_2 in basalt rock).

92 *See* THAMBIMUTHU ET AL., *supra* note 47, at 3–5.

93 *See* PAGE ET AL., *supra* note 6, at 13 (describing scenarios where emissions goals, energy access, and air quality are met, if CO_2 captured using CCS increases to around 5.6 gigatonnes (Gt) in 2050 from roughly 40 megatonnes (Mt) of CO_2 per year). The global carbon industry would likely need to scale up to over 2,000 facilities that capture 2.8 Gts of CO_2 per year to limit warming to 2 degrees Celsius. CARBON CAPTURE COALITION, CARBON CAPTURE JOBS AND PROJECT DEVELOPMENT STATUS 2 (2020), https://carboncapturecoalition.org/wp-content/uploads/2020/06/Carbon-Capture-Jobs-and-Projects.pdf.

94 *See* INT'L ENERGY AGENCY, EXPLORING CLEAN ENERGY PATHWAYS: THE ROLE OF CO_2 STORAGE 9 (2019), https://www.iea.org/reports/the-role-of-co2-storage (estimating that the action necessary to reach the Paris goal will require an investment of $9.7 trillion in the emissions pathway of the Clean Technology Scenario).

95 *Id.*

96 *See* Vello Kuuskraa & Matt Wallace, *CO_2-EOR Set for Growth as New CO_2 Supplies Emerge*, 122 OIL & GAS J. 66 (2014). EOR is used worldwide, and the U.S. is a world leader in this technology; oil and gas operators inject approximately 68 million tons of CO_2 underground each year to help recover oil and gas resources. *Id. See* Philip Marston & Patricia A. Moore, *From EOR to CCS: The Evolving Legal and Regulatory Framework for Carbon Capture and Storage*, 29 ENERGY L. J. 421 (2008) (describing how the current EOR pipeline system could merge into a CCS system).

could be a driver for the oil and gas industry to participate in future CCS projects.[97] During EOR, CO_2 is injected into underground geological formations where it moves through rock spaces, mixing with residual oil.[98] The CO_2 pressurizes the reservoir, which in turn increases the chance of oil and gas recovery.[99] EOR remains one of the few commercially feasible ways to sequester carbon, and there are hundreds of wells in the U.S. today using EOR.[100] EOR has been an essential driver in creating a market for CCS projects, with some projects relying solely on EOR to make them commercially feasible.[101]

Fluctuating commodity prices could impact the viability of these projects that rely economically on EOR.[102] Today, most EOR activities in the U.S. take place in west Texas in the Permian Basin.[103] Since EOR prolongs and improves the recovery of emission-producing fossil fuels, its climate benefits are dubious.[104] Despite a negligible

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97 *See* Nettles & Conner, *supra* note 56, at 32–34.

98 JONES, *supra* note 72, at 5. In the case of gas recovery, the same activity is referred to as EGR (Enhanced Gas Recovery). *See id.* at 2.

99 *Enhanced Oil Recovery*, U.S. DEP'T OF ENERGY: NAT'L ENERGY TECH. LAB'Y, https://netl.doe.gov/oil-gas/oil-recovery (last visited Jan. 14, 2022).

100 *Id.*

101 *See, e.g.*, JESSE JENKINS, FINANCING MEGA-SCALE ENERGY PROJECTS: A CASE STUDY OF THE PETRA NOVA CARBON CAPTURE PROJECT 1–2 (2015), http://www.paulsoninstitute.org/wp-content/uploads/2015/10/CS-Petra-Nova-EN.pdf (explaining how the Petra Nova Plant relies on EOR operations to be economically feasible); *see also What Are the Top Carbon Capture and Storage Projects Around the World?*, NS ENERGY (July 19, 2019), https://www.nsenergybusiness.com/features/top-carbon-capture-storage-projects/. The Petra Nova facility in Texas is the first operating industrial-scale coal-fired electricity generating plant with a CCS system in the United States successfully capturing CO_2 from the NRG-owned W.A. Parish power station from when it was commissioned in early 2017. JONES, *supra* note 72, at 7.

102 *Petra Nova Status Update: Petra Nova Carbon Capture System (CCS) Placed in Reserve Shutdown*, NRG ENERGY, INC. (Aug. 26, 2020), https://www.nrg.com/about/newsroom/2020/petra-nova-status-update.html; Nichola Groom, *Problems Plagued U.S. CO_2 Capture Project Before Shutdown: Document*, REUTERS (Aug. 6, 2020), https://www.reuters.com/article/us-usa-energy-carbon-capture/ problems-plagued-u-s-co2-capture-project-before-shutdown-document-idUSKCN2523K8.

103 Kuuskraa & Wallace, *supra* note 96, at 67.

104 Most of the CO_2 used for EOR in the U.S. is gathered from naturally occurring sources rather than industrial sources of CO_2, spurring questions over the climate impact of EOR. FOLGER, *supra* note 46, at 8. Industrial sources of CO_2 include ammonia production, natural gas, and coal gasification facilities. Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells, 75 Fed. Reg. 77,230, 77,244 (Dec. 10, 2010) (to be codified at 40 C.F.R. pts. 124, 144, 145, 145, and 147).

impact on climate change on a small scale, repeated long-term EOR can lead to substantial storage of CO_2 in reservoirs.[105]

Recent interest in CCS has been driven by concerns about climate change, global demand for decarbonization, and increasingly better market conditions for CCS projects.[106] Larger oil and gas companies pledging to be part of a net-zero future have shown a great interest in CCS as a tool to continue operating.[107] Currently, there are over sixty-five commercial CCS facilities worldwide, twenty-six of which are fully operating;[108] there are also countless other pilot and demonstration projects.[109] New types of CCS technologies are also being tested, particularly for industrial usages.[110] Most recent projects have been developed in the U.S.,[111] demonstrating that policy can create favorable business conditions for investing in CCS.[112]

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105 DEREK VIKARA ET AL., U.S. DEP'T OF ENERGY: NAT'L ENERGY TECH. LAB'Y, CO_2 LEAKAGE DURING EOR OPERATIONS – ANALOG STUDIES TO GEOLOGIC STORAGE OF CO_2 17 (2019) (estimating that 30–40% of the CO_2 is stored in each cycle, which is referred to as "incidental storage," and that the CO_2 will remain stored indefinitely).

106 PAGE ET AL., *supra* note 6, at 16 (indicating that a driver of projects has been the revised 45Q tax credit).

107 *See* Akshat Rathi, *BP Beefs Up Carbon Capture Team in Bid to Meet Climate Goals*, BLOOMBERG (Feb. 13, 2020, 10:31 AM), https://www.bloomberg.com/news/articles/2020-02-13/bp-beefs-up-carbon-capture-team-in-bid-to-meet-climate-goals?leadSource=uverify%20wall (showing how BP has stated interest in carbon capture); *BP Deal Boosts Santos' CCS Ambitions*, TRANSITION ECONOMIST (Mar. 13, 2020), https://pemedianetwork.com/transition-economist/articles/renewables/2020/bp-deal-boosts-santos-ccs-ambitions. Chevron's Gorgon Injection Project, a natural gas production facility in Australia, began sequestering CO_2 in 2019 and plans to store a total of 100 million tons of CO_2. *Fact Sheet: Gorgon Carbon Capture and Storage*, CHEVRON, https://australia.chevron.com/-/media/australia/publications/documents/gorgon-carbon-capture-and-storage--fact-sheet.pdf (last visited Jan. 14, 2023). ExxonMobil recently floated the idea of a $100 billion carbon capture hub around the greater Houston area. Paul Takahashi, *Exxon Eyes Houston for $100B Carbon Capture Hub* (Apr. 20, 2021), https://www.houstonchronicle.com/business/energy/article/Exxon-eyes-Houston-for-100B-carbon-capture-hub-16115848.php.

108 PAGE ET AL., *supra* note 6, at 19 (noting there are 65 commercial CCS facilities, of which 26 are operating). CCS facilities currently in operation can capture and permanently store around 40 Mt of CO_2 every year. *Id.*

109 *Id.* (noting that there are another 34 pilot and demonstration-scale CCS facilities in operation or development and eight CCS technology test centers).

110 *See, e.g.*, *id* at 20 (looking at carbon capture at a cement plant and the ZEROS project involving the development of a technology that makes carbon capture more economical).

111 *Id.* at 18.

112 *Id.*

III. ECONOMIC DRIVERS AND POLITICAL LANDSCAPE: CONGRESS AND CCS

A. CURRENT MARKET INCENTIVES

The economic feasibility of CCS is a critical concern for the large-scale development necessary to combat climate change.[113] Without a price on carbon emissions or mandatory emissions reductions, carbon sequestration has little commercial value.[114] There are many costs involved in the industrial cycle of CCS, including the various costs of transporting CO_2, which vary depending on the location of sequestration.[115] Heterogeneity of storage sites around the U.S. can further amplify the costs of a CCS project;[116] other costs include the handling of CO_2 before sequestration.[117]

The economic prospects for CCS projects depend partly upon developing a much stronger market demand for carbon sequestration. Those markets, in turn, will only develop in the face of more robust carbon policies. The CCS market was relatively small in 2020, with the global market at the time estimated to be around $1.96 billion.[118] However, from

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[113] *See* THAMBIMUTHU ET AL., *supra* note 47, at 341; *see also* Daiju Narita, *Economic Optimality of CCS Use: A Resource-Economic Model* (Kiel Inst. for the World Econ., Working Paper No. 1508, 2009).

[114] CCSREG PROJECT: CARNEGIE MELLON UNIVERSITY, CARBON CAPTURE AND SEQUESTRATION: FRAMING THE ISSUES FOR REGULATION 18 (2008).

[115] *See* KAMEL BENNACEUR ET AL., INT'L ENERGY AGENCY, CO_2 CAPTURE AND STORAGE: A KEY CARBON ABATEMENT OPTION 81–107 (2008), https://doi.org/10.1787/9789264041417-en (noting several ways to transport CO_2 to the storage site after capturing and separation). From the storage site point of view, a large quantity of CO_2 can be transported through pipelines in a cost-effective way. *Id.* The cost of this transportation, however, depends on the operational conditions, onshore and offshore locations, and the size and composition of pipelines. *Id.*

[116] *See* Jordan K. Eccles et al., *Physical and Economic Potential of Geological CO_2 Storage in Saline Aquifers,* 43 ENV'T SCI & TECH. 1962, 1968 (2009) (demonstrating geographic variability of costs across the U.S.).

[117] This includes when the moisture of CO_2 needs to be separated to reduce corrosions and hydration, which can impose additional costs. *See* INT'L ENERGY AGENCY: GREENHOUSE GAS R&D PROGRAMME, REPORT NO. PH4/33, IMPROVEMENT IN POWER GENERATION WITH POST-COMBUSTION CAPTURE OF CO_2 54–55 (2004) (describing complex system that separates sources of steam).

[118] *See Carbon Capture and Sequestration Market Size, Share & COVID-19 Impact Analysis, by End-Use, by Capture Source, and Regional Forecast, 2021-2028*, FORTUNE: FORTUNE BUSINESS INSIGHTS, https://www.fortunebusinessinsights.com/industry-reports/carbon-capture-and-sequestration-market-100819 (last visited Jan. 14, 2023) (summarizing proprietary market research report).

2021–2028, the CCS market is projected to expand to $7 billion as the global economy recovers from the pandemic.[119]

As countries move to redeploy natural gas to jumpstart their recovering economies, most countries will also be conscious of the worsening climate situation; CCS offers a practical solution to continued gas reliance.[120] In the U.S., Congress will be at the forefront of this new global CCS market expansion if it continues to commit to CCS development and research. From 2010–2022, Congress allocated $9.2 billion for the DOE to research and expand CCS development.[121] The E.U. hosted a similar timeline of CCS market emergence from the early 2000s. From 2004–2005, Norway trailblazed their domestic CCS market development by engaging with both private industry and the environmental sector, including both NGOs and government agencies.[122] The Norwegian domestic CCS market truly expanded once Norway introduced gas-fired power plants into its previously low-emission power matrix.[123] In 2021, energy supermajor Baker Hughes and Norwegian domestic CCS developer Borg CO_2 announced a collaboration to develop the industrial CCS capacity of the Viken region of Norway.[124] The companies aim to capture up to 90% of carbon output from industrial sites in the region when operations commence in the future.[125] In Germany however, CCS was more polarized because the CCS market first

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119 *Id.*

120 *Id.*

121 ANGELA C. JONES & ASHLEY J. LAWSON, CONG. RSCH. SERV., R44902, CARBON CAPTURE AND SEQUESTRATION (CCS) IN THE UNITED STATES 1 (2022), https://sgp.fas.org/crs/misc/R44902.pdf.

122 Gerhard Fuchs, *Building the Agenda for Carbon Dioxide Capture and Storage: Limits of EU-Activism*, *in* ENERGY POLICY MAKING IN THE EU: BUILDING THE AGENDA 205 (Jale Tosun et al. eds., Springer 2015).

123 *Id.*

124 *Baker Hughes and Borg CO2 to Collaborate to Develop Carbon Capture & Storage Hub for Industrial Cluster in Norway*, BAKER HUGHES (June 22, 2021), https://investors.bakerhughes.com/node/25441/pdf.

125 *Id.*

expanded there to "modernize" the coal industry by reducing emissions from coal-burning plants.[126] Thus, E.U. CCS market growth started with experimentation with national Member State needs.

Other than isolated instances of the use of carbon dioxide for EOR, there is currently no significant market for carbon sequestration in the U.S.[127] The U.S. does have the "45Q" tax credit, which offers a subsidy that incentivizes some carbon sequestration.[128] Another economic driver for CCS projects has been the California Low Carbon Fuel Standard, which spurred new investment plans for CCS.[129] Previous investments such as the Energy Independence and Security Act of 2007, where Congress authorized substantial federal funding for CCS projects, have not been sufficient to facilitate large-scale developments of CCS projects.[130]

In November 2021, Congress enacted the Infrastructure Investment and Jobs Act of 2021, which outlined a variety of funding plans for CCS operations.[131] Congress notably laid out the "Carbon Capture Technology Program" to enhance the development of CCS

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126 Julian Wettengel, *Quest for Climate Neutrality Puts CCS Back on the Table in Germany*, CLEAN ENERGY WIRE (Jan. 6, 2023), https://www.cleanenergywire.org/factsheets/quest-climate-neutrality-puts-ccs-back-table-germany.

127 *See* Karin Rives, *Record 51 US Carbon Capture Projects Announced in 2021, but Finance, Policy Lag*, S&P GLOB.: MKT. INTEL. (Feb. 23, 2022), https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/record-51-us-carbon-capture-projects-announced-in-2021-but-finance-policy-lag-69026384.

128 "45Q" refers to section 45 of Title 26 U.S. of the U.S. Internal Revenue Code, which provides a tax credit on a per-ton basis for CO_2 that is sequestered. *See* 26 U.S.C. § 45Q. It is an incentive of $20 per metric ton for CO_2 geological storage and $10 per metric ton used for EOR. *See id.* § 45Q(a).

129 SAMANTHA MCCULLOCH ET AL., INT'L ENERGY AGENCY, ENERGY TECHNOLOGY PERSPECTIVES 2020: SPECIAL REPORT ON CARBON CAPTURE UTILISATION AND STORAGE (2020).

130 *See* 42 U.S.C. § 16293. The DOE also provided around $36 million to advance 15 carbon capture projects back in 2008. *U.S. Department of Energy Invests $31 Million to Advance Carbon Capture and Storage for Natural Gas Power and Industrial Sectors*, U.S. DEP'T OF ENERGY: OFF. OF FOSSIL ENERGY & CARBON MGMT. (Aug. 26, 2022), https://www.energy.gov/fecm/articles/us-department-energy-invests-31-million-advance-carbon-capture-and-storage-natural.

131 Infrastructure Investment and Jobs Act, Pub. L. No. 117–58, § 40302, 135 Stat. 429 (2021).

technology for further integration in the commercial market, with over $100 million in funding divided over a four-year period from 2022 to 2026.[132] The Act outlined a "Carbon Storage Commercialization Program" to provide funding for the development of new or expanded CCS projects in the commercial sector. The Program particularly focused on funding the permitting and construction stages of development,[133] with an authorized $2.5 billion budget.[134] The Act also set aside about $2.1 billion for developing CCS transportation infrastructure to match the corresponding expansion of CCS projects the Program would encourage.[135] Finally, the Act provided a $3.5 billion budget to develop regional DAC hubs to directly engage with existing carbon-intensive industrial areas to cut down on emissions.[136] The extensive amount of federal funding and congressional support for CCS projects is a good sign, but it will be effectively utilized at the state and local levels. Large amounts of funding will likely help promote CCS growth in the U.S. so long as the federal government engages adequately with industry to employ the programs outlined in the Act.

The prospects for a more substantial CCS market are also dependent, in turn, on the enactment of more robust climate policies that would impose a constraint on net carbon emissions via a net emissions cap or a tax on net carbon emissions. In the last few years, a few states have imposed strong carbon policies that will move their economies or electricity

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132 *Id.* § 40303.
133 *Id.* § 40305(1), 135 Stat. 1001.
134 *Id.* § 40305, 135 Stat. 1002.
135 *Id.* 135 Stat. 1376.
136 *Id.* § 40308, 135 Stat. 1003–05.

sectors to zero or net-zero carbon emissions in or before 2050.[137] These policies could conceivably incentivize CCS projects as net emissions caps in those states approach zero. However, the prospects for a robust national carbon policy or the adoption of solid-state policies by most states currently appear weak.[138]

A notable exception is the recent growth in CCS development under the Inflation Reduction Act of 2022.[139] The Act included tax credits for CCS projects, which will foster DAC development in Wyoming and a clean ammonia fertilizer plant in Beaumont, Texas.[140] The plant will capture CO_2 released from the process of ammonia production.[141] Adaptive technologies such as CCS in ammonia production show the benefits of a technologically agnostic approach to fighting climate change. Adapting existing energy projects to CCS would save money; therefore, the technology is justifiable economically in addition to promoting lowered emission.

Part of the problem is the increasing ideological polarization of the major political parties, both in Congress and among party members. Since the late 1900s, the two major political parties in the U.S. have grown farther apart ideologically than at any time since

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[137] Greenhouse Gas Emission Limits—Amendment, 2020 Wash. Sess. Laws 738; An Act Relating to Greenhouse Gas Emissions, 2019 Nev. Stat. 1970; Greenhouse Gas Emissions Control, MINN. STAT. § 216H.02 (2022); Climate Action Plan To Reduce Pollution, 2019 Colo. Sess. Laws 3262; New York State Climate Leadership and Community Protection Act, 2019 N.Y. Laws 106; Vermont Global Warming Solutions Act of 2020, 2019 Vt. Acts & Resolves 1996.

[138] *See U.S. State Greenhouse Gas Emissions Targets*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, https://www.c2es.org/document/greenhouse-gas-emissions-targets/ (last visited Jan. 14, 2023) (noting few states have made legislative commitments to GHG reductions).

[139] Craig Bettenhausen, *The Inflation Reduction Act is Already Advancing Carbon Capture*, C&EN (Sept. 13, 2022) (accessed at: https://cen.acs.org/business/investment/Inflation-Reduction-Act-already-advancing/100/i33).

[140] *Id.*

[141] *Id.*

the Civil War.[142] The gap is growing,[143] accompanied by increasing hostility between the parties.[144] Parts of the progressive left wing of the Democratic Party are particularly hostile toward the oil and gas industry, urging a climate strategy that would focus on eliminating fossil fuel combustion from the American economy rather than focusing on net emissions.[145] Conversely, Former President Trump and the Republican Party have championed fossil fuels, promising to "bring back" coal industry jobs.[146] Indeed, the technology that facilitated that boom—hydraulic fracturing, or "fracking"—became a focus of conflict between the progressive left and conservative right in the 2020 presidential campaign.[147]

Thus, as America has become increasingly polarized, climate policy has been a significant dividing line between the parties. The Republican Party has strongly opposed national greenhouse gas emissions limits in Congress and statehouses alike, despite

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[142] *See Realtime NOMINATE Ideology and Related Data*, VOTEVIEW, https://voteview.com/data (downloadable dataset, illustrating polarization) (last visited Jan. 14, 2023).

[143] *Political Polarization in the American Public*, PEW RSCH. CTR. (June 12, 2014), https://www.pewresearch.org/politics/2014/06/12/political-polarization-in-the-american-public/.

[144] *Partisan Antipathy: More Intense, More Personal*, PEW RSCH. CTR. (Oct. 10, 2019), https://www.pewresearch.org/politics/2019/10/10/partisan-antipathy-more-intense-more-personal/.

[145] Gavin Bade, *Bernie Sanders' $16.3T Climate Plan Would Phase Out Fossil Fuels*, POLITICO (Aug. 22, 2019, 7:06 AM), https://www.politico.com/story/2019/08/22/bernie-sanders-2020-climate-change-1471638; Kate Aronoff, *Call the Fossil Fuel Industry's Net-Zero Bluff*, THE NEW REPUBLIC (Mar. 5, 2021), https://newrepublic.com/article/161601/call-fossil-fuel-industrys-net-zero-bluff; David Roberts, *How to Drive Fossil Fuels Out of the US Economy, Quickly*, VOX (Aug. 6, 2020, 10:10 AM), https://www.vox.com/energy-and-environment/21349200/climate-change-fossil-fuels-rewiring-america-electrify.

[146] James Murray, *Has Trump Lived Up to His Promise to Revive the US Coal Industry?*, NS ENERGY (Oct. 5, 2020), https://www.nsenergybusiness.com/features/trump-us-coal-industry/.

[147] Jarrett Renshaw, *U.S. Presidential Hopeful Biden Says He Would Not Ban Fracking*, REUTERS (Aug. 31, 2020, 3:38 PM), https://www.reuters.com/article/us-usa-election-biden-fracking/u-s-presidential-hopeful-biden-says-he- would-not-ban-fracking-idUSKBN25R2NI; *Biden's Confusing Stand on Fracking,* PITTSBURGH-POST GAZETTE (Sept. 1, 2020), https://www.post-gazette.com/opinion/editorials/2020/09/01/Biden-s-confusing-stand-on-fracking/stories/202008260066.

increasing support for climate legislation among younger Republicans.[148] The Obama Administration EPA's Clean Power Plan would have imposed greenhouse gas emissions limits on the electricity sector.[149] However, before that regulation could be implemented, more than 20 state attorneys general sued to overturn the rule,[150] and it was ultimately repealed by the Trump Administration.[151]

Although the current Senate majority leader, as of 2023, is a member of the Democratic Party, some Democratic senators may be wary of a climate policy that transitions the American economy toward net- zero emissions.[152] Senator Joe Manchin (D) previously took a steadfast stance against federal climate change aid packages based on the conservative leanings of his West Virginia constituents and the state's close ties with the coal industry.[153] Recently, however, Manchin reversed his previous stance and instead backed a $369 billion climate and energy package alongside his Democratic colleagues.[154] The reversal was a surprising turn given West Virginia's traditional stance on climate issues, but Manchin expressed his support for the package being due to the benefits West Virginia's low-income, former coal communities will receive from future federal economic

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148 Cary Funk & Meg Hefferon, *U.S. Public Views on Climate and Energy: Democrats Mostly Agree the Federal Government Should do More on Climate, While Republicans Differ by Ideology, Age and Gender*, PEW RSCH. CTR. (Nov. 25, 2019) https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/.

149 *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources, *supra* note 17.

150 Kiah Collier, *Texas Part of Coalition Suing EPA Over Clean Power Plan*, TEX. TRIB. (Oct. 23, 2015, 10:00 AM), https://www.texastribune.org/2015/10/23/texas-sues-epa-over-clean-power-plan/.

151 *See* Repeal of the Clean Power Plan, *supra* note 18.

152 *Manchin, Capito Vote Against Clean Power Plan,* THE PARKERSBURG NEWS AND SENTINEL: LOC. NEWS (Oct. 19, 2019), https://www.newsandsentinel.com/news/local-news/2019/10/manchin-capito-vote-against-clean-power-plan; *see also Sen. Joe Manchin Takes Fight to EPA Clean Air Regulators,* THE INTELLIGENCER (Nov. 12, 2015), *https*://www.theintelligencer.net/news/top-headlines/2015/11/sen-joe-manchin-takes-fight-to-epa-clean-air-regulators/.

153 Brad Plumer & Lisa Friedman, *Democrats Got a Climate Bill. Joe Manchin Got Drilling, and More*, N.Y TIMES (July 30, 2022), https://www.nytimes.com/2022/07/30/climate/manchin-climate-deal.html.

154 *Id.*

support.[155] If a resolutely pro-fossil-fuel state's senator can shift his position, then the implementation of CCS projects in states such as Texas has a brighter future than previously believed.

B. Political Optimism for Bipartisan Support

While a substantial carbon tax or emissions cap might be unthinkable to many Republicans—and some conservative Democrats—in Congress today, there remain at least three reasons to be optimistic about the future of CCS. First, as intermittent renewable resources comprise an ever- larger share of the electricity generation market, particularly in states that are moving toward net-zero emissions by mid-century, the task of maintaining an affordable and reliable supply of electricity when wind and solar power are unavailable will become more challenging.[156] The market for supplying that supplemental power will accordingly become more and more lucrative over time. In that event, it is conceivable that in jurisdictions subject to emissions caps, regulated emitters will look to purchase carbon offsets—that is, to purchase credits representing tons of sequestered carbon. An emissions cap versus a tax credit would be a choice between a "carrot versus stick" approach for fostering industry engagement with CCS. However, it is reasonable to suggest that any approach that engages with industry in a positive way will have the benefit of utilizing industry expertise willingly.

Second, even if Congress has little appetite for coercive regulation that pushes carbon emissions reductions, it may be less hostile to policies that offer subsidies for particular technologies, including carbon sequestration. Federal subsidies for CCS seem

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155 *Id.*

156 *See generally* Dan Tong et al., *Geophysical Constraints on the Reliability of Solar and Wind Power Worldwide*, Nature Commc'ns (Oct. 22, 2021), https://www.nature.com/articles/s41467-021-26355-z.

likely to invite opposition from the progressive wing of the Democratic Party, but these subsidies may find their way into a stimulus or budget bill, or other similar legislation.[157] Alternatively, a more politically palatable energy or climate bill could, for example, increase the value of the 45Q tax credit.[158] Depending upon the size of the subsidy, that sort of national policy could strengthen the economics of CCS projects, at least at the margins.

However, party positions on climate policy are not immutable. Republican voters in severely climate-impacted states or congressional districts may eventually support climate bills. For example, the daily flooding in the streets of Miami that began in the 2010s[159] will grow as the ocean continues to warm and expand, which could force the city to raise taxes to finance investments aimed at elevating key roadways and constructing a new seawall.[160] In Louisiana, the continued and accelerating loss of coastline is already building support for climate action there.[161] As warmer oceans increase the destructive

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157 Sarah Kaplan, *Stimulus Deal Includes Raft of Provisions to Fight Climate Change,* WASH. POST: CLIMATE SOLS. (Dec. 21, 2020, 6:38 PM), https://www.washingtonpost.com/climate-solutions/2020/12/21/congress-climate-spending/.

158 *Coalition Statement on President Biden's FY2022 Budget Request*, CARBON CAPTURE COAL. (June 1, 2021), https://carboncapturecoalition.org/coalition-statement-on-president-bidens-fy2022-budget-request.

159 Matthew Cappucci, *Sea Level Rise is Combining with Other Factors to Regularly Flood Miami,* WASH. POST (Aug. 8, 2019, 9:00 AM), https://www.washingtonpost.com/weather/2019/08/08/analysis-sea-level-rise-is-combining-with-other-factors-regularly-flood-miami/; *This Florida Keys Neighborhood Has Been Flooded for Nearly 3 Months*, NPR: ENV'T (Nov. 28, 2019, 7:12 AM), https://www.npr.org/2019/11/28/783349974/this-florida-keys-neighborhood-has-been-flooded-for-nearly-3-months.

160 Patricia Mazzei, *A 20-Foot Sea Wall? Miami Faces the Hard Choices of Climate Change,* N.Y. TIMES, https://www.nytimes.com/2021/06/02/us/miami-fl-seawall-hurricanes.html (last updated Aug. 21, 2021); David Hasemyer, *Fossil Fuels on Trial: Where the Major Climate Change Lawsuits Stand Today,* INSIDE CLIMATE NEWS (Jan. 17, 2020), https://insideclimatenews.org/news/17012020/climate-change-fossil-fuel-company-lawsuits-timeline-exxon-children-california-cities-attorney-general/.

161 For example, Louisiana Governor John Edwards recently signed an executive order to assist climate change and enhance coastal resilience. *Gov. Edwards Signs Executive Orders to Address Climate Change and Enhance Coastal Resilience*, LA. OFF. OF THE GOVERNOR (Aug. 19, 2020), https://gov.louisiana.gov/index.cfm/newsroom/detail/2647.

power of Atlantic hurricanes, barrier island communities from Georgia to Delaware will be impacted by lost tourism revenues and infrastructure costs, such as the construction of over-sea bridges to maintain vehicle access to the islands.[162] The municipalities of Newtok, Alaska, and Isle de Jean Charles, Louisiana, have already been pushed inland due to sea-level rise, and many other coastal municipalities will face this costly choice soon. [163] Higher rates of severe drought and flooding in certain parts of the country will affect the cost and availability of property insurance, and banks will refuse to write mortgages for some affected properties, causing sharp declines in property values.[164]

The recent Texas energy crisis during Winter Storm Uri is an extreme example of the costly impacts of climate change.[165] In February 2021, an unexpectedly severe winter storm hit Texas, with temperatures as low as zero degrees Fahrenheit. Increased heating and energy demand spikes caused power and water outages for almost five million Texans.[166] Controlled blackouts failed to contain the strain on the Texas power grid, the event stretched for ten days, the state suffered $130 billion in property damage,[167] and 246 deaths

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[162] Julie C. Zinnert et al., *Connectivity in Coastal Systems: Barrier Island Vegetation Influences Upland Migration in a Changing Climate*, 25 GLOB. CHANGE BIOLOGY 2419, 2419–20 (2019).

[163] Robynne Boyd, *The People of the Isle de Jean Charles Are Louisiana's First Climate Refugees – But They Won't Be the Last*, NRDC (Sept. 23, 2019), https://www.nrdc.org/stories/people-isle-jean-charles-are-louisianas-first-climate-refugees-they-wont-be-last#:~:text=The%20people%20of%20Isle%20de,at%20risk%20of%20coastal%20flooding; Craig Welch, *Climate Change Has Finally Caught Up to this Alaska Village,* NAT'L GEOGRAPHIC (Oct. 22, 2019), https://www.nationalgeographic.com/science/article/climate-change-finally-caught-up-to-this-alaska-village.

[164] *See* Charlie Wowk, *Burning Down the House: How Inadequate Climate Risk Disclosures and Information Asymmetries Threaten to Disrupt the U.S. Mortgage Market*, THE FINREG BLOG (Feb. 11, 2021), https://sites.law.duke.edu/thefinregblog/2021/02/11/burning-down-the-house-how-inadequate-climate-risk-disclosures-and-information-asymmetries-threaten-to-disrupt-the-u-s-mortgage-market/.

[165] *See generally Winter Strom Uri 2021*, TEX. COMPTROLLER OF PUB. ACCTS.: FISCAL NOTES (OCT. 2021), https://comptroller.texas.gov/economy/fiscal-notes/2021/oct/docs/fn.pdf.

[166] *AccuWeather Raises Texas Damage, Loss Estimate from Winter Storm to $130B*, INS. J. (Mar. 5, 2021), https://www.insurancejournal.com/news/southcentral/2021/03/05/604122.htm.

[167] *Id.*

occurred as a result of the storm.[168]

If phenomena such as increasingly frequent and severe natural disasters, rising sea levels, and energy crises can generate support for climate legislation in Republican districts or states, the prospects for such legislation improve dramatically.[169] Because these phenomena are virtually certain to occur, there is hope that political support for climate action will grow,[170] which would likely improve the prospects for CCS projects.

Despite bleak outlooks for bipartisan climate change action, the election of President Biden has undoubtedly shed new light on U.S. climate policy.[171] Biden's ambitious American Jobs Plan (AJP), a $2.3 trillion infrastructure plan focusing on jobs, infrastructure, research and development, and the care economy, includes $1 trillion explicitly designated for climate change.[172] The plan supports large-scale carbon sequestration efforts[173] and aims to kick-start carbon removal by establishing ten demonstration projects for cement, steel, and chemical facilities, which have been historically tricky to decarbonize.[174] The original AJP provisions for fighting climate

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168 TEX. DEP'T OF STATE HEALTH SERV., FEBRUARY 2021 WINTER STORM-RELATED DEATHS – TEXAS 2 (2021), https://dshs.texas.gov/news/updates/SMOC_FebWinterStorm_MortalitySurvReport_12-30-21.doc?terms=Winter+Storm-Related+Deaths.

169 Alex Tyson & Brian Kennedy, *Two-Thirds of Americans Think Government Should Do More on Climate: Bipartisan Backing for Carbon Capture Tax Credits, Extensive Tree-Planting Efforts*, PEW RSCH. CTR. (June 23, 2020), https://www.pewresearch.org/science/2020/06/23/two-thirds-of-americans-think-government-should-do-more-on-climate/.

170 *Id.*

171 Nathan Rott, *Biden Moves to Have U.S. Rejoin Climate Accord*, NPR (Jan. 20, 2021, 5:42 PM), https://www.npr.org/sections/inauguration-day-live-updates/2021/01/20/958923821/biden-moves-to-have-u-s-rejoin-climate-accord (explaining that President Joe Biden, in one of his first acts as president, signed an executive order to have the United States reenter the Paris Climate Agreement).

172 *The Biden Plan to Build a Modern Sustainable Infrastructure and Equitable Clean Energy Future*, BIDEN HARRIS, https://joebiden.com/clean-energy/ (last visited Jan. 14, 2023). Whether the deal would fall through remained uncertain at the time this plan was written. *See also* James Politi, *Biden Confident $1tn Infrastructure Deal Within Reach Despite Vote Setback*, FIN. TIMES (July 21, 2021), https://www.ft.com/content/a0843d7e-8ced-41da-8f82-204d896e8033.

173 Joel Jaeger et al., *Does Biden's American Jobs Plan Stack Up on Climate and Jobs?*, WORLD RES. INST. (Apr. 1, 2021), https://www.wri.org/blog/2021/04/american-jobs-plan-climate-jobs-us.

174 GLOB. CCS, *supra* note 6, at 12.

change and incentivizing the U.S. CCS industry were split into two recently passed acts. In November 2021, President Biden signed the Infrastructure and Jobs Act of 2021 into law, with a focus on U.S. infrastructure development.[175] The remaining CCS-pertinent provisions of the original AJP were recently enacted in the 2022 Inflation Reduction Act.[176] The two acts together will accelerate CCS activity by expanding and extending the 45Q.[177] The plan also brings several long-awaited policy changes, including: direct pay for the 45Q credit; expansion of 45Q to boost development in high-cost sectors, including industrial applications and DAC; low-interest loans through the provisions of the bipartisan Storing CO_2 and Lowering Emissions Act (SCALE); and funding for the buildout of CO_2 transport and geological storage infrastructure.[178]

Carbon removal initiatives have also seen other bipartisan support in Congress.[179] The bipartisanship is likely driven by the ability of CCS projects to prolong the use of fossil fuels, which increases support from representatives of both parties from districts with heavy-emissions industries or oil and gas production. For example, Senators Chris Coons (D) and Bill Cassidy (R) introduced the SCALE Act—now included in the AJP—to target

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[175] Shannon Pettypiece, *Biden Signs Infrastructure Bill, Marking Victory in Hard-Fought Legislative Battle*, MSNBC NEWS (Nov. 15, 2021, 1:36 PM), https://www.nbcnews.com/politics/white-house/ biden-sign-infrastructure-bill-marking-victory-hard-fought-legislative-battle-n1283910.

[176] Humzah Yazdani, *Why the US Inflation Reduction Act is an Important Step in the Transition to Clean Energy*, WORLD ECON. F. (Aug. 22, 2022), https://www.weforum.org/agenda/2022/08/why-the-u-s-inflation-reduction-act-is-an-important-step-in-the-transition-to-clean-energy/.

[177] Jaeger et al., *supra* note 173.

[178] *Carbon Capture Coalition Statement on the American Jobs Plan*, CARBON CAPTURE COAL. (Mar. 31, 2021), https://carboncapturecoalition.org/carbon-capture-coalition-statement-on-the-american-jobs-plan/.

[179] *See* David Garman & Dan Reicher, *Republicans and Democrats Can Agree on Carbon Capture*, THE HILL (Nov. 16, 2015, 5:30 PM), https://thehill.com/opinion/op-ed/260321-republicans-and-democrats-can-agree-on-carbon-capture.

the lack of commercialization of CCS projects.[180] Another bipartisan bill, the Carbon Capture, Utilization, and Storage Tax Credit Amendments Act of 2021, was introduced by Senators Capito (R) and Smith (D).[181] The bill aimed to extend the 45Q tax credit to the end of 2030, increase the value of 45Q, and include a direct payment option for all clean energy and industrial tax credits.[182]

A similar bill, the NET Zero Act of 2021, was introduced by Congressman Donald Beyer Jr. (D) in late 2021 to increase the 45Q credit for DAC operations specifically.[183] The Act would extend the 45Q tax credit for 10 years for DAC projects that utilized enhanced oil recovery.[184] Thus, some bipartisan support for negative emissions technology exists, but it may not be sufficient. A bill would only be useful in helping the U.S. meet climate change goals if it was passed into law and took effect in time to make a difference in facilitating CCS expansion in industry.

C. ESG: A NEW DRIVER FOR LOW CARBON

Consensus on climate change and increasing focus on Environmental, Social, and

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[180] Lee Beck & Stuart Ross, *Introduction of a Bipartisan Scale Act – Landmark CO_2 Capture, Transport and Storage Infrastructure Bill*, CLEAN AIR TASK FORCE (Mar. 17, 2021), https://www.catf.us/2021/03/u-s-house-and-senate-introduce-bipartisan-scale-act-comments/. The CO_2 Infrastructure Finance and Innovation Act (CIFIA) program would have potentially financed CO_2 transport infrastructure and authorized cost-sharing grants to: develop commercial-scale geological CO_2 storage projects, support CO_2 utilization emissions, and increase funding to EPA for Class VI CO_2 storage wells. *Id.* It would be similar to the existing TIFIA program for highways and WIFIA program for water.

[181] *U.S. Senators Smith, Capito Lead Bipartisan Senate Effort to Reduce Greenhouse Emissions with Carbon Capture Legislation*, TINA SMITH: U.S. SENATOR FOR MINN. (Mar. 25. 2021), https://www.smith.senate.gov/us-senators-smith-capito-lead-bipartisan-senate-effort-reduce-greenhouse-emissions-carbon-capture.

[182] *Carbon Capture Coalition Applauds Introduction of Bipartisan Senate Carbon Capture, Utilization and Storage Tax Credit Amendments Act*, CARBON CAPTURE COAL. (Mar. 25, 2021), https://carboncapturecoalition.org/carbon-capture-coalition-applauds-introduction-of-bipartisan-senate-carbon-capture-utilization-and-storage-tax-credit-amendments-act/. The Act would potentially allow project developers to monetize tax credits without needing to utilize the tax equity market, which can be inefficient and lead to higher transaction costs. *Id.* Carbon capture industry groups have viewed direct payment reform as critical to enhance project developments and acquire funding. *Id.*

[183] NET Zero Act of 2021, H.R. 5179, 117th Cong. § 2 (2021).

[184] *Id.*

Corporate Governance (ESG) factors has led to a new era of oil and gas company governance and arguably transformed oil and gas laws and regulatory systems themselves.[185] Increasing climate-change-related litigation and ESG considerations from investors are other concerns that the heavy-emissions industry must consider.[186] However, whether shareholders of a large oil and gas corporation are willing to pivot toward low-carbon practices remains to be seen.[187] In Texas, Occidental Petroleum (Oxy) and its venture capital arm Oxy Low Carbon Ventures founded a new company, 1PointFive, to create "net-zero" oil by utilizing DAC technologies in its production facilities in the Permian Basin.[188] The 1PointFive plant is currently at an advanced stage of development, and is projected to be operational by 2024.[189] If completed, the 1PointFive

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185 *See generally* Tara K. Righetti et al., *The New Oil and Gas Governance*, 130 YALE L. J. 51 (2020) (examining how climate change and ESG factors have led to a new oil and gas governance structure, with a focus on environmental conservation instead of production maximization).

186 Christopher Matthews, *Exxon vs. Activists: Battle Over Future of Oil and Gas Reaches Showdown*, WALL STREET J.: BUS., https://www.wsj.com/articles/exxon-vs-activists-battle-over-future-of-oil-and-gas-reaches-showdown-11621950967?mod=hp_lead_pos6 (last updated May 25, 2021, 4:31 PM) (explaining that Exxon is currently facing an activist battle over its board to reduce emissions); *see also* Robert Harrabin, *Shell: Netherlands Court Orders Oil Giant to Cut Emissions*, BBC (May 26, 2021), https://www.bbc.com/news/world-europe-57257982. Litigation concerns over emissions reductions have recently proven to be a reality as shown in the Dutch court ruling mandating that Shell Petroleum reduce their emissions by 45% by 2030. *Id.*

187 Adriano Marchese, *BP Shareholders Reject Shareholder Resolution on Climate Change Targets*, MARKETSCREENER (May 12, 2021), https://www.marketscreener.com/quote/stock/BP-PLC-9590188/news/BP-Shareholders-Reject-Shareholder-Resolution-on-Climate-Change-Targets-33242014/ (noting, for example, that BP's net-zero 50 strategy plan has seen shareholder opposition as in the rejection of the shareholder resolution on climate change targets by a large majority); *see also* Sam Meredith, *Oil Giant Shell Secures Investor Backing for its Energy Transition Strategy, but a Growing Minority Rebel*, CNBC (May 18, 2021, 8:43 AM), https://www.cnbc.com/2021/05/18/shell-secures-backing-for-climate-strategy-but-growing-minority-rebel.html#:~:text=LONDON%20—%20Royal%20Dutch%20Shell%20shareholders,to%20tackle%20th%20e%20climate%20emergency. Notably, though Shell recently had a vote in favor of the company's ambitious energy transition plans. *Id.*

188 *Oxy Low Carbon Ventures, Rusheen Capital Management Create Development Company 1PointFive to Deploy Carbon Engineering's Direct Air Capture Technology*, GLOBENEWSWIRE: CARBON ENG'G (Aug. 19, 2020), https://www.globenewswire.com/news-release/2020/08/19/2080502/0/en/Oxy-Low-Carbon-Ventures-Rusheen-Capital-Mangement-create-development-company-1PointFive-to-deploy-Carbon-Engineering-s-Direct-Air-Capture- technology.html.

189 *1PointFive and Carbon Engineering Announce Direct Air Capture Deployment Approach to Enable*

facility in the Permian Basin will be the world's largest DAC facility with the capacity to remove one million tons of carbon emissions per year.[190] BP and gas supplier Linde plc are also collaborating to develop their own CCS project in Texas.[191] The project, which will be located near Houston and projected to be operational by 2026, will focus on the capture of emissions from the Gulf Coast industrial region south of Houston.[192]

Industry-led CCS projects targeted at industrial and petrochemical production hotspots in Texas are evidence of the energy industry's willingness to engage with practical and adaptive climate change solutions. There is now a narrow window of opportunity for Texas to become a leading region for carbon capture technologies and a hub for the future carbon removal industry.[193] Texas has already taken steps to invest in carbon removal to preserve the state's fossil-fuels industry;[194] however, despite initial progress, NETs remain too expensive, and there is still considerable groundwork that needs to be laid before any large-scale deployment of CCS. The global COVID-19 pandemic has also shifted near-term political focus and tightened state spending. However, Texas has been home to several carbon capture projects, some even pre-dating the 45Q tax credit. These projects include the high-temperature gas processing Century Plant, the Petra Nova

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Global Build-Out of Plants, GLOBENEWSWIRE: CARBON ENG'G (June 7, 2022), https://www.globenewswire.com/en/news-release/2022/06/07/2457710/0/en/1PointFive-and-Carbon-Engineering-Announce-Direct-Air-Capture-Deployment-Approach-to-Enable-Global-Build-Out-of-Plants.html.

190 *CCUS at Scale*, 1POINTFIVE , https://www.1pointfive.com/ (last visited Jan. 14, 2023).

191 *BP, Linde Plan Carbon Capture Project Near Houston*, REUTERS (May 17, 2022, 7:28 AM), https://www.reuters.com/markets/carbon/bp-linde-plan-carbon-capture-project-near-houston-2022-05-17/.

192 *Id.*

193 Josiah Neely, *Texas Should Lead in Promoting Carbon Capture Regulation [Opinion],* HOUS. CHRON. (Nov. 29. 2019, 12:43 PM), https://www.houstonchronicle.com/opinion/outlook/article/Texas-should-lead-in-promoting-carbon-capture-14866762.php.

194 Jeremy B. Mazur, *RRC's Carbon Capture Rules Move Energy Expansion Forward*, TEXAS 2036, https://texas2036.org/posts/carbon-capture-rules-expand-energy-expansion/ (last visited Jan. 14, 2023).

Carbon Capture Project, and Frio Brine.[195] Thus, both political and industry appetite for these types of projects have long been existent in Texas.

IV. OIL, GAS, AND CCS IN TEXAS: A HISTORICAL OVERVIEW

The first oil well was drilled in Texas in 1866.[196] Since then, oil and gas have continued to play a critical role in Texas, representing around a third of the state economy.[197] Among other things, the state's severance tax on oil and gas is an essential economic driver for funding state projects,[198] and the Texas oil and gas industry supports around 2.5 million jobs.[199] Houston is home to over 4,600 energy-related firms,[200] and Texas hosts the headquarters of several large oil and gas companies including ExxonMobil and Phillips 66. The oil and gas industry is interwoven into aspects of the culture, economy, and social fabric of many Texas communities. The state oil and gas regulator, the Railroad Commission (RRC), is unique in its unparalleled expertise from decades of regulating one

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195 *See What Are the Top Carbon Capture and Storage Projects Around the World?*, NS ENERGY (July 19, 2019), https://www.nsenergybusiness.com/features/top-carbon-capture-storage-projects/; *see also* Susan D. Hovorka, *Frio Brine Pilot Experiment: Field Experiment for CO_2 Sequestration*, BUREAU OF ECON. GEOLOGY GCCC (Apr. 2005), https://www.beg.utexas.edu/gccc/research/fbpexperiment (describing one of the first carbon capture pilot projects in Texas).

196 *See* B.A. Wells & K.L. Wells, *First Texas Oil Well*, AM. OIL AND GAS HIST. SOC'Y, https://aoghs.org/petroleum-pioneers/first-texas-oil-well/ (last updated Sept. 8, 2022) (noting that the first oil well in Texas was drilled on September 12, 1866, in Nacogdoches County by Lyne Taliaferro Barret, seven years after Edwin L. Drake's first U.S. oil well was drilled in Pennsylvania).

197 Brandon Mulder, *Fact-Check: Is the Texas Oil and Gas Industry 35% of the State Economy?*, AUSTIN AM.-STATESMAN (updated Dec. 22, 2020, 12:40 PM), https://www.statesman.com/ story/news/politics/politifact/2020/12/22/fact-check-texas-oil-and-gas-industry-35-state-economy/ 4009134001/ (noting that the oil and gas industry represents 35% of Texas's economy); *see also* Ross Ramsey, *Analysis: Energy Isn't the Whole Texas Economy, but it's a Critical Piece*, TEX. TRIB. (Apr. 22, 2020), https://www.texastribune.org/2020/04/22/texas-energy-economy-critical-taxes/.

198 *See* Alex Samuels, *Hey, Texplainer: How Does Texas' Budget Use Taxes From Oil and Natural Gas Production?*, TEX. TRIB. (Jan 5, 2018), https://www.texastribune.org/2018/01/05/hey-texplainer-how-does-texas-budget-use-taxes-oil-and-natural-gas-pro/.

199 Bethany Blankley, *Survey: The Oil and Gas Industry Has Supported 2.5 Million Texas Jobs. 11.3 Million People Nationwide*, THE CTR. SQUARE (July 20, 2021), https://www.thecentersquare.com/ texas/study-oil-and-gas-industry-supported-2-5-million-texas-jobs-11-3-million-nationally/article_ 71df755e-e96d-11eb-8d4d-dff1b91cc504.html.

200 *Energy*, GREATER HOUS. P'SHIP, https://www.houston.org/why-houston/industries/energy (last viewed Jan. 14, 2023). Houston is often referred to as the "Energy Capital of the World." *Id.*

of the country's most significant oil- and gas-producing state.[201] Texas is a recognized leader in the production, export, and creation of petrochemicals and other oil- and gas-based products.[202] The Texas shale revolution has played a critical part in the U.S. economy, revitalizing manufacturing around the American Gulf Coast; it has also made Texas a net exporter of energy and the largest oil and gas producer in the world.[203] Undoubtedly, the industry is vital to the Texas economy—but the onset of the energy transition means both industry and political leadership face difficult strategic questions about the future of oil and gas.

Despite the economic benefits of oil and gas, Texas is the largest emitter of GHGs in the U.S., with a quarter of all U.S. industrial emissions stemming from Texas.[204] The state has yet to adopt a climate change adaptation plan; instead, most climate change preparedness has come from local communities.[205] The Texas Legislature is too polarized to support climate change action, with Democrats seeking more action and Republicans less.[206] Over the years, there has been an increase in the diversification of the Texas

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201 *History of the Railroad Commission of Texas*, RRC, https://www.rrc.texas.gov/about-us/rrc-history/ (last visited Jan. 14, 2023).

202 Robert Rapier, *The Permian Basin Is Now the World's Top Oil Producer,* FORBES (Apr. 5. 2019, 8:00 AM), https://www.forbes.com/sites/rrapier/2019/04/05/the-permian-basin-is-now-the-worlds-top-oil-producer/?sh=1e67bef83eff.

203 YERGIN, *supra* note 34, at 25–30.

204 Kenneth B. Medlock III & Keily Miller, CARBON CAPTURE IN TEXAS: COMPARATIVE ADVANTAGE IN A LOW CARBON PORTFOLIO 8 (2020); Jordan Blum, *Texas Could Be Poised to Lead in Carbon Capture Technology*, S&P GLOB. PLATTS (Sept. 24, 2020, 7:10 PM), https://www.spglobal.com/platts/en/market-insights/latest-news/petrochemicals/092420-texas-could-be-poised-to-lead-in-carbon-capture-technology.

205 *See Preparing for Climate Change in Texas,* GEORGETOWN CLIMATE CTR., https://www.georgetownclimate.org/adaptation/state-information/texas/overview.html (last viewed Jan. 14, 2023); Erin Douglas, *Texas Legislature Advances Bills to Shield Oil and Gas from Climate Initiatives*, TEX. TRIB. (May 4, 2021), https://www.texastribune.org/2021/05/03/texas-house-fossil-fuel-oil-divest/.

206 Erin Douglas, *Texas House Democrats Launch Climate, Environment Caucus with One Goal: Talk about Climate Change in the Legislature*, TEX. TRIB. (Feb. 10, 2021, 4:00 PM), https://www.texastribune.org/2021/02/10/texas-democrats-climate-environment-caucus/.

economy, slightly reducing the heavy reliance on oil and gas. Texas has seen a significant increase in renewable energy production, mainly from wind and solar.[207] However, the Texas renewables boom is likely driven by favorable economic conditions rather than a concern over the future impacts of climate change and the necessity to reduce statewide GHG emissions.[208]

As climate change issues become more pressing, states should prepare for large-scale emissions reduction. Issues related to CCS must be resolved fairly, quickly, and efficiently to ensure that developers are not deterred by specific instances of unduly burdensome or encumbering regulations. Some states have prepared policies and regulations for CCS readiness in case of necessity in a low-carbon future and to protect existing high-emissions industries.[209] There are still many concerns that need to be addressed to ensure that projects operate in an efficient regulatory environment. At minimum, states with high-emissions industries need to resolve critical policy and regulatory questions to enable the private sector to commit to CCS. An examination of the CCS regulatory framework in the U.S. will jumpstart the discussion of whether Texas is the best choice for hosting CCS development in the future.

A. THE REGULATORY ENVIRONMENT OF CARBON CAPTURE PROJECTS

No coherent regulatory framework governs CCS projects. Instead, each project is

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207 *Grid Information: Generation*, ERCOT, http://www.ercot.com/gridinfo/generation (last visited Jan. 14, 2023) (showing that wind energy represents 24% of Energy by Fuel for 2021).

208 *See* Erin Douglas, *A Year After the Electric Grid Failed, Texas Focuses on Reliability, Not Climate Change*, TEX. TRIB. (Feb. 15, 2022), https://www.texastribune.org/2022/02/15/texas-power-grid-climate-change/.

209 Jonas J. Monast et al., *A Cooperative Federalism Framework for CCS Regulation*, 7 ENV'T & ENERGY L. & POL'Y J. 11–12 (2012).

subject to a patchwork of both federal and state regulations.[210] Regulatory uncertainty and complexity create costs that are detrimental to project development,[211] and the current myriad of regulatory challenges raises jurisdictional questions over whether a federal or state framework is best suited to govern future CCS projects.[212] Hence, navigating the regulatory environment of carbon capture projects can be complex and ambiguous. The closest basis for a comprehensive federal regime for onshore CCS projects is currently found in the EPA's designation and classification of Class VI wells under the federal Safe Drinking Water Act's (SDWA) Underground Injection Control Program (UIC).[213] The EPA promulgated a final rule in 2011 establishing Class VI wells for injecting CO_2 into deep rock formations;[214] under this regulation, no underground injection may occur unless the EPA has issued a permit.[215] The original purpose of the SDWA was to protect underground water sources from hazardous injections; it falls short in consideration of

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[210] *See* THOMAS J RUSSIAL, US CARBON SEQUESTRATION COUNCIL, CARBON CAPTURE AND STORAGE – LEGAL AND REGULATORY FRAMEWORK 22 (2011).

[211] *See generally* MoonSook Park, Potential Regulatory Systems for Carbon Capture and Sequestration (CCS): Legal Analysis of the Current and Future Regulatory Systems and Recommendations for Acceptance in South Korea (2017) (SJD dissertation, Indiana University Maurer School of Law) (on file with Maurer School of Law Digital Repository, Indiana University), https://www.repository.law.indiana.edu/etd/38.

[212] *See generally* Jonas J. Monast et al., *A Cooperative Federalism Framework for CCS Regulation*, 7 ENV'T & ENERGY L. & POL'Y J. 1 (2012), https://law.uh.edu/eelpj/publications/7-1/01Monast.pdf (exploring how cooperative federalism under the Tenth Amendment can be used as a framework for CCS regulation).

[213] Fed. Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells, 73 Fed. Reg. 144, 43,492 (July 25, 2008); *see also Protecting Underground Sources of Drinking Water from Underground Injection (UIC)*, ENV'T PROT. AGENCY, https://www.epa.gov/uic (last updated Aug. 2, 2022). There are currently six classes of injection wells regulated by the EPA's UIC program. *Id.* Class I wells are used to inject hazardous and non/hazardous wastes into deep, confined rock formations. *Id.* Class II wells inject fluids from oil and gas production of primarily brines that are brought to the surface during production. *Id.* Class III wells are used to inject fluids associated with mining activities. *Id.* Class IV wells are used to dispose hazardous or radioactive wastes into or above geological formation containing underground source of drinking water (USDW). *Id.* Class V wells include all injection wells outside the scope of the other well classes. *Id.*

[214] Fed. Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells, 75 Fed. Reg. 237, 77,230 (Dec. 10, 2010).

[215] *See* 40 C.F.R. § 124.1 (2022).

many issues related explicitly to carbon capture because it was never intended to regulate such projects.[216]

Before the EPA issues an operator permit, the applicant must meet stringent requirements.[217] Among other things, the rule imposes extensive responsibility on the applicant during both the operation of the project and the post-injection period, as well as monitoring obligations for the sequestered CO_2.[218] The applicant must also adhere to specific construction techniques that are different from other UIC wells.[219] The EPA requires that the applicant assume responsibility for fifty years post-injection or alternatively demonstrate to the UIC program director that underground drinking water sources are not endangered.[220]

States and tribes can apply for regulatory primacy over the UIC program, but must comply with the minimum requirements set by the EPA.[221] Most states hold primacy over several other EPA well classes, and in Texas, Class II wells have been regulated by the RRC for decades.[222] Only Wyoming and North Dakota have obtained primacy for the Class VI program.[223] However, Texas has made recent strides to pave the way for Class VI well permit power. The RRC recently made changes to the state's carbon injection rules to better

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216 Fed. Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells, 75 Fed. Reg. at 77236 ("While the SDWA provides EPA with the authority to develop regulations to protect USDWs from endangerment, it does not provide authority to develop regulations for all areas related to GS [geologic sequestration].").

217 *See Class VI – Wells used for Geologic Sequestration of Carbon Dioxide*, ENV'T PROT. AGENCY, https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-co2 (last updated Nov. 8, 2022).

218 40 C.F.R. § 146.93 (2022).

219 Nettles & Conner, *supra* note 56, at 36.

220 *Id.*

221 *Primary Enforcement Authority for the Underground Injection Control Program*, ENV'T PROT. AGENCY, https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program-0 (last visited Jan. 14, 2023).

222 *How Are Class II Oil and Gas Disposal Wells Regulated?*, TEX. GROUNDWATER PROT. COMM., https://tgpc.texas.gov/POE/FAQs/OG_Regulated_FAQ.pdf (last visited Jan 14, 2023).

223 JONES, *supra* note 72, at 11.

bring Texas in line with EPA's own regulations.[224]

A UIC Class VI permit is critical because operators are typically exempt from other overlapping federal regulations. For example, there has been considerable discussion as to whether the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) should apply to carbon sequestration projects.[225] However, the EPA has held that a hazardous substance release under a UIC permit would be exempted as a "federally permitted release" from liabilities under CERCLA.[226] After a request for clarification from industry stakeholders, the EPA has stated that the hazardous waste requirements under RCRA do not apply to CO_2 either.[227] The non-application of both CERCLA and RCRA is beneficial to project development because both acts could drive up premiums and create general liability concerns that increase overall project costs.[228]

In specific circumstances, the National Environmental Policy Act (NEPA), the principal federal law governing environmental review and permitting, could apply to CCS projects.[229] NEPA is triggered when a project has a sufficient "federal nexus," such as a

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224 Keith Goldberg, *Texas Aims to Take Charge of Carbon Capture Projects*, LAW360 (Sept. 23, 2022), https://www-law360-com.eu1.proxy.openathens.net/articles/1526346/print?section=compliance.

225 Elizabeth J. Wilson et al., *Assessing a Liability Regime for CCS*, 1 ENERGY PROCEDIA 4575, 4,577 (2009).

226 Comprehensive Environmental Response, Compensation, and Liability Act of 1980 § 107(j), 42 U.S.C. § 9607(j) (exempting federally permitted releases of hazardous substances from liability under the statute); *id.* at §103(a), 42 U.S.C. § 9603(a) (exempting such releases from reporting to the National Response Center); *id.* at § 101(10)(G), 42 U.S.C. § 9601(10)(G) (defining "federally permitted release" to include underground injection of fluids authorized under the SDWA, including permits issued by states with authorities delegated under that statute).

227 J. Wylie Donald, *EPA Excludes Carbon Dioxide Waste Streams from RCRA – A (Very Small) Step Forward for CCS*, LEXISNEXIS: ENVIRONMENTAL, https://www.lexisnexis.com/legalnewsroom/environmental/b/hazardouswaste/posts/epa-excludes-carbon-dioxide-waste-streams-from-rcra-a-very-small-step-forward-for-ccs (last visited Jan. 14, 2023).

228 J.W. Moore, *The Potential Law of On-Shore Geologic Sequestration of CO_2 Captured from Coal-Fired Power Plants*, 28 ENERGY L. J. 443, 444 (2008).

229 *See generally* 43 U.S.C. § 1638.

federal permit.[230] If NEPA applies, projects must undergo an Environmental Assessment (EA), and if necessary, the more rigorous Environmental Impact Statement (EIA) could be requested.[231] Both the EA and EIA are cumbersome and can cause significant project delays. Many projects rely on federal funding, which often triggers NEPA.[232] Ancillary infrastructure in the CCS process, such as CO_2 pipelines, can also trigger NEPA review if: (1) a federal nexus is present, and (2) the independent project is sufficiently "connected" to a pipeline that would by itself be subject to NEPA review.[233] To alleviate regulatory encumbrances, the DOE has promulgated specific exclusions from the NEPA process, including certain CCS-related activities.[234]

A handful of other statutes might apply to CCS project, including the Clean Water Act (CWA). For example, a CWA permit could be necessary if a project is located on federal wetlands.[235] Additionally, the Endangered Species Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act could all be applicable if the project poses a threat to protected habitats or species.[236] The National Historic Preservation Act also may

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230 Seth Kerschner et al., *How US Environmental Laws and Regulations Affect Carbon Capture and Storage*, THE CTR. FOR AM. & INT'L L., https://www.cailaw.org/media/files/IEL/Publications/2021/april/kerschner-pullins-curcuru.pdf (last visited Jan. 14, 2023).

231 13 C.F.R. § 400.206 (2022).

232 Seth Kershner et al., *How US Environmental Laws and Regulations Affect Carbon Capture and Storage,* LEXOLOGY (Jan. 29, 2021) https://www.lexology.com/library/detail.aspx?g=2b12ab2c-c5b1-4437-943b-5ba8e0e47a66; *see also Department of Energy Invests $72 Million in Carbon Capture Technologies*, U.S. DEP'T OF ENERGY (Sep. 1, 2020), https://www.energy.gov/articles/department-energy-invests-72-million-carbon-capture-technologies#:~:text=DOE%20is%20awarding%20a%20total,as%20%E2%80%9Cdirect%20air%20capture.%E2% 80%9D (providing an example of federal funding for CCS).

233 Seth Kerschner & Taylor Pullins, *How US Environmental Laws and Regulations Affect Carbon Capture and Storage*, WHITE & CASE (Jan 29, 2021), https://www.whitecase.com/insight-our-thinking/how-us-environmental-laws-and-regulations-affect-carbon-capture-and-storage.

234 *See generally* National Environmental Policy Act Implementing Procedures, 10 C.F.R. § 1021 (2021).

235 *See* 33 U.S.C. § 1344.

236 *See* 16 U.S.C. § 1531–1544; 16 U.S.C. § 703–712; and 16 U.S.C. 668–668(d).

apply when the project is located on qualifying federal land.[237] Any CCS project, similarly to other large infrastructure projects, will face a myriad of project-specific state and federal regulations.

B. TEXAS-SPECIFIC REGULATORY LANDSCAPE

Most states have developed their own framework to regulate CCS activity. In 2009, the Texas Legislature responded to the new UIC Class VI Well program by adopting Senate Bill 1387 (SB 1387).[238] SB 1387 gave the RRC authority to direct carbon capture and geological storage, and introduced a trust fund to cover the long-term monitoring of geological storage facilities and infrastructure.[239] The bill also established a report on CCS development between state agencies to further the development efforts of statewide carbon sequestration projects.[240] Texas currently holds primacy over the permitting of Class I-V UIC wells, and the permitting authority is divided between the RRC and the Texas Commission on Environmental Quality (TCEQ), depending on well classification.[241] This bifurcated jurisdictional authority has burdened Texas' ability to seek primacy from the EPA over the Class VI UIC program.[242]

In 2021, the Texas Legislature passed a law to address this problem by granting jurisdiction over the injection and geological storage of carbon dioxide exclusively to the

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237 *See* 16 U.S.C. § 470(h)–2(d).
238 Tex. S.B. 1387, 81st Leg., R.S. (2009).
239 *Id.* § 120.003.
240 *Id.* § 8(c) 1–4 (including the following agencies: Bureau of Economic Geology of The University of Texas at Austin, Railroad Commission of Texas, Texas Commission on Environmental Quality, and other heads as appropriate).
241 Senate Comm. on Nat. Res. & Econ. Dev., Bill Analysis, Tex. S.B. 450, 87th Leg., R.S. (2021).
242 *Id*.

RRC.[243] The RRC has prepared to apply for Class VI well primacy with amendments to bring state law in line with UIC Class VI federal rules—namely, improving the standards of permit transparency, making terminology more consistent with federal tax credit terminology, and enacting stricter requirements for permit applicants.[244] These measures signal the RRC's commitment to obtaining the Class VI well permitting power in the run-up to its formal application submission. Before the RRC receives full primacy, applicants for CCS projects (unrelated to EOR) must apply to both the RRC and the EPA.[245]

Many states still lack a clear framework for the long-term liability of CO_2 storage.[246] Liability risks can be classified into two separate categories: operational liability and climate liability.[247] The duration of the project operator's liability is important—the CO_2 will potentially be sequestered for thousands of years, but it is unlikely that the owner firm will be in existence for the same period. This is problematic because most investors want to calculate their liability with certainty.[248] Other risks include the onshore and offshore transportation of CO_2, which requires design, monitoring for leaks, and protection against overpressure, especially in populated areas.[249] It is necessary to resolve many of the liability concerns around CCS to ensure a functioning regulatory framework and encourage

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243 House Comm. on Energy Res., Bill Analysis, Tex. H.B. 1284, 87th Leg., R.S. (2021); Carlos Anchondo, *Texas Wants Oversight of CO2 Wells. Other States May Follow.*, E&E NEWS (Oct. 3, 2022, 7:10 AM), https://www.eenews.net/articles/texas-wants-oversight-of-co2-wells-other-states-may-follow/.

244 Lauren A. Bachtel et al., *CCUS: Texas Takes Steps Toward Class VI Primacy*, MAYER BROWN (Sept. 13, 2022), https://www.mayerbrown.com/en/perspectives-events/publications/2022/09/ccus-texas-takes-steps-toward-class-vi-primacy.

245 *Geologic Storage of Anthropogenic CO2*, RRC, https://www.rrc.texas.gov/oil-and-gas/applications-and-permits/injection-storage-permits/co2-storage/ (last visited Jan. 14, 2023).

246 Nettles and Conner, *supra* note 56, at 29–30.

247 M.A. de Figueiredo et al., *Framing the Long-Term In Situ Liability Issue for Geologic Carbon Storage in the United States*, 10 MITIGATION AND ADAPT. STRAT. FOR GLOBAL CHANGE 647, 647–657 (2005).

248 GLOB. CCS, *supra* note 6, at 25.

249 *See* THAMBIMUTHU ET AL., *supra* note 47, at 181–86.

project development.[250]

The Gulf of Mexico has tremendous potential for long-term storage of CO_2;[251] geological advantages and storage capacity have spurred a growing interest in sequestering CO_2 offshore there.[252] Just as with onshore CCS, there is no comprehensive regulatory framework governing offshore CCS projects. However, the EPA has regulated CO_2 sequestration projects and similar activities under the ocean dumping regime established by the Marine Protection, Research, and Sanctuaries Act (MPRSA).[253]

Texas has responded to growing interest in offshore CCS; in 2009, the Texas Legislature passed House Bill 1796 (HB 1796), giving the Texas General Land Office (GLO) authority to adopt rules for offshore sequestration,[254] as well as identify potential locations in state-owned submerged lands suitable for such projects.[255] The Bureau of Economic Geology at the University of Texas at Austin serves as a scientific advisor for the GLO;[256] among other guidance, the Bureau can measure, monitor, and verify the permanent storage status of sequestered carbon.[257] Once permanent storage is verified and all

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250 Ian Havercroft, *Lessons and Perceptions: Adopting a Commercial Approach to CCS Liability*, GLOB. CCS INST. 1, 4–5 (2019).

251 Heather Richards and Carlos Anchondo, *CCS in the Gulf: Climate Solution or Green Washing?*, E&E NEWS (Jan. 31, 2022, 7:30 AM), https://www.eenews.net/articles/ccs-in-the-gulf-climate-solution-or-green-washing/.

252 *See* Michael B. Gerrard & Romany M. Webb, *Sequestering Carbon Dioxide Undersea in the Atlantic: Legal Problems and Solutions*, 36 UCLA J. Of Env't L. & Pol'y, no. 1, 2018, at 2, 5. https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=4210&context=faculty_scholarship (providing an overview of the regulatory system of offshore CCS, while acknowledging that little is known about the legal regime for sub-seabed injection); *see also* Daniel P. Shrag, *Storage of Carbon Dioxide in Offshore Sentiments*, 325 SCI. MAG. 1658, 1659 (2009). Notably, offshore sequestration would be far away from populated areas. *Id.*

253 Marine Protection, Research, and Sanctuaries Act of 1972, Pub. L. No. 92–532, 86 Stat. 1052; *Ocean Dumping Permits*, ENV'T PROT. AGENCY, https://www.epa.gov/ocean-dumping/ocean-dumping-permits (last updated Apr. 25, 2022).

254 Tex. H.B. 1796, 81st Leg., R.S., § 382.502(a) (2009).

255 *Id.* § 382.503(a) (2009).

256 *Id.* § 382.506(c).

257 *Id.* § 382.506(b).

other requirements are met, the Texas School Land Board will acquire title to the sequestered CO_2[258]—at which time the CO_2 producer is relieved of liability regarding the stored carbon.[259] There are many issues to consider concerning the offshore sequestration of CO_2, but the incremental steps taken by Texas stakeholders are beneficial. Although most projects remain at the pilot stage, assisting the development of an offshore carbon capture industry could be necessary to preserve heavy-emissions industries around the American Gulf Coast.[260]

V. BARRIERS TO JUMP-STARTING INVESTMENT IN CCS IN TEXAS

A. EXPANDING EXISTING INFRASTRUCTURE AND THE HUBS AND CLUSTERS MODEL

Economic feasibility is critical for the development of a carbon removal industry. Most CCS projects would benefit from economies of scale, which reduce the cost per ton of CO_2 sequestered over time.[261] A "hubs and clusters" model that expands carbon sequestration infrastructure in a limited geographical area and creates a cluster of CCS is preferred to enable the favorable conditions necessary to make projects economically feasible.[262] Relying on a single emitter could create interdependency risk that effectively reduces investment in new CCS projects. On a high level, policymakers should focus on creating clusters of specialized CO_2 sequestration facilities that contract with the heavy emissions industries to create economies of scale as a spill-over effect.[263]

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258 *Id.* § 382.507(a).
259 *Id.* § 382.508(b).
260 Tex. H.B. 1796, 81st Leg., R.S., § 382.503 (2009).
261 GLOB. CCS, *supra* note 6, at 22; LINCOLN PRATSON, BUILDING AN UNDERGROUND 'HIGHWAY' FOR CARBON DIOXIDE.
262 *See Texas Could be Poised to Lead in Carbon Capture Technology*, S&P GLOB. (Sept. 24, 2020, 6:10 PM), https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/petrochemicals/092420-texas-could-be-poised-to-lead-in-carbon-capture-technology.
263 GLOB. CCS, *supra* note 6, at 22; *Carbon Safe*, NAT'L ENERGY TECH. LAB'Y, https://netl.doe.gov/coal/carbon-storage/storage-infrastructure/carbonsafe (*last visited* Jan. 14, 2023).

The U.S. Gulf region is a carbon removal cluster.[264] The high carbon density from energy and the production of petrochemicals around the Gulf of Mexico makes the area a potential target for establishing a future carbon removal industry.[265] Exxon has already designated the Houston area specifically as a future hotspot for CCS activities. In fact, Exxon estimates that some 500 billion metric tons of CO_2 may be stored both off- and on-shore along the Gulf Coast.[266] Tax credit exemptions for CCS operations recently approved by Congress could encourage a thirteen-fold increase in carbon capture.[267] A subsidy could be significant for Exxon's Houston CCS hub because it further incentivizes Exxon to continue pursuing CCS operations in one of the most hydrocarbon-heavy industrial zones in the country.

The development of a Gulf Coast carbon capture cluster will require the expansion of the existing CO_2 pipelines infrastructure.[268] Texas is already a leader in CO_2 pipeline capacity for EOR activities, and retrofitting existing infrastructure could potentially assist investment in a statewide deployment of CCS technologies. One potential course of action is for Texas to own and operate CO_2 pipelines and then gradually transfer ownership to the private sector.[269]

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264 *See Texas Could be Poised to Lead in Carbon Capture Technology*, *supra* note 262.

265 GLOB. CCS, *supra* note 6, at 22; *Carbon Safe*, *supra* note 263.

266 GLOB. CCS, *supra* note 6, at 22 (explaining that the Gulf of Mexico is a hub for CCS activity); *see also* Takahasi, *supra* note 107.

267 Nicholas Kusnetz, *Exxon's Long-Shot Embrace of Carbon Capture in the Houston Area Just Got Massive Support from Congress*, INSIDE CLIMATE NEWS (Sept. 25, 2022), https://insideclimatenews.org/news/25092022/exxon-houston-ship-channel-carbon-capture/.

268 *Gulf of Mexico Carbon Capture and Sequestration Partnership Hub Announces Development of One of the Largest CO2 Offshore Storage Projects*, CRESCENT MIDSTREAM (Dec. 12, 2022), https://crescentmidstream.com/news/gulf-mexico-carbon-capture-and-sequestration-partnership.

269 GLOB. CCS, *supra* note 6, at 25.

B. PUBLIC ENGAGEMENT REGARDING CCS PROJECTS

Environmental monitoring that addresses safety, leakage, and risks is critical to ensure project safety and address public and stakeholder concerns. Effective CO_2 monitoring helps educate the public and address environmental concerns about future projects and can alleviate concerns about community engagement and stakeholder involvement. Since CO_2 is present everywhere in the environment, establishing an anomalous amount can be difficult.[270] Many global regulations use a baseline to consider what accounts for a CO_2 leak, but forget that baselines shift upwards due to climate change, resulting in false positives.[271] Policymakers should update regulations to consider the impact of climate change in order to ensure that future projects do not shut down due to miscalculations.

The construction and operation of energy and infrastructure projects often face a variety of opposition from stakeholders; CCS projects have not been immune to stakeholder opposition and lawsuits.[272] Since Texas is already an oil- and gas-producing state, public acceptance and tolerance of new CCS infrastructure could be higher than in states without existing oil and gas infrastructure. In any case, early involvement with stakeholders and local community engagement is vital to project success. It is

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[270] Katherine D. Romanak & Tim Dixon, *CO_2 Storage Guidelines and the Science of Monitoring: Achieving Project Success Under the California Low Carbon Fuel Standard CCS Protocol and Other Global Regulations*, 113 INT'L J. OF GREENHOUSE GAS CONTROL 103523 (2022), https://www.sciencedirect.com/science/article/abs/pii/S1750583615001929.

[271] *Id.*

[272] *See* DJL Farm LLC v. EPA, 813 F.3d 1048 (7th Cir. 2016) (challenging issuance of permits to FutureGen Industrial Alliance seeking to use CCS technology to develop world's first near-zero emissions power plant). FutureGen had applied for permits to construct four Class VI UIC wells and inject approximately 22 million metric tons of carbon dioxide into the wells over a 20-year period. *Id.* A group of Illinois landowners challenges the issuance of permits in court; the case was dismissed because FutureGen lost funding for the project and closed down before legal process ran its course. *Id.*

recommended to educate residents near potential project sites about the benefits of CCS to local communities in the early stages of project development.[273] For example, the differing public perceptions of nuclear energy in Germany versus France demonstrate the importance of public engagement with energy technology. France generates 70% of its energy from nuclear power alone.[274] Conversely, for decades, German activists have vehemently opposed expanding domestic nuclear energy production.[275] Public outcry over fears of nuclear contamination in Germany remain objectively overblown, given the consistently good safety record of nuclear plants in western Europe.[276] Yet, public salience cannot be ignored.[277] Texas' reception of CCS would be similar to France's reception of nuclear energy—generally positive, due to dependency on the oil and gas industry.

C. UTILIZATION OF CO_2

Recognition of the value of utilizing CO_2 is imperative to create more buy-in to expand carbon-capture initiatives. Currently, there is a growing trend toward using hydrogen as a zero-emissions energy carrier,[278] which would play a critical role in the decarbonization of the hard-to-decarbonize energy industry.[279] Hydrogen produced from

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273 Pavel Tcvetkov et al., *Public Perception of Carbon Capture and Storage: A State-of-the-Art Overview*, 5 HELIYON 1, 5 (2019).

274 *Nuclear Power in France,* WORLD NUCLEAR ASS'N (March 2022), https://www.world-nuclear.org/information-library/country-profiles/countries-a-f/france.aspx.

275 *Why Germans Remain So Jittery About Nuclear Power*, THE ECONOMIST (Jan. 8, 2022), https://www.economist.com/europe/2022/01/08/why-germans-remain-so-jittery-about-nuclear-power.

276 *Id.*

277 *Id.*

278 Alex Ivanenko, *Get Ready: The Hydrogen Economy Is on its Way,* FORBES (Mar 11, 2021, 8:40 AM), https://www.forbes.com/sites/forbestechcouncil/2021/03/11/get-ready-the-hydrogen-economy-is-on-its-way/.

279 GLOB. CCS, *supra* note 6, at 12. It may also be an important source of energy for residential heating and flexible power generation. Coal or natural gas with CCS is the cheapest way to produce low-carbon hydrogen. *Id*. It will remain the lowest cost option in regions where large amounts of affordable renewable electricity for hydrogen producing electrolysis is not available and fossil fuel prices are low. *Id.* To decarbonize hard-to-abate sectors and reach net-zero emissions, global hydrogen production must grow significantly, from 70 Mt per annum (Mtpa) today to 425–650 Mt a year by mid-century. *Id.*

natural gas is called "blue hydrogen," and it is the most cost-effective way to make hydrogen. Texas is home to a third of the global hydrogen pipeline system and produces around a third of the total U.S. hydrogen output.[280] Excess gas supplies in combination with increased carbon capture systems could lead to further growth in hydrogen production. In other words, the state is well-suited to take a leading role and become a central hub for the future hydrogen economy. Policymakers should critically examine the role of Texas as a leader in the future hydrogen economy with an eye on restructuring the refinery industry into a hydrogen production hub. As pressure to reduce emissions increases, hydrogen production offers an alternative to the heavy-emissions energy industry that can capitalize on reducing—and creating value in capturing—CO_2.

D. REGULATORY ISSUES

Concerns from CCS operators about the long-term liability exposure of storing CO_2 must be effectively resolved to limit the risk to private investors and enhance commercial confidence in carbon capture projects. The lengthy timeframe of the geological sequestration of CO_2 likely means that private firms will assume risk exposure beyond the firm's existence.[281] Some firms, such as private equity funds, often have a limited lifespan of five to ten years.[282] Knowing liability will likely supersede the life expectancy of their firm, it is unlikely that these entities would invest. One possibility is for the state to assume

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280 *Green Hydrogen: The Future of Galveston County*, THE CNTY. OF GALVESTON, TEX. (Oct. 21, 2021), https://www.galvestoncountytx.gov/Home/Components/News/News/322/.

281 *See* METZ ET AL., CARBON DIOXIDE CAPTURE AND STORAGE 34 (2005) (explaining that CO_2 can remain in the reservoir far longer than 1,000 years).

282 J.B. Maverick, *Hedge Fund vs. Private Equity Fund: What's the Difference?,* INVESTOPEDIA (Jan. 31. 2021), https://www.investopedia.com/ask/answers/121614/what-difference-between-hedge-fund-and-private-equity-fund.asp.

any liability after a specified post-closure period.[283] Public-private cooperation in this area could be an essential driver for CCS projects, and is already being explored in Texas.[284]

Other ways the private sector can guard against long-term risks include risk-capping mechanisms or other private insurance functions.[285] Alternatively, a state-driven insurance program could alleviate many of these concerns and speed projects along.[286]

Texas should resolve its bid for primacy over the EPA's UIC program and address any other regulatory concerns that may be creating hurdles for CCS projects, such as pore space ownership. Today, thousands of wells are drilled in Texas under the existing UIC Class II Well program, and the EPA manages only a fraction of them.[287] Some experts argue that geological carbon sequestration projects are best regulated by local authorities.[288] If granted primacy over the Class VI well program, the RRC could likely make it easier for stakeholders and operators to receive information about geological mapping data, and could potentially lower the number of years for geological monitoring that are currently required by the EPA.

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283 *See* Holly Javedan, *Regulation for Underground Storage of CO_2 Passed by U.S. States* 5 (Mass. Inst. of Tech., Working Paper), https://sequestration.mit.edu/pdf/US_State_Regulations_Underground_CO2_Storage.pdf (noting that some states have already addressed the issue of long-term liability and transfer of site ownership to the state post-injection). In Texas, HB 1796 of 2009 transfers liability post-injection to the state. *Id.*

284 *See* infra, Part IV.b.

285 Pauline Hovy, *Risk Allocation in Public-Private Partnerships: Maximizing Value for Money*, INT'L INST. FOR SUSTAINABLE DEV. (August 2015), https://www.iisd.org/system/files/publications/risk-allocation-ppp-maximizing-value-for-money-discussion-paper.pdf.

286 *See* The Price–Anderson Nuclear Industries Indemnity Act, 42 U.S.C. § 2210 (1957) (indemnifying the nuclear industry by compensating the industry for liability and ensuring public compensation could be applicable to CCS projects). Private sector insurance mechanisms are still at an early stage of determining how these projects can be insured effectively.

287 *Class II Oil and Gas Related Injection Wells*, ENV'T PROT. AGENCY, https://www.epa.gov/uic/class-ii-oil-and-gas-related-injection-wells (last visited Jan. 14, 2023).

288 Nettles & Conner, *supra* note 56, at 54.

VI. CONCLUSION

Limiting global warming to 1.5°C and reaching net-zero carbon emissions by mid-century will require large-scale negative emissions technology such as carbon capture. Despite limited economic drivers such as the 45Q tax credit, CCS projects remain—to a large extent—economically unfeasible. A carbon price or other mechanism enabling cost-effective investment into negative emissions technology is necessary to create a market that spurs investment in CCS projects. However, making carbon reduction technologies economic will likely require bipartisan congressional and state support that is difficult to achieve in an increasingly polarized political climate. CCS could garner bipartisan support because it is a climate change response that effectively deals with emissions from industry, but does not enforce radical changes in the industry's current energy matrix. Political barriers slow down policy progression, and by extension, the country's ability to effectively combat climate change. However, state governments can also assist in developing CCS projects, and Texas is ideally situated to develop a carbon capture cluster around the American Gulf Coast. To jumpstart investments in CCS, the state of Texas should, at a minimum, clear the carbon capture industry of any current regulatory hurdles that are in existence. If the state wants to protect its oil and gas industry, it should commence policy-driven action for large-scale CCS projects as soon as possible.

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Recycling is Rubbish: Reinvent, Realign, and Restructure U.S. Material Management[1]

By James D. Brien

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I. INTRODUCTION

The amount of municipal solid waste produced in the U.S. has increased almost every year since 1960 and now averages almost five pounds per person, per day.[2] The EPA estimates that in 2018, the U.S. generated over 292 million tons of this waste.[3] It is estimated that between 30% and 65% of this waste comes from one source: containers and other packaging materials.[4] The U.S. then incinerated or landfilled more than 60% of those

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2 *National Overview: Facts and Figures on Materials, Wastes and Recycling*, ENV'T PROT. AGENCY, https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#NationalPicture (last updated July 31, 2022) [hereinafter *National Overview*]. Municipal solid waste is composed of the various items consumers throw away after being used; it excludes construction and demolition debris, wastewater sludge, and industrial waste. *Id.*

3 *Id. But SEE* ROBERT CARMICHAEL, ECONOMIST IMPACT, PLASTICS MANAGEMENT INDEX: EVALUATING EFFECTIVE MANAGEMENT AND SUSTAINABLE USE OF PLASTICS 13 (Naka Kondo ed., 2021) (estimating U.S. municipal solid waste as 353.5 million tons in 2016).

4 *See Containers and Packaging: Product-Specific Data*, ENV'T PROT. AGENCY, https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific-data (last updated Mar. 8, 2022) (reporting that packaging makes up 28% of municipal solid waste); *Solid Waste & Landfill Facts*, UNIV. OF S. IND., https://www.usi.edu/recycle/solid-waste-landfill-facts/ (last visited Feb. 19, 2022) (reporting that packaging makes up 65% of household trash).

292 million tons of waste.[5] The emissions produced by incinerating and landfilling at this rate harm people, resources, and the environment.[6] This is unsustainable—if everyone on Earth used and threw away the same volume of resources as the average American, we would need almost five Earths' worth of biocapacity to produce those resources.[7] Humans can help restore Earth's natural ability to regenerate resources by using resources more sustainably.

Sustainably using resources demands reducing, reusing, and then recycling waste. Significantly reducing and reusing waste on the consumer end is unlikely without changing American throwaway culture.[8] Fortunately, the U.S. can still encourage reducing, reusing, and recycling by holding producers of consumer goods responsible for waste. When a material is recycled and re-manufactured after use, a circular economy appears.[9] Circular economies imagine a way to reuse the same materials indefinitely without disposal (acquire raw material, manufacture material, manufacture product, use product, recycle product, reprocess material, manufacture product, etc.).[10] Currently, the typical lifecycle of a material ends after just one use.[11] Recycling is crucial to a system that hopes to use

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5 *National Overview*, *supra* note 2.

6 *See infra* note 61 and accompanying text.

7 *Media Backgrounder*, GLOB. FOOTPRINT NETWORK 2, https://www.footprintnetwork.org/content/images/uploads/Media_Backgrounder_GFN.pdf (last visited Sept. 16, 2022).

8 *See* Ellen MacArthur, *Why Our Throwaway Culture Has to End*, NAT'L GEOGRAPHIC (June 6, 2018), https://www.nationalgeographic.co.uk/environment-and-conservation/2018/06/why-our-throwaway-culture-has-end; *see also* Katherine White et al., *The Elusive Green Consumer*, HARV. BUS. REV., July–Aug. 2019, at 124 (reporting that positive attitudes towards the environment does not always correlate with changing behavior); CARMICHAEL, *supra* note 3, at 67 (showing the need for consumer education and awareness of significant impacts).

9 WILLIAM R. BLACKBURN, THE SUSTAINABILITY HANDBOOK 560 (2nd ed. 2015).

10 *See What is a Circular Economy?*, ENV'T PROT. AGENCY, https://www.epa.gov/recyclingstrategy/ what-circular-economy (last updated Aug. 25, 2022).

11 *Id. See also* ORG. FOR ECON. CO-OPERATION & DEV., GLOBAL PLASTICS OUTLOOK: ECONOMIC DRIVERS,

resources sustainably.

Although recycling is crucial, the U.S. is currently in a recycling crisis, and its landfill and incineration rates are likely even higher now than in 2018.[12] This crisis is self-inflicted. For decades, the U.S. relied on other countries, mainly China, to process and recycle (or burn or landfill[13]) its municipal solid waste.[14] For 25 years, China imported 45% of the world's plastic waste, including 70% of the U.S.'s plastic waste.[15] This amounted to about 157,000 large shipping containers of plastic waste in 2018 alone.[16] China no longer buys this waste.[17] Now, more than 111 million tons of plastic waste will

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ENVIRONMENTAL IMPACTS AND POLICY OPTIONS 32 (2022) [hereinafter GLOBAL PLASTICS OUTLOOK] ("The current use of plastics is far from circular. Of the 353 Mt [million tonnes] of global plastic waste generated globally in 2019, only an estimated 55 Mt [16%] were collected for recycling, 22 Mt of which *were disposed* [meaning only 9% of plastics produced were recycled and turned into secondary materials]. Secondary plastics accounted for barely 6% of total plastics use in 2019. In total, 67 Mt [19%] of plastic waste and residues globally were incinerated in industrial facilities and 174 Mt [49%] were disposed of in sanitary landfills. The amount of mismanaged and littered plastic waste *is increasing* and has reached 82 Mt [23%] per year. Of this, only 3 Mt [4% of mismanaged plastic] is collected for proper disposal by litter clean-up measures." (emphasis added)).

12 *Cf.* Alana Semuels, *Is This the End of Recycling?*, THE ATLANTIC (Mar. 5, 2019), https://www.theatlantic.com/technology/archive/2019/03/china-has-stopped-accepting-our-trash/584131/ (reporting that most "recyclables" in the U.S. are now landfilled since China will no longer accept most U.S. waste); Melanie Rybar, *Expert Focus: How is the US Approaching the Regulation of Packaging Materials*, CHEMICAL WATCH (Oct. 21, 2021), https://chemicalwatch.com/ 356915/expert-focus-how-is-the-us-approaching-the-regulation-of-packaging-materials (explaining that Covid-19 has only exacerbated the U.S. waste problem by increasing packaging waste).

13 *See* Kenneth Rapoza, *China Doesn't Want the World's Trash Anymore. Including 'Recyclable' Goods*, FORBES (Nov. 29, 2020), https://www.forbes.com/sites/kenrapoza/2020/11/29/china-doesnt-want-the-worlds-trash-anymore-including-recyclable-goods/?sh=2e1c891a7290 ("The fact is, many pieces of plastic, including those with recyclable icons on them, are not recycled in the U.S. And when China, or other developing nations get a hold of them, they simply end up in a landfill, or in a storage facility somewhere, never recycled.").

14 Megan Manning & Stephanie Deskins, *Making it Usable Again: Reviving the Nation's Domestic Recycling Industry*, 50 GOLDEN GATE U. L. REV. 107, 114 (2020).

15 Jamie Tucker, et al., *The Last Straw? Recent Actions and Outlook for Single-Use Plastics*, THOMSON REUTERS 1 (Mar. 26, 2020); Cheryl Katz, *Piling Up: How China's Ban on Importing Waste has Stalled Global Recycling*, YALE ENV'T 360 (Mar. 7, 2019), https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling.

16 Rapoza, *supra* note 13.

17 For years, China made money by using its cheap labor force to sort, process, and repurpose waste to be sold back to the world as new products. However, as China becomes richer, and its environmental laws become stricter, China no longer wants to be the world's waste processing center. Manning & Deskins, *supra* note 15, at 113–17.

need a new disposal method over the next decade.[18] After China stopped accepting this waste, the U.S. tried sending it to other countries.[19] This waste soon inundated those countries and they also stopped accepting shipments.[20] Because of its past reliance on China, the U.S. has failed to build the necessary infrastructure to manage its own waste, and is currently ill-equipped to do anything but landfill or incinerate its waste.[21]

Now that the U.S. is stuck with most of its waste, it has no other option than to develop plans to properly manage it. Individual states do not have the funds or the economies of scale to handle this nationwide problem.[22] The solution to this crisis, therefore, must begin with the federal government. Because of its resources, expertise, and ability to set uniform policy, the federal government is uniquely suited to address the U.S.'s waste-management problems. With the proper system in place, recyclers would pay municipalities for their waste and bring those materials back into the economy.[23]

"We've all heard the phrase 'Reduce, Reuse, Recycle.' . . . But those three words can only take us so far—it's time to transform the United States [recycling] system."[24]

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18 *See* Rapoza, *supra* note 13; Katz, *supra* note 15; EUGÉNIE JOLTREAU, (DE)GLOBALIZATION OF INTERNATIONAL PLASTIC WASTE TRADE 3 (2019).

19 Colin Parts, *Waste Not Want Not: Chinese Recyclable Waste Restrictions, Their Global Impact, and Potential U.S. Responses*, 20 CHI. J. INT'L L. 291, 303–04 (2019).

20 *Id. See also* CARMICHAEL, *supra* note 3, at 24–25 (describing U.S. plastic exports to poor countries and the interplay with the Basel Convention, which the U.S. has yet to ratify).

21 Manning & Deskins, *supra* note 14, at 109–12.

22 *Id.* at 109–10. *Cf.* Ex-post Evaluation of Five Waste Stream Directives, EUR. PARL. DOC. (COM 397) 36 (2014) [hereinafter Waste Stream Evaluation] (showing that economies of scale are necessary to benefit from certain economic and environmental advantages associated with waste prevention and reuse).

23 *See* Alden Wicker, *Don't Let Consumerism Co-opt the Zero-Waste Concept*, YES! (May 10, 2021), https://www.yesmagazine.org/issue/solving-plastic/2021/05/10/zero-waste-consumerism (describing how packaging has become so complex and hard to recycle that municipalities no longer make money from recycling and now have to pay to get rid of it); Leslie Nemo, *Getting Manufacturers to Help Pay for Recycling*, BLOOMBERG (Sept. 7, 2021), https://www.bloomberg.com/news/articles/2021-09-07/who-pays-to-recycle-our-waste-u-s-states-have-a-new-answer (reporting that Lane County, Oregon went from being paid $10 per ton of recyclable material to paying $160 per ton after China stopped accepting waste).

24 ENV'T PROT. AGENCY, NATIONAL RECYCLING STRATEGY: PART ONE OF A SERIES ON BUILDING A CIRCULAR ECONOMY FOR ALL iii (2021) [hereinafter NATIONAL RECYCLING STRATEGY].

Therefore, to protect people, resources, and the environment, the federal government must implement a national recycling framework that expands the market for recycled materials in the U.S. Sadly, decades of lackluster legislation and regulation have left a patchwork recycling system across the U.S. that is inefficient, costly, and wasteful. This Note proposes a federal law to better manage packaging waste, which currently stands as the single largest source of municipal solid waste.[25]

This Note proposes the Comprehensive Overhaul of Materials Management, Efficiency, and Resource Conservation Excise Tax (COMMERCE) Act, borrowing features from existing state and international laws. The proposed COMMERCE Act has four main parts: (A) it repeals tax subsidies for virgin-material extraction to make reprocessed materials more competitive;[26] (B) it charges producers of waste a fee to encourage reducing, reusing, and recycling packaging waste and to fund domestic recycling infrastructure;[27] (C) it creates national labeling requirements to decrease consumer confusion about recycling;[28] and (D) it creates separate, uniform recycling bins for different materials to streamline waste management and increase efficiency.[29] While this proposed law is not the ultimate solution to the U.S. waste problem, it will start the U.S. on the road away from the landfill—"[T]he one less traveled by, And that has made all the difference."[30]

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25 Sara Hartwell, FED. TRADE COMM'N, P954501, PARCELING OUT THE GREEN GUIDES—DO THEY NEED REWRAPPING? 74 (Apr. 30, 2008), [hereinafter Packaging Workshop], https://www.ftc.gov/sites/default/files/documents/public_events/green-packaging-claims/transcript-3.pdf.

26 *See* discussion *infra* Part IV.A.

27 *See* discussion *infra* Part IV.B.

28 *See* discussion *infra* Part IV.C.

29 *See* discussion *infra* Part IV.D.

30 ROBERT FROST, *The Road Not Taken*, *in* THE POETRY OF ROBERT FROST 105 (Edward Connery Lathem ed., 1979).

This Note argues that the federal government must reform parts of U.S. waste management and tax policy to optimize recycling practices throughout the country. Part I discusses the importance of recycling and explains the problems the U.S. faces in recycling more. Part II describes current federal law governing solid-waste management in the U.S. and discusses its inadequacies. Part III analyzes California's, Maine's, and Oregon's solutions to the recycling crisis, and discusses examples from the EU and South Korea. In addition, Part III argues that the scale and complexity of recycling demands a national solution and proposes the COMMERCE Act. The proposed Act lays out several key elements that have the potential to achieve progress on the critical issue of managing packaging waste.

II. BACKGROUND

A. RECYCLING: WHY DOES IT MATTER?

Per capita, Americans consume more of the world's resources than citizens of any other country: "[w]ith less than 5 percent of world population, the U.S. uses one-third of the world's paper, a quarter of the world's oil, 23 percent of the coal, 27 percent of the aluminum, and 19 percent of the copper."[31] Much of these consumed resources end up as waste, with Americans producing half of the world's waste.[32] Many of these resources are non-renewable, but they are recyclable.[33] On the global level, the U.S. has failed to commit

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31 Roddy Scheer & Doug Moss, *Use It and Lose It: The Outsize Effect of U.S. Consumption on the Environment*, SCI. AM.: EARTHTALK (Sept. 14, 2012), https://www.scientificamerican.com/article/american-consumption-habits/. The average American uses as many resources as 35 average Indian citizens or 53 average Chinese citizens. *Id.*

32 *Id.*

33 Non-renewable resources, like oil (used to make many plastics) and minerals, are materials that Earth cannot quickly regenerate. However, depending on the material and the recycling process, many non-renewable resources can be recycled and used again. BLACKBURN, *supra* note 9, at 564.

to sustainable waste management and adhere to international standards.[34] The global community cannot hold the U.S. responsible for its waste-management practices; nor has the federal government held states responsible.[35]

Reducing consumption is crucial. However, after a product is produced and consumed, several options exist to manage the "waste." One option is for businesses or consumers to litter or to discharge waste into a waterway, where it will eventually wind up in the ocean.[36] For obvious reasons, it is undesirable to contribute to ocean waste. Unfortunately, the U.S.' strict clean water laws do not always prevent this.[37] Another option is to incinerate the waste and use the heat to create energy.[38] Much of the waste is then converted into a gaseous form that pollutes the air, and the rest is landfilled as ash.[39] Many municipalities do this.[40] A third option is to dig a hole and dump the waste in it, also

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34 CARMICHAEL, *supra* note 3, at 61. *But see* Environment Assembly Res. EA.5/L.23/Rev.1 (Mar. 2, 2022) (agreeing to develop an international legally binding instrument on plastic pollution); Rachel S. Doughty & Lisa Kaas Boyle, *Plastic Pollution Policy: California Leads, but the Crisis Requires National and International Action*, ABA (Feb. 27, 2022), https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2021-2022/march-april-2022/plastic-pollution-policy/ (explaining the Basel Convention and how it and other recent international agreements may affect the U.S. as a waste exporter).

35 *Id.* at 24 (explaining that though the U.S. signed the Basel Convention, it has not ratified it).

36 This disposal method was more common before the enactment of the Marine Protection, Research and Sanctuaries Act (codified at 33 U.S.C. § 27). *See Learn about Ocean Dumping*, ENV'T PROT. AGENCY, https://www.epa.gov/ocean-dumping/learn-about-ocean-dumping (last updated June 10, 2021).

37 *See* RECKONING WITH THE U.S. ROLE IN GLOBAL OCEAN PLASTIC WASTE, NAT'L ACADS. OF SCIS., ENG'G, & MED. (2021) (estimating 1–2 million metric tons [about 25% of the global total] of plastic waste enters the ocean each year from the U.S. or its exported recyclables); *see also* CARMICHAEL, *supra* note 3, at 23–26; Ana Faguy, *West Continues to Use Asia and Africa for Illicit Waste, Report Finds*, E&E NEWS (Nov. 8, 2021), https://subscriber.politicopro.com/article/eenews/2021/11/08/west-continues-to-use-asia-and-africa-for-illicit-waste-report-finds-282969 (showing that an increasing amount of U.S. waste is illicitly shipped to Asian and African countries and is then dumped in their rivers).

38 3 FRANK P. GRAD, TREATISE ON ENVIRONMENTAL LAW § 4.01[5] (Matthew Bender ed., 2021); CARMICHAEL, *supra* note 3, at 57.

39 CARMICHAEL, *supra* note 3, at 57. *See also* Katz, *supra* note 15 ("[E]ven the most state-of-the-art incinerators can emit dioxins and other harmful pollutants.").

40 *See Energy Recovery from the Combustion of Municipal Solid Waste (MSW)*, ENV'T PROT. AGENCY, https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw (last updated Nov. 2, 2021).

known as landfilling. Landfilling is the U.S.'s most common waste-management technique.[41] None of these options are optimal. Landfilling and incinerating waste causes numerous environmental harms: toxins in the air, water, and soil; potent methane emissions; and many environmental justice issues.[42]

Another management option is to make products that are easily recyclable and that reprocessing centers actually recycle into other products over and over. This creates a circular economy where materials are reused in a cycle rather than disposed of: "[a] circular economy reduces materials use, redesigns materials to be less resource intensive, and recaptures 'waste' as a resource that can serve as feedstock to manufacture new materials and products."[43] A circular economy built on recycling is by far the best option for several reasons: recycling keeps waste out of incinerators and landfills,[44] creates jobs and increases

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41 *See National Overview*, *supra* note 2.

42 *See* Manning & Deskins, *supra* note 14, at 112–13. For a discussion on the numerous environmental justice issues associated with U.S. waste and consumption as a result of low recycling, *see, e.g.*, ROBERT D. BULLARD ET AL., TOXIC WASTES AND RACE AT TWENTY 1987–2007 (2007), (re-emphasizing race as the biggest variable in where hazardous waste facilities are sited in the U.S.). *See also* Paul Mohai & Bunyan Bryant, *Environmental Injustice: Weighing Race and Class as Factors in the Distribution of Environmental Hazards*, 63 U. COLO. L. REV. 921 (1992) (showing race as a more important factor than income in the distribution of environmental hazards); Noah Sachs, *Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States*, 30 HARV. ENV'T L. REV. 51, 92–93 (2006) (describing some of the overseas harm felt by U.S. waste); Jael Holzman, *Low Pay, Abusive Conditions Rife at Congolese Cobalt Mines—Report*, E&E NEWS (Nov. 8, 2021), https://subscriber.politicopro.com/article/eenews/2021/11/08/low-pay-abusive-conditions-rife-at-congolese-cobalt-mines-report-282967 (reporting abysmal working conditions for Congolese cobalt miners).

43 NATIONAL RECYCLING STRATEGY, *supra* note 24, at 5.

44 *See* Manning & Deskins, *supra* note 14, at 115.

the GDP,[45] slows natural resource depletion,[46] and reduces greenhouse gas emissions.[47] As Earth's population continues to increase, develop, and consume more, reusing and recycling materials in a circular economy becomes ever more important.

B. PROBLEMS WITH THE UNITED STATES' CURRENT SYSTEM

The U.S. faces multifaceted problems in sustainably managing resources through recycling.[48] These problems fall within two categories. First, governments view virgin materials as inherently better than recycled materials. This shows itself in the way the federal government gives virgin-material producers special tax breaks, which in turn gives virgin materials an unfair market advantage over reprocessed materials.[49] At the other end of the spectrum, municipalities view household waste as inherently worthless.[50] Second, U.S. waste management is flawed because of inconsistent state laws, cheap landfill costs, a severe lack of national infrastructure, wishcycling,[51] and companies and consumers generally not realizing the externalities of their decisions.

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45 ENV'T PROT. AGENCY, RECYCLING ECONOMIC INFORMATION (REI) REPORT 1 (2020) (noting that in 2012, recycling activities were responsible for 681,000 jobs, more than $37 billion in wages, and $5.5 billion in tax revenue). With landfilling, municipalities cannot recoup any of their costs of collecting, transporting, and disposing waste. *See* GRAD, *supra* note 39, § 4.01[3][a]. With the proper infrastructure in the U.S., municipalities will be able to sell waste for reprocessing into new materials. *Cf.* Katz, *supra* note 15.

46 *See* GRAD, *supra* note 38, § 4.01[2][a].

47 *See National Overview*, *supra* note 2 (showing that recycling and composting prevented 193 million metric tons of CO2 emissions in 2018); *see also* NATIONAL RECYCLING STRATEGY, *supra* note 24, at iii, 5 ("[N]atural resource extraction and processing make up half of all global greenhouse gas (GHG) emissions that drive the climate crisis."); GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 23 ("Closing material loops could lower the carbon footprint of plastics substantially.").

48 S. REP. NO. 94-988, General Statement (1976) ("The solid waste problem is not a single problem but a complex set of issues involving such questions as how society uses it resources, how it reuses dicarded [sic] material, and how it ultimately disposes of materials no longer suitable for use.").

49 Britt Anne Bernheim, Can We Cure Our Throwaway Habits by Imposing the True Social Cost on Disposable Products?, 63 U. COLO. L. REV. 953, 961–62 (1992).

50 *Cf.* Carrie Bradshaw, *England's Fresh Approach to Food Waste: Problem Frames in the* Resources and Waste Strategy, 40 LEGAL STUD. 321 (2020) (discussing the issue of framing food waste in England, which is analogous to the amount of U.S. packaging waste thrown away instead of recycled).

51 *See infra* Part II.B.2.

1. THE U.S. OVERVALUES VIRGIN MATERIALS AND UNDERVALUES WASTE

The U.S. incentivizes the production of virgin materials. For more than 60 years, the federal government has subsidized virgin materials with tax breaks for its producers.[52] Because of these tax breaks, "virgin material prices are artificially low."[53] This has two main effects: it artificially decreases recycled materials' competitiveness in the market and causes producers to use more materials.[54]

Municipalities view waste in such a way that further reduces the competitiveness of recycled materials. American municipalities do not place the same value on used and virgin materials and therefore do not do enough to encourage material reuse.[55] Rather, municipalities view waste as a burden to be managed, not as a resource to be utilized:

> Framing waste as a waste management problem (what we do with stuff once it becomes waste), rather than a resource management problem (how do we produce and manage resources to prevent them from becoming waste), has led to end-of-pipe approaches which tackle the symptoms, not the causes, of waste, and shift blame to those at the end of the chain (especially consumers).[56]

Merely reclassifying "waste" to "resource" produces increased recycling, easier handling

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52 Bernheim, *supra* note 49, at 962. *See*, *e.g.*, 26 U.S.C. §§ 167(h), 611–17.

53 Bernheim, *supra* note 49, at 962. *Cf.* Geof Koss, *Repeal of Fossil Fuel Breaks 'Still Subject to Discussion'*, E&E NEWS (Sept. 23, 2021), https://subscriber.politicopro.com/article/eenews/2021/09/23/repeal-of-fossil-fuel-breaks-still-subject-to-discussion-280932 (discussing a repeal of multiple fossil fuel tax breaks, which would increase the cost of virgin plastic, therefore making recycled polymers more competitive).

54 Bernheim, *supra* note 49, at 962. *See also* GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 84 (showing the vulnerability of secondary plastic markets, which do not fully reflect secondary production costs because of the impact of virgin materials and oil prices).

55 *Cf., e.g.*, ALA. DEP'T OF ENV'T MGMT., ECONOMIC IMPACT OF RECYCLING IN ALABAMA AND OPPORTUNITIES FOR GROWTH 14 (2012) (reporting $193 million value of materials thrown away that could have been recycled); GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 24 ("[S]econdary plastics are still mainly considered substitutes for primary plastics, rather than a valuable resource in their own right. . . . Thus, the secondary plastics market is small and vulnerable.").

56 Bradshaw, *supra* note 50, at 332.

of waste streams, and decreased treatment costs.[57] The U.S. must redefine waste as a valuable commodity to be recycled, repurposed, and reused—not as a nuisance to be managed.

2. The U.S. Improperly Manages its Waste, which Discourages Resource Reuse

The second category of challenges in sustainably reusing resources has to do with the U.S.'s hodgepodge of different recycling laws.[58] Not only do these inconsistent laws directly affect—and play a determinant role in—the recycling rate in each state,[59] but they also confuse consumers.[60] The U.S. recycling system depends upon 20,000 different municipal waste-management systems which vary widely in standards and acceptable items.[61] Further, some state laws seem to be anti-sustainability. For example, while some states ban certain plastics, other states ban municipalities from banning certain plastics.[62] These inconsistent laws are just one factor contributing to the current recycling crisis.

Another factor is that the U.S. does not pay the "real" cost of landfilling waste because many municipalities do not include externalities associated with throwing it

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57 Won-Seok Yang et al., *Past, Present and Future of Waste Management in Korea*, 17 J. Material Cycles & Waste Mgmt. 207, 207–09 (2015) (using this reclassification as a true model of the circular economy). *See also* Carmichael, *supra* note 3, at 8 ("If the circular economy is to succeed, the perception of plastic waste must shift from valueless to valuable.").

58 *See* W. Kip Viscusi, et al., *Lessons from Ten Years of Household Recycling in the United States*, 48 Env't L. Rep. 10377, 10379 (2019) (classifying state recycling laws based on stringency and effectiveness).

59 *See id.* at 10379–80 (showing a 26% swing in recycling rates between states with and without mandatory recycling laws).

60 Manning & Deskins, *supra* note 14, at 118.

61 E.A. Crunden, *Recycling Hearing Probes Plastics Challenges, Market Trends*, E&E News (Sept. 23, 2021), https://subscriber.politicopro.com/article/eenews/2021/09/23/recycling-hearing-probes-plastics-challenges-market-trends-280936. *See* Manning & Deskins, *supra* note 14, at 131 (explaining recent economic limits on municipal collection and the steps being taken to expand collection for recycling and reuse).

62 Ethan D. King, *State Preemption and Single Use Plastics: Is National Intervention Necessary?*, 20 Sustainable Dev. L. & Pol'y 31, 31 (2019). While these states may claim they are just anti-regulation and pro-business, sustainability and business do not work against each other. *See generally* Blackburn, *supra* note 9.

away.[63] Externalities, for the purpose of this Note, are waste's negative impacts on third parties not directly related to a transaction between a producer and consumer.[64] Essentially, they are a "second price tag on every product we consume, representing the real costs of disposing of the product and the environmental impacts directly flowing from the existence of that product."[65] These negative impacts can be economic, social, or environmental.[66]

Because externalities are not factored into landfilling costs, landfilling waste is much cheaper than recycling.[67] A municipality may pay anywhere from two to five times more to recycle one ton of waste than to landfill it.[68] Land for landfilling, especially in the American West, is relatively inexpensive and abundant.[69] Because landfilling is often so inexpensive in the U.S., minerals are often cheaper to throw away and mine anew than to responsibly reuse.[70] But even with the current low cost, landfilling has long been recognized as a looming crisis—especially in cities and more populous regions.[71] If externalities associated with the beginning of a product's life (mining, extracting, manufacturing, etc.) and the end of that product's life (transportation, disposal, etc.) were

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63 *See* Sachs, *supra* note 42, at 56.

64 *See* Tejvan Pettinger, *Externalities – Definition*, ECON. HELP, https://www.economicshelp.org/blog/glossary/externalities/ (last visited Sept. 16, 2022).

65 Sachs, *supra* note 42, at 56.

66 *See id.* (discussing real and environmental costs of waste disposal and showing the negative social impacts disproportionally born by people of color in U.S. waste disposal).

67 Savanna Stanfield, *Is Recycling Cheaper Than Landfill? (With Cost Comparison)*, CITIZEN SUSTAINABLE (Apr. 22, 2021), https://citizensustainable.com/recycling-landfill-cheaper/.

68 *Id.*

69 Sachs, *supra* note 42, at 89.

70 Stanfield, *supra* note 67.

71 *See* S. REP. NO. 94-988, (1976) ("Solid waste management is considered to be one of the most pressing problems of large and medium-sized cities. . . . [A]lmost half of the cities will be running out of available disposal capacity in less than five years. The mayors refer to this state of affairs as a crisis."). This crisis is especially pronounced in more populated areas of the country, like the northeast. Entire states, like Massachusetts, are running out of landfill space and are driving up landfill costs in other states. Claire Potter, *NH House Panel to Tackle Bills on Landfills, Waste Reduction*, VALLEY NEWS (Jan. 16, 2022), https://www.vnews.com/Public-hearings-on-waste-management-in-NH-44489216.

factored into a producer's total costs, then recycled materials would be much more cost-competitive.[72] For example, in Europe, where many countries factor in some of these issues, recycling waste is often cheaper than landfilling waste, and recycled raw materials are 16–61% cheaper than virgin materials.[73]

Unfortunately, the U.S. cannot just quit its landfill addiction—responsibly recycling its waste at scale is currently impossible.[74] One of the biggest barriers to recycling more is the U.S.' lack of infrastructure to support robust recycling across the entire process, which includes reducing,[75] collecting,[76] sorting,[77] processing,[78] and remanufacturing waste.[79] Creating capacity for a circular economy will require a massive investment in national recycling infrastructure.[80]

Another practice that wreaks havoc in American recycling efforts is wishcycling. Wishcycling occurs when hopeful consumers place could- and should-be recyclable

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72 *Cf.* Anthony A. Austin, *Where Will All the Waste Go?: Utilizing Extended Producer Responsibility Framework Laws to Achieve Zero Waste*, 6 GOLDEN GATE U. ENV'T L. J. 221, 231 (2013) (analyzing the vast energy savings of using secondary materials over virgin materials because of the savings from mining, extracting, and manufacturing virgin materials).

73 Waste Stream Evaluation, *supra* note 22, at 37–38; Stanfield, *supra* note 67.

74 Manning & Deskins, *supra* note 14, at 117 ("[T]he nation has relied too long on exporting waste to China and has thus become incapable of processing its own recyclable trash.").

75 *See* EXTENDED PRODUCER RESPONSIBILITY FOR PACKAGING AND PAPER PRODUCTS, PROD. STEWARDSHIP INST. 1 (2020) [hereinafter EPR FOR PPP] (explaining that product producers have no incentives to reduce packaging or materials; rather, the trend is moving towards ever more complex and harder-to-recycle materials); CARMICHAEL, *supra* note 3, at 28 (reporting that petrochemical companies continue to invest heavily in infrastructure to manufacture virgin plastics).

76 Manning & Deskins, *supra* note 14, at 120 (noting that more than 40% of recycling centers in the U.S. closed from 2015–2019).

77 Issues exist with consumers wishcycling and infrastructure. The infrastructure issue begins with single-stream recycling and ends with the inability of current machines to separate combined materials effectively. *See* Manning & Deskins, *supra* note 14, at 120–21.

78 Manning & Deskins, *supra* note 14, at 122. It does not matter if consumers throw non-recyclable materials into a provided bin if no processing centers exist to accept the material.

79 *Id.* ("[A]cquiring and producing new materials often costs less than producing recycled secondary materials.").

80 KAREN BANDHAUER ET AL., PAYING IT FORWARD: HOW INVESTMENT IN RECYCLING WILL PAY DIVIDENDS 4, 6 (2021) (estimating $17 billion is needed over 5 years to reach a 50% recycling rate by 2030).

materials in their recycling bins, not knowing that these items either cannot be recycled with the U.S.'s current infrastructure, or that these items are being landfilled anyway due to recycling's high cost.[81] Many everyday items cannot be recycled with the country's current infrastructure: plastic bags, plastic straws, plastic party cups, paper coffee cups, plastic silverware and takeout boxes, toothbrushes, toothpaste tubes, and much more.[82] But companies do not make this clear to consumers. In fact, these products often have a recycling symbol on them.[83] Wishcycling does more harm than good by gumming up sorting facilities, contaminating bales of material causing secondary processors not to buy them, and then winding up in the landfill—with all the other waste that otherwise could have been recycled.[84]

Finally, and inextricably integrated with many of these problems, businesses do not realize all the externalities associated with the beginning- and end-life of their products, ranging from extraction to disposal.[85] Because businesses do not internalize these externalities, they often discuss sustainability and the circular economy without taking any action.[86] Therefore, optimum sustainability is unlikely to develop on its own without

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81 Livia Albeck-Ripka, *Your Recycling Gets Recycled, Right? Maybe, or Maybe Not*, N.Y. TIMES, (May 29, 2018), https://www.nytimes.com/2018/05/29/climate/recycling-landfills-plastic-papers.html.

82 JENNIE ROMER, CAN I RECYCLE THIS? A GUIDE TO BETTER RECYCLING (2021)*; see also* JOLTREAU, *supra* note 18, at 1 (emphasizing that about 40% of plastics are single use and quickly end up as waste).

83 The recycling symbol is the collection of arrows arranged in a triangle around a number found on almost all plastic packaging. This common symbol is known and identified in several ways in the various sources cited. *See, e.g.*, S.B. 343, 2021–2022 Reg. Sess. (Cal. 2021) (using term chasing arrows symbol, Resin Identification Code (RIC), and recycling symbol). This Note uses the term "recycling symbol" for consistency.

84 ROMER, *supra* note 82, at 57–58; *see also* GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 24 (explaining the difficulty in sorting and recycling mixed plastics, causing them to lose most of their value).

85 Thomas Helbling, *Externalities: Prices Do Not Capture All Costs*, INT'L MONETARY FUND (Sept. 3, 2022), https://www.imf.org/external/pubs/ft/fandd/basics/external.htm.

86 Although many businesses see the need for better regulation of their waste-management problems, and support such regulation, they have not been acting on their own with the needed gumption. Indeed, plastic's share of the global packaging volume has increased from 17% in 2000 to 25% in 2015—and this is only projected to keep increasing. CARMICHAEL, *supra* note 3, at 9, 16.

government regulation. In a capitalist system, businesses seek to maximize profits while avoiding the externalities of their actions: "The business of business is business, not sustainability." [87] Only when businesses internalize these costs will they be truly incentivized to reduce waste and make products that are more recyclable.[88] Therefore, any effective waste-management solution will need to internalize the externalities of waste to producers.

C. EXTERNALITIES: PAY-AS-YOU THROW AND EXTENDED PRODUCER RESPONSIBILITY AS TWO METHODS FOR INTERNALIZING THE EXTERNALITIES OF WASTE

Currently, society feels the negative effects of burning, landfilling, or exporting excess waste.[89] Although all Americans produce waste, the externalities associated with waste are not equally distributed; the U.S. needs to shift these effects elsewhere. Poorer, non-White Americans often feel these negative impacts more intensely. [90] These externalities are from U.S. waste are further borne by communities throughout the world, not just Americans.[91] Thus, justice, fairness, and common-sense require these externalities be shifted back to the producers causing them. Most of this excess waste is packaging waste, which producers currently have little incentive to reduce.[92] The government must regulate producers so they internalize the externalities of the waste they produce. Only then will producers be truly motivated to change their practices.

When negative externalities reach a point where individual interests sacrifice social

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87 BLACKBURN, *supra* note 9, at 1.
88 *See* CARMICHAEL, *supra* note 3, at 9.
89 *See* Manning & Deskins, *supra* note 14, at 112–13.
90 *Id.*
91 *See, e.g.*, *id.*; *Managing Air Quality – Control Strategies to Achieve Air Pollution Reduction*, ENV'T PROT. AGENCY, https://www.epa.gov/air-quality-management-process/managing-air-quality-control-strategies-achieve-air-pollution (last updated Sept. 29, 2021) (noting that pollution does not follow geographic boundaries and travels great distances to affect people internationally).
92 *See* Waste Stream Evaluation, *supra* note 22, at 37–38.

welfare, government needs to step in "to control the play of economic forces . . . to promote . . . the total welfare, of their citizens as a whole."[93] This is the basis for the idea of a Pigouvian tax.[94] Pigou said that a state may shift externalities back to those responsible by encouragements or restraints—bounties or taxes.[95]

One example of a Pigouvian tax, which has become popular in recent decades, has been a pay-as-you-throw (PAYT) surcharge on municipal waste.[96] PAYT charges consumers for their waste by weight or volume.[97] This cost structure is meant to internalize to consumers the externalities associated with their waste.[98] The EPA recommends setting PAYT rates by computing the full costs of each municipal waste collection service.[99] These include front- and back-end costs of waste management as well as policy considerations, such as charging less for desirable programs like recycling and composting.[100]

PAYT is a good supplement to a waste-management system that incentivizes recycling, but PAYT on its own is deficient for several reasons. First, most municipalities that use PAYT systems do not set fees that accurately reflect all the externalities associated with landfilling. Many states and municipalities only consider upfront costs like

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93 ARTHUR PIGOU, THE ECONOMICS OF WELFARE 129–30 (4th ed. 1932).

94 A form of excise tax, a Pigouvian tax corrects inefficient market outcomes by pricing the tax to equal negative externalities. *See Pigouvian Tax*, TAX FOUND., https://taxfoundation.org/tax-basics/ pigouvian-tax/ (last visited Sept. 16, 2022). However, excise taxes in general can be levied in more ways than just to account for externalities, such as a user fee. *See Excise Tax*, TAX FOUND., https://taxfoundation.org/tax-basics/excise-tax/ (last visited Sept. 16, 2022).

95 PIGOU, *supra* note 93, at 192.

96 *Pay-As-You-Throw*, ENV'T PROT. AGENCY, https://archive.epa.gov/wastes/conserve/tools/payt/web/ html/index.html (last updated Feb. 21, 2016).

97 *Id.*

98 *Cf. id.* ("When the cost of managing trash is hidden in taxes or charged at a flat rate, residents who recycle and prevent waste subsidize their neighbors' wastefulness. Under PAYT, residents pay only for what they throw away.").

99 ENV'T PROT. AGENCY, EPA530-R-99-006, RATE STRUCTURE DESIGN: SETTING RATES FOR A PAY-AS-YOU-THROW PROGRAM 27 (1999).

100 *Id.*

transporting or disposing waste in their pricing.[101] These pricing systems inaccurately reflect the effects landfilling has on the environment and Earth's resources. Second, PAYT shifts producers' externalities to consumers. PAYT is therefore too far removed from producers to cause them to change their packaging habits.[102] However, producers ought to internalize the externalities of packaging waste because they are the ones most suited to solving the problem by changing their practices.

One concept meant to make producers internalize the externalities associated with their waste is Extended Producer Responsibility (EPR). EPR forces the producer of a good to assume the "operational or financial responsibility for the take-back, disposal, recycling, or other disposition of the product and its packaging after use."[103] This could work in several ways, including voluntary or mandatory approaches.[104] For example, a government could (1) regulate product design to minimize adverse environmental and social effects; (2) mandate product take-backs so companies are directly responsible for their products' end-life; or (3) assess a fee to make sure companies are responsible for disposal and other

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101 *See, e.g.,* VT. AGENCY OF NAT. RES., VARIABLE RATE PRICING (AKA UNIT-BASED PRICING) GUIDE AND SAMPLE ORDINANCE FOR MUNICIPALITIES 5, 11 (2015) (recommending a pricing structure that only covers the cost of hauling and disposal for each unit of waste); THE COMMONWEALTH OF MASS. DEP'T OF ENV'T PROT., PAY-AS-YOU-THROW: AN IMPLEMENTATION GUIDE FOR SOLID WASTE UNIT-BASED PRICING PROGRAMS 30 (2004) (providing for a full cost accounting method of setting rates, which includes the front- and back-end costs associated with landfilling, but not all the externalities that a producer or consumer must realize to pay the full price of the waste); FORT COLLINS, COLO., CODE § 12-19(a)(2) (2021) (requiring solid waste collectors to charge a fee based only on volume, with no set standards of what should be included in the fee).

102 A nationwide requirement that municipalities adopt PAYT for garbage collection would help consumers internalize the externalities of their waste and would probably decrease consumption and increase recycling. But this would not have a strong effect on producers. An EPR system that reflected the externalities of packaging waste on producers, with a PAYT system reflecting the externalities associated with excess consumption would be an ideal solution. However, the focus of this Note deals only with the externalities producers should realize.

103 BLACKBURN, *supra* note 9, at 579.

104 Sachs, *supra* note 42, at 91 ("However, the voluntary model of product stewardship, standing alone, is probably not sufficient to make a significant difference in the U.S. waste stream, particularly for product classes with dozens of manufacturers.").

waste-management costs.[105] For some products, like electronic waste, a physical take-back approach is best because the waste is so complex.[106] For other products, like packaging waste, a fee-based approach to EPR is better because of the impossibility of returning every piece of packaging to its producer.[107]

EPR is not a new concept. The EPA has studied it as a model for the U.S. since as early as the 1970s.[108] The Resource Conservation and Recovery Act ("RCRA") of 1976 directed the EPA to develop recommendations for material and energy recovery from solid waste and to "recommend[] incentives . . . and disincentives to accelerate the reclamation or recycling of materials from solid wastes," among other things.[109] The EPA concluded that EPR was quite feasible and that it would have "significant impacts on the post-consumer solid waste stream."[110] Nearly 50 years later, the EPA is still recommending EPR as an approach to tackling the U.S.'s\ recycling crisis.[111] The time is ripe for Congress to implement EPA's recommendations, now that the U.S. can no longer export millions of tons of recyclable waste to China every year.

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105 BLACKBURN, *supra* note 9, at 579–80.

106 Electronic waste includes phones, computers, and printers. Forcing the producers of electronic waste to be directly responsible for recycling their products will increase incentives to design for durability and recyclability. Further, the manufacturer is best suited to recycle complicated products as they know the component parts best. Some companies, such as Xerox, IBM, and Dell, have already implemented programs like this. *See* Sachs, *supra* note 42, at 75–76 n. 109.

107 For example, forcing producers to collect boxes, wrappers, and containers would be almost impossible without 100% consumer participation. Further, both the financial and environmental costs would be astronomical in comparison to merely making producers financially responsible for their part of the current waste cycle. *See* Sachs, *supra* note 42, at 76, 84 ("If EPR were implemented through a physical take-back system rather than up-front fees, products would have to be tracked and sorted out of the waste stream by brand name—a daunting bureaucratic challenge with very high transaction costs.").

108 *See* ENV'T PROT. AGENCY, FOURTH REPORT TO CONGRESS RESOURCE RECOVERY AND WASTE REDUCTION 88–99 (1977).

109 Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, § 8005(a)(1)–(10), 90 Stat. 2795, 2837 (1976) (codified as amended in scattered sections of 42 U.S.C.).

110 FOURTH REPORT TO CONGRESS RESOURCE RECOVERY AND WASTE REDUCTION, *supra* note 108, at 93–94.

111 *See* National Recycling Strategy, *supra* note 24, at 29.

Not only has the U.S. studied EPR, but many states and countries have implemented it for decades.[112] Thirty-three U.S. states have enacted more than 115 EPR laws.[113] These laws cover many products including batteries, carpets, mattresses, electronics, and packaging.[114] Internationally, EPR laws have also proven effective.[115] Canada and the EU both have EPR packaging laws that have significantly increased recycling rates compared to the U.S.[116] EPR can help solve resource depletion problems the world is facing.[117] These systems work, and the U.S. needs to implement them at a national scale.

III. THE CURRENT NATIONAL LANDSCAPE OF FEDERAL WASTE MANAGEMENT AND PRODUCT LABELING LAWS

The federal government has historically played a minor regulatory role with solid waste. RCRA is the main federal law dealing with solid waste in the U.S.[118] However, RCRA does not give the EPA enough authority to properly regulate and incentivize recycling in the U.S. Without stronger laws to encourage recycling, valuable minerals will continue to "[e]scape from the [e]conomy."[119] The federal government also plays a role in product labeling, which can be vital in educating consumers about a product's recyclability. The Federal Trade Commission (FTC) oversees some product marketing and labeling in

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112 *See, e.g.*, BLACKBURN, *supra* note 9, at 581–83; *U.S. EPR Laws*, PROD. STEWARDSHIP INST., https://www.productstewardship.us/page/State_EPR_Laws_Map (last visited Nov. 25, 2022).

113 *U.S. EPR Laws*, *supra* note 112.

114 *Id.*

115 EPR FOR PPP, *supra* note 75, at 2.

116 *Id.*

117 The effects of an EPR system should ultimately lengthen the depletion rate of any materials covered under the system since "[d]epletion rates can be lengthened with greater recycling and reuse or through a lower rate of consumption," and the purpose of EPR is to internalize the costs and responsibilities of products to force producers to (1) use less material, and (2) design products to be more recyclable, compostable, and reusable. BLACKBURN, *supra* note 9, at 564; Austin, *supra* note 72, at 236.

118 *See* Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, § 1, 90 Stat. 2795 (1976) (codified as amended in scattered sections of 42 U.S.C.).

119 *See* NATIONAL RECYCLING STRATEGY, *supra* note 24, at 11–12 (demonstrating that resource loss from improper recovery of recyclables hurts the economy).

the U.S. through the Fair Packaging and Labeling Act and the FTC's guides on marketing claims.[120] However, the FTC's guides on environmental marketing claims have not gone far enough in making sure producers educate consumers on what is and is not recyclable.

A. The Resource Conservation and Recovery Act and its Amendments Dealing with Non-Hazardous Solid Waste are Inadequate in Encouraging Resource Reuse and Recycling

In 1976, Congress made its largest effort to tackle solid waste yet by enacting RCRA.[121] Most of RCRA's provisions regulate hazardous solid waste though, rather than non-hazardous solid waste like packaging materials.[122] It is therefore wholly ineffective for dealing with the U.S.' current solid waste problem—the sheer volume of waste being landfilled and incinerated.[123] For non-hazardous solid waste, RCRA only prohibited open dumps and established sanitary landfills.[124] Mandating sanitary landfills did succeed in increasing the health and wellness of Americans.[125] However, beyond regulating sanitary landfills, federal intervention in non-hazardous solid waste management has been restrained.[126]

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120 *See infra* Part III.B.

121 *See* Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, 90 Stat. 2795 (1976) (codified as amended in scattered sections of 42 U.S.C.). RCRA amended the Solid Waste Disposal Act of 1965.

122 *See generally id.*

123 *See* 42 U.S.C. § 6942 (requiring only that the EPA establish "guidelines to assist" states in establishing solid-waste management plans); *see also* Roger W. Andersen, *The Resource Conservation and Recovery Act of 1976: Closing the Gap*, 1978 WIS. L. REV. 633, 642 (1978).

124 42 U.S.C. § 6944.

125 *See Resource Conservation and Recovery Act (RCRA) Overview*, ENV'T PROT. AGENCY, https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview (last updated June 29, 2021) (reporting that RCRA prevented contamination and future Superfund sites from adversely impacting U.S. communities).

126 The federal government intended only to assist states in developing plans that encouraged environmentally sound disposal methods, maximized the utilization of resources, and encouraged resource conservation. 42 U.S.C. § 6941. Further, Congress tasked the EPA to develop guidelines that advised states "how-to-do-it" rather than telling states to do it, and the legislative history supports the federal government's intent for a back-seat approach. *See* Andersen, *supra* note 123, at 664 n.186. RCRA also directed the

In 1980, Congress again amended the Solid Waste Disposal Act.[127] Congress' findings regarding material conservation and recovery were enlightening: (1) conserving materials and decreasing waste could provide significant savings; (2) solid waste contains valuable materials which, if recovered, could save increasingly scarce fossil fuels and virgin materials; (3) recovery of these materials could reduce municipal burdens on the ever-increasing volume of waste streams; and (4) the technology to conserve and recover these resources already exists and is feasible.[128] While these four findings portended a shift in federal waste-management policy, Congress's fifth finding clarified that it was not in fact a new stance; Congress said that communities all have different needs and that "[f]ederal assistance in *planning and implementing* such . . . recovery programs *should* be available" to these communities.[129]

Ultimately, the 1980 amendments did not increase federal regulation of solid waste. Congress merely created an Office of Solid Waste to, among other things, "provide technical and financial assistance to States . . . in the development and implementation of solid waste plans."[130] Further, the federal government gave states grants to implement waste recovery plans.[131] Notably, a state could receive these grants by conserving resources *or* by building incinerators.[132] Therefore, despite Congress's recognition of waste

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secretary of commerce to "encourage greater commercialization of proven resource recovery technology," but this duty ended up only requiring data reporting and publication. *See* 42 U.S.C. § 6951, 6954; 40 C.F.R. §§ 3.1–3.2000 (2009).

127 Solid Waste Disposal Act Amendments of 1980, Pub. L. No. 96-482, 94 Stat. 2334 (1980) (codified as amended in scattered sections of 42 U.S.C.).

128 42 U.S.C. § 6941(a).

129 *Id.* (emphasis added).

130 *Id.* § 6912(a)(3).

131 *Id*. § 6948.

132 *See id.* § 6943(c) (stating that assistance is available to states if the administrator determines that the plan will conserve resources *or* recover energy from materials). Incineration is the main way to recover energy from "waste." *See supra* notes 37-39 and accompanying text.

recovery's importance, Congress ended up spurring more investment into waste incineration rather than recovery with these grants.[133]

Regulations promulgated under the Solid Waste Disposal Act and its amendments support the conclusion that the federal government has not taken an active enough role in managing solid waste. Specifically, 40 C.F.R. Section 256 deals with the development and implementation of state solid-waste management plans.[134] This regulation requires states to submit solid-waste management plans and gives the EPA authority to either approve or deny them.[135] The plans must provide for and consider resource conservation and resource recovery;[136] however, the EPA did not set any minimums for resource conservation and recovery either. The only requirements are that the state plan shall have a policy and strategy to encourage resource conservation and recovery, and that they shall not preempt a locality from contracting with a recovery facility to supply solid waste.[137] State plans shall also provide for adequate practices necessary to dispose of waste in an environmentally sound manner.[138] Yet as good as this requirement may appear, "environmentally sound" includes landfills and incinerators—therefore recycling does not necessarily increase.[139] The rest of the provisions on resource recovery are merely suggestions for states and are not enforceable.[140]

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133 *Cf. National Overview*, *supra* note 2 (showing an increase in combustion with energy recovery of more than twelve times since 1980, while recycling grew by about four times, even while the amount landfilled continued to increase).
134 40 C.F.R. §§ 256.01(a–b) (2022).
135 *Id.* §§ 256.01(b), 256.03.
136 *Id.* §§ 256.01(b)(6), 256.02(a)(2).
137 *Id.* § 256.30.
138 *Id.* § 256.40.
139 *See id.*
140 *See id.* § 256.31 (2022) (recommending a procurement plan and encouraging development of recovery facilities).

Another EPA regulation, 40 C.F.R. part 246, deals with source separation for material recovery. Source separation is important for efficient and cost-effective resource recovery because it decreases labor costs and recycling contamination.[141] The EPA sets basic minimum separation requirements for office paper and residential materials.[142] Yet even these bare minimum "requirements" only apply to federal agencies and are merely recommendations for state and local governments.[143] Even if the requirements applied equally to states, they still would not substantially increase the U.S.'s recycling rates because of their limited applicability and scope.[144] Therefore, the EPA's current regulations are not enough to fix the U.S.' solid waste problems; furthermore, the EPA lacks authority to promulgate regulations that will.

Ultimately, while RCRA did some things well, such as managing hazardous solid waste and banning unsanitary open dumps, Congress did not delegate enough authority to the EPA to regulate non-hazardous solid waste. For example, the recently released National Recycling Strategy shows that the EPA continues to try to increase recycling rates.[145] The Strategy's objectives are to improve secondary materials' markets, improve infrastructure, reduce waste stream contamination, enhance circularity, and increase data collection.[146] However, the EPA does not have the authority to implement many of its own

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141 *See* Manning & Deskins, *supra* note 14, at 132.

142 40 C.F.R. §§ 246.200-1, 201-1 (2022).

143 *See id.* § 246.100(b) ("[T]he 'Requirement' sections of these guidelines are mandatory for all Federal agencies that generate solid waste. In addition, they are recommended for State, interstate, regional, and local governments for use in their activities.").

144 *See id.* §§ 246.200–201 (2022) (requiring offices of more than 100 people to separate out high-quality paper for recovery, and residential areas of more than 500 people to separate used newspapers for recovery). The rest of the section, however, deals with recommendations that do not even bind federal agencies. *Id.*

145 *See generally* NATIONAL RECYCLING Strategy, *supra* note 24.

146 *Id.* at iii.

recommendations.[147] This Note's proposed COMMERCE Act, in contrast, would give the EPA the authority to complete these important objectives.[148] Because the environmental waste problem continues to worsen, Congress must act again. Members of Congress tried several times in 2021 to implement some such policies, but these efforts did not become law, nor did they go far enough.[149] The COMMERCE Act is more desirable than these proposed laws because it not only combines their good elements but also pays for itself, something many of these bills fail to do.

B. Federal Labeling Requirements for Recycling Claims are Insufficient to Properly Educate Consumers About Their Waste

The Federal Trade Commission (FTC) ostensibly has authority to promulgate regulations dealing with claims about a packaging material's recyclability.[150] Under this authority, the FTC has promulgated 16 C.F.R. part 260, which deals with environmental marketing claims. This regulation reflects the FTC's "current views about environmental claims" and "help[s] marketers avoid making environmental marketing claims that are unfair or deceptive."[151]

According to the FTC, an environmental claim is deceptive if it is likely to mislead

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147 *See*, *e.g.*, *id.* at 30 (recommending that the EPA conduct an analysis of policies to "help inform decision makers nationally" and "develop[] recommendations for administrative or legislative action").

148 *Cf., e.g.*, Inflation Reduction Act of 2022, Pub. L. No. 117–169, § 60111, 136 Stat. 1818 (2022) (expanding EPA's authority to oversee corporate climate commitments).

149 *See* Break Free From Plastic Pollution Act of 2021, S. 984, H.R. 2238, 117th Cong. (2021) (proposing a comprehensive series of measures to reform solid-waste management in the U.S., including EPR for packaging waste); RECYCLE Act of 2021, S. 923, H.R. 2159, 117th Cong. (2021) (focusing solely on educating consumers about recycling, without a corresponding increase in infrastructure); RECOVER Act, H.R. 2357, 117th Cong. (2021) (authorizing $500 million over the next five years to increase domestic recycling infrastructure, with no way to pay for it); REDUCE Act of 2021, S. 2645, 117th Cong. (2021) (placing an excise tax on plastics without considering specific externalities associated with each). None of these bills does enough individually. The problems in the U.S.'s waste stream are multi-faceted—they need a multi-faceted solution.

150 *See* 15 U.S.C. §§ 41–58 (giving authority to manage "unfair and deceptive" marketing practices, but not specifically delegating requirements to promulgate regulations on recyclable claims).

151 16 C.F.R. § 260.1(a) (2022).

consumers and is key to their decisions.[152] Further, an environmental claim usually requires "competent and reliable scientific evidence" to support it.[153] With that evidence, a marketer can make a general environmental claim about a product or packaging so long as it applies to all but minor, incidental components of that product. However, even a minor, incidental component of a larger product can render a recycling claim deceptive if it significantly limits its recyclability.[154] Although the FTC has authority under the FTC Act to take action against a company engaged in deceptive environmental marketing claims, the FTC does not regularly enforce these regulations for non-recyclable consumer goods touted as recyclable.[155]

Several problems exist with the current regulations. First, the FTC does not have explicit delegated authority to promulgate regulations regarding environmental claims.[156] Second, a "reasonable consumer" is easily misled by the recycling symbol found on most plastic packaging, yet this symbol is exempt from misleading environmental marketing claims if placed away from a product's main label.[157] Third, some FTC examples on what

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[152] *Id.* § 260.2.

[153] *Id.*

[154] *Id.* § 260.3(b). These components could include certain dyes, the shape, the size, or other attributes of a product. If labeled as recyclable, this claim would be deceptive. *Id.* § 260.12(d).

[155] *See Cases and Proceedings: Advanced Search*, FTC, https://www.ftc.gov/enforcement/cases-proceedings/advanced-search (choose "Environmental Marketing" from Consumer Protection Topics dropdown; choose "Food and Beverages," "Consumer Goods (Non Food and Beverage)," and "Retail" under Industry dropdown) (last visited Oct. 22, 2021) (showing only two cases with complaints and resolutions, neither of which deals with recyclable claims).

[156] *See, e.g.*, Roscoe B. Starek, III, *A Brief Review of the FTC's Environmental and Food Advertising Enforcement Programs*, FEDERAL TRADE COMMISSION (Oct. 13, 1995), https://www.ftc.gov/news-events/news/speeches/brief-review-ftcs-environmental-food-advertising-enforcement-programs ("That means that the guides do not establish standards for environmental performance. And they don't even incorporate the technical, scientific definitions of terms.").

[157] *See* 16 C.F.R. § 260.12(d) ex. 2 (2022) (exempting the "recycling symbol" from recyclable claims so long as it does not appear in a prominent place on the packaging). Yet, consumers are often unaware of the technical meanings of these symbols and instead rely on them to indicate their recyclability. *See, e.g.,*

is or is not an acceptable claim seem to be in conflict.[158] Fourth, decades after the FTC promulgated its regulations, consumers and producers remain confused about claims' meanings and producers' responsibilities.[159] Finally, due to the absence of strong FTC labeling requirements, private standards and certifying bodies have appeared; these have grown so numerous that consumers have a hard time understanding and making informed decisions based on them.[160] Congress, therefore, needs to specifically require the FTC to regulate the recycling symbol and other environmental claims.

IV. BUILDING THE COMMERCE ACT BASED ON RECENT STATE LAWS AND INTERNATIONAL EXAMPLES FOR CONGRESS TO IMPLEMENT

Recently, U.S. states have led the way in trying to decrease and bring awareness to excess packaging waste. Maine, Oregon, and California have enacted EPR and labeling laws that should provide a model for the federal government to follow.[161] Further, countries like South Korea have several decades of successful waste-management experience the

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Emily Petsko, *Recycling Myth of the Month: Those numbered symbols on single-use plastics do not mean 'you can recycle me'*, OCEANA (Mar. 11, 2020), https://oceana.org/blog/recycling-myth-month-those-numbered-symbols-single-use-plastics-do-not-mean-you-can-recycle-me/; *see also* NATIONAL RECYCLING STRATEGY, *supra* note 24, at 27 (stating that "[l]ables should be accurate and not misleading," and that consumer confusion could be reduced with consistent signage for recyclable products).

158 For example, example 2 under 16 C.F.R. § 260.3(c) (2022) can be read as conflicting with example 2 under 16 C.F.R. § 260.12(d) (2022). The first example speaks of a trash bag labeled "recyclable," which is misleading because trash bags are normally thrown away, leading to no environmental benefit. The second example speaks of a yogurt container with the recycling symbol—which, as discussed above, leads consumers to think the product is recyclable—not being misleading so long as the symbol is not placed in a prominent place. So, the trash bag in the first example would presumably not be misleading if it had the recycling symbol on it, even though this would cause the same deception to consumers as in the first example.

159 *See* BLACKBURN, *supra* note 9, at 594.

160 *See id.* at 594–98.

161 *See* ME. REV. STAT. ANN. tit. 38, § 2146(1)(I) (2021); Modernizing Oregon's Recycling System, §§ 26a, 36, 41; Cal. Stat. 507, sec. 4, § 42355.5(a)-(b). Since this article was first published, Colorado has also passed its own EPR legislation. H.B. 22-1355, 73d Gen. Assemb., 2d Reg. Sess. (Colo. 2022).

U.S. can use as guidance.[162] Individual states' solutions are not enough; the federal government should learn from and adopt the solutions these states and countries have found along the way.

Although individual states have taken the lead, the federal government is best suited to implement meaningful recycling reforms. Individual states are not equipped to handle the big-picture issues of national material markets and infrastructure. First, if each state had its own EPR and labeling system, it would be harder for businesses to comply nationwide, and they would face higher costs.[163] Every state that implements its own packaging requirements adds to producers' compliance costs and potentially jeopardizes the monetary and environmental benefits realized through effective waste-management strategies.[164] Second, a national system of bins and labels would be easier for consumers to understand when they travel, because the bins would be uniform. Third, economies of scale dictate building infrastructure where it would make economic sense;[165] the federal government is better equipped than smaller or less populous states to research and finance sensible infrastructure. Finally, if the U.S. hopes to solve its waste problem, the federal

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[162] *See, e.g.*, Ki-Yeong Yu, *Volume Based Waste Fee (VBMF) System for Municipal Solid Waste*, SEOUL SOL. (Jan. 13, 2017), https://seoulsolution.kr/en/content/6326.

[163] *Cf.* Dan Leif, *Q&A: Seizing the Moment on Recycling Policy*, RES. RECYCLING (Apr. 19, 2022), https://resource-recycling.com/recycling/2022/04/18/qa-seizing-the-moment-on-recycling-policy/ ("Let's imagine that three or five more states pass packaging EPR bills that differ in their approach. We then have a reprise of the disjointed approach that occurred around state electronics EPR laws from the early 2000s, each differing in their details. For many companies and groups, that is a recipe for disaster."); Waste Stream Evaluation, *supra* note 22, at 41 (noting that a lack of harmony between EU member state policy instruments in waste management jeopardizes cost efficiency); Rybar, *supra* note 12 (noting that without a federal program, companies will face a confusing, complicated, and costly patchwork of legislation). Several other states have already introduced their own EPR legislation or efforts to study EPR to try to deal with the waste problem. *See, e.g.*, H.R. 65 H.D. 1, 31st Leg., 2021 Sess. (Haw. 2021); S.B. 292, 2022 Reg. Sess. (Md. 2022); H. 948, 192nd General Court, 2021–2022 Sess. (Mass. 2021); H. 142, 2021–2022 Sess. (Vt. 2021).

[164] *See* Rybar, *supra* note 12.

[165] EPR FOR PPP, *supra* note 75, at 1.

government will need to preempt states actively fighting sustainability.

Setting uniform laws for municipal waste management across states certainly raises some federalism concerns. For instance, it would make no sense to set a uniform rate for landfilling across the country when landfilling is less expensive in some areas than others. Nonetheless, the federal government could require municipalities to consider certain factors, including externalities, when setting their own rates. The federal government could also require municipalities to implement PAYT or provide incentives for meeting reduction targets. These types of regulations would balance the historical local power to manage waste with the current need for comprehensive reform. Even if these options are implemented, certain issues remain pervasive enough that the federal government will need to set strict rules across the board, such as EPR fees for producers of packaging materials.

The problem is clear; the question is how to solve it. State legislation is necessary, and people should encourage their states to do more—but trying to solve the recycling crisis state-by-state is not enough. The U.S. needs strong, comprehensive federal legislation to tackle this crisis. The COMMERCE Act proposes that federal legislation, at a minimum, needs to: (A) repeal subsidies for virgin-material producers;[166] (B) create a national EPR system for packaging and single-use products that accurately reflects the externalities associated with these materials;[167] (C) dictate product labeling and packaging standards to increase consumer awareness of what to do with, and what actually happens to, their waste; [168] and (D) create standard recycling bins for different materials that allow

[166] *See* discussion *infra* Part IV.A.
[167] *See* discussion *infra* Part IV.B.
[168] *See* discussion *infra* Part IV.C.

municipalities to easily add new materials to their recycling stream when feasible.[169] These proposals are within the federal government's power to tax, spend, and regulate commerce. The federal government can implement them using existing agencies, without the need for new agencies or organizations.

A. CONGRESS MUST FIRST REPEAL VIRGIN MATERIAL SUBSIDIES

The federal government must take the first step of the COMMERCE Act because states cannot. The government needs to reform the tax code to eliminate virgin-material "subsidies that promote unsustainable consumption and technologies."[170] As described above, the federal government has long encouraged mining new minerals and materials by giving producers special tax benefits.[171] Congress should immediately repeal certain provisions from the tax code to eliminate these special tax breaks that producers of reprocessed materials do not realize. First, Congress should repeal 26 U.S.C. § 167(h), which allows businesses to deduct expenses paid when exploring for or developing oil or gas within the U.S.[172] Second, Congress should repeal those parts of 26 U.S.C. § 263(c) and (i) that deal with deductions for oil and gas drilling. Third, Congress needs to clean up 26 U.S.C. §§ 613 and 613A to repeal mineral subsidies dealing with oil, gas, and oil shale.[173] Fourth, Congress must strike 26 U.S.C. §§ 43 and 45I, which give a credit for projects that enhance oil recovery beyond what a producer would reasonably expect from a site, and a credit for oil and gas produced from marginal wells. Finally, Congress should

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169 *See* discussion *infra* Part IV.D.

170 BLACKBURN, *supra* note 9, at 566.

171 *See supra* Part II.B.1; *see also, e.g.*, 26 U.S.C. §§ 167(h), 611–617.

172 26 U.S.C. § 167(h).

173 *See* 26 U.S.C. § 613(a) (allowing a taxpayer to deplete up to 100% of taxable income from oil and gas properties); *id.* § 613(b)(2)(B) (allowing a taxpayer to depreciate 15% of the gross income from oil shale properties); *id.* § 613A (allowing a taxpayer to depreciate certain oil and natural gas income).

strike 26 U.S.C. § 7704(d)(1)(E) to prevent income generated from oil and gas from qualifying as deductible income.[174] Each of these is a special subsidy that drives down the cost of virgin plastics, thus making recycled material less competitive. Eliminating them will help businesses trying to recycle materials compete with businesses mining for virgin materials.

These proposals are not new. However, they have yet to pass. The Clean Energy for America Act included similar proposals, yet they were subsequently stripped from the Build Back Better Act, despite being part of President Biden's campaign position that, "[t]here is no reason that the fossil fuel industry deserves special privileges over other businesses."[175] Repealing these tax breaks would fund other parts of the COMMERCE Act—each piece is necessary and works together to pay for itself. For example, the increased tax revenue from Part A and the EPR fee from Part B would pay for the increased investments in education and infrastructure from Part B and the uniform bins from Part D.

Finally, Congress should commission the IRS to prepare a report identifying other tax breaks that encourage producing or consuming raw timber or minerals over recycled materials. The IRS could then recommend to Congress that any such tax breaks be phased out or repealed. Based on other policy goals, Congress may decide that elimination of these other tax incentives is a lower priority than the oil and gas incentives; reducing virgin

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[174] Congress must repeal other provisions of the tax code to help the U.S. transition to cleaner energy. *See* Clean Energy for America Act, S. 1298, 117th Cong. Title V (2021). However, this Note focuses on tax credits for oil and gas—major components of most plastic production, and necessary to keep the plastics industry from becoming the main climate driver in the U.S. *See* E.A. Crunden & Ana Faguy, *Plastics Poised to Overtake Coal as Climate Driver*, E&E NEWS (Oct. 21, 2021), https://subscriber.politicopro.com/article/eenews/2021/10/21/plastics-poised-to-overtake-coal-as-climate-driver-282248; *see also* Roland Geyer et al., *Production, Use, and Fate of all Plastics Ever Made*, 3 SCI. ADVANCES 1, 1 (2017) (noting that the vast majority of plastics are made from fossil fuels and are not compostable).

[175] Koss, *supra* note 53.

plastic production is more urgent because plastic is the least recycled and most harmful among packaging materials.[176]

Repealing these tax breaks would have several positive effects on the issues recycling faces in the U.S. First, producers buying virgin materials for their packaging would pay the true, unsubsidized costs of these materials. This would increase both demand for recycled material and private investment in recycling infrastructure to meet the increased demand.[177] Reduced tax subsidies would also increase tax revenue. The federal government could use this revenue to pay for other parts of this Act, including grants for infrastructure and consumer education. Repealing these tax breaks is necessary; combining the rest of the COMMERCE Act's proposals will further augment these positive effects.

B. CREATING AN EPR SYSTEM FOR PACKAGING AND SINGLE-USE PRODUCTS

The second step needed to reimagine waste management in the U.S. is enacting a suitable EPR system for packaging material and single-use products: "Going a step further, [Congress] can realign tax policy to encourage the behavior and focus [businesses] need."[178] Indeed, "[t]here are [some] externalities that simply have to be hemmed in through regulations."[179] Maine's and Oregon's recently passed laws are a helpful guide for Congress in creating a national EPR system, with one important caveat—Maine and Oregon both create a producer responsibility organization that is unnecessary at the national level.

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176 *See* GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 19, 21–22 (showing only 9% of plastic waste is recycled and that the plastic leakage from the rest is posing substantial risks to human health and the environment).

177 *Cf. id.* at 24 (showing that the secondary plastics market is intimately tied to that of virgin materials).

178 BLACKBURN, *supra* note 9, at 566.

179 Bruce Kahn, Keynote Speaker Vermont Law Journal Symposium, *Balancing Corporate & Activist Interests: Clean Energy, Wildlife Protection, and Land Use Reform*, VIMEO: VT. L. SCH. 1:24:43 (Nov. 5, 2021), https://livestream.com/vermontlawschool/events/9922547.

1. AN OVERVIEW OF MAINE'S AND OREGON'S RECENT LAWS IMPLEMENTING EPR

On July 12, 2021, Maine was the first state to pass legislation implementing a statewide EPR system for packaging waste.[180] Oregon followed shortly thereafter and enacted similar legislation on August 6, 2021.[181] Oregon's Act is much more detailed than Maine's law and has more requirements. For example, Maine's law deals specifically with packaging material.[182] It does not touch on single-use products or other products that often end up in landfills, like paper.[183] Alternatively, in addition to EPR, Oregon also attempts to deal with product labeling, composting, and marine cleanup.[184] Further, the Oregon Act emphasizes comingled recyclables and their potential harm to an efficient recycling system.[185] Although more complex, Oregon's law will go a lot further in achieving important recycling objectives.

Maine's and Oregon's EPR systems require producers to join an organization and pay a fee to that organization for all packaging waste they produce.[186] The organizations will collect and disburse these fees.[187] Maine will have a bidding process to choose an organization; in Oregon, organizations submit plans to the state agency, subject to

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[180] *Summary of LD 1541*, ST. OF ME. LEGISLATURE, https://legislature.maine.gov/LawMakerWeb/summary.asp?ID=280080518, (last visited Oct. 1, 2021).

[181] *See* Modernizing Oregon's Recycling System, 2021 Or. Laws 681.

[182] ME. REV. STAT. ANN. tit. 38, § 2146(1)(I) (2021).

[183] *See id.*

[184] *See* Modernizing Oregon's Recycling System, *2021 Or. Laws 681,* §§ 26a, 36, 41.

[185] *See id.* § 19 (prohibiting certain commingled recyclables in the waste stream); *id.* § 22(3)–(5) (determining which materials are appropriate to commingle); *id.* §§ 24–25 (charging a fee and risk fee to producers for the cost of separating commingled recyclables and disposing nonrecyclable waste mixed in); *id.* §§ 37–39 (requiring certification and a permit to establish and operate a commingled recycling processing facility after a certain date). *See also* Manning & Deskins, *supra* note 14, at 114–17, 121, 131–32 (explaining the problem of commingled recycling streams, or "single-stream recycling," and potential solutions in the U.S.); Waste Stream Evaluation, *supra* note 22, at 50 (showing the need to reduce contamination in the recycling stream for increased recycling to take place).

[186] *See* ME. REV. STAT. ANN. tit. 38, § 2146(6) (2021); Modernizing Oregon's Recycling System, 2021 Or. Laws 681, § 4(1)–(2) (2021).

[187] ME. REV. STAT. ANN. tit. 38, § 2146(3), 2146(6) (2021); Modernizing Oregon's Recycling System §§ 11, 13–15 (2021).

approval.[188] Therefore, in Oregon, there will likely be multiple organizations trying to administer an already complex system. As argued below, the federal government does not need a separate organization to manage an EPR system for packaging waste, thereby saving money and red tape.[189]

Both states exempt certain producers, which would also be unnecessary at the federal level. In Oregon, small producers are exempt from the requirement that they be a member of the organization.[190] Also, for producers with less than $10 million in gross revenue or who sold less than five tons of covered products in a year, there will be a uniform fee, rather than a per-ton rate.[191] However, in Maine, producers are exempt if in the last year they: (1) realized less than $2,000,000 in gross revenue; (2) used less than one ton of packaging material; (3) realized more than 50% of their total gross revenue from salvages or the like; or (4) sold perishable food packaged in less than fifteen tons of packaging material.[192] These exemptions mostly target smaller producers that might not be able to easily calculate the amount of packaging they send into individual states. As opposed to the state systems, a federal EPR system with a self-reporting mechanism would not need to exclude smaller producers. First, because the fee would remain the same throughout the nation, producers would not need to differentiate between geographic

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188 ME. REV. STAT. ANN. tit. 38, § 2146(3)(A) (2021); Modernizing Oregon's Recycling System § 4(9)(a) (2021) (indicating Oregon could have many organizations).

189 *See* discussion *infra* Part IV.B.4.

190 Modernizing Oregon's Recycling System § 5. The Oregon law defines a small producer as: a nonprofit; a public body; a company with less than $5 million in gross revenue or who sold less than one ton of covered products into Oregon in a year; a beverage manufacturer who sells less than five tons of covered products a year; a restaurant that sells food intended to be consumed immediately and does not produce food service ware; or a producer that operates a single retail establishment which is not a franchise and has no online sales. *Id.* § 2(32)(a)–(g).

191 *Id.* § 11(6).

192 ME. REV. STAT. ANN. tit. 38, § 2146(2)(A)–(D) (2021).

boundaries. Small producers would only have to know how much they sell in the U.S. every year, rather than try to calculate how much product they sold into Maine, Oregon, etc., which would be a more difficult burden on smaller producers. And second, their fee would be easy to calculate based on their business records, which, if accurately kept, should reflect all materials purchased and sold each year.

Maine and Oregon also set their fees differently. In Maine, for producers covered under the law, there is a fee based on the net weight or volume of each type of packaging material used.[193] The fee is not set out in the law. Instead, the Maine Department of Environmental Protection will adopt rules "setting forth the manner in which such payments must be calculated for packaging material that is readily recyclable and packaging material that is not readily recyclable."[194] These rules "must be designed to incentivize the use . . . of packaging material that is readily recyclable and disincentivize the use . . . of packaging material that is not readily recyclable."[195] Ultimately, a producer may reduce or eliminate fees owed in Maine in two ways: a producer may either set up an alternative collection and management program, subject to approval by the department,[196] or reduce the amount of packaging material used.

However, in Oregon, the organization assesses the fee rather than the state agency.[197] The organization must look at several factors. First, the fees must meet the organization's obligations.[198] Second, the fees must differentiate between types of covered

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193 *Id.* § 2146(6).
194 *Id.*
195 *Id.*
196 *Id.* § 2146(8).
197 Modernizing Oregon's Recycling System, 2021 Or. Laws 681, § 11(1) (2021).
198 *Id.*

product, material, and format.[199] Third, each material must have its own base fee.[200] Fourth, there should be a separate, higher fee for products not accepted by recycling collection programs in the state.[201] Fifth, the fees must incentivize producers to reduce environmental and health impacts by charging lower fees for lower impacts and vice versa.[202] When assessing environmental impacts of materials, an organization should look to the post-consumer content of the material, product-to-package ratio, choice of material, life-cycle environmental impacts, and recycling rate of the material.[203] Oregon lists more factors to consider when setting a fee than Maine does. Similarly, Congress should give a non-exclusive list of externalities for the EPA to consider when setting its fee.

Maine and Oregon require their organizations to disburse fees in different ways, but with similar goals. Maine's organization will manage a packaging stewardship fund to deposit and disburse collected fees.[204] The organization may then disburse funds in four ways: (1) reimburse participating municipalities for their costs in collecting, transporting, and processing packaging materials, among other things;[205] (2) cover the costs of the stewardship organization;[206] (3) pay the department applicable fees, including those incurred in adopting rules;[207] and (4) support investments in education and infrastructure that support the recycling of packaging material.[208] On the other hand, Oregon's

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199 *Id.*
200 *Id.* § 11(2).
201 *Id.* § 11(3).
202 *Id.* § 11(4).
203 Modernizing Oregon's Recycling System, 2021 Or. Laws 681, § 11(4)(a)—(e) (2021).
204 ME. REV. STAT. ANN. tit. 38, § 2146(12) (2021).
205 *See id.* § 2146(9)–(10), (12)–(13) (reimbursing municipalities at the median per-ton rate of managing waste in the state, hoping to incentivize municipalities to reduce costs).
206 *Id.* § 2146(12)(B). The organization must be audited annually. *Id.*
207 *See id.* § 2146(12)(C), (13).
208 *See id.* § 2146(11), (12)(D).

organization will be directly responsible for all the law's obligations, but it must also compensate local governments and service providers for some of their waste-management costs.[209]

Ultimately, the Maine and Oregon EPR systems are thoughtful laws that ought to reduce waste within those states. However, the small size of these states and their economies will limit the laws' effects. The federal government needs to implement this kind of system on a national scale to have sufficient effects on the recycling crisis. And, as stated above, it would be inefficient, costly, and confusing if all states adopted their own EPR systems with unique nuances.[210] Further, as discussed below, the added costs of a managing organization are unnecessary; the government already has all the tools it needs to implement a successful EPR system without new agencies or organizations.[211]

2. The European Union and Germany Provide Long-Term Examples of Effective EPR Systems

Maine's and Oregon's laws are too new to show their effects, but international systems have been around for many years and have shown much success. Europe leads the world in efforts to manage plastics, partly due to "the proactivity of the EU and its ability to fund innovation and research."[212] In 1994, the EU released its Directive on Packaging and Packaging Waste that recognizes producer responsibility for packaging waste.[213] The EU encouraged member states to take measures to "introduce producer responsibility to minimize the environmental impact of packaging."[214] The EU directive sets forth essential

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209 *See* Modernizing Oregon's Recycling System, 2021 Or. Laws 681, §§ 6, 13–15.
210 *See* discussion *supra* Part IV.
211 *See* discussion *infra* Part IV.B.4.
212 CARMICHAEL, *supra* note 3, at 2.
213 *See* European Parliament and Council Directive 94/62/EC, 1994 O.J. (L 365) 1.
214 *Id.* art. 4.

requirements for packaging composition, reusability, and recoverability to standardize marketable waste for recycling.[215] Since then, every member state in the EU has adopted EPR legislation.[216] Furthermore, packaging waste recycling has consistently increased within the EU.[217] Implementing EPR systems and other policies has been greatly effective at meeting the EU's recycling goals.[218]

Like the U.S. now, Europe had its own difficulties in managing waste and implementing effective policies. The EU's 1994 Directive on Packaging and Packaging Waste resulted from EU member states complaining about discordant national waste policies.[219] Because each member state had its own legislation, member states and producers requested comprehensive legislation that would harmonize packaging waste management.[220] Similarly, the lack of harmony among states' waste management hinders U.S. recycling efforts.[221] The U.S. must therefore harmonize management of EPR systems across the nation.

Other problems in the EU included the increased costs associated with setting up new waste-management systems and the costs of setting up new EPR systems. Despite that, these costs were mitigated—indeed overcome—by savings realized from decreased virgin-material extraction and use, decreases in greenhouse gas emissions, diversion from

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215 Waste Stream Evaluation, *supra* note 22, at 6.

216 Sachs, *supra* note 42, at 68.

217 *Treatment of Packaging Waste in the EU-15*, EUR. ENV'T AGENCY, https://www.eea.europa.eu/data-and-maps/figures/treatment-of-packaging-waste-in-the-eu-4 (last updated Nov. 29, 2012); Waste Stream Evaluation, *supra* note 22, at 49.

218 Waste Stream Evaluation, *supra* note 22, at 3–4, 18, 22. *See also* GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 24 (explaining that EU policies to simultaneously "push" supply through EPR and "pull" demand through recycled content targets have strengthened secondary material markets).

219 Waste Stream Evaluation, *supra* note 22, at 5–6.

220 *Id.*

221 *See supra* Part II.B.2.

the landfill, and landfill infrastructure savings.[222] Further, member states that struggled to reach the EU's recycling targets had the same issues the U.S. does now: a lack of infrastructure, a high dependence on landfilling, administrative and instructional drawbacks, and inefficient source separation of waste.[223] Many of these countries overcame these problems.[224] By also overcoming these problems, the U.S. will realize the high recycling rates and economic advantages the EU now sees.

Within the EU, Germany models best waste-management practices.[225] Part of the reason Germany leads "is its lifecycle approach, including efforts to build a circular economy for plastics."[226] In fact, Germany's law inspired the EU's 1994 directive.[227] Germany's packaging ordinance is so effective because it internalizes waste costs to producers; Germany's system requires producers to pay a licensing fee to use a packaging logo that indicates its recyclability.[228] The fee to use the logo increases with the non-recyclability of the packaging, which internalizes to producers the increased costs of managing harder to recycle waste.[229] Germany's EPR system decreased packaging volume by 4% over nine years while packaging recovery rates went from 37% to 77%.[230] In contrast, packaging volume increased by 15–20% in the Netherlands, which ran a voluntary recycling program.[231]

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222 *See* Waste Stream Evaluation, *supra* note 22, at 36, 42.
223 *Id.* at 27-28.
224 *See id.*
225 CARMICHAEL, *supra* note 3, at 2.
226 Waste Stream Evaluation, *supra* note 22, at 7.
227 *Id.* at 14.
228 Sachs, *supra* note 42, at 69.
229 *Id.*
230 Margaret Walls, *Extended Producer Responsibility and Product Design: Economic Theory and Selected Case Studies*, RESOURCES FOR THE FUTURE, Mar. 2006, at 38.
231 *Id.*

A government that mandates a well-organized EPR system will see its recycling rates rise. On the other hand, a government that runs a voluntary recycling program is likely to see waste volume increase and the recyclability of goods and packaging decrease. The U.S. has many good examples of EPR systems to emulate, both nationally and internationally. To significantly increase recycling, the U.S. must mandate EPR like Germany rather than merely recommend it like the Netherlands.

3. Outlining the Main Features of a Federal EPR Fee for Producers Using Packaging Material

The U.S. should implement its own EPR law, which will streamline state systems like it did for EU member states. Congress should draw from the best parts of each EPR law without following examples that will add unnecessary cost or complexity to the system.

Like Maine, Oregon, and Germany, a U.S. federal EPR system should charge producers a fee to make them internalize the externalities of their waste. For packaging, a fee-based EPR system is better than a producer take-back approach because waste collection systems already operate in many municipalities.[232] Further, it would be almost impossible for producers and consumers to sort and send back the thousands of different types of packaging currently in use.[233] It will therefore be cheaper and less complex for producers to pay for a system already up and running than to try and implement their own. Nevertheless, like Maine's law, the government should allow producers to mitigate the fee if they show they have a packaging take-back or reuse system in place with a minimum

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[232] *See* Elena Bertocci, Me. Dep't of Env't Prot., *Maine and Oregon: The New Frontiers of Packaging EPR*, Prod. Stewardship Inst. at 14:50–16:32 (Oct. 27, 2021), http://www.productstewardshipinstitute.net/audiofiles/PSI_2021-10_ME-OR_Packaging_Laws_Webinar_Recording_1080p.mp4 (describing that Maine decided to implement a fee rather than a take-back approach like it has for other products because of the unique attributes of packaging materials).

[233] Manning & Deskins, *supra* note 14, at 119-22.

efficacy. The burden for showing this must be on the producer to mitigate their fee.

While it may be considered a type of excise tax, an EPR fee is a better solution than a simple excise tax.[234] A well-designed EPR system is different because fees are calculated to internalize producers' externalities for specific materials and their recyclability, whereas a simple excise tax is just a flat fee that does not accurately reflect externalities.[235] An EPR system with a true Pigouvian tax can curb waste and improve recycling at a higher rate than a simple excise tax.[236] Additionally, authorizing the EPA to determine the fee allows it to be more flexible and respond to changing market conditions as recycling infrastructure increases and waste-management costs decrease in the U.S. Further, a simple excise tax would require Congress to reassess and amend the tax code regularly. This is not a good idea for the same reason Congress should not have put virgin-material subsidies in the tax code—now, even with wide support, Congress still has a hard time repealing them.[237]

Therefore, a national EPR system with a Pigouvian tax for packaging waste is best suited to decrease waste and increase resource recovery. Specifically, this fee should make producers responsible for negative externalities of waste disposal and environmental costs: collecting, transporting, and disposing of waste; re-mining a virgin material lost to the landfill; cleaning up litter from single-use products, cleaning up communities long stuck with the adverse effects of American waste;[238] and paying for increased emissions and

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234 See REDUCE Act of 2021, S. 2645, 117th Cong. (2021) for an example of a simple excise tax, which sets a flat rate for all types of plastic that would need additional Congressional action to adjust to changing market conditions over the years.

235 *See supra* notes 96-100 and accompanying text.

236 *See* Ulrik Boesen, *Federal Plastics Tax Is Not a Good Revenue Raiser*, TAX FOUNDATION (Sept. 30, 2021), https://taxfoundation.org/federal-plastics-tax-proposal/.

237 *See* Koss, *supra* note 53 (reporting hard lobbying against proposals to repeal oil and gas subsidies).

238 These communities tend to be poorer and have a higher rate of Black, Indigenous, and people of color.

other negative effects on climate that certain materials produce.[239] Only once producers internalize their products' real costs will they have incentives to decrease waste and make products more recyclable.[240]

Like Maine gave its state agency authority to set the fee, Congress should also give the EPA authority to set fees for packaging waste. Congress should make clear that the fees should consider externalities throughout the front- and back-end of a material's life. For example, the EPA should consider environmental justice issues, greenhouse gas emissions, and pollution concerns associated with virgin-material production and disposal. Because these concerns are generally lower with recycled content, fees for recycled packaging material should be less than fees for packaging material made from virgin materials. Similarly, some materials do not have value as a commodity; municipalities should not collect these materials for recycling,[241] and the fees associated with them should increase. Fees should also increase for materials that cannot be recycled or that can only be recycled a limited number of times, like plastics.[242] These fees are necessary because producers

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See supra note 42; Julia Mizutani, *In the Backyard of Segregated Neighborhoods: An Environmental Justice Case Study of Louisiana*, 31 GEO. ENV'T L. REV. 363, 364–70 (2019). Producers should also pay the costs of treating the increased rates of asthma and other negative health effects caused by living next to the dumps and incinerators placed close to these communities. *See* NATIONAL RECYCLING STRATEGY, *supra* note 24, at 7.

239 *See* Crunden & Faguy, *supra* note 174.

240 Sachs, *supra* note 42, at 75–76.

241 Packaging Workshop, *supra* note 25, at 100–01. Some resins are worth more to recyclers and are therefore more likely to get recycled. The resins that are easier and worth more to recycle will be recycled at a higher rate; therefore, the EPR system should account for the lower waste produced by these plastics. *See* ROMER, *supra* note 82, at 54–55; *Containers and Packaging: Product-Specific Data*, *supra* note 4.

242 *See* JOLTREAU, *supra* note 18, at 2 (explaining that plastics degrade during the recycling process and therefore can only be recycled a limited number of times); Geyer, *supra* note 174, at 2 ("Recycling [of plastics] delays, rather than avoids, final disposal."). Even the most recyclable plastic, PET, still needs at least 50% virgin plastic to retain its structure—whereas glass and metal can be recycled endlessly with the proper facilities. JOLTREAU, *supra* note 18, at 2. The Italian model is a good example for the EPA of a fee structure that recognizes this. For example, in Italy, the fee for one ton of steel packaging is 50 times lower than the most recyclable type of plastic, and 123 times lower than the least recyclable type of plastic. *See* DOMINIC HOGG ET AL., STUDY TO SUPPORT PREPARATION OF THE COMMISSION'S GUIDANCE FOR EXTENDED PRODUCER RESPONSIBILITY SCHEMES 162–66 (2020).

choose to make packaging hard to recycle.

On the other hand, proper recycling results in fewer externalities, and producers should be rewarded with a lower fee for using materials that can be, and are, recycled.[243] This incentive would drive up demand for recycled materials, simultaneously increasing private investment in infrastructure and increasing recycled material's competitiveness in the market. At the same time, this fee will have a positive effect on sustainability's first two goals: reducing and reusing. To avoid the fee, producers would reduce the amount of packaging in products and find ways to reuse packaging so it does not wind up in the waste stream.

The EPR fee should pay the COMMERCE Act's costs for recycling education and infrastructure in the U.S., and for grants to municipalities to buy new, uniform bins across the U.S. True, the U.S. is already making investments in its recycling infrastructure. For instance, the recently passed infrastructure bill included $275 million in grants to improve recycling management and infrastructure for post-consumer materials,[244] and $75 million for consumer education about recycling.[245] Yet the U.S. needs $17 billion in infrastructure investment over the next five years to make recycling accessible and ubiquitous.[246] These investments would almost double their return in economic benefits over ten years and add 200,000 new jobs.[247] Taxpayers should not foot this bill—the producers of the U.S.'s

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243 *See, e.g.*, JOLTREAU, *supra* note 18, at 4 (describing how almost 5% of France's total emissions were avoided due to recycling).

244 *See* Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117-58, div. J tit. VI, 135 Stat. 429, 1404 (2021) (appropriating $275 million for grants under § 302(a) of the Save Our Seas 2.0 Act) *and* 33 U.S.C. §§ 4281–82 (granting EPA authority to give grants to states to support recycling programs and infrastructure).

245 Infrastructure Investment and Jobs Act § 70402.

246 BANDHAUER ET AL., *supra* note 80, at 6.

247 *Id.* at 5, 10–11.

excess waste must pay for it. If producers invest in infrastructure directly, they will also receive the economic benefit of these recyclables.

Some argue that taxpayers will foot the bill anyway when producers increase prices to reflect EPR fees; they argue that this kind of EPR system is regressive and hurts the poor.[248] However, this assumes that businesses will just increase prices and not change their behavior in the face of this new system. But EPR encourages lesser volumes of more recyclable waste. So, businesses that choose more sustainable packaging will purchase less packaging material and pay a smaller fee.[249] Ultimately, this will allow these businesses to keep products at lower prices. As consumers do now, they will choose the lower priced products—which will now be the more sustainable products. Consumers will reject the higher priced, less-sustainable alternatives. This will cause demand to shift towards the "greener" alternative, leading more businesses to choose better packaging materials.[250] Just as now, the market will keep prices low. This system ensures that the market demands recycled materials to keep prices low.

4. CONGRESS MUST DELEGATE AUTHORITY TO EXISTING FEDERAL AGENCIES TO IMPLEMENT A NATIONAL EPR LAW

An effective EPR system for packaging does not need a separate managerial organization because the federal government already has the expertise and capacity to handle a national EPR system for packaging waste. The EPA, IRS, and FTC are already well-equipped to quickly implement a national EPR system. The EPA is the U.S.' most

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248 *See*, *e.g.*, Boesen, *supra* note 236.

249 *See supra* note 107 and accompanying text.

250 *See* Robyn White, *Higher Food Costs Due to EPR 'Unlikely'*, LETS RECYCLE (Nov. 2, 2021), https://www.letsrecycle.com/news/higher-food-costs-due-to-epr-unlikely/ (noting that it will be "up to businesses to decide" whether to increase prices under EPR).

qualified agency for assessing environmental harms and already has a wealth of experience and knowledge about U.S. waste management.[251] The IRS already has the experience and infrastructure to collect and enforce periodic payments from businesses across the country. Finally, the FTC understands labeling and has decades of experience on how consumers think, which will allow them to create clear national standards.

Not creating a separate managerial organization or agency will have benefits that Maine and Oregon will not see. First, a federal system will lower administrative costs and confusion between agency–organization management. Administrative costs will be lower because the U.S. already has these agencies. Both systems will need increased agency capacity, whether to oversee the program or to oversee the organization, but the extra costs of a new organization will be cut by making the agency directly responsible for effecting the EPR program. Second, each organization added to the system risks increased confusion, and producers in Oregon may choose to create an organization for each type of material. This would unduly complicate the system and increase costs. Finally, unlike Germany, where a producer responsibility organization for product takebacks grew organically,[252] municipalities already have a system of private waste-management contracts; these systems should not be unnecessarily interfered with. The EPR system needs to charge producers the real costs of their waste and feed those charges back into the system while making it more efficient and sustainable. Although it is difficult to calculate the real costs of externalities, the EPA has the ability and resources to approximate the appropriate fees

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[251] *See generally, e.g.*, *National Overview*, *supra* note 2; *Containers and Packaging: Product-Specific Data*, *supra* note 4; *Sustainable Materials Management*, ENV'T PROT. AGENCY, https://www.epa.gov/smm (last updated Mar. 3, 2022).

[252] Sachs, *supra* note 42, at 69.

to charge producers of waste.[253]

Congress should therefore delegate much of the authority to implement this EPR system to the EPA, starting with several immediate responsibilities. First, the EPA needs to fully assess externalities associated with each type of waste. This assessment must include unrealized environmental and social costs of: (1) mining and producing virgin raw materials; (2) the difficulty of recycling certain materials; (3) landfilling valuable resources; (4) impacts to communities that are disproportionately affected by waste incineration and landfilling; (5) impacts to foreign countries that are harmed by exported American waste; and (6) collecting, sorting, and processing waste. Using this information, the EPA should assess a base per-ton fee for different packaging materials.

After the EPA assesses the base fee, it should assess additional fees which will incentivize increased recycling in the U.S. The fee should distinguish between types of material, including between different types of plastic that are more, or less, recyclable.[254] The EPA should also consider increasing fees for packaging with various features that make them harder to recycle, such as certain added dyes, mixed layers of different plastics, or added labels or other materials that a consumer must remove to make an item recyclable.[255] If it so chose, the EPA could also decide to add a yearly premium on

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[253] *See, e.g.*, ENV'T PROT. AGENCY, FULL COST ACCOUNTING FOR MUNICIPAL SOLID WASTE MANAGEMENT: A HANDBOOK 5–10 nn. 5–7 (1997) (acknowledging the difficulties in calculating external social and environmental costs of waste management, but nevertheless laying a foundation for how to do so).

[254] *See* GLOBAL PLASTICS OUTLOOK, *supra* note 11, at 17 ("[V]arious plastics have different lifetimes, recyclability, and risks to the environment and to human health.").

[255] *See, e.g.*, Break Free From Plastic Pollution Act of 2021, S. 984, 117th Cong. § 12102(b)(3)(B)(iv) (2021) (requiring consideration of the higher cost of managing products with certain designs, labels, or bonded materials). *See also* Katz, *supra* note 15 ("[P]lastic packaging has become increasingly complex, with colors, additives, and multilayer, mixed compositions making it ever more difficult to recycle."). Of course, Congress could also authorize the EPA to ban items from the waste stream that they determine are extra harmful—like styrofoam.

producers who have not either decreased their packaging or increased recyclability.[256] These higher fees will incentivize producers to use more recyclable materials. The EPA should reassess these fees every five years as system capacity and recycled content increases, and as other externalities shift due to the new system. Giving this flexibility over the fee to the EPA will allow for an EPR system that is more responsive to changing market conditions, unlike a simple excise tax.

After calculating the appropriate fees, the EPA may then recommend the fee structure to Congress, which it should adopt into the Internal Revenue Code. The IRS has authority to hold producers responsible for their fees, including its current powers to audit and file tax liens and levies to ensure businesses' compliance.[257] Ultimately, the fees should be easy enough to understand and calculate that each producer can assess them based on their yearly business records. Similarly to how IRS Form 6627 functions for environmental taxes, the IRS can create a new form that attaches to Form 720.[258] This new form will have line items for businesses to report the weight and type of materials used for packaging or single-use products. Businesses can self-assess their material use and calculate the fee owed by multiplying the amount of material used with the rate set forth in the Internal Revenue Code. Businesses will then pay the fee with their taxes. Businesses that do not

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256 *See* Nat'l Fed'n of Indep. Bus. v. Sebelius, 567 U.S. 519, 567 (2012) ("[T]axes that seek to influence conduct are nothing new."); *see also* Janet E. Milne, *The U.S. Supreme Court Opens a Door: Expanded Opportunities for Environmental Taxes*, 43 ENV'T L. REP. 10406, 10409–10 (2013) ("In the environmental context, inactivity (the failure to change behavior in an environmentally positive manner) is an important, underappreciated federal tax base because it targets the environmental vulnerability—the failure to act. That failure often contributes to the environmental problem. Hence, it is environmentally useful to have another means to reach the passive individual.").

257 *See* 26 U.S.C. §§ 6201, 7801(a)(1) (granting authority to the Secretary of the Treasury to enforce the Internal Revenue Code).

258 *See* I.R.S., FORM 720, QUARTERLY FEDERAL EXCISE TAX RETURN (June 2021), https://www.irs.gov/pub/irs-pdf/f720.pdf; I.R.S., FORM 6627, ENVIRONMENTAL TAXES (July 2022), https://www.irs.gov/pub/irs-pdf/f6627.pdf.

pay their fees would face the same consequences as if they chose not to pay their other taxes.

These fees are constitutional under Supreme Court precedent and are not an impermissible penalty for several reasons. First, just because Congress has a regulatory purpose of enacting this fee to decrease material use and promote recycling does not make it invalid.[259] Second, this fee is distinguishable from the tax the Court struck down in *Bailey v. Drexel Furniture Co.*[260] The fee is generally applicable to all businesses, it is commensurate with the amount of materials used, there is no scienter requirement, and the IRS, not the EPA, will enforce the law.[261] Finally, these fees will raise revenue for the federal government.

Congress should also commission the EPA to conduct a nationwide study on recycling capacity, which must consider every step of recycling including collection, sorting, transport, processing, and secondary markets.[262] The funds for this study will come from the general fund, which the EPR fee will eventually replace once in place. The EPA then needs to assess what infrastructure the U.S. needs, where it needs it, and in what order, to increase material reuse efficiently and quickly.[263] The proposed COMMERCE Act differs from EPA's National Recycling Strategy in that it collects the fees necessary to

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259 *See* United States v. Doremus, 249 U.S. 86, 93 (1919) ("[T]he fact that other motives may impel the exercise of federal taxing power does not authorize the courts to inquire into that subject. If the legislation enacted has some reasonable relation to the exercise of the taxing authority conferred by the Constitution, it cannot be invalidated because of the supposed motives which induced it.").

260 Bailey v. Drexel Furniture Co., 259 U.S. 20 (1922).

261 *Compare id. and* MILAN N. BALL, CONG. RSCH. SERV., R46551, THE FEDERAL TAXING POWER: A PRIMER 14 (2020) (listing the factors the Court used to strike down the tax in *Drexel*) *with Sebelius*, 567 U.S. at 563 ("The exaction . . . looks like a tax in many respects.").

262 *See* NATIONAL RECYCLING STRATEGY, *supra* note 24, at 21–22 (laying a roadmap for an infrastructure study).

263 *See id.* (explaining how the EPA would assess the needs with a focus on Environmental Justice).

finance these infrastructure improvements, rather than just identifying them.[264] After this, the EPA should set tangible goals for increasing the amount of municipal solid waste recycled each year.

The eventual goal would be to implement a mandatory recycling law where consumers can place all packaging (and other) waste into recycling bins. However, mandatory recycling laws will not be helpful in the initial years of this program as the market adjusts to higher costs for virgin materials and starts implementing better design and recycling practices. Only once infrastructure capacity is available can mandatory consumer recycling laws be helpful.[265] During this implementation period, fees should increase for packaging material that processors cannot recycle to drive production lines toward more recyclable materials.[266] At the same time, costs will decrease for recycled and recyclable materials because of their increased recoverability. The increased fee and lower cost for recycled material will further incentivize producers to switch their methods.

The fees will go into the general fund each year. As part of the COMMERCE Act, Congress should apportion 100% of these fees for the first ten years into a fund set up for the EPA to manage.[267] The EPA should use fees collected under this system in several ways. First, the EPA should give grants to support building new recycling infrastructure in the U.S. The EPA should give these grants based on needs assessed in their nationwide

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264 *See supra* notes 246-249 and accompanying text.

265 *See* Sachs, *supra* note 42, at 80–81 (describing the issues Germany faced when it mandated recycling and recycled materials far surpassed capacity).

266 This could be accomplished by placing a line item on the new IRS Form that multiplies the rate by a certain amount with language such as "You are liable for the multiplied rate if, on December 31st, you used materials that the EPA has determined are nonrecyclable." *See, e.g.*, FORM 6627, ENVIRONMENTAL TAXES, *supra* note 258, at Part IV.

267 *See, e.g.*, 54 U.S.C. § 200402(b)(1), (e) (establishing deposits into a fund from specific tax revenue for the purpose of maintaining protected federal lands).

study. Second, like Maine, the EPA should reimburse municipalities for the costs of collecting and transporting waste based on nationwide averages for that type of locality.[268] Third, the EPA should use the fees to support municipal grants in buying new, uniform recycling bins to streamline waste management and increase efficiency.[269] Lastly, fees should support consumer education on recycling. After ten years, Congress should evaluate the needs identified by the EPA and continue to endow this special fund as necessary.

The EPR portion of the COMMERCE Act need not preempt states from any of their taxing, spending, or police power rights. Of course, under this system states would still be free to ban certain materials or products from their waste streams that they find particularly egregious. States could also require other fees based on externalities not found at a national level. Also, states could still charge consumers a pay-as-you-throw fee for any costs not covered under the national system, further incentivizing consumers to buy products made with easy-to-recycle packaging material.[270] The national fee will generally reflect unwanted qualities of hard-to-recycle materials, which will make those materials more costly and therefore less attractive to businesses for packaging. Therefore, this Act would not unnecessarily interfere with state sovereignty, but would eliminate confusing, inconsistent laws all trying to implement separate EPR tenets.

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[268] *See* ME. REV. STAT. ANN. tit. 38, § 2146(10) (2021) (requiring reimbursements to municipalities based on the "median per-ton cost of managing packaging material that is readily recyclable and . . . not readily recyclable."); *see also* Brian Beneski, Me. Dep't of Env't Prot., *Maine and Oregon: The New Frontiers of Packaging EPR*, PROD. STEWARDSHIP INST., at 14:50–16:32 (Oct. 27, 2021), http://www.productstewardshipinstitute.net/audiofiles/PSI_2021-10_ME-OR_Packaging_Laws_Webinar_Recording_1080p.mp4 (describing Maine's reasoning to reimburse the median cost to incentivize streamlining and lowering municipalities waste-management costs).

[269] *See* discussion *infra* Part IV.D.

[270] *See supra* note 89–92 and accompanying text.

C. Clarifying Labeling Requirements to Decrease Consumer Confusion

An effective EPR system that forces producers to internalize the externalities of their waste will only go so far. If consumers are still confused as to what is recyclable and continue to contaminate the recycling stream, municipalities will not be able to sell waste to reprocessing facilities.[271] Clearer labels will educate consumers on what can be recycled, thereby decreasing contamination in recycling streams and increasing recyclability of goods and profits for waste collectors.[272] Therefore, along with the EPR system, the U.S. needs to better regulate packaging labeling.

1. California as an Example for Congress: Banning the Unrestricted Use of the Recycling Symbol

California is leading the charge in clarifying recyclability claims on packaging. On October 5, 2021, the Governor of California, Gavin Newsom, signed Senate Bill 343.[273] The California legislature desired explicit and implicit environmental marketing claims to be "substantiated by competent and reliable evidence to prevent deceiving or misleading consumers about the environmental impact of plastic products."[274] Further, the legislature wanted to make sure that any "claims related to the recyclability of a product or packaging be truthful in practice and accurate."[275] Consumers and recyclers have been confused for

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271 Many municipalities contract for waste collection and management services and therefore do not "sell" waste to re-processors directly. However, if waste has a higher value when collected, contractors will be able to sell it and make their operations more profitable. This will lead to them being willing to contract with a municipality for less, therefore decreasing costs to municipalities. Municipalities do, however, have a role in setting rules for sorting and collecting waste, which may lead directly to cost savings.

272 *See* Manning & Deskins, *supra* note 14, at 143.

273 S.B. 343, 2021–2022 Reg. Sess., 2021 Cal. Stat. 507.

274 CAL. PUB. RES. CODE § 42355.5(a) (Deering 2022).

275 *Id.* § 42355.5(b).

many years about what the producer-developed recycling symbol means.[276] Consumers often understand this symbol to mean "recyclable," however, these materials are often landfilled or incinerated in the U.S.[277]

California's new law requires a product sold in California that displays the recycling symbol to meet certain requirements.[278] California law already required people who represented their goods as not harmful to, or as beneficial to, the environment to maintain specific records supporting that representation.[279] The new law makes clear that using the recycling symbol represents that a product is not harmful to the natural environment.[280] Therefore, people who use the recycling symbol or similar symbols must maintain written records "supporting the validity of the representation."[281]

Section 17580.5(a) of the new law makes it unlawful for a person to make an explicit or implicit untruthful, deceptive, or misleading environmental marketing claim,[282]

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276 *See* Packaging Workshop, *supra* note 25, at 104 (agreeing that many people find the recycling symbol confusing); *id.* at 72–73, 96–98, 103–05 (noting that more than half of consumers rely on recycling symbols on products to determine whether a product is recyclable, that even some recycling professionals do not understand the symbol well, and that it is probably the single most confusing symbol for consumers); *id.* at 141–42 (explaining that although the recycling symbol tells people that a product should be recyclable, often there is no program in the country that would collect this product for recycling).

277 *See* Letter from Lynne R. Harris to Off. of the Sec'y, FTC (May 19, 2008) (https://www.ftc.gov/sites/default/files/documents/public_comments/guides-use-environmental-marketing-claims-534743-00034/534743-00034.pdf) (acknowledging better consumer education is needed to tackle confusion regarding the recycling symbol and its use in misleading environmental marketing claims).

278 *See* 2021 Cal. Legis. Serv. Ch. 507 (S.B. 343) (West). The law also applies to other symbols or statements that would lead a consumer to believe the product is recyclable. *Id.*

279 *Id.*

280 CAL. BUS. & PROF. CODE § 17580(a) (Deering 2022).

281 *Id.* The information documented in the written records must include the reasons the person believes the representation to be true; significant adverse environmental impacts directly associated with the production, distribution, use, and disposal of the good; measures taken to reduce the environmental impacts of the good; permit violations associated with the good; whether the terms used conform to FTC standards; and, if the person uses the term "recyclable" or the recycling symbol, whether the good meets all of the requirements of the new law. *Id.*

282 *Id.* § 17580.5(a).

though companies do have a defense if their claim is one of the FTC's examples of non-deceptive environmental marketing claims.[283] California's new law carves out one important exception—the use of the recycling symbol cannot be used as a defense, even though the FTC cites it as non-deceptive if it is inconspicuously placed.[284]

Therefore, the law presumes the recycling symbol is a deceptive or misleading claim.[285] A person who hopes to use this symbol has the burden to show that the product is recyclable according to California's standards. This depends on what is recyclable *and* recycled within the state. The law requires California's Department of Resources Recycling and Recovery to conduct studies every five years on recycling programs within the state to see what types of materials are collected, sorted, and sold.[286] If the department determines that the material type and form is collected, sorted, and reclaimed within the state for at least 60% of the state's population it is considered recyclable.[287] Further, a product will not be considered recyclable if: (1) its plastic packaging includes any components, inks, adhesives, or labels that prevent its recyclability; (2) the plastic products

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283 *Id.* § 17580.5(b)(1). *See* 16 C.F.R. § 260 for examples of what the FTC considers non-deceptive.

284 *Compare* 16 C.F.R. § 260.12(d) ex. 2 (exempting containers with the recycling symbol located in inconspicuous places from constituting a recyclable claim), *with* CAL. BUS. & PROF. CODE § 17580.5(b)(2)(B) (Deering 2022) (clarifying that the defense does not apply for alleged violations of section 42355.51(b)(1) of the Public Resources Code), *and* CAL. PUB. RES. CODE § 42355.51(b)(1) (Deering 2022) (deeming a product displaying a recycling symbol to be deceptive or misleading unless it is actually considered recyclable in the state).

285 *See* CAL. PUB. RES. CODE § 42355.51(b)(1) (Deering 2022).

286 *Id.* § 42355.51(d)(1)(B).

287 *Id.* § 42355.51(d)(2). Further, the reclaiming facility must be consistent with the requirements of the Basel Convention, which the U.S. has signed but not ratified. *See Basel Convention on Hazardous Wastes*, U.S. DEP'T OF STATE, OFFICE OF ENV'T QUALITY, https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/basel-convention-on-hazardous-wastes/#:~:text=The%20United%20States%20signed%20the,implement%20all%20of%20its%20provisions (last visited Nov. 26, 2022). The Basel Convention seeks to protect human health from the adverse effects of waste. Specifically, it seeks to bring informed consent to the transboundary shipment of wastes to countries without adequate infrastructure to safely dispose of it—which is exactly how America dealt with much of its recyclable waste for decades. *See Overview*, UNITED NATIONS ENV'T PROGRAMME, BASEL CONVENTION, http://www.basel.int/TheConvention/Overview/tabid/1271/ default.aspx (last visited Nov. 26, 2022).

and non-plastic products and packaging are not designed to ensure recyclability and includes any of the components from (1); (3) it contains certain added chemicals; or (4) it is made with PFAS.[288] Subject to some exclusions,[289] a person can put a recycling symbol on their product or packaging only if they comply with the above standards. If they cannot, they must put the number identifying the plastic within a basic triangle instead of within the recycling symbol.[290]

The California law is straightforward, and the U.S. must implement something similar. The COMMERCE Act aims to help consumers understand recycling better, to help municipalities manage commingled recyclables, and to remove the veil of recyclability that manufacturers have hidden behind since the development of the recycling symbol. Although California's law will impact packaging throughout the U.S., the federal government still needs to implement these requirements on a national level to reduce confusion and increase compliance.

2. Authorizing the FTC to Revamp Regulations on Environmental Marketing Claims and Develop National Recycling Symbols and Wording

Consumers are undoubtedly confused by myriad packaging materials that make up the current waste stream.[291] Labels today range from the ever-confusing recycling symbol to even more confusing claims such as "check locally" or "not recycled in all communities."[292] Federal intervention and preemption are needed because at least 39 states

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288 CAL. PUB. RES. CODE § 42355.51(d)(3) (Deering 2022).
289 *See id.* § 42355.51(d)(4)–(7).
290 *Id.* §§ 18015(a),(d), 42355.51(c)(4).
291 *See supra* notes 76–79, 267–268 and accompanying text.
292 *See, e.g.*, First Amended Complaint at 26, Greenpeace, Inc. v. Walmart Inc., No. 3:21-CV-00754-MMC (N.D. Cal. Mar. 29, 2021) (alleging deceptive practices with small print recyclable qualifications).

require the recycling symbol in some form or another.[293] Further, producers will be more confused and have higher burdens as more states require them to meet different labeling requirements.

Therefore, the federal government must regulate recycling claims uniformly across the U.S. to alleviate producer and consumer confusion. Increased consumer education will decrease wishcycling and contamination in the waste stream. This will increase the value of recycled materials and decrease recycling costs, further reducing the price of recycled material, and increasing its demand. The FTC is well-equipped to study and regulate recycling claims about packaging. In fact, the FTC already regulates them, but Congress has not given it sufficient authority yet.[294]

Currently, the Fair Packaging and Labeling Act only regulates the labeling of quantity on certain types of packaging.[295] Therefore, as part of the COMMERCE Act, Congress should amend the Fair Packaging and Labeling Act to (1) apply to all products, (2) add a new subsection to 15 U.S.C. § 1453(a) to authorize recycling claims on packaging only if the packaging meets specific criteria developed by the FTC, and (3) instruct the FTC to develop nationally uniform symbols and wording to make a product's recyclability clear.

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293 *See What are the Requirements for Resin Identification Codes for Polymer Blends?*, KELLER & HECKMAN: PACKAGINGLAW.COM (Nov. 27, 2012), https://www.packaginglaw.com/ask-an-attorney/what-are-requirements-resin-identification-codes-polymer-blends; *see also, e.g.*, CAL. PUB. RES. CODE § 18015 (Deering 2021) (setting resin identification code requirements for all plastics sold in California).

294 *Compare* 16 C.F.R. § 260.12 (2022) (generic regulations concerning misleading recycling marketing), *with* Horseracing Integrity and Safety Act of the 2021 Consolidated Appropriations Act, Pub. L. No. 116-260, 134 Stat. 1182, Division FF, Title XII, §§ 1203–1210 (2021) (granting the FTC broad oversight authority over the sport of horseracing).

295 *See Fair Packaging and Labeling Act: Regulations Under Section 4 of the Fair Packaging and Labeling Act*, FED. TRADE COMM'N, https://www.ftc.gov/legal-library/browse/rules/fair-packaging-labeling-act-regulations-under-section-4-fair-packaging-labeling-act (last visited Nov. 26, 2022).

Congress should delegate authority to the FTC to determine what criteria a producer must meet before putting specific claims or symbols on packaging. Similar to 15 U.S.C. § 1453(a), Congress could specify that no person shall distribute any packaged commodity unless in conformity with regulations established by the FTC,[296] except these new regulations will deal with recycling claims on packaging. In promulgating these regulations, the FTC should consider things such as a minimum number of consumers who have access to recycling programs for the type of material, whether the U.S. has the capacity to recycle a certain percentage of the material used, whether secondary markets are available for the reprocessed material, and whether the material includes additives or features that make it non-recyclable.[297] Producers can then use information from the EPA's periodic assessments on the state of U.S. recycling capabilities to determine whether their packaging meets FTC standards to use the symbols. Through post-market monitoring and enforcement, the FTC could enforce an action against a producer if they use the symbol without supporting data.[298] However, Congress should also authorize a private cause of action for consumers to bring against companies with deceptive environmental marketing claims.

Further, Congress should task the FTC with creating new symbols and wording that clearly indicate what material a product is and its recyclability or non-recyclability. The current method of labeling plastics with a number between one and seven is confusing for consumers and not detailed enough for recycling processors to determine a material's

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296 *See* 18 U.S.C. § 1453(a).

297 The EPA will be able to supply the FTC with much of this needed data from their reports.

298 *See* 15 U.S.C. § 45 (outlining the FTC's authority to take action against individuals and entities that employ deceptive practices).

recyclability. As part of this effort, the FTC should regulate when a producer may use a symbol or wording indicating a material's recyclability. If a producer cannot meet these standards, their packaging should include symbols indicating its non-recyclability. Then, the producer must also pay the higher fee calculated by the EPA to include the externalities of losing the resource to the landfill. For consumer and producers' ease, these labeling standards should preempt state law to maintain uniformity across the U.S.

D. CREATING UNIFORM RECYCLING BINS FOR CONSUMER EASE ACROSS THE NATION

Finally, to decrease contamination in the recycling stream and increase the quality and quantity of recyclable material, many municipalities will have to switch from single-stream recycling to multi-stream recycling. Multi-stream recycling decreases contamination, makes separation easier, and increases the value of recycled materials.[299] The COMMERCE Act recognizes this and helps municipalities implement these new systems by (1) creating uniform recycling bins that match the FTC-developed labels for different materials, and (2) giving grants to municipalities to buy these new bins and other needed infrastructure to implement multi-stream recycling.

South Korea is a prime example of the importance of clear labeling, EPR, pay-as-you-throw, and multi-stream recycling. Since the 1980s, South Korea has seen waste increase by a factor of five, while its landfill rates have dropped from over 90% of waste to under 10%.[300] According to South Korea's Ministry of Environment, the country

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[299] *See* Waste Stream Evaluation, *supra* note 23, at 36 (explaining that such collection systems result in a higher yield of collected waste and a positive influence on waste collected); Manning & Deskins, *supra* note 14, at 145.

[300] *South Korea Legislates Towards a Zero Waste Society*, WASTE MGMT. REV. (July 17, 2015, 1:40 PM), https://wastemanagementreview.com.au/south-korea-legislates-towards-a-zero-waste-society/; *See also* Yang, *supra* note 57, at 210.

recycles and reuses 86% of its waste.[301] The U.S. can also realize these results with the right programs. Additionally, household waste in South Korea is less than half that of each American.[302] Still, the government does not consider this enough. South Korea has set a goal of dramatically reducing waste and has worked for decades towards achieving that goal.[303]

South Korea's success comes from national legislation, comprehensive management plans, and campaigns to educate the public.[304] First, South Korea has EPR systems for many types of waste.[305] Second, South Korea has a national bin system where consumers separate their recyclables according to kind.[306] Third, consumers pay according to the volume of waste they generate to encourage recycling.[307] Fourth, South Korea prioritizes reducing, reusing, recycling, and recovery at every step of a material's lifecycle.[308] Finally, South Korea invests in recycling and recovery infrastructure.[309] This kind of success would be more difficult to achieve in the U.S. due to different cultural, logistical, and transportation challenges, but South Korea is four decades ahead of the U.S.

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301 *Land & Waste*, MINISTRY OF ENV'T, http://eng.me.go.kr/eng/web/index.do?menuId=466 (last visited Mar. 4, 2022).

302 *Compare id.* (showing that South Koreans generated 1.02 kilograms [roughly 2.25 pounds] of waste per person per day in 2017), *with National Overview: Facts and Figures on Materials, Wastes and Recycling*, ENV'T PROT. AGENCY, https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials (last visited Sept. 9, 2022) (showing that Americans generated 4.9 pounds of waste per person per day in 2018).

303 *See* Yang, *supra* note 57, at 207–09.

304 *See id.*

305 *Id.* at 213–14.

306 Manning & Deskins, *supra* note 14, at 143; Seoul Metropolitan Government, *Recycling Station Project: Bringing Innovation to Recyclable Waste Separation and Disposal to Residential Area*, SEOUL SOL. (June 20, 2015), https://seoulsolution.kr/en/content/recycling-station-project-bringing-innovation-recyclable-waste-separation-and-disposal.

307 Yang, *supra* note 57, at 212; *See also* Ki-Yeong Yu, *Volume Based Waste Fee (VBMF) System for Municipal Solid Waste*, SEOUL SOL. (Jan. 13, 2017), https://seoulsolution.kr/en/content/6326.

308 Yang, *supra* note 57, at 214.

309 *Id.* at 216.

on national waste-management strategies.[310] There is certainly room for the U.S. to improve upon its current system.

Since the U.S. lacks the necessary infrastructure, some municipalities will not be able to recycle some recyclable materials economically or environmentally.[311] However, as the federal government funds new recycling infrastructure, municipalities will be able to recycle more materials. By creating EPR fees that reflect a desire for recycled goods, while simultaneously investing in increased recycling infrastructure across the U.S., recycled material will become more competitive in the marketplace. Municipalities will then be able to shift their collection system by adding bins for materials they could not previously collect to take advantage of new economic and environmentally sound opportunities to recycle more materials.[312] In the meantime, consumers are confused by municipalities' single-stream bins with specific rules for what can and cannot go into them.[313] Therefore, having separate bins for each class of materials will allow municipalities to easily add new materials to their recycling stream that consumers will understand.[314] These separate bins will decrease wishcycling, allowing recycled material to become more competitive.

For example, in the American West, bulky and heavy glass bottles may have to travel hundreds of miles from collection to processing centers. It may not make economic or environmental sense to recycle these materials until the U.S. builds closer processing

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310 *See* Manning & Deskins, *supra* note 14, at 128.
311 *See* Katz, *supra* note 15.
312 *See* Manning & Deskins, *supra* note 14, at 141–42.
313 *See The Pros and Cons of Single Stream Recycling*, RTS (Feb. 17, 2021), https://www.rts.com/ blog/the-pros-and-cons-of-single-stream-recycling/ (listing limited plastic types available for collection along with outlining how consumers continue to place non-collectible materials alongside them).
314 *See* Manning & Deskins, *supra* note 14, at 143–44.

centers, or until municipalities have the capability to crush glass themselves before shipping. Until that happens, it may make more sense to landfill these materials. With uniform bins across the country that differentiate between materials, a municipality that is only able to recycle aluminum and paper economically and environmentally will only have these two bins for consumers. As infrastructure improves and that municipality can recycle glass, it can easily furnish consumers with the nationally standard glass bin. Different bins allow consumers to tangibly understand what is and is not recyclable in their communities. This will decrease contamination and potentially influence consumers' purchasing decisions when they see what their communities do not recycle. It therefore would make economic, environmental, and logistical sense to implement multi-stream recycling and uniform bins across the U.S.

V. CONCLUSION

The U.S. uses resources far faster than Earth can replenish them. Many of these resources are used one time and then landfilled or incinerated, wasting the usefulness of these valuable materials, taking them out of the economy, and harming the environment. The U.S. must sustainably manage its resources for the good of its people, economy, and the environment. One of the key steps in sustainably managing resources is recycling, which the U.S. is currently ill-equipped to do. In the midst of a recycling crisis, the U.S. must take proactive steps to reimagine what *reduce, reuse, recycle* means to it.

Reducing, reusing, and recycling is essential to sustainably managing resources. Extended producer responsibility for packaging materials will cause producers to reduce waste, reuse containers, and recycle the rest. While states play an important role, only the federal government can implement some of the necessary laws to recycle effectively. The

federal government must therefore eliminate virgin-material subsidies, implement a national EPR scheme for packaging materials, revamp product labeling standards, and design nationally uniform recycling bins. These steps will jump-start U.S. domestic recycling into a new era of circularity—one where resources are circularly reused rather than disposed of as valueless.

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The Corporate Myth of Recycling Plastics: Deceptive Marketing & Global Consequences

By Lexi Carroll

I. INTRODUCTION

In our era of environmental angst, a certain culture surrounds recycling. Consumers tend to tell others when they recycle and to shame those who do not. They look at the symbol on the bottom of a product, feel unsure about what it means, and toss it in the blue bin, believing it to be recyclable. The burden of making the correct environmental choices, particularly with recycling, has been placed on consumers. This is the culture that corporations created and governments supported. It persists in large part because of corporate deception and an absence of meaningful regulation surrounding recycling labeling that together mislead consumers into believing recycling is beneficial to the environment, as opposed to just producers' bottom line. In reality, attempting to recycle plastics is largely ineffective and has serious global ramifications, particularly on developing nations.

Over the past decade, and particularly among younger generations, environmental concerns and anxieties have grown dramatically.[1] There is growing interest in making environmentally conscious consumer choices and in living more sustainably.[2] Unfortunately, this aspiration makes people vulnerable to confusion and deceit—particularly in this era of misinformation.[3]

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1 Alec Tyson, Brian Kennedy & Cary Funk, *Gen Z, Millennials Stand Out for Climate Change Activism, Social Media Engagement With Issue*, PEW RESEARCH CENTER (May 26, 2021), https://www.pewresearch.org/ science/wp-content/uploads/sites/16/2021/05/PS_2021.05.26_climate-and-generations_REPORT.pdf.

2 James Ellsmoor, *77% Of People Want To Learn How To Live More Sustainably*, FORBES (July 23, 2019), https://www.forbes.com/sites/jamesellsmoor/2019/07/23/77-of-people-want-to-learn-how-to-live-more- sustainably/?sh=79375be12b01.

3 *See* Menno D. T. de Jong, Gabriel Huluba & Ardion D. Beldad, *Different Shades of Greenwashing: Consumers' Reactions to Environmental Lies, Half-Lies, and Organizations Taking Credit for Following Legal Obligations*, 34 J. BUS. & TECH. COMMC'N 38, 38–41 (2020).

This Note will specifically focus on the deception that surrounds single-use plastics and recycling. As the public became increasingly aware of the plastic pollution problem, corporations used recycling as a convenient narrative to resolve the moral dissonance consumers face when purchasing single-use plastics.[4] But converging problems of cost, sorting, degradation, and the absence of end-markets mean that plastics are rarely recycled.[5] The following pages will describe how corporations have successfully convinced consumers otherwise.[6]

There is a unique danger in placing trust in failed solutions. If people falsely believe that recycling effectively remedies the waste problem posed by single-use plastics, the problem goes ignored. And there is discomfort in the idea that people who voluntarily set out to mitigate an environmental issue may inadvertently add to the problem. Moreover, people are entitled to know what is recyclable, that recycling is not a solution to single-use plastics, and that placing trust in recycling plastics lends itself to global harm.[7]

This Note informs what is a surprisingly uncontroversial approach to the plastic problem—recycling. Ultimately, it endeavors to increase awareness about the fallacy of recycling plastics and to urge transparency so that informed consumers can dictate future systemic responses to the plastics crisis.

II. SINGLE-USE PLASTICS ARE UBIQUITOUS

In the 1970s, manufacturers began rapidly replacing paper and glass products with

4 *See* discussion *infra* Parts IV–V.
5 *See* discussion *infra* Part III.
6 *See* discussion *infra* Part V.
7 *See* discussion *infra* Parts III, VI.

a lighter, more durable, more affordable alternative—plastic.[8] The material's popularity has since skyrocketed, "surpass[ing] most other man-made materials."[9] Packaging is the largest market for plastic, meaning plastic is primarily purposed as a single-use material.[10] When used as packaging, the fossil-fuel-based material is disposed of immediately after consumer use, typically in mere minutes.[11] After disposal, a small minority of plastics is recycled and the rest is incinerated, taken to landfills, or left elsewhere in the environment.[12]

Incineration releases toxic chemicals and air pollutants, making it a serious public health threat, particularly in communities living near waste incinerators.[13] Further, it presents an environmental justice issue because those communities are disproportionately low-income and house communities of color.[14] As for the plastics destined for landfills, they face a space scarcity issue—the planet is simply running out of space for landfills.[15] There is also potential for leaching at remaining landfill sites, which raises environmental and public health concerns because of the types and quantities of toxic chemicals present.[16] Similarly, plastics' additives and byproducts in landfills present the possibility of soil and

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8 Courtney Lindwall, *Single-Use Plastics 101*, NAT. RESOURCE DEF. COUNCIL, INC. (Jan. 9, 2020), https://www.nrdc.org/stories/single-use-plastics-101.

9 Roland Geyer, Jenna R. Jambeck & Kara Lavender Law, *Production, Use and Fate of All Plastics Ever Made*, 3 SCI. ADVANCES 1, 1 (2017).

10 *Id.*

11 Lindwall, *supra* note 8.

12 *Plastics: Material-Specific Data*, ENV'T PROT. AGENCY, https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/ plastics-material-specific-data (last updated Sept. 19, 2022).

13 Daniel Rosenberg, Veena Singla & Darby Hoover, *Burned: Why Waste Incineration Is Harmful*, NAT. RESOURCES DEF. COUNCIL, INC. (July 19, 2021), https://www.nrdc.org/experts/daniel-rosenberg/burned-why-waste-incineration-harmful.

14 *Id.*

15 Okunola A. Alabi et al, *Public and Environmental Health Effects of Plastic Wastes Disposal: A Review*, 5 J. TOXICOLOGY & RISK ASSESSMENT 1, 4 (2019).

16 *Id.*

groundwater contamination, which can persist in environments long-term.[17] Despite these concerns, incinerators and landfills are the intended end-of-life locations for most plastics.[18] A meaningful percentage of plastics also end up polluting both land and water.[19] Each year, an average of eight million tonnes of plastics are released into the ocean.[20] Its presence in waters leads to toxic chemical releases, marine life illness and death, and negative health effects for humans who consume microplastics through the food chain.[21]

And the gravity of the plastics crisis is only worsening.[22] Based on the present growth rate of plastic, it is estimated that plastics production will double within the next twenty years.[23] Academics predict that "if current production and waste management trends continue, roughly 12,000 [metric tons] of plastic waste will be in landfills or in the natural environment by 2050."[24] In more digestible terms, that translates to 26.5 trillion pounds of plastic waste on Earth in less than 30 years—over 175 times the current biomass of all humans on the planet.[25]

III. RECYCLING PLASTICS DOES NOT WORK

"Reduce, Reuse, Recycle" is the mantra touted as the leading solution to the nation's overconsumption and plastic waste generation problems. Even though reduction and reuse are most effective at protecting the environment and preserving natural resources, recycling

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17 *Id.* at 6.
18 *Id.* at 1.
19 *Id.* at 6.
20 *Id.*
21 *Id.* at 6-8.
22 Laurent Lebreton & Anthony Andrady, *Future scenarios of global plastic waste generation and disposal, in* 5 PALGRAVE COMMC'NS 1, 2 (2019), https://www.nature.com/articles/s41599-018-0212-7.
23 *Id.*
24 Geyer et al., *supra* note 9.
25 *See* Jason Daley, *Humans Make Up Just 1/10,000 of Earth's Biomass*, SMITHSONIAN MAG. (May 25, 2018), https://www.smithsonianmag.com/smart-news/humans-make-110000th-earths-biomass-180969141/.

continues to receive the most attention.[26] Generally, recycling is both feasible and beneficial;[27] however, a different story surrounds recycling plastics.

The chasing arrows symbol has been pasted on millions of plastic products ranging from soda bottles to shower curtains.[28] The arrows act as a silent stamp of approval for consumer purchase, suggesting the product will be diverted from the landfill.[29] That message is erroneous.[30] According to the EPA's most recent 2018 estimate, less than 9% of generated plastic waste is recycled.[31] The 9% figure reflects the inefficiencies of recycling: inefficient costs, sorting complications, plastic degradation, and an economically unviable market for recycled materials.[32] Each inefficiency is a product of or contributor to another inefficiency; together, they make plastics effectively non-recyclable.[33] An NPR story provides a global overview of these inefficiencies:

> All used plastic can be turned into new things, but picking it up, sorting it out and melting it down is expensive. Plastic also degrades each time it is reused, meaning it can't be reused more than once or twice. On the other hand, new plastic is cheap. It's made from oil and gas, and it's almost always less expensive and of better quality to start fresh.[34]

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26 *Reducing and Reusing Basics*, Env't Prot. Agency, https://www.epa.gov/recycle/reducing-and-reusing-basics (last updated Mar. 25, 2022).

27 *Recycling Basics*, Env't Prot. Agency, https://www.epa.gov/recycle/recycling-basics (last updated Dec. 21, 2021).

28 *See* Hiroko Tabuchi & Winston Choi-Schagrin, *California Aims to Ban Recycling Symbols on Things That Aren't Recyclable*, N.Y. TIMES (Sept. 8, 2021), https://www.nytimes.com/2021/09/08/climate/recycling- california.html.

29 *Id.*

30 *Id.*

31 *Plastics: Material-Specific Data*, *supra* note 12.

32 Laura Sullivan, *How Big Oil Misled The Public Into Believing Plastic Would Be Recycled*, NPR (Sept. 11, 2020), https://www.npr.org/2020/09/11/897692090/how-big-oil-misled-the-public-into-believing-plastic-would-be-recycle.

33 *Id.*

34 *Id.*

A. COST PROBLEM

Much plastic costs more to recycle than virgin plastic costs to create.[35] The relative profitability of recycling compared to producing virgin plastic is tied directly to oil prices, because plastic is primarily produced from oil or gas that undergoes chemical processing.[36] When oil prices are low, it can be cheaper to create virgin plastic than to recycle.[37] For example, in the spring of 2015, oil prices dropped from $120 per barrel to approximately $60 per barrel, forcing many recycling plants to go out of business.[38] At this low price, even exceptionally high-quality plastic was not turning a profit.[39] The entire recycling industry struggled;[40] raw material production was simply more cost-effective.[41]

Even when oil prices are not particularly low, some plastic products are plainly not worth recycling. For example, a plastic bag is understood by the recycling industry to be the "bottom of the barrel."[42] The value of a plastic bag is low because it costs approximately the same to sort and clean a plastic bag as it does a plastic detergent bottle, but the bag yields much less recycled plastic.[43] As a result, recycling centers cannot afford to put much time and money into attempting to recycle plastic bags; their low value does not warrant the use of such resources.[44] Unfortunately, the same holds true for many other

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35 *Id.*

36 Hannah Ritchie, *FAQs On Plastics*, OUR WORLD IN DATA (Sept. 2, 2018), https://ourworldindata.org/faq-on- plastics. *See also* Bruno Gervet, *The Use of Crude Oil in Plastic Making Contributes to Global Warming*, LULEÅ UNIV. OF TECH. (May 2007), https://www.ltu.se/cms_fs/1.5035!/plastics%20-%20final.pdf.

37 Stacey V. Smith, *Low Oil Prices Interfere With What Recyclers Are Paid For Plastic*, NPR (Jan. 14, 2016), https://www.npr.org/2016/01/14/463010138/low-oil-prices-interfere-with-what-recyclers-are-paid-for-plastic.

38 *Id.*

39 *Id.*

40 *Id.*

41 Ritchie, *supra* note 36.

42 Smith, *supra* note 37.

43 *Id.*

44 *Id.*

plastic products.[45]

B. SORTING PROBLEM

Another inefficiency of recycling is that it demands extensive and tedious sorting because there are thousands of different types of plastics.[46] "A major challenge for producing recycled resins from plastic waste is that most different plastic types are not compatible with each other because of inherent immiscibility at the molecular level, and differences in processing requirements at a macro-scale."[47] During initial product manufacturing, an exorbitant combination of dyes and additives can be added to the resin to produce a particular color, texture, or shape in the final product.[48] That opportunity for product variation complicates the recycling process; the characteristics of the plastic can alter its melting point and other properties.[49] Ultimately, plastics must be carefully sorted to avoid contamination and be successfully reinvented as a new product—a burdensome requirement.[50]

C. DEGRADATION PROBLEM

A common misconception is that most plastic can be recycled many times over.[51] In reality, most recycled plastic is only recycled once before it is eventually disposed of in a landfill or incinerated.[52] During recycling operations, the structure of the polymers

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45 Renee Cho, *Recycling in the U.S. is Broken. How Do We Fix It?*, COLUM. CLIMATE SCH. (Mar. 13, 2020), https://news.climate.columbia.edu/2020/03/13/fix-recycling-america/.

46 *Recycling Plastic: Complications & Limitations*, EUREKA! RECYCLING, https://media.alexandriava.gov/docs- archives/tes/solidwaste/info/recyclingplasticcomplications.pdf (last visited Dec. 1, 2022).

47 Jefferson Hopewell, Robert Dvorak & Edward Kosior, *Plastics Recycling: Challenges and Opportunities*, 364 PHIL. TRANSACTIONS OF THE ROYAL SOC'Y 2115, 2119 (2009).

48 *Recycling Plastic: Complications & Limitations*, *supra* note 46.

49 *Id.*

50 *Id.*

51 Ritchie, *supra* note 36.

52 *Id.*

changes, resulting in a secondary material that is physically, mechanically, and aesthetically worse than virgin material.[53] Soon, the quality decreases so much that the recycled plastic becomes unusable.[54] Consequently, recycling merely delays disposal in a landfill or incineration.[55]

D. MARKET PROBLEM

Until 2018, China was a primary market for scrap materials from U.S. material recovery facilities.[56] In 2016, the U.S. exported nearly 700,000 tonnes of plastic waste to be recycled in China.[57] However, in 2017, China announced its plan to prohibit the importation of certain grades of paper and plastic, and by January 2018, China enacted the "National Sword" policy, which banned the import of most plastics sent to China's recycling processors.[58] China's new criteria require imported plastic to be clean and unmixed, and meet a stringent contamination standard of 0.5%.[59] American cities are

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53 Francesco Paolo La Mantia, *Polymer Mechanical Recycling: Downcycling or Upcycling?*, 20 PROGRESS IN RUBBER, PLASTICS & RECYCLING TECH. 11, 11 (2004).

54 Lilly Sedaghat, *7 Things You Didn't Know About Plastic (and Recycling)*, NAT'L GEOGRAPHIC (Apr. 4, 2018), https://blog.nationalgeographic.org/2018/04/04/7-things-you-didnt-know-about-plastic-and-recycling/.

55 Ritchie, *supra* note 36.

56 *Sustainable Materials Management (SMM) Web Academy Webinar: China's Green Sword: Impacts to State and Local Governments*, Env't Prot. Agency, https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-chinas-green-sword-impacts-state-and (last visited Apr. 16, 2022).

57 Hannah Ritchie & Max Roser, *Plastic Pollution*, OUR WORLD IN DATA (Apr. 2022), https://ourworldindata.org/plastic-pollution#plastic-waste-per-person.

58 *Sustainable Materials Management (SMM) Web Academy Webinar: China's Green Sword: Impacts to State and Local Governments*, *supra* note 56; Cheryl Katz, *Piling Up: How China's Ban on Importing Waste Has Stalled Global Recycling*, YALE ENV'T 360 (Mar. 7, 2019), https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling#.

59 Nicole Javorsky, *How American Recycling Is Changing After China's National Sword*, BLOOMBERG (Apr. 1, 2019), https://www.bloomberg.com/news/articles/2019-04-01/how-china-s-policy-shift-is-changing-u-s-recycling (specifying that the strict contamination rate is 0.5% and noting that contamination rates of U.S. recyclables can reach 25% or higher).

generally not equipped to meet these requirements.[60] In 2018, China accepted less than 1% of its 2016 total.[61]

China's new policy was primarily a response to its ongoing environmental concerns with pollution that accompanied imported materials.[62] A significant amount of plastic entered China without a permit, and much of the unpermitted material was not recyclable.[63] The result was extensive pollution both in waterways and on land.[64] Even plastic that entered by permit was contaminated—by food waste, plastic wrap, et cetera—making plastic difficult and expensive to recycle and thus not a profitable import.[65]

China's policy left the U.S. and many other countries without a market for their waste.[66] Many cities and counties had to choose between throwing all plastics away or paying exponentially higher rates to get the recycling off their hands.[67] Many regions, including cities like Broadway, Virginia, and Fort Edward, New York, could not pay increased costs and thus suspended their recycling programs.[68] Many nations, including the U.S., diverted their plastic waste to other Asian countries, but those markets are also

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60 *Id.*; Oliver Milman, *'Moment of Reckoning': US Cities Burn Recyclables After China Bans Imports*, THE GUARDIAN (Feb. 21, 2019), https://www.theguardian.com/cities/2019/feb/21/philadelphia-covanta-incinerator-recyclables-china-ban-imports.

61 Christopher Joyce, *Where Will Your Plastic Trash Go Now That China Doesn't Want It?*, NPR (Mar. 13, 2019), https://www.npr.org/sections/goatsandsoda/2019/03/13/702501726/where-will-your-plastic-trash-go-now-that-china-doesnt-want-it.

62 Katz, *supra* note 58.

63 Joyce, *supra* note 61.

64 *Id.*

65 *Id.*

66 Alana Semuels, *Is This the End of Recycling?*, THE ATLANTIC (Mar. 15, 2019), https://www.theatlantic.com/ technology/archive/2019/03/china-has-stopped-accepting-our-trash/584131/.

67 *Id.*

68 *Id.*

unstable.[69] Many Southeast Asian countries have even sent back the plastic waste shipped to them.[70] Evidently, current plastic production and consumption levels are globally unmanageable for recycling.

IV. CONSUMER DECEPTION BY CORPORATIONS

The deception of recycling dates back to the 1970s, with a confusing symbol and cunning advertisements.[71] Reports at the time, written by scientists tasked with predicting potential problems for industry executives, detailed how plastic degrades each time it is recycled, that recycling is expensive, and that sorting is not feasible.[72] Yet, consumers were pushed to believe that recycling plastic was feasible, beneficial, and their own responsibility.[73] In a 1974 speech, an industry insider wrote "[t]here is serious doubt that [recycling plastic] can ever be made viable on an economic basis"—illustrating that the misleading nature of those narratives was known at the time.[74]

"If the public thinks that recycling is working, then they are not going to be as concerned about the environment," said Larry Thomas, former president of one of the industry's most powerful trade groups.[75] In an interview with NPR, another industry insider admitted that "selling recycling sold plastic."[76] To keep producing plastic, the industry had to push a narrative that omitted the problems plaguing the viability of

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69 GREENPEACE, SOUTHEAST ASIA'S STRUGGLE AGAINST THE PLASTIC WASTE TRADE: A POLICY BRIEF FOR ASEAN MEMBER STATES 3 (2019), https://storage.googleapis.com/planet4-philippines-stateless/2019/06/a72e63b1-waste-trade-report-5b-1.pdf?_ga=2.100347866.552988082.1560739055-281246604.1499670505.

70 *Id.*

71 Sullivan, *supra* note 32.

72 *Id.*

73 *Id.*

74 *Id.*

75 *Id.*

76 *Id.*

recycling plastics.[77] NPR and PBS' *Frontline* conducted an extensive investigation into the plastic industry in 2020, revealing that the industry had made billions selling the world virgin plastic by claiming it could and would be recycled, knowing full well that was inaccurate.[78] The obstacles that plastic recycling faced in the 1970s are the same it faces now, almost fifty years later.[79]

A. RESIN IDENTIFICATION CODES

In 1970, a design was created to symbolize the recycling process—the now universally recognized chasing arrows.[80] The symbol was never trademarked and became widely used in the public domain to represent recycling.[81] Then, in 1988, the Plastics Industry Association[82] developed Resin Identification Codes.[83] The original design was an equilateral triangle with three chasing arrows, a number in the center of the triangle, and an abbreviated term for "polymeric material" below; it was a play on the universal recycling symbol.[84] In 1989, plastic and oil executives lobbied nearly forty states to mandate that the Codes appear on *all* plastics.[85] Despite the resemblance to the recycling symbol, the Codes provide absolutely no information about whether a plastic product can

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77 *Id.*
78 *Id.*
79 *Id.*
80 Penny Jones & Jerry Powell, *Gary Anderson Has Been Found!*, RES. RECYCLING (May 1999), https://logoblink.com/img/2008/03/recycling_symbol_garyanderson.pdf.
81 *Id.*
82 At the time, the organization used the name Society of the Plastics Industry. The organization rebranded itself in 2010 and now does business as the Plastics Industry Association. *SPI no more; rebrands as Plastics Industry Association, aka PLASTICS*, PLASTICS TODAY (Dec. 6, 2016), https://www.plasticstoday.com/business/spi-no-more-rebrands-plastics-industry-association-aka-plastics.
83 Brad Kelechava, *Resin Identification Codes (RICs), as Specified by ASTM D7611*, AM. NAT'L STANDARDS INST. (Feb. 21, 2019), https://blog.ansi.org/2019/02/resin-identification-codes-rics-astm-d7611/#gref.
84 *Id.*
85 Sullivan, *supra* note 32.

be recycled.[86] The American National Standards Institute, the current administrator of the Codes, explains that "the use of a Resin Identification Code on a manufactured plastic article does not imply that the article is recycled or that there are systems in place to effectively process the article for reclamation or re-use."[87] Rather, the Codes are used solely to identify the type of plastic resin used in a manufactured item.[88]

The potential for confusion was recognized by influential organizations. The National Recycling Coalition, which represents groups focused on maximizing recycling, argued from the Codes' inception that their presence on non-recyclable or difficult-to-recycle plastics misled consumers.[89] The Plastics Industry Association, a primary investor in the Resin Identification Codes, countered that the Codes should be used as widely as possible.[90] The American National Standards Institute tried to address the misplaced connotation over ten years later by eliminating the chasing arrows element of the Resin Identification Codes.[91] In the new Codes, the equilateral triangle with a number from one to seven inside and an abbreviation below remains.[92]

The National Recycling Coalition's concerns that the Codes misled consumers were valid. A 2019 *New York Post* article detailed a study in which 62% of surveyed Americans expressed worry "that a lack of knowledge is causing them to recycle incorrectly."[93] The

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86 Kelechava, *supra* note 83.

87 *Id.* (quoting *ASTM D7611/D7611M-20: Standard Practice For Coding Plastic Manufactured Articles For Resin Identification*, ANSI WEBSTORE, https://webstore.ansi.org/Standards/ASTM/ASTMD7611D7611M20?source=blog&_ga=2.147211634.456692269.1664741527-525854321.1664741527 (last visited Dec. 1, 2022).).

88 *Id.*

89 Gail L. Achterman, *Implementing Plastics Recycling Mandates*, 9 NAT. RES. & ENV'T 13, 13 (1994).

90 *Id.*

91 Kelechava, *supra* note 83.

92 *Id.*

93 Marie Haaland, *more than half of Americans are confused about recycling*, N.Y. POST (Apr. 16, 2019, 3:04 PM), https://nypost.com/2019/04/16/more-than-half-of-americans-are-confused-about-recycling/.

results corroborated the respondents' fears: over half incorrectly believed greasy pizza boxes could be recycled, and nearly 70% incorrectly thought plastic utensils could be recycled.[94]Importantly, the answers provided in this study may have been correct in one location but incorrect in another; whether a product can be recycled largely depends on the municipality—another contributor to consumer confusion.[95]

A Consumer Brands Association report similarly reveals consumer confusion around recycling plastics.[96] In its study, 92% of respondents did not understand the Resin Identification Code labeling: 68% expressed their assumption that any product with symbols for all seven codes was recyclable, and the remaining 24% admitted they did not know what the code meant.[97] When directly questioned about whether they thought recycling was confusing, only 4% said no.[98] 93% found recycling more confusing than doing taxes, building Ikea furniture, participating in the stock market, or understanding the opposite sex.[99] In other words, consumers find the process of recycling incredibly difficult to navigate.

B. ADVERTISEMENTS

Corporations and industry-backed organizations compound consumers' reasonable confusion by creating advertisements and marketing schemes that depict recycling as an easy solution where the burden of responsibility falls on the consumer. The first notable

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94 *Id.*

95 For example, a pizza box in Arlington County, Virginia can be recycled, but in neighboring Fairfax County, pizza boxes are not accepted for recycling. CONSUMER BRANDS ASS'N, REDUCE. REUSE. CONFUSE. 7, https://consumerbrandsassociation.org/wp-content/uploads/2019/04/ConsumerBrands_ReduceReuseConfuse.pdf.

96 *Id.* at 1–14.

97 *Id.* at 6.

98 *Id.* at 8.

99 *Id.*

example of this propaganda is likely Keep America Beautiful's 1971 "Crying Indian" advertisement.[100] The anti-litter organization, founded by American Can Co. and Owens-Illinois Glass Co. and later joined by Coca-Cola and the Dixie Cup Co., ran this guilt-inducing advertisement to curb pollution.[101] In a judgmental tone, the actor walks along a trash-ridden beach and says, "Some people have a deep, abiding respect for the natural beauty that was once this country. And some people don't. People start pollution, people can stop it."[102] At the end, a tear falls down his cheek.[103] While the surface-level message appears well-intentioned, the advertisement operates to shift the burden of pollution from the companies producing the future litter to the individual consumers. This strategy was later imitated nationwide by companies that rely on plastic packaging.

For example, in 1990, DuPont Company—a major chemical producer—ran an advertisement to encourage plastic recycling.[104] In this commercial, a plastic bottle bounced out of a garbage truck and a narrator said, "The bottle may look empty, yet it's anything but trash. It's full of potential . . . We've pioneered the country's largest, most comprehensive plastic recycling program to help plastic fill valuable uses and roles instead of filling valuable land."[105] The message clearly communicated that plastics can and should be recycled. Around this time, executives at corporations like Exxon, Chevron, and Procter

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100 Keep America Beautiful, Inc., *The Crying Indian - full commercial - Keep America Beautiful*, YOUTUBE (May 1, 2007), https://www.youtube.com/watch?v=j7OHG7tHrNM.

101 Finis Dunaway, *The 'Crying Indian' Ad That Fooled the Environmental Movement*, CHI. TRIBUNE (Nov. 21, 2017, 12:00 AM), https://www.chicagotribune.com/opinion/commentary/ct-perspec-indian-crying-environment-ads-pollution-1123-20171113-story.html.

102 Keep American Beautiful, Inc., *supra* note 100.

103 *Id.*

104 E.I. du Pont de Nemours & Co., *Recycle*, HAGLEY DIGIT. ARCHIVES (July 19, 1990), https://digital.hagley.org/VID_1995300_B01_ID02.

105 *Id.*

& Gamble were becoming concerned with the deteriorating image of plastic products.[106] In response, the plastics industry began a $50 million-a-year advertisement campaign to promote the benefits of the material.[107]

A recent advertisement on PepsiCo's Recycling website demonstrates that industry is still pushing the narrative that recycling is the answer to the plastic problem.[108] In large font, the home page reads "SMALL ACTS = BIG IMPACT."[109] Below, PepsiCo writes, "Recycling is a simple act of goodness that connects us all together to shift towards a world where packaging need never become waste."[110] The underlying message is that consumer recycling is virtuous, easy, and a burden for consumers to bear. That message ignores the realities of the problem and oversimplifies recycling. First, it ignores the root issue that the producer initiates the plastic problem when it chooses to use an unsustainable material. The consequences that arise from that choice should thus fall on the producer,[111] especially one like PepsiCo that has consistently been titled a Top Three Global Polluter—"[a] parent compan[y] whose brands were recorded polluting the most places around the world with the greatest amount of plastic waste."[112] The PepsiCo recycling message also oversimplifies recycling by calling it "a simple act of goodness."[113] Recycling is neither

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106 Sullivan, *supra* note 32.

107 *Id.*

108 PEPSICO RECYCLING, https://www.pepsicorecycling.com/ (last visited Dec. 2, 2022).

109 *Id.*

110 *Id.*

111 *See* WORLD WILDLIFE FUND, EXTENDED PRODUCER RESPONSIBILITY (EPR) FOR PLASTIC PACKAGING 1 (2019), https://wwfeu.awsassets.panda.org/downloads/wwf_epr_position_paper.pdf (arguing for "Extended Producer Responsibility (EPR) as a critical policy tool with a track record to hold manufactures accountable for their plastic products and packaging's end-of-life impacts, as well as to encourage holistic ecodesign in the business sector").

112 BREAK FREE FROM PLASTIC, BRANDED VOL. III: DEMANDING CORPORATE ACCOUNTABILITY FOR PLASTIC POLLUTION 2 (2020), https://www.breakfreefromplastic.org/wp-content/uploads/2020/12/BFFP-2020-Brand-Audit-Report.pdf.

113 PEPSICO RECYCLING, *supra* note 108.

simple[114] nor an act of goodness.[115] Finally, the statement ignores the reality of PepsiCo's plastic use by alluding to a future "where packaging need never become waste."[116] As recycling processes currently stand, there is no potential for single-use plastics to have an infinite lifecycle; plastic packaging is destined to become waste.[117] These advertisements, constructed as propaganda, further contribute to the corporate deception surrounding plastics recycling.

V. SUCCESSFUL CONSUMER DECEPTION BY CORPORATIONS

In large part, companies' attempts at convincing consumers that they have an important responsibility to recycle plastics have been effective. A July 2021 survey conducted by the Paper and Packaging Board found that 88% of people who always or frequently recycle believe that "they are doing their part to save the planet."[118] This response indicates that most people who frequently recycle believe they have a duty to help remedy current environmental issues and that recycling fulfills that duty. Further, the study reveals some correlation between self-satisfaction and participating in recycling.[119] Nearly four in five people who do not always recycle reported feeling guilty about such behavior.[120] A Pew Research Center study found that 32% of U.S. adults admit they are highly bothered by people throwing items away that could be recycled.[121] Importantly,

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114 *See* discussion *supra* Part IV.A.
115 *See* discussion *infra* Part VI.
116 *Id.*
117 *See* discussion *supra* Part III.C.
118 *Survey Reveals Gap in Consumer Recycling Behavior, Knowledge*, MOD. MATERIALS HANDLING (Aug. 31, 2021), https://www.mmh.com/article/survey_reveals_gap_in_consumer_recycling_behavior_knowledge.
119 *Id.*
120 *Id.*
121 Monica Anderson, *For Earth Day 2017, Here's How Americans View Environmental Issues*, PEW RSCH. CTR. (Apr. 20, 2017), https://www.pewresearch.org/fact-tank/2017/04/20/for-earth-day-heres-how-americans-view-environmental-issues/.

such emotions may not be well-founded; as previously established, Americans' understanding of what is recyclable is incomplete at best.[122] Nonetheless, many Americans have placed some amount of trust in recycling, and it is worth questioning whether that trust does more harm than good.

VI. INTERNATIONAL HARM

The harm that U.S. plastic production poses to the environment and human health extends beyond the nation's borders. Once the U.S. was no longer able to export much of its plastic waste to China, it tried to find new destinations.[123] Those new destinations were primarily Southeast Asian countries.[124] Between 2016 and 2018, Southeast Asian imports of plastic waste "surged 171 percent to over two million tons, much of which was contaminated and unprocessable."[125] Although the U.S. may not be the sole contributor of that imported plastic, a Greenpeace report found that the U.S. is the world's biggest exporter of scrap as well as the top exporter of scrap and plastic waste to the Association of Southeast Asian Nations (ASEAN) region.[126] It also found that after China's National Sword policy, Malaysia, Thailand, Vietnam, and Indonesia remained the ASEAN region's largest importers of plastic waste, responsible for nearly 96% of plastic waste imports to Southeast Asia—but the amount of plastic that each of those countries imported had skyrocketed.[127] Each country imported at least 144,000 tonnes more scrap plastic in 2018 than in 2016, while Malaysia, taking the brunt of the plastic waste, imported an additional

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122 *See* discussion *supra* Part IV.A.
123 Joyce, *supra* note 61.
124 *Id.*
125 Aarushi Jain, *Trash Trade Wars: Southeast Asia's Problem With the World's Waste*, COUNCIL ON FOREIGN RELS. (May 8, 2020, 2:42 PM), https://www.cfr.org/in-brief/trash-trade-wars-southeast-asias-problem- worlds-waste#.
126 GREENPEACE, *supra* note 69, at 4, 7.
127 *Id.* at 5.

585,124 tonnes.[128] U.S. exports to Thailand jumped almost 7,000% in one year.[129] Similarly, U.S. exports to Malaysia increased by several hundred percent.[130]

Importantly, these are lower-income countries that lack the infrastructure to properly manage recyclables.[131] Environmental activist Stiv Wilson's visit to an Indonesian recycling plant after China implemented its National Sword policy aptly illustrates this infrastructure issue.[132] Wilson explained what happens after a paper factory separates out imported plastics: the plastics are "dumped in the neighboring community, and then the only way to get rid of it is to openly burn it . . . Air, water and land (are) all affected by this."[133] Many Thai residents are concerned about these practices.[134] A Thai activist from a province where many dumpsites are located lamented that the air, dust, and water pollution from imported waste "burdens the Thai people."[135] These fears are justified—the types of plastic waste the U.S. heavily exports lead to contaminated water supplies, illegal dumping and open-burning, killed crops, and respiratory illnesses.[136] In addition, attempts to export those plastics destroy local beauty when many of them indefinitely end up in communities' beaches, rivers, and fields.[137] Clearly, the by-product of Americans' consumerism has serious costs for ASEAN countries and other importers of

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128 *Id.*
129 Joyce, *supra* note 61.
130 *Id.*
131 Katz, *supra* note 58.
132 Joyce, *supra* note 61.
133 *Id.*
134 *Protesters Urge ASEAN Leaders to Ban Trash Imports*, PHYS ORG (June 21, 2019), https://phys.org/news/2019-06-protesters-urge-asean-leaders-trash.html.
135 *Id.*
136 Michael Taylor, *Imported Plastic Waste Is Destroying Asia's Crops and Health*, GLOB. CITIZEN (Apr. 23, 2019), https://www.globalcitizen.org/en/content/plastic-waste-asia-health-crops/.
137 Adele Shraiman, Ekaterina Mikhaylova & Hope de Rooy-Underhill, *The US' Environmental Obstructionism is Hurting the Planet — and Itself*, CTR. FOR INT'L ENV'T L. (Jan. 17, 2020), https://www.ciel.org/us-environmental-obstructionism-is-hurting-the-planet-and-itself/.

the U.S.' plastic waste.[138]

For those reasons, when wealthy nations began diverting significantly more plastic waste to Southeast Asia, Southeast Asian citizens and governments were overwhelmed. In June of 2019, people in Bangkok, Thailand protested plastic waste and called on Southeast Asian leaders to ban trash imports from developed nations.[139] Governments, including those of Vietnam, Thailand, and Malaysia, showed some resistance to plastic exporters by limiting their quantity of imports or setting dates for future bans on plastic waste imports.[140] For example, Thailand announced its intent to ban imported plastic waste by 2021, Malaysia and Vietnam stopped issuing new permits for importing plastic waste, and Vietnam cracked down on illegal shipments.[141] Countries like the Philippines and Malaysia have gone so far as to send plastic waste back to its country of origin.[142] Malaysia insisted that it would not be the "garbage dump" of the world.[143] When American corporations falsely push the narrative that recycling plastic works, they ignore these international communities' realities of living with plastic waste.

VII. OBSTRUCTING INTERNATIONAL LAW

A. BASEL CONVENTION

The volume of plastics exports from wealthy nations, particularly from the United States, is more than unprincipled—in many cases, the exports now violate international

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138 Zuhaina Zakaria et al., *Is it right to see pollution as an inevitable by-product of sustainable economic growth? Analyzing impact of water, plastic and air pollution for ASEAN countries*, 10 J. SEC. & SUSTAINABILITY ISSUES 206, 206 (2020).

139 *Protesters urge ASEAN leaders to ban trash imports*, *supra* note 134.

140 GREENPEACE, *supra* note 69, at 3.

141 *Id.*

142 *Id.*; Rob Picheta, *Malaysia has sent back tons of plastic waste to rich countries, saying it won't be their 'garbage dump'*, CNN (Jan. 20, 2020, 11:04 AM), https://www.cnn.com/2020/01/20/asia/malaysia-plastic-waste-return-scli-intl/index.html.

143 Picheta, *supra* note 142.

standards.[144] A treaty titled the "Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal" was enacted in 1989 for the promotion of environmentally sound management of hazardous wastes, especially in developing countries.[145] The Convention consists of 188 parties; although the United States has signed the Convention, it has never ratified the agreement.[146] In response to the growing plastics crisis, the United Nations Environment Programme amended the Basel Convention to alter and include entries on plastic waste.[147] The plastic scrap and waste amendments took effect on January 1, 2021.[148]

Unlike the original Convention, the amendments specifically focus on exports and imports of plastic scrap and waste.[149] The strict limits are indicative of a global consensus to curb trade in plastic waste.[150] The standout element of the amendments is its prior notice and consent provision, whereby "transboundary movements of most plastic scrap and waste to countries party to the Convention are allowed only with the prior written consent of the importing country and any transit countries."[151] Prior notice and consent is not required for plastic scrap that is "pre-sorted, clean, uncontaminated, and destined for recycling in an

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144 Hiroko Tabuchi & Michael Corkery, *Countries Tried to Curb Trade in Plastic Waste. The U.S. Is Shipping More.*, N.Y. TIMES (Mar. 12, 2021), https://www.nytimes.com/2021/03/12/climate/plastics-waste-export-ban.html.

145 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Mar. 22, 1989, 1673 U.N.T.S. 57.

146 *Basel Convention on Hazardous Wastes*, U.S. DEP'T OF STATE, https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/basel-convention-on-hazardous-wastes/ (last visited Dec. 2, 2022).

147 *New International Requirements for the Export and Import of Plastic Recyclables and Waste*, Env't Prot. Agency, https://www.epa.gov/hwgenerators/new-international-requirements-export-and-import-plastic-recyclables-and-waste#fqs (last updated June 22, 2022) [hereinafter *New International Requirements*].

148 *Id.*

149 *Id.*

150 Tabuchi & Corkery, *supra* note 144.

151 *New International Requirements*, *supra* note 147.

environmentally sound manner." [152] However, most non-hazardous plastics in the United States cannot meet the demanding criteria[153] and thus still require prior notice and consent, as does hazardous waste.[154] Importantly, Convention-controlled plastic scrap and waste trade is prohibited between Parties (countries that have ratified the Convention) and non-Parties unless there is a separate agreement between the countries that satisfies the Convention.[155] For most scrap plastic the United States wishes to ship to a Convention Party, it must notify and receive that country's consent as well as the transit countries' consent.[156] If the United States fails to do this, and has no separate agreement in place that satisfies the Convention's criteria, it effectively ignores the purpose of the Basel Convention.[157]

There is evidence that the United States has indeed been blatantly ignoring the Convention's amendments and thus disregarding more than 185 nations' commitments to limit exports of plastic waste from richer countries to poorer ones.[158] After the amendments took effect in January 2021, the United States' overall scrap plastic exports actually rose, though exports to poorer nations stayed relatively the same.[159] Environmental watchdog

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152 *Id.* (explaining Basel listing B3011).

153 *See* Milman, *supra* note 60 (addressing China's criteria for plastic imports, rather than those of the Basel Amendments, but stating that the lesser standard of "clean and unmixed" is too difficult for most American cities to meet).

154 *New International Requirements*, *supra* note 147.

155 *Id.*

156 *See International Agreements on Transboundary Shipments of Hazardous Waste*, Env't Prot. Agency, https://www.epa.gov/ hwgenerators/international-agreements-transboundary-shipments-hazardous-waste (last updated Nov. 1, 2022). Notice and consent will almost always be required because the U.S. has only established separate agreements for importing and exporting waste with Canada, Mexico, Costa Rica, Malaysia, and the Philippines. *Id.* The agreements with Costa Rica, Malaysia, and the Philippines allow the U.S. to *receive* waste for recycling or disposal, but the U.S. may not *export* waste to the countries. *Id.*

157 *Id.*

158 Tabuchi & Corkery, *supra* note 144.

159 *Id.*

groups interpret this data as evidence that American exporters are ignoring the new rules.[160] According to the EPA, compliance with the new international law would have "significant impacts" on exports and imports of United States' plastic recyclables—yet the trade data above does not reflect any such "significant impacts."[161]

American companies have argued that because the United States did not ratify the Basel Convention, nothing prohibits it from exporting its waste.[162] However, that interpretation directly conflicts with the EPA's interpretation of the amendments: The EPA states that "U.S. exports and imports of non-hazardous plastic scrap and waste are subject to applicable laws and regulations in the country or countries that control the waste, as well as any applicable international agreement, such as the Basel Convention."[163] The scrap industry makes a different argument, claiming both that it is likely in compliance with the new rules and that the increase of exported plastic is a reflection of growing international demand for plastic to recycle.[164] Although these claims are more plausible than the broad argument that the United States has no obligation to comply, they are unsupported by the facts. The vast number of Party countries instead reflects a widespread desire to *decrease* global demand for plastic waste—as do growing citizen outrage and the plastic-returning phenomena described above.[165]

Some recycling companies claim they are following the rules and regulations by exporting clean and pre-sorted scrap.[166] These claims imply that the companies' scrap falls

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160 *Id.*
161 *New International Requirements*, *supra* note 147.
162 Tabuchi & Corkery, *supra* note 144.
163 *New International Requirements*, *supra* note 147.
164 Tabuchi & Corkery, *supra* note 144.
165 *See supra* Part VI.
166 *Id.*

under the Convention criteria that exempt prior notice and consent.[167] But as the EPA notes, "Plastic scrap must meet a very narrow and strict set of criteria . . . to not be subject to . . . prior notice and consent requirements."[168] As described above, such plastic would need to be "pre-sorted, clean, uncontaminated, and destined for environmentally sound recycling"—a near impossible feat.[169] Other plastic shipments from the United States have exhibited more blatant violations.[170] For example, a shipment of PVC plastic left New Jersey in February 2021 for India, a Convention Party; because the Convention restricts PVC trade, the shipment was in violation of the Convention.[171]

Because the United States is not a Convention Party, there is no real enforcement mechanism to bring companies into compliance with the amendments.[172] However, if the American public were aware of this form of environmental obstructionism, perhaps it would alter its consumer behavior or loudly demand change, such as ratification of the Basel Convention or less plastic packaging.

B. INTERNATIONAL HUMAN RIGHTS

Consistent with its designation as a serious human rights violator,[173] the United States' plastic problem and recycling failures conflict with human rights. International human rights law is made up of treaties and supplemental instruments that set standards for

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167 *New International Requirements*, *supra* note 147.
168 *Id.*
169 *Id.*
170 Tabuchi & Corkery, *supra* note 144.
171 *Id.*
172 *See generally Implementation & Compliance Committee*, BASEL CONVENTION, http://www.basel.int/TheConvention/ImplementationComplianceCommittee/Overview/tabid/2868/Default.aspx (last visited Dec. 2, 2022) (stating that the Convention's Implementation and Compliance Committee shall review general issues of compliance for *Party countries*).
173 Doug Cassel, *The United States and Human Rights Treaties: Can We Meet Our Commitments?*, 41 HUM. RTS. 5, 7 (2015).

civil, political, economic, cultural, and social rights that all humans should enjoy.[174] Like the Basel Convention, States must voluntarily ratify the treaties before they are bound to respect them.[175] Of the eighteen main human rights instruments, the United States has only ratified five—fewer than almost every other nation in the world.[176] Although the United States is not formally bound by many human rights treaties, its actions are nevertheless performed on a global stage. Right now, there is an evolving school of thought—like that behind the Basel Convention amendments—that humans are entitled to a healthy environment and that the plastic crisis infringes on that right.[177] Current United States actions apparently disregard that notion.

In 2021, the United Nations presented a thematic report to the UN General Assembly on the lifecycle of plastics and human rights.[178] The UN's Special Rapporteur on toxins and human rights stated that "the plastics crisis is of a global magnitude and affects a broad range of human rights, including the rights to life, health, science, housing, and a healthy environment."[179] In discussing the plastics crisis, the Special Rapporteur also

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174 *International Human Rights Law*, U.N. HUM. RTS. OFF. OF THE HIGH COMM'R, https://www.ohchr.org/en/instruments-and-mechanisms/international-human-rights-law (last visited Dec. 2, 2022).

175 *Id.*

176 *Status of Ratification Interactive Dashboard*, U.N. HUM. RTS. OFF. OF THE HIGH COMM'R, https://indicators.ohchr.org (last visited Dec. 2, 2022). The five treaties the United States has ratified are: International Convention on the Elimination of All Forms of Racial Discrimination; International Covenant on Civil and Political Rights; Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment; Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict; and Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography. *Id.*

177 *Access to a healthy environment, declared a human right by UN rights council*, U.N. (Oct. 8, 2021), https://news.un.org/en/story/2021/10/1102582; *Call for submission, "The lifecycle of plastics and human rights" Mandate of the Special Rapporteur on toxics and human rights*, U. N., https://www.ohchr.org/en/special-procedures/sr-toxics-and-human-rights/call-submission-lifecycle-plastics-and-human-rights-mandate-special-rapporteur-toxics-and-human (last visited Dec. 2, 2022) [hereinafter *Mandate of the Special Rapporteur*].

178 *Mandate of the Special Rapporteur*, *supra* note 177.

179 *Id.*

noted that plastic production continues to grow despite increased attention to the need to address "false solutions of recycling."[180] Ultimately, the Special Rapporteur called for a rights-based approach to the lifecycle of plastics: "transparency, participation, access to adequate information[,] and effective remedy are critical to effective long-term strategies to reduce the negative impacts of plastics on human rights."[181] Currently, transparency and consumer access to adequate information are absent from the plastic recycling process in the United States.[182] U.S. corporations, through misleading advertisements and deceptive symbols, defy a rights-based approach and thus advance activity whereby plastics undermine human rights.[183]

The Human Rights Council also recognized a new human right in 2021: access to a safe, clean, healthy, and sustainable environment.[184] The Council made a global call for States to collaborate and implement the newly recognized right.[185] If the United States wants to acknowledge the Council's call, it could begin by making the plastic and recycling industries more transparent, as the UN's Special Rapporteur suggested.[186] As discussed above, the United States' disposal of plastics is a threat to clean and healthy environments globally.[187]

There is evolving global sentiment—embodied in the Basel Convention amendments, human rights reports, and a newly declared human right—that environmental

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180 *Id.*
181 *Id.*
182 *See supra* Parts IV-V.
183 *See id.*
184 *Mandate of the Special Rapporteur*, *supra* note 177.
185 *Id.*
186 *Id.*
187 *See supra* Part VI.

degradation, especially by single-use plastics, harms human rights.[188] Governments and corporations in the U.S. are functioning in opposition to that global sentiment by increasing production and unsustainably disposing of a material that poses risks to the environment and human health, all the while misleading the public about those realities.[189]

VIII. A FULL PICTURE OF THE PROBLEM

In plain terms, consumers have been duped to believe that recycling plastics is highly effective and largely beneficial.[190] The recycling industry has placed Codes on plastic products that indicate nothing about their recyclability, but still suggest to consumers that they are recyclable.[191] Companies have created advertisements that similarly imply recycling is a straightforward consumer responsibility.[192] Yet, the evidence contradicts the message that corporate America is sending to consumers.[193] It says that the efficacy of recycling plastics is less than 9% because of cost, sorting, degradation, and market obstacles.[194] It says that the United States' recyclers burden other nations, particularly those in Southeast Asia, with their plastic waste, causing health and environmental issues in those countries.[195] In doing so, they run afoul of international law and international human rights.[196]

The majority of Americans report participating in recycling, viewing recycling as a duty, and associating recycling participation with some level of morality.[197] The story told

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188 *See supra* Parts VII.A–B.
189 *See supra* Parts II–VI.
190 *See* supra Part V.
191 *See supra* Part IV.A.
192 *See supra* Part IV.B.
193 *See supra* Part III.
194 *Id.*
195 *See supra* Part VI.
196 *See supra* Part VII.
197 *See* supra Part V.

to consumers about recycling is directly at odds with actual recycling practices—and consumers, blamelessly, buy into the narrative.[198] This sort of deception provides a landscape for uninformed consumer behavior.

When recycling's efficacy is overstated, the benefits of tossing single-use plastics in a blue bin may seem higher to consumers than the costs. However, the 9% efficacy rate of recycling plastics[199] compared to its high social cost—extensive international harm[200]—suggests otherwise. Seemingly, overselling recycling interferes with consumers' ability to make reasoned purchases.

As an attorney for the Center for International Environmental Law aptly stated, when Americans "learn that their waste ends up in fields in Malaysia, or openly burned in Indonesia or Vietnam, it's not going to sit very well."[201] The comment's underlying premise is that consumers are not aware of the true harms of recycling, and if they were, they would alter their behaviors. Although there is an argument that *too much* information prohibits consumers from making rational choices,[202] that theory does not negate efforts to eliminate *misleading* information. There are potential solutions to the above issues focused on remedying recycling itself,[203] but until those solutions come to fruition, consumers should not be misled about the true costs and benefits of recycling plastics.

The remainder of this Note discusses the inadequacies of existing laws that address, or fail to address, deceptive recycling practices. It then proposes a federal truth-in-

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198 *See supra* Parts IV and V.
199 *Plastics: Material-Specific Data*, *supra* note 12.
200 *See supra* Part VI.
201 Tabuchi & Corkery, *supra* note 144.
202 Karen Bradshaw Schulz, *Information Flooding*, 48 IND. L. REV. 755, 755 (2014).
203 *See* LEWIS AKENJI ET AL., PLASTIC WASTE AND RECYCLING 281–443 (Trevor M. Letcher ed., 2020).

advertising remedy modeled on California's recent law SB-343, but demands even more transparency from corporations.

IX. FINDING A SOLUTION

A. FEDERAL TRADE COMMISSION'S ROLE

Presently, there is no comprehensive federal regulation that specifically governs the recycling symbol. The only federal oversight available to address related deceptive practices is through Federal Trade Commission (FTC) consumer protection law.[204] Under § 5(a) of the FTC Act, the Commission has enforcement authority to remedy actions that unlawfully deceive consumers.[205] The section reads as follows: "unfair or deceptive acts or practices in or affecting commerce . . . are . . . declared unlawful."[206] Further, "deceptive practices" are defined as those "involving a material representation, omission[,] or practice that is likely to mislead a consumer acting reasonably in the circumstances."[207] Seemingly, a symbol on the bottom of a product that includes the universal recycling symbol within it, but indicates nothing about the recyclability of the product, would be a "material representation . . . likely to mislead a consumer acting reasonably in the circumstances."[208] If a consumer incorrectly believes a plastic product is recyclable, they may be more inclined to purchase the product and dispose of it in a recycling bin. At scale, such misrepresentations harm environments globally.[209]

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204 15 U.S.C. § 45.

205 *A Brief Overview of the Federal Trade Commission's Investigative, Law Enforcement, and Rulemaking Authority*, FED. TRADE COMM'N, https://www.ftc.gov/about-ftc/mission/enforcement-authority (last updated May 2021).

206 15 U.S.C § 45(a)(1).

207 *A Brief Overview of the Federal Trade Commission's Investigative, Law Enforcement, and Rulemaking Authority*, *supra* note 205.

208 *Id.*

209 *See supra* Part VI.

Yet, the FTC's Green Guides suggest that such a practice would not constitute a deceptive recyclability claim.[210] The Green Guides, last updated in 2012, were created to help marketers ensure their claims are true and substantiated, in accordance with § 5 of the FTC Act.[211] Although the Guides are not binding and do not have the force and effect of law, they provide instructive examples of "green" claims, including recyclability, that could be brought under § 5.[212] The recyclability section states that "a product or package should not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item."[213] Below is an example from the same section of the Guides that seems to narrow the above consumer protection:

> Example 2: A nationally marketed plastic yogurt container displays the Resin Identification Code (RIC) (which consists of a design of arrows in a triangular shape containing a number in the center and an abbreviation identifying the component plastic resin) on the front label of the container, in close proximity to the product name and logo. This conspicuous use of the RIC constitutes a recyclable claim. Unless recycling facilities for this container are available to a substantial majority of consumers or communities, the manufacturer should qualify the claim to disclose the limited availability of recycling programs. If the manufacturer places the RIC, without more, in an inconspicuous location on the container (e.g., embedded in the bottom of the container), it would not constitute a recyclable claim.[214]

At first glance, the example suggests that § 5 of the FTC Act provides some level of protection to consumers from companies who place RICs on products that are not widely recyclable, and who fail to disclose that. However, the latter half of the example reveals

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210 *Green Guides*, FED. TRADE COMM'N, https://www.ftc.gov/legal-library/browse/rules/green-guides (last visited Dec. 3, 2022).
211 *Id.*
212 *Id.*
213 16 C.F.R. § 260.12 (2022).
214 *Id.* § 260.12(d).

that the protection is limited to scenarios where the Codes are not "in an inconspicuous location on the container."[215] Considering that many RICs are placed on the bottom of plastic products ("an inconspicuous location"), the Act effectively gives corporations the go-ahead to place an arguably deceptive symbol on their products.[216] Some suggest that placement on the bottom of the product is less likely to influence consumers' buying decisions, but that argument seems suspect.[217] The surveys cited above reveal that consumers already have perceptions of the Codes—specifically that they indicate recyclability.[218] If the majority of Codes are placed on the bottom of products to avoid lawsuits against the company, consumers attempting to be "environmentally friendly" would know to reference the bottom of a product, and would then still be deceived. It seems that making a consumer protection claim against companies utilizing the Codes deceptively under § 5 will most often be futile.

More importantly, FTC claims are unable to overhaul deceptive practices concerning recycling plastics at large. Consumer protection law can remedy individual cases of recyclability deception by a single company on a single product. However, the sheer number of plastic products nationwide tagged with chasing arrows or an RIC makes FTC enforcement at-scale infeasible. The more effective and judicially efficient approach to protecting consumers from deceptive marketing that implies recyclability is to target state legislation.

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215 *Id.*
216 *Id.*
217 *Resin Identification Code (RIC)*, STOP WASTE, http://guides.stopwaste.org/packaging/avoiding-pitfalls/resin- identification-code# (last visited Dec. 3, 2022).
218 CONSUMER BRANDS ASS'N, *supra* note 95.

B. STATE LEGISLATION

Thirty-nine states *require* the Resin Identification Code and chasing arrows symbol on rigid plastics, plastic bottles, or both.[219] As discussed above, plastic and oil executives lobbied state governments to mandate that the Codes appear on plastics in the late 1980s.[220] The American National Standards Institute did alter the Codes in 2013 by eliminating the chasing arrows to "limit any misplaced associations of RICs with recycling codes."[221] However, no states made major changes to eliminate the mandated chasing arrows until 2021.[222]

In May 2021, the state of Washington removed its mandate that plastic bottles and rigid plastic containers be labeled with the chasing arrows symbol under SB 5022.[223] In August of that year, Oregon rescinded its provisions that required the chasing arrows symbol and RICs to appear on plastic containers under SB 582.[224] Although these changes mark progress, they only eliminate the mandate that such symbols be required; they do not *ban* the symbol on any plastic products.[225]

In October 2021, California became the first state to restrict the use of the chasing arrows symbol by passing SB 343.[226] The bill bans corporations from pasting the chasing arrows symbol on products or packaging that do not meet certain recycling criteria.[227] To

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219 Clare Goldsberry, *ASTM Plastics Committee Revises Resin ID Code*, PLASTICS TODAY (Mar. 4, 2020), https://www.plasticstoday.com/recycling/astm-plastics-committee-revises-resin-id-code.

220 Sullivan, *supra* note 32.

221 Kelechava, *supra* note 83.

222 *See* Alex Bertolucci, State of Or. Dep't of Env't Qualtiy, *Recycling Labeling Laws Today - Truth In Labeling Task Force*, STATE OF OR. DEP'T OF ENV'T QUALITY, https://www.oregon.gov/deq/recycling/Documents/ recTILlawsToday.pdf (last visited Dec. 3, 2022).

223 S.B. 5022, 67th Leg., Reg. Sess. (Wash. 2021).

224 S.B. 582, 81st Or. Leg. Assemb., Reg. Sess. (Or. 2021).

225 *Id*; S.B. 5022, 67th Leg., Reg. Sess. (Wash. 2021).

226 S.B. 343, 2021 Leg., Reg. Sess. (Cal. 2021).

227 Tabuchi & Choi-Schagrin, *supra* note 28.

be considered recyclable for purposes of using the symbol, there must be a viable end market by which the product is actually turned into new products.[228] In addition, the plastic must meet design criteria, including the absence of toxic chemicals.[229] California State Senator Ben Allen described the bill as a "basic truth-in-advertising concept," implying that the symbol often acts as false advertising.[230] The bill received great support from environmental organizations like Greenpeace, whose oceans campaign director said, "[the] bill is a huge step in ending 'greenwashing' about plastic recycling."[231] California is not the only state to introduce such a bill. Bill A7668 is pending in New York and, if passed, would likewise eliminate the chasing arrows from non-recyclable products.[232] A potential outcome of these bills is that once consumers realize their plastic products are not being recycled, they will demand less or alternative packaging.

Certainly, California has offered a potential model for states to take the first step toward combating corporations' deceptive recyclability claims. The bill's criminal liability element puts new, severe pressure on corporations to label products in ways that more accurately reflect their recyclability.[233] If the law is heavily enforced, it seems likely that the chasing arrows will no longer appear on products that do not have a real chance of being recycled.

However, the law does nothing to prohibit the updated RICs from appearing on

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228 *Id.*
229 *Id.*
230 *Id.*
231 Irina Ivanova, *States take aim at ubiquitous "chasing arrow" symbol on products that aren't recycled*, CBS NEWS (Sept. 14, 2021), https://www.cbsnews.com/news/recycling-symbol-false-advertising-california-oregon-new-york/.
232 Assemb. B. A7668, 2021–2022 Leg., Reg. Sess. (N.Y. 2021).
233 *See* S.B. 343, 2021 Leg., Reg. Sess. (Cal. 2021).

unrecyclable plastic products.[234] As detailed above, the new Codes still use an equilateral triangle with a number from one to seven inside and an abbreviation below; the only difference is that the triangle is not broken up by three small arrows.[235] Presumably, from the consumer's perspective, the meaning of the symbol has not changed. Because almost 70% of consumers believe the Codes indicate recyclability,[236] there is reason to worry that the erroneous perception will remain even if the chasing arrows are removed. If corporations choose to abide by California's new law by simply replacing old RICs with the newer version, consumers may continue to be deceived. In sum, while the absence of chasing arrows on unrecyclable plastic products is progress, it might not lead to consumers pressuring companies for more meaningful change. If consumers continue to be confused or misled by RICs, the bill will not inspire consumers to demand more sustainable packaging.

Instead, state legislation could either eliminate *all* misleading information or provide instructive information to supplement RICs. To eliminate all misleading information, legislation would need to ban all RICs from plastic products. The purpose of the Codes are to communicate information to recycling centers, not consumers.[237] Further research should be conducted to develop methods by which the same information could be provided by producers to recyclers without involving the consumer. Alternatively, instructive language could accompany the Codes for clarification. That language might read: "this code does not indicate recyclability." This type of disclaimer requires no

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234 *Id.*
235 Kelechava, *supra* note 83.
236 CONSUMER BRANDS ASS'N, *supra* note 95.
237 *See* Kelechava, *supra* note 83, at 6.

interpretation or analysis from the consumer; it merely clarifies that the symbol is not linked to recyclability. Either proposal—total elimination or supplemental information—would likely avoid consumer confusion more effectively than California's new bill. Without such confusion, consumers may stop purchasing plastics or more loudly demand that companies find alternatives.

C. FEDERAL LEGISLATION

Alternatively, Congress could enact federal legislation that bans the continued production of single-use plastic products that have functional alternatives. Such federal action is not only bolder and broader than state legislation focused on deceptive recycling symbols, but it also recognizes the difficulty of addressing the plastics crisis without first turning off the plastic tap. Because the sheer quantity of single-use plastics waste is already unmanageable[238] and it is estimated that plastic production will double within the next twenty years,[239] the most sensible action would be to address the root of the problem (plastic production), as opposed to perpetuating failed solutions (like plastic recycling).

In March 2021, a bill titled the "Break Free From Plastic Pollution Act of 2021" was introduced in the Senate.[240] If enacted, the bill would, among other changes, reduce throwaway plastics, enact producer responsibility, and pause new or expanded plastic production.[241] This bill, or one like it, would provide the federal government an opportunity to finally take action in combating the plastics crisis.

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238 *See* Alabi et al., *supra* note 15.

239 Lebreton & Andrady, *supra* note 22, at 2.

240 Break Free From Plastic Pollution Act of 2021, S. 984, 117th Cong. (2021). The bill was introduced in the Senate on March 25, 2021. Four days later, it was referred to the Subcommittee on Environment and Climate Change. There does not appear to have been any action since that referral.

241 *See #breakfreefromplastic Pollution Act*, BREAK FREE FROM PLASTIC MOVEMENT, https://www.breakfreefromplastic.org/pollution-act/ (last visited Dec. 3, 2022).

X. CONCLUSION

Transparency is absent from the narrative surrounding the single-use plastics crisis and the false solution of recycling. People are incorrectly instructed—whether predicated on morality, environmental conscientiousness, or responsible consumerism—that recycling is a remedy to the overwhelming plastic waste problem. Consumers lack the privilege of full information. And transparency makes a difference—people respond to or maintain the status quo based on their wealth of information.[242] There is a growing movement of people eschewing single-use plastics precisely because they have acquired the knowledge that single-use plastics are functionally non-recyclable and to pretend otherwise just compounds the problem.[243]

To be clear, this Note is not a call to consumers to stop recycling. Recycling materials other than plastic is largely beneficial and there are a small number of plastic products that can be recycled once or twice.[244] Rather, it is intended as a source of information that consumers may use to determine if and how they will continue to purchase items packaged or made with plastic.

Individual consumers who choose to alter their behaviors by responding to accurate information will not end the plastics crisis on their own. But, ideally, their thoughtful behaviors—purchasing fewer plastics, supporting companies that act conscientiously, et cetera—would signal a public willingness for larger change. Consequently, companies,

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242 *See* Iris Vermeir & Wim Verbeke, *Sustainable Food Consumption: Exploring the Consumer "Attitude – Behavioral Intention" Gap*, 19 J. AGRIC. & ENV'T ETHICS 169, 174–75 (2006).

243 Steven Kurutz, *Life Without Plastic Is Possible. It's Just Very Hard.*, N.Y. TIMES (Feb. 16, 2019), https://www.nytimes.com/2019/02/16/style/plastic-free-living.html.

244 *Recylcing Basics*, *supra* note 27; Ritchie, *supra* note 36.

state legislatures, and Congress would be forced to respond. Perhaps this response would take the form of states requiring the removal of Resin Identification Codes from plastic products, Congress banning continued production of single-use plastics, or the United States ratifying the Basel Convention. Regardless, if any of these actions are pursued, it will represent an acknowledgement that the plastics problem deserves attention and that the principal remedy to date—recycling plastics—has failed.

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The Energy Capital of the World and Environmental Justice: Citizen Suits in Houston

By Blake Welborn

I. INTRODUCTION

This Note will explore the use of citizen suits authorized by the Clean Air Act as a tool in the arsenal of the environmental justice movement.[1] It will look specifically at Houston and the litigation spawned from *Environment Texas Citizen Lobby, Inc. v. ExxonMobil Corp.* to illustrate the difficult and confusing landscape surrounding citizen suits—particularly when it comes to satisfying the standing requirement.[2]

This Note will proceed as follows: Part Two of this paper discusses Houston, including its history, demographics, and racial stratification. It also discusses environmental justice, both generally and with specific regard to Houston. This paints a picture as to why the jumbled-up thorniness of the current standing doctrine for citizen suits and environmental law must be clarified. Part Three will discuss citizen suits as a legal doctrine and legal practice, paying special attention to the standing requirement for bringing such a suit. Finally, Part Four examines the almost decade-worth of litigation stemming from *Environment Texas.* It briefly describes the trio of cases filed by Environment Texas and the Sierra Club, looks in depth at the Fifth Circuit's most recent decision, and urges the Fifth to reject a but-for test for traceability and instead embrace an outlook that acknowledges the right of communities to bring citizen suits.

II. HOUSTON AND THE ENVIRONMENTAL JUSTICE MOVEMENT

A. DEMOGRAPHICS

Houston is the fourth-largest city in the United States and home to 2.3 million

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1 *See* 42 U.S.C. § 7604.

2 *See* Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 66 F. Supp. 3d 875, 882 (S.D. Tex. 2014), *vacated and remanded*, 824 F.3d 507 (5th Cir. 2016).

residents.[3] It has large foreign-born and minority populations, imbuing it with rich cultural and linguistic diversity.[4] It is a city known for its nightlife and world-class dining, both of which are built on a bedrock of this diversity.[5] Despite its diversity—or more likely because of it—Houston is also incredibly segregated.[6] Decades of redlining[7] and other discriminatory housing practices have created stark boundaries in the city, such that its non-White and poorest residents live in neighborhoods that bear the brunt of health and environmental hazards.[8] These disparities play out in the lives of Houstonians in dramatic ways: where you live in Houston affects the quality of education you receive, how much money you make, and how likely you are to develop illnesses, including cancer.[9] Even your life expectancy is correlated with your zip code.[10]

B. A CITY WITH NO ZONING

Houston is famously known for having no zoning laws.[11] This is generally a point of pride for Houstonians—it creates neighborhoods interspersed with structures and

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3 *Houston Quick Facts*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/fact/table/houstoncitytexas/ POP010220 (last visited Dec. 20, 2022).

4 *See id.*

5 *See About Houston*, CITY OF HOUS., https://www.houstontx.gov/abouthouston/ (last visited Dec. 20, 2022).

6 *See* Nate Silver, *The Most Diverse Cities Are Often The Most Segregated*, FIVETHIRTYEIGHT (Sept. 24, 2021), https://fivethirtyeight.com/features/the-most-diverse-cities-are-often-the-most-segregated/ #fn-1.

7 *Exploring the Legacy of Redlining in Houston*, UNDERSTANDING HOUS. (Feb. 10, 2021), https://www.understandinghouston.org/blog/legacy-of-redlining-in-houston. Redlining was a practice used in Houston and most American cities where bankers drew red lines around Black neighborhoods and refused to finance homes in those areas. *Id.* Black families were left out of the wealth-building brought by owning a home. *Id.* Even though this process was outlawed in 1968, its scars are still felt in communities around the U.S. where Black people have been relegated to the least desirable tracts of urban areas. *Id.*

8 *Id.*

9 *Id.*

10 *Id.*

11 Allison Shertzer, Tate Twinam, Randall P. Walsh, *Zoning and the Economic Geography of Cities*, 105 J. URB. ECON. 20, 32 (2018). This is not entirely true, though. While Houston may not have specific municipal zoning restrictions, it employs a wide variety of land use strategies that seem to elude a comparison to another city or specific definition. *Id.*

developments one might not expect[12]—but this attitude belies how the practice plays out. Zoning regulations exist largely to keep undesirable developments (i.e. pollution-producing facilities) far away from residential areas.[13] Without these regulations, industry and its pollution creeps into neighborhoods.[14]

Without formal zoning laws, industry has thrived in Houston as facilities can be built almost anywhere.[15] However, this comes at a cost: 65% of Houstonians live within one mile of a facility that releases toxins into the air, a rate higher than any other city in Texas.[16] This disparity, like so many others in Houston, has played out along racial boundaries. Non-White Houstonians experience higher levels of particulate matter in their neighborhoods, which has been linked to higher levels of COPD and adult asthma.[17] Figure 1 illustrates the racial boundaries of Houston and the placement of toxic facilities.[18] The realities of Houston's lack of zoning are apparent in this map, where the vast majority of toxic facilities are in majority non-White neighborhoods.

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12 *See* Adam Zuvanich, *Let's Take Long, Hard Look at Zoning Laws*, THE LEADER (Feb. 10, 2021), https://www.theleadernews.com/opinion/lets-take-long-hard-look-at-zoning-laws/article_6bbd0900-665c-11eb-8984-d7715cfa0139.html; *see also* Fernando Ramirez, *The Weirdest Images to Come from Houston's Lack of Zoning Laws*, CHRON. (Jan. 8, 2020), https://www.chron.com/news/ houston-texas/houston/article/Weirdest-images-from-Houston-s-lack-of-zoning-laws-9171688.php.

13 *See* Shertzer et al., *supra* note 11, at 28.

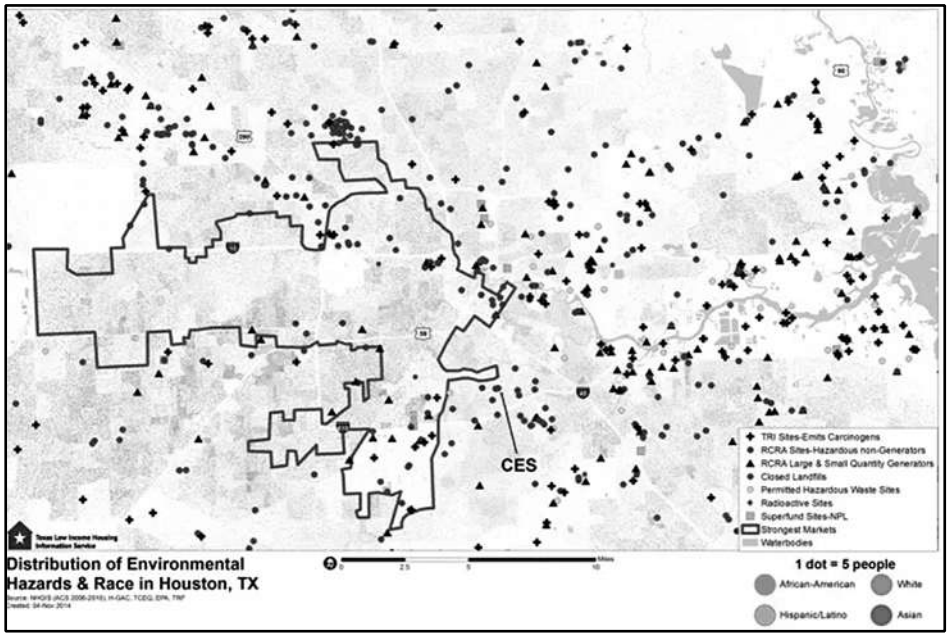
14 *See id.* at 34.

15 *See* James D. Saltzman, *Houston Says No to Zoning*, FOUND. FOR ECON. EDUC. (Aug. 1, 1984), https://fee.org/articles/houston-says-no-to-zoning/.

16 *See* Shertzer et al., *supra* note 11, at 28. This is over 20% more than the next closest city, San Antonio, which has zoning laws. *Id.*

17 *See* Jin-Zhun Wu et al., *Effects of Particulate Matter on Allergic Respiratory Diseases*, 4 CHRONIC DISEASES & TRANSNAT'L MED. 95, 96 (2018); *see also* JinzhunWu et al., *Effects of Particulate Matter (PM) on Childhood Asthma Exacerbation and Control in Xiamen, China*, 19 BMC PEDIATRICS (2019).

18 *See EPA Hears Testimony on Civil Rights and Environmental Injustice in Houston*, TEX. HOUSERS, (Jan. 13, 2016) https://texashousers.org/2016/01/13/epa-hears-testimony-on-civil-rights-and-environmental-injustice-in-houston/.



C. AN INTRODUCTION TO ENVIRONMENTAL JUSTICE

Though the concept of environmental justice may appear nebulous, it is simply a response to environmental racism, which:

> Refers to the institutional rules, regulations, policies or government and/or corporate decisions that deliberately target certain communities for locally undesirable land uses and lax enforcement of zoning and environmental laws, resulting in communities being disproportionately exposed to toxic and hazardous waste based upon race. Environmental racism is caused by several factors, including intentional neglect, the alleged need for a receptacle for pollutants in urban areas, and a lack of institutional power and low land values of people of color.[19]

The acknowledgement of environmental racism is not a new phenomenon, especially in Houston. Dr. Robert Bullard, heralded as the "father of environmental justice," pointed out some of these injustices in 1978.[20] As a researcher at Texas Southern

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19 *Environmental Justice & Environmental Racism*, GREENACTION, https://greenaction.org/what-is-environmental-justice/ (last visited Nov. 11, 2022).

20 Robert D. Bullard, *The Mountains of Houston: Environmental Justice and the Politics of Garbage*, 93 CITE 28, 28–33 (2014). Environmental racism and responses to it did not begin in 1978, but rather Dr. Bullard's 1978 study was one of the first instances where these realities, that people of color had been living with for centuries, was formally put into a study.

University, Bullard was commissioned to conduct a survey of landfills in Houston for a class-action lawsuit brought under the Civil Rights Act.[21] The citizens of Northwood Manor, 82% of whom were Black, sued the City of Houston, the State of Texas, and Browning Ferris Industries, alleging that the city's systematic placement of landfill facilities in majority Black neighborhoods violated the Civil Rights Act.[22] Bullard's pioneering study found that even though Houston's population was just over 25% Black, all five of the city landfills and six of the eight incinerators were located in Black neighborhoods.[23] Bullard remarked that Houston's Black neighborhoods had been "unofficially zoned for garbage."[24] The citizens of Northwood ultimately lost their case, but Bullard's study served as a foundation for environmental justice research and litigation in Houston and beyond.[25] As Texas' energy and industrial sectors have continued to boom in recent decades, Houston has become internationally recognized as a site for petrochemical development, raising a host of new environmental justice concerns.

D. "THE ENERGY CAPITAL OF THE WORLD"

Houston is often referred to as the "Energy Capital of the World," and for good reason.[26] It's home to nearly a third of the Nation's oil and gas extraction jobs, 4,600 energy-related firms, and more engineers than any other metroplex in the United States.[27]

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21 *Id*. at 28.
22 *Id*.
23 *Id*.
24 *Id*. at 30.
25 *See, e.g.*, Robert D. Bullard et al., *Toxic Wastes and Race at Twenty: Why Race Still Matters After All of These Years*, 38 ENV'T L. 371 (2008).
26 *See, e.g.*, John C. Roper, *Can Houston Keep Its Title As World's Energy Capital?*, HOUS. CHRON. (Dec. 16, 2018), https://www.chron.com/business/texas-inc/article/Can-Houston-keep-its-title-as-world-s-energy-13468317.php.
27 *Energy*, GREATER HOUS. P'SHIP, https://www.houston.org/why-houston/industries/energy (last visited Dec. 20, 2022).

Industry-expanding technologies such as hydraulic fracturing and deep water offshore technology were developed in or are centered in Houston, and over 2.6 million barrels of oil have been processed there.[28] Houston's profound energy industry is dependent on the Houston Ship Channel, a 50-mile industrial inlet that starts in Galveston Bay and meanders through the low-lying areas of Eastern Harris County.[29] The Ship Channel is the largest port on the Gulf Coast and its banks are home to myriad petrochemical producers and refineries, including the second-largest complex in the world.[30] Without the Ship Channel, Houston would surely not be the "Energy Capital of the World," and both Texas' and Houston's economy would look drastically different. There would also likely be considerably less pollution in the Houston metro area, the burden of which has been disproportionately shouldered by vulnerable populations including people of color, people living in poverty, and limited-English households.[31] The trio of cases analyzed below center around the petrochemical facilities and proximal communities that cohabit the Ship Channel's banks.

E. "DOUBLE JEOPARDY IN HOUSTON"

Harrisburg and Manchester are two neighborhoods particularly impacted by pollution from Houston's oil and gas industry. Both are situated on the Ship Channel's banks, and petrochemical complexes dot the neighborhoods.[32] A study by the Union of

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28 *Id*.

29 *Welcome to the Houston-Galveston Navigation Channel Project Online Resource Center*, U.S. ARMY CORPS OF ENG'RS, GALVESTON DIST., https://web.archive.org/web/20090109052637/http://www.swg.usace.army.mil/items/hgnc/ (last visited Dec. 20, 2022).

30 *About Us*, PORT HOUS., https://porthouston.com/about-us/ (last visited Dec. 20, 2022).

31 Sustainable Sys. Rsch., *Evaluation of Vulnerability and Stationary Source Pollution in Houston*, NRDC, 34 (Sept. 2020), https://www.nrdc.org/sites/default/files/houston-stationary-source-pollution-202009.pdf.

32 *Id.* at 27, 33.

Concerned Scientists and Texas Environmental Justice Advocacy Services (TEJAS) found that residents of Harrisburg and Manchester were exposed to a particulate matter pollution burden 50 to 55 times greater than the average Houstonian and have nearly a 10% higher cancer risk.[33] Both neighborhoods also have an incredibly high percentage of residents (90%) who live within a mile of a toxic polluting facility.[34] Notably, 97% of the residents of Harrisburg and Manchester are not White.[35]

III. ENVIRONMENTAL CITIZEN SUITS AND STANDING

A. CITIZEN SUITS

Environmental citizen suits are "civil action[s] brought by a private party against a defendant—either another private party or a government agency—who is allegedly violating a federal environmental statute," such as the Clean Air Act.[36] Citizen suits can be brought against governmental agencies seeking declaratory and injunctive relief and against private defendants seeking civil penalties.[37]

The wave of environmental legislation in the 1970s saw the addition of citizen suit provisions into most federal environmental statutes, starting with the Clean Air Act.[38] These provisions were added to federal environmental statutes to allow concerned citizens

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33 Yukyan Lam et al., *Toxic Air Pollution in the Houston Ship Channel: Disparities Show Urgent Need for Environmental Justice*, NRDC & TEX. ENV'T JUST. ADVOC. SERVS. (Sept. 2021), https://www.nrdc.org/sites/default/files/air-pollution-houston-ship-channel-ib.pdf; *Double Jeopardy in Houston*, CTR. FOR SCI. & DEMOCRACY AT THE UNION OF CONCERNED SCIENTISTS & TEX. ENV'T JUST. ADVOC. SERVS. 13 tbl.5 (2016), https://www.ucsusa.org/sites/default/files/attach/ 2016/10/ucs-double-jeopardy-in-houston-full-report-2016.pdf.

34 *Double Jeopardy in Houston*, *supra* note 33, at 15 tbl.8.

35 *Id.* at 5.

36 Robin Kundis Craig, *Will Separation of Powers Challenges 'Take Care' of Environmental Citizen Suits? Article II, Injury-in-Fact, Private 'Enforcers,' and Lesson from* Qui Tam *Litigation*, 72 U. COLO. L. REV. 93, 93 (2001).

37 *Id*.

38 Matthew C. Stephenson, *Public Regulation of Private Enforcement: The Case for Expanding the Role of Administrative Agencies*, 91 VA. L. REV. 93, 99 n.16 (2013).

and citizen groups to enforce federal environmental regulations.[39] Congress recognized that agencies were not effectively enforcing regulations because "they [were] short on resources, possess[ed] limited information, and [were] subject to political pressure."[40] These new statutory provisions provided private citizens with a cause of action so they could enforce pollution regulations against violators[41] in an effort to "speed up, expand, and intensify the war against air pollution."[42] Section 304 of the Clean Air Act authorizes "any citizen" to commence a civil action against "any person" who is "alleged to have violated . . . or to be in violation of (A) an emission standard or limitation . . . or (B) an order issued by the Administrator or a State with respect to such a standard or limitation."[43]

In theory, any private citizen who has standing to sue can do so to enforce regulations and potentially levy fines against a violator. Proponents of citizen suits laud them as a method to empower communities[44] so they can enforce regulations when otherwise overworked—or overly lax—agencies do not.[45] Others feel these types of suits overstep constitutional bounds and unjustly obstruct or delay agencies and industry.[46] In reality, "a combination of limited resources and institutional barriers binds the transformative power of citizen suits claimed on the political left and refutes the threats to

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39 *Id*. at 99 n.17.

40 Marisa L. Ugalde, *The Future of Environmental Citizen Suits After* Buckhannon Board & Care Home, Inc. v. West Virginia Department of Health & Human Resources, 8 ENV'T. L. 589, 594 (2002).

41 Robin Kundis Craig, *Should There Be a Constitutional Right to a Clean and Healthy Environment?*, 34 ENV'T L. REP. 11013, 11014 (2004). As it turns out, the 91st Congress was smart to loop in citizens to environmental enforcement. Craig uses empirical data to show that citizen suits have steadily increased since their inception, especially since the 1990s. *Id.* EPA and state government enforcement can fluctuate and even stall out depending on political whim, so having a constant stream of enforcement from citizens and private parties has at least kept polluters on their toes. *Id.*

42 H.R. REP. NO. 91-1146, at 1 (1970), *reprinted in* 1970 U.S.C.C.A.N. 5356, 5356.

43 42 U.S.C. § 7604.

44 Craig, *supra* note 41, at 11014–15.

45 David E. Adelman & Robert L. Glicksman, *Reevaluating Environmental Citizen Suits in Theory and Practice*, 91 U. COLO. L. REV. 385, 387 (2020).

46 *Id*.

agency authority asserted by critics on the political right."[47] What we are left with after several decades of citizen suit litigation is a doctrine pared down significantly from what Congress initially intended. Instead, it is quite difficult for environmental groups to bring citizen suits and aid agencies in the enforcement of environmental statutes.[48]

B. STANDING

Since the 1990s, the Supreme Court's constitutional jurisprudence has put significant limits on environmental citizen suits, doing away with some forms altogether and making the rest more difficult to successfully bring and litigate.[49] One such hurdle is Article III standing, which poses a substantial barrier to citizen suits and has sparked much discussion over its history and legality.[50]

Article III standing, as we now understand it, began to take shape in the 1920s and 1930s, as a judge-made protection against recent progressive legislation.[51] Progressive Justices who favored the New Deal invoked justiciability doctrines to protect legislative and administrative decisions from citizen lawsuits, throwing out suits where they held the petitioners had "no personal stake for the invocation of judicial power."[52] Broadly speaking, the Court held that no one had a right to sue unless some law "conferred a right to do so."[53] At that point, all that was required was that a plaintiff have a legal right to sue,

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47 *Id*. at 388.
48 *See id.* at 415.
49 Craig, *supra* note 41, at 11017.
50 Cass R. Sunstein, *What's Standing After* Lujan*? Of Citizen Suits, "Injuries," and Article III*, 91 MICH. L. REV. 163, 177–79 (1992). Sunstein discusses the historical notions of standing found in English and American common law and argues that Article III standing, as it has been judicially created, has no basis in either historical common law or in constitutional law. *Id.* Sunstein points out that "the general principle" for Article III "is that a case cannot exist unless some source of law creates a cause of action," and since citizen suits expressly create a cause of action, the Court's standing test should not prevent them. *Id.*
51 *Id*. at 179–80.
52 *Id*. at 180.
53 *Id*.

conferred by a statute, contract, tortious right, or property interest.[54] The Court continued to develop the cause of action and injury requirements in response to the Administrative Procedure Act in 1946, but the three-part standing test as we now know it was not fully fleshed out by the Court until *Lujan v. Defenders of Wildlife*. In *Lujan*, the Court synthesized its previous precedents and determined that the test for standing required that:

> First the plaintiff must have suffered an "injury in fact"—an invasion of a legally protected interest which is (a) concrete and particularized . . . and (b) "actual or imminent, not 'conjectural' or 'hypothetical'" . . . . Second, there must be a causal connection between the injury and the conduct complained of—the injury has to be "fairly . . . trace[able] to the challenged action of the defendant, and not . . . the result [of] the independent action of some third party not before the court." . . . Third, it must be "likely," as opposed to merely "speculative," that the injury will be "redressed by a favorable decision."[55]

This test represented an amalgamation of the Court's doctrine regarding the requirements to bring a suit. Applying this test, the Court found that the petitioners in *Lujan* did not satisfy Article III standing because their alleged injury was not concrete and particularized, nor was it redressable by action of the court.[56] In *Lujan*, wildlife conservation groups had alleged that a joint regulation promulgated by the Department of the Interior and the Department of Commerce, which limited the geographic scope of the Endangered Species Act's consultation requirement to exclude agency-funded activities abroad, would interfere with their members' future ability to view endangered wildlife abroad in their capacities as professionals and tourists.[57] Though members had visited areas that would be affected by agency-funded projects abroad and may have intended to return

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54 *Id*. at 181.
55 Lujan v. Defs. of Wildlife, 504 U.S. 555, 560–61 (1992).
56 *See id*. at 560–61, 578.
57 *Id*. at 563.

to visit these areas, members did not have concrete future plans to visit such areas.[58] Justice Scalia wrote that it went beyond "the outermost limit of plausibility" to characterize speculative injuries to a member's general interest in seeing endangered wildlife around the globe as an injury that was concrete and particularized.[59] The Court also determined that the injury was not redressable, because a district court could only levy penalties against the Secretary of the Interior as a party to the suit, but not against the agencies funding the projects.[60] Further, the Court noted that the respective agencies only partially funded the development projects at issue, so even if the district court did terminate funding until consultation, there was no indication that this action would reduce the alleged harm to group members or to the endangered species.[61]

In the decades since *Lujan*, academics and judges alike have pointed to the enduring conundrum that is Article III standing, evidenced by inconsistencies and seemingly off-the-cuff rationalizations in court decisions and opinions. Environmental litigation faces unique challenges in satisfying standing requirements as courts wrestle with the concepts inherent to environmental issues. Legal concepts and requirements for Article III standing like imminence and probabilistic harm do not always translate well when dealing with incredibly large and complex environmental problems like climate change and air pollution that may only have "partial" solutions. Each requirement of Article III standing—injury in fact, causality, and redressability—has evolved in specific ways that affect the efficacy of environmental litigation and citizen suits.

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58 *Id.*

59 *See id*. at 567 (holding that conservation groups failed to demonstrate that members would be concretely and personally injured by the lack of consultation).

60 *Id.* at 568.

61 Lujan v. Defs. of Wildlife, 504 U.S. 555, 571 (1992).

1. INJURY IN FACT

The first requirement of Article III standing is that the plaintiff's injury be concrete and particularized and actual or imminent, not hypothetical.[62] These requirements have been the subject of much discussion and theorizing, and different courts have applied slightly different meanings to these phrases, shifting standing ever so slightly with each opinion published.[63] Proving injury in fact for environmental challenges can pose specific and complex challenges.

In *Friends of the Earth, Inc. v. Laidlaw Environmental Services (TOC), Inc.*, petitioners testified that they didn't use certain parts of the Tyger River for recreational purposes because of the pollution from defendant's plant.[64] One petitioner testified that she decided not to buy a house near the river because of the pollution.[65] Another noted the price disparity between her home (in close proximity to the river) and similar homes in the area that were further from the river.[66] The Court held that the petitioners' "reasonable concern" about defendant's discharges directly affected their "recreational, aesthetic, and economic interests," and that these presented more than "mere 'general averments' and 'conclusory allegations.'"[67]

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62 *Id.* at 560.

63 This can be seen by the Court's ever-changing definition of imminence, which helps to make up just one part of the three-part test for Article III standing. *See, e.g.*, Clapper v. Amnesty Int'l USA, 568 U.S. 398, 432 (2013) (Breyer, J., dissenting). ("[R]ecognizing that '"imminence" is concededly a somewhat elastic concept' . . . the Court has referred to, or used (sometimes along with 'certainly impending') other phrases such as 'reasonable probability' that suggest less than absolute, or literal certainty [that injury will soon occur]."); Babbitt v. United Farm Workers Nat'l Union, 442 U.S. 289, 298 (1979) (explaining plaintiff "must demonstrate a realistic danger of sustaining a direct injury"); Monsanto Co. v. Geertson Seed Farms, 561 U.S. 139, 153 (2010) (requiring "reasonable probability . . . and "substantial risk"); MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118, 129 (2007) (requiring a "genuine threat of enforcement").

64 Friends of the Earth, Inc. v. Laidlaw Env't Servs. (TOC), Inc., 528 U.S. 167, 182 (2000).

65 *Id.*

66 *Id.*

67 *Id.* at 183–84.

In another case, affiants testified that they were exposed to sulfurous odors "while in the home, in the yard, or driving through town," and that these odors were "overpowering and capable of inducing physical discomfort."[68] The court held that the affiants' complaint satisfied the injury in fact requirement because their enjoyment of their surroundings was severely diminished by these odors.[69]

In a different case, petitioners complained about noxious odors and visible particulate matter in their community that came from a nearby Murphy Oil plant.[70] The court determined that the petitioners met the requirements for injury in fact and did not need to show that they actually suffered adverse health effects.[71] Rather, the simple fact that some of the petitioners used their yards less frequently due to the pollution was enough to satisfy the injury prong, because "breathing, smelling and being reasonably concerned about the health effects of polluted air diminish[ed] their use and enjoyment of their property."[72]

2. TRACEABILITY

The second requirement of Article III standing is that the alleged injury be fairly traceable to the challenged action of the defendant such that a causal connection is created between the injury and the conduct complained of.[73] Just as with injury in fact, the traceability requirement creates unique challenges for environmental suits. Air pollution,

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68 Texans United for a Safe Econ. Educ. Fund v. Crown Cent. Petroleum Corp., 207 F.3d 789, 792 (5th Cir. 2000).

69 *Id*.

70 Concerned Citizens Around Murphy v. Murphy Oil USA, Inc., 686 F. Supp. 2d 663, 669–70 (E.D. La. 2010).

71 *Id.* at 671.

72 *Id*. The Fifth Circuit relied here on precedent from *Texans United*, stating that "breathing and smelling polluted air is sufficient to demonstrate injury-in-fact and thus confer standing under the CAA." *Id.*

73 *See* Lujan v. Defs. of Wildlife, 504 U.S. 555, 560 (1992).

due to the nature of gas molecules, is difficult to track, making it complicated to trace an injury back to a specific emission when there are compounding factors at play.[74]

The Fifth Circuit in *Texans United* reminded us that standing, and therefore traceability, should not be conflated with a defendant's actual liability.[75] Affiants' testimony that they observed smoke from defendant's plant at the same time they smelled noxious odors in their neighborhood, in combination with expert testimony regarding the frequency of violations and presence of sulfur dioxide fumes in the neighborhood that corresponded with admitted upsets, was sufficient to satisfy traceability.[76] The court determined that this evidence created causal links between defendant's alleged violations and the petitioners' alleged harms, satisfying the traceability requirement.[77]

The *Concerned Citizens* court reiterated the Fifth Circuit's holding when it found that plaintiffs had satisfied traceability based on affiant testimony.[78] The petitioners testified that noxious odors grew stronger when they were closer to or downwind of the plant, and that strong odors coincided with "upsets" and the production of black smoke at the plant.[79] The court rejected defendant's assertion that the petitioners could not prove the odor they smelled in their neighborhood was attributable to an admitted unlawful discharge around the same time.[80] In rejecting this argument, the court reasoned that traceability can

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74 *See* Stephanie Martinovich, *New Approach Could Change How We Track Extreme Air Pollution Events*, MASS. INST. OF TECH. (June 30, 2021), https://news.mit.edu/2021/new-approach-could-change-how-we-track-extreme-air-pollution-events-0630 (noting that air pollution is "exceedingly challenging to monitor").

75 Texans United for a Safe Econ. Educ. Fund v. Crown Cent. Petroleum Corp., 207 F.3d 789, 793 (5th Cir. 2000).

76 *Id*.

77 *Id*.

78 Concerned Citizens Around Murphy v. Murphy Oil USA, Inc., 686 F. Supp. 2d 663, 672 (E.D. La. 2010).

79 *Id.* at 671.

80 *Id.*

be established by circumstantial evidence that a pollutant causes or contributes to the alleged injury, that it need not be the sole cause of the alleged injury, and that the traceability requirement "is not equivalent to a requirement of tort causation."[81]

3. REDRESSABILITY

The third and final requirement of Article III standing—redressability—requires it to be likely that a favorable decision by the court will redress the alleged injury.[82] Essentially, it must be within the court's power to help alleviate the injury alleged by the petitioner. This requirement also creates unique challenges for environmental litigation.[83] In 2007, the Court held that a petitioner's injury (land loss due to sea level rise caused by climate change) was redressable.[84] The Court acknowledged the "enormity of the potential consequences associated with manmade climate change" and admitted that while regulating motor vehicles might not reverse manmade climate change, it did not follow that the Court lacked jurisdiction to decide whether the EPA had a duty to slow or reduce climate change.[85] Justice Scalia dissented, claiming that the injury was too broad to be redressable by the court, as it required "literally chang[ing] the atmosphere around the world."[86] Scalia's view denied the science inherent in the issue and neglected to recognize the role that the U.S. has had in furthering climate change, while the majority's decision took these factors into account in its finding of redressability. The EPA was not regulating carbon dioxide emissions as explicitly required by the Clean Air Act and the Court could require it to do so, effectively redressing the alleged injury.

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81 *Id*. at 672.
82 Lujan v. Defs. of Wildlife, 504 U.S. 555, 561 (1992).
83 *See* Massachusetts v. EPA, 549 U.S. 497, 525 (2007).
84 *Id.*
85 *Id.*
86 *Id*. at 541 (Scalia, J., dissenting).

In *Laidlaw*, defendants argued that the civil penalties sought would not offer sufficient redress to the alleged injury; because the penalties were paid to the government—not to plaintiffs—they could not redress the pollution of the Tyger River.[87] The Court rejected this argument outright, citing precedent which held that "all civil penalties have some deterrent effect."[88] The Court reasoned that a sanction that "effectively abates" illegal conduct and prevents its recurrence serves as a form of redress, and that civil penalties can fit this description.[89]

Citing this line of reasoning in *Laidlaw*, the Fifth Circuit in *Texans United* determined that plaintiffs had successfully demonstrated that the injunction and penalties requested would be capable of redressing their injuries.[90] Petitioners alleged existing and ongoing violations at the time of the complaint, which were capable of being redressed by the court if proven at trial.[91] Additionally, the court rejected defendant's argument that the alleged injuries were not redressable because action taken against it would not reduce pollution from any other source to which the petitioners were still exposed.[92] The court cited precedent holding that "an injunction may be appropriate even if it will not prevent all discharges of the pollutants affecting the plaintiff."[93] The court was not required to stop all pollution from reaching the plaintiffs, but it was able to redress the specific pollution

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87 Friends of the Earth, Inc. v. Laidlaw Env't Servs. (TOC), Inc., 528 U.S. 167, 185 (2000).

88 *Id.*

89 *Id*. The majority also refutes the dissent's argument that it is merely "the availability rather than the imposition of civil penalties" that deters polluters: "A would-be polluter may or may not be dissuaded by the existence of a remedy on the books, but a defendant once hit in its pocketbook will surely think twice before polluting again." *Id.* at 186.

90 Texans United for a Safe Econ. Educ. Fund v. Crown Cent. Petroleum Corp., 207 F.3d 789, 794 (5th Cir. 2000).

91 *Id*.

92 *Id*. at 793.

93 *Id*.

caused by the defendant, satisfying redressability.[94]

The *Concerned Citizens* court determined that the plaintiffs had satisfied the redressability requirement because they showed that the defendant had violated its permit and the Clean Air Act numerous times, and unless some action was taken these violations would likely continue to occur.[95] The court reasoned that civil penalties were likely to redress the plaintiff's injury because they encourage the discontinuance of current violations while simultaneously deterring the commission of future violations.[96]

When examining how different courts apply and administer the test for Article III standing, one can begin to see the threads that weave together the standing doctrine as it operates today. *Lujan* laid the groundwork for standing by synthesizing the three requirements, and in combination with *Laidlaw* and *Massachusetts*, shows how the Court thinks about environmental suits and the issue of standing. Circuit and district courts continue to flesh out these ideas—with minimal guidance—giving us decisions like those in *Texans United* and *Concerned Citizens*. As with all legal doctrine, the application of precedent becomes difficult when novel situations warrant decisions. This rings especially true when the lawsuit is an environmental citizen suit arising from the Clean Air Act, one of the most complex environmental statutes in the U.S.

IV. *ENVIRONMENT TEXAS* AND THE FIFTH CIRCUIT

In the late aughts, a citizen group called Environment Texas, in conjunction with the Sierra Club's legal team and the National Environmental Law Center, filed three

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94 *Id.*
95 Concerned Citizens Around Murphy v. Murphy Oil USA, Inc., 686 F. Supp. 2d 663, 673 (E.D. La. 2010).
96 *Id.*

lawsuits against petrochemical facilities along the Houston Ship Channel.[97] All three of these cases center around the health and environmental rights of people living in vulnerable communities along the Ship Channel, in close proximity to its petrochemical industry. Additionally, they each serve as reminders of the enormous undertaking that is filing a citizen suit, and how difficult it can be to enforce environmental regulations against massive polluters, despite this being heralded as the express purpose of citizen suits in the Clean Air Act.[98]

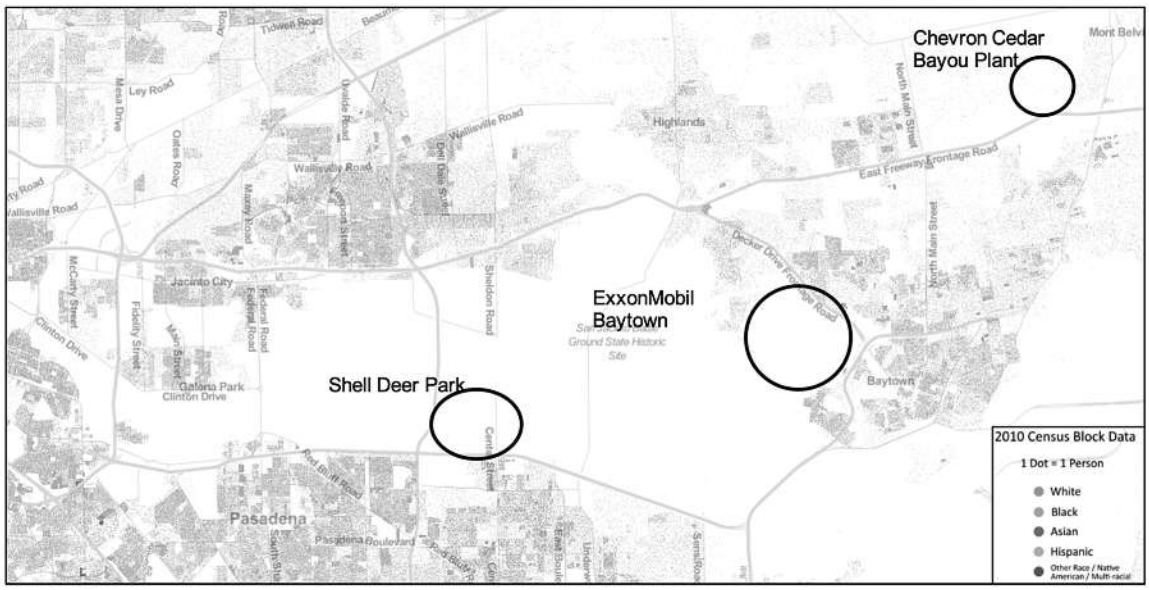

Figure 2: Racial Demographics of Eastern Harris County and locations of the plants in the three *Environment Texas* suits.[99]

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97 *See* Complaint, Env't Tex. Citizen Lobby, Inc. v. Shell Oil Co., No. 08CV00070, 2008 WL 110772 (S.D. Tex. Jan. 7, 2008); Complaint, Env't Tex. Citizen Lobby, Inc. v. Chevron Phillips Chem. Co., L.P., No. 09CV02662, 2009 WL 3124286 (S.D. Tex. Aug. 19, 2009); Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 66 F. Supp. 3d 875, 883 (S.D. Tex. 2014), *vacated and remanded*, 824 F.3d 507 (5th Cir. 2016).

98 *See* Stephenson, *supra* note 38.

99 *The Racial Dot Map*, UNIV. OF VA.: WELDON COOPER CTR. FOR PUB. SERV. https://demographics.coopercenter.org/racial-dot-map. This map was created using the Weldon Cooper Center for Public Services' Racial Dot Map, which used demographic data from the 2010 census. The map has since been taken offline, as explained on their website. Black circles have been added by the author to identify the locations of the plants in the *Environment Texas* suits.

A. *ENVIRONMENT TEXAS V. SHELL* (2008)

In *Environment Texas v. Shell*, plaintiffs requested relief on three issues: Shell's violations of State Implementation Plan (SIP) limitations, violations of New Source Performance Standards (NSPS), and violations of Title V operating permits.[100] Using data from the Texas Commission on Environmental Quality (TCEQ), Environment Texas showed that the Shell Deer Park plant emitted 4.4 million pounds of pollutants over and above its permit allowance during various "emission events," including equipment malfunctions and unscheduled maintenance.[101] The plant violated numerous federal, state, and Clean Air Act permit requirements from 2003–2007 at a rate of once per week.[102] The plant illegally emitted thousands of pounds of sulfur dioxide, nitrogen oxides, volatile organic compounds (VOCs), benzene, carbon monoxide, hydrogen sulfide, and other various toxic chemicals and carcinogens.[103] The plaintiffs argued that these emissions contribute to cardiac, pulmonary, and neurological health problems, the formation of ground level ozone, particulate matter pollution, and acid rain, which all directly affected the quality of the petitioners' lives.[104] Shell refuted many of these claims, alleging that the plant did not emit anywhere near the amount claimed in the original complaint, did not emit with the frequency alleged, and that the emission events Shell was responsible for were caused by natural disasters and therefore excluded from liability.[105]

The court never discussed the Article III standing requirements for this case,

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100 Complaint ¶¶ 61–80, Env't Tex. Citizen Lobby, Inc. v. Shell Oil Co., No. 08CV00070, 2008 WL 110772 (S.D. Tex. Jan. 7, 2008).
101 *Id.* ¶¶ 35, 44.
102 *Id.* ¶¶ 34–36.
103 *Id.* ¶¶ 38-52.
104 *Id.* ¶ 3.
105 *See* Original Answer of Defendants ¶¶ 3, 35–36, Env't Tex. Citizen Lobby, Inc. v. Shell Oil Co., No. 08-cv-00070, 2008 WL 760468 (S.D. Tex. Mar. 19, 2008).

though, because the case never reached the district court. Instead, the plaintiffs voluntarily dismissed the complaint against Shell Deer Park.[106] The dismissal stated that "[t]his stipulation is premised on Defendants' representation that Shell Deer Park Refining Company is neither an owner nor an operator of the Shell Deer Park refinery or chemical plant."[107] While it is not entirely clear, it is possible that Environment Texas did not sue the correct party that was legally responsible for the plant and was forced to dismiss the suit.

B. *ENVIRONMENT TEXAS V. CHEVRON* (2009)

In *Environment Texas v. Chevron*, Environment Texas sued Chevron under the citizen suit provision of the Clean Air Act, alleging violations at its Cedar Bayou chemical refinery plant.[108] The plaintiffs filed for relief on four issues: Chevron's violations of State Implementation Plan (SIP) limitations, violations of New Source Performance Standards (NSPS), violations of National Emission Standards for Hazardous Air Pollutants (NESHAPs), and violations of Title V operating permits.[109] From 2003–2009, the Cedar Bayou Plant violated its emission limits on at least 175 occasions, releasing "more than 765,000 pounds of volatile organic compounds, over 310,000 pounds of carbon monoxide, over 45,000 pounds of nitrogen oxides, over 18,000 pounds of 1,3-butadiene, and over 17,000 pounds of benzene" into the Baytown community surrounding the plant.[110] In 2008 alone, the plant produced 400,000 pounds of pollutants during emission events.[111] These

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106 *See* Stipulation of Voluntary Dismissal, Env't Tex. Citizen Lobby, Inc. v. Shell Oil Co., No. 4:08-cv-00070, 2009 WL 1169459 (S.D. Tex. Apr. 23, 2009).
107 *Id.*
108 Complaint ¶1, Env't Tex. Citizen Lobby, Inc. v. Chevron Phillips Chem. Co., L.P., No. 09CV02662, 2009 WL 3124286 (S.D. Tex. Aug. 19, 2009).
109 *Id.* ¶ 18.
110 *Id.* ¶¶ 40, 49.
111 *Id.* ¶ 49.

pollutants can cause eye irritation, headaches, nausea, decreased lung capacity, cancer, and asthma.[112] They also contribute to the formation of acid rain and ground level ozone.[113] Further, chemicals released by the plant contribute to particulate matter pollution.[114]

The plaintiffs alleged that its members lived, worked, recreated, and traveled close to the plant and were aware that its emissions blow in their direction.[115] They further alleged that they saw flares from the plant at night, and that their health issues (such as coughing, sore throats, muscle aches, fatigue, headaches, congestion, and burning eyes) generally got better when they traveled away from the area.[116]

The district court never reached standing in this case, either. In 2010, before the case went to trial and without filing an answer to the original complaint, Chevron Phillips settled with Environment Texas for $2 million.[117] In their original complaint, petitioners sought $32,500 (the statutory maximum under the Clean Air Act) for each day of violations.[118] Based on their allegations of over 175 days of emissions events, the penalty would've been well over $5 million.[119] But as illustrated by *Environment Texas v. Chevron* below, accepting a $2 million dollar settlement was likely favorable to litigating for over a decade and fighting to prove Article III standing requirements that have become increasingly cumbersome to satisfy.

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112 *Id.* ¶ 51.
113 *Id.* ¶¶ 56–58.
114 *See* Shertzer et al., *supra* note 11, at 28.
115 Complaint ¶¶ 63–65, Env't Tex. Citizen Lobby, Inc. v. Chevron Phillips Chem. Co., L.P., No. 09CV02662, 2009 WL 3124286 (S.D. Tex. Aug. 19, 2009).
116 *Id.* ¶¶ 62–63.
117 *Environmental Groups and Chevron Phillips Chemical Co. Agree to Settlement of Clean Air Act Lawsuit*, ENV'T TEX. (Nov. 18, 2010), https://environmentamerica.org/texas/media-center/environmental-groups-and-chevron-phillips-chemical-co-agree-to-settlement-of-clean-air-act-lawsuit-2/.
118 Complaint ¶ 72, Env't Tex. Citizen Lobby, Inc. v. Chevron Phillips Chem. Co., L.P., No. 09CV02662, 2009 WL 3124286 (S.D. Tex. Aug. 19, 2009).
119 *See id.* ¶¶ 40, 72.

C. *ENVIRONMENT TEXAS V. EXXONMOBIL* (2010)

1. CASE BACKGROUND

In 2010, Environment Texas filed a complaint against ExxonMobil's Baytown refinery, one of the biggest petrochemical complexes in the world and the largest refinery in the U.S.[120] Petitioners alleged seven violations in their original complaint: violations caused by unlawful upsets, exceedances of hourly emission limits, exceedances of highly reactive VOCs, exceedances of limits of visible smoking flares, exceedances from flare pilot flame outages, fugitive emissions,[121] and violations of Title V permits as evidenced from TCEQ deviation reports.[122] The defendants reported to TCEQ that the complex released over 4,000,000 pounds of carbon monoxide, 2,000,000 pounds of sulfur dioxide, 1,500,000 pounds of VOCs, 190,000 pounds of nitrogen oxides, 40,000 pounds of 1,3-butadiene, and 25,000 pounds of benzene during a five year period preceding the complaint.[123] These pollutants, and others that the plant released in smaller but not inconsequential amounts, can cause birth defects, reproductive issues, and cancer, as well as contribute to the formation of acid rain, ground level ozone, and particulate matter pollution.[124]

The plaintiffs alleged that some of its members work and play around the Baytown refinery and were forced to breathe the illegal emissions.[125] Members complained of

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120 Complaint ¶ 1, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., No. 10-cv-4969, 2010 WL 5071832 (S.D. Tex. Dec. 13, 2010).

121 "Fugitive emission" is defined by TCEQ regulation as "[a]ny gaseous or particulate contaminant entering the atmosphere that could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening designed to direct or control its flow." 30 TEX. ADMIN. CODE § 101.1(39) (2016).

122 Complaint ¶¶ 26–44, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 10-cv-4969, 2010 WL 5071832 (S.D. Tex. Dec. 13, 2010).

123 *Id.* ¶ 53.

124 *Id.* ¶¶ 55, 66, 69.

125 *Id.* ¶ 64.

smoke, soot, and haze coming from the refinery that they could see and smell in their neighborhood.[126] Members also complained of specific injuries that are associated with pollution of this type, as outlined above.[127]

The defendants filed a motion to dismiss, alleging among other things that the plaintiffs did not satisfy Article III standing.[128] Specifically, Exxon argued that Environment Texas did not satisfy constitutional standing requirements because it did not claim an injury that was concrete or particularized and that Environment Texas lacked associational standing to bring this case on behalf of its members.[129] Additionally, defendants claimed that because TCEQ had already levied fines against the facility, they were shielded from a Clean Air Act suit. Defendants also argued that there was no threat of ongoing violations, so the plaintiffs' suit was moot.[130]

In 2012, after their motion to dismiss was denied, the defendants filed a motion for summary judgment, claiming that the plaintiffs' suit was precluded by TCEQ action and arguing that citizen suits are not allowed to "second guess" agency action that is supposedly sufficient under the current regulatory scheme.[131] This, as the court would point out, was a misguided interpretation of citizen suits, as they are meant to co-exist with and bolster

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126 *Id*. ¶¶ 76–78.

127 *Id*. ¶ 79. ("Plaintiffs have members who live and work near the Baytown Complex and who, along with their families, suffer from: chest congestion, bronchitis, asthma, headaches, sneezing, coughing, itchy and watering eyes, and fatigue, among other conditions. These conditions typically lessen or disappear when Plaintiffs' members who live and work near the Baytown Complex go on vacation or visit friends and relatives out of the area. Plaintiffs' members who moved to neighborhoods near the Baytown Complex from other parts of the state or country began experiencing these symptoms only once they moved to Baytown.").

128 Defendants' Motion to Dismiss at 3, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., No. 10:CV:4969, 2011 WL 10773344 (S.D. Tex. Mar. 7, 2011).

129 *Id*. at 26–27 (claiming that Environment Texas didn't even have members and was therefore precluded from suing on behalf of anyone).

130 *Id*. at 3.

131 Defendants' Motion for Summary Judgment at 15, 20, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., No. 10-cv-4969, 2012 WL 8319138 (S.D. Tex. Aug. 10, 2012).

agency oversight, or make up for where it is lacking.[132]

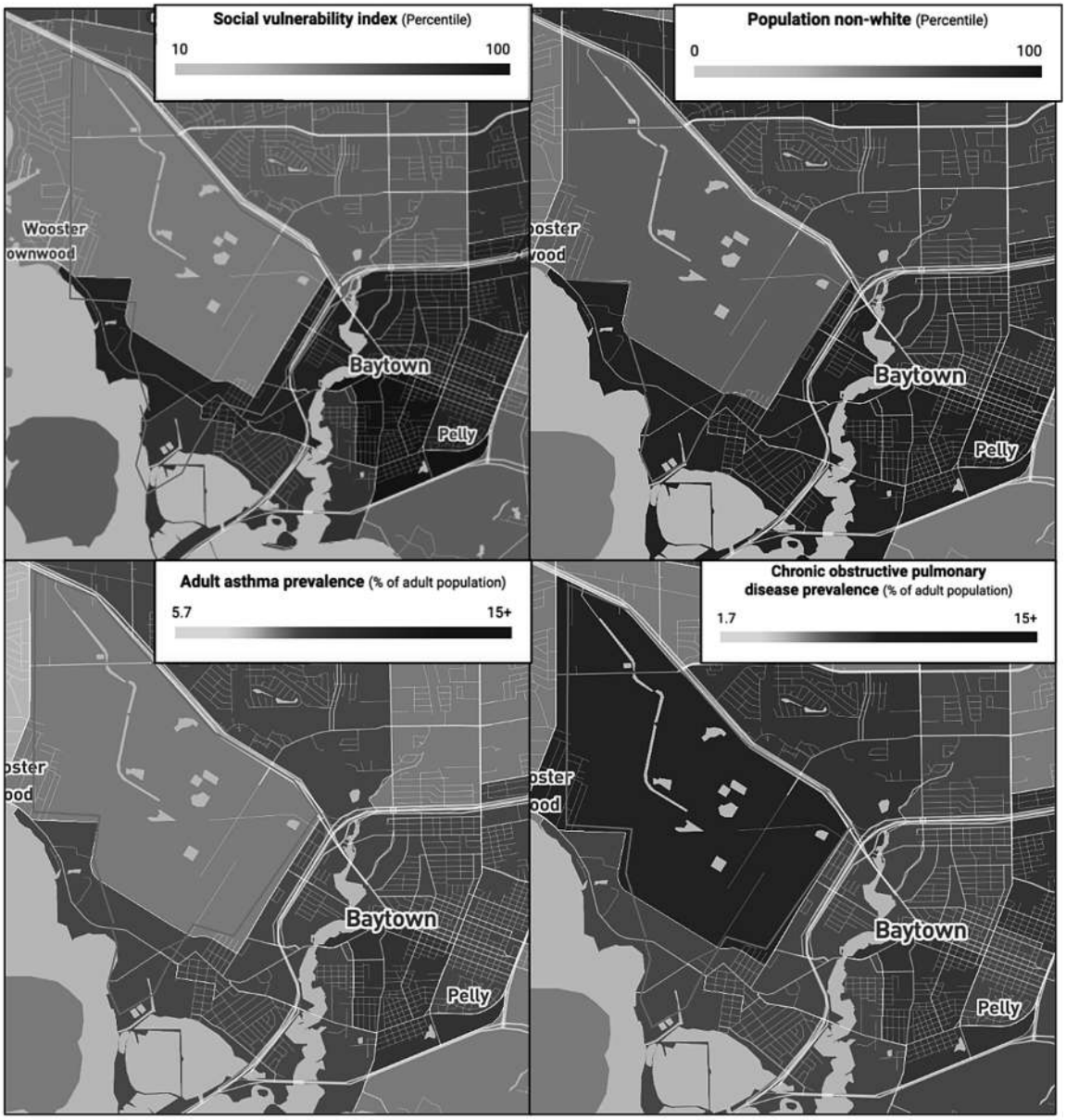

Figure 3: Socioeconomic and public health data for the communities surrounding the Baytown Chevron Refinery[133]

[132] *See id.* at 2.

[133] *Finding Pollution—And Who it Impacts Most—In Houston*, ENV'T DEF. FUND, https://www.edf.org/maps/airqualitymaps/houston/pollution-map/ (last visited Mar. 25, 2023). These maps were created using the Environmental Defense Fund's interactive Houston pollution map. Red outlines have been added by the author to show the boundaries of the Baytown Refinery.

2. District Court and Fifth Circuit Decisions

In the district court's first decision, Judge Hittner determined that all three requirements of Article III standing had been met and that Sierra Club members also had standing to sue in their own right, satisfying the requirements of associational standing.[134] Sierra Club members testified that their allergies, breathing problems, headaches, and disruptive noise caused by the plant prevented them from going outside, prevented them from running, and in one case even caused them to move away from the complex.[135] Citing *Laidlaw* and *Texans United*, Judge Hittner held that the plaintiffs satisfied injury in fact.[136] Judge Hittner also held that traceability was satisfied, stating that plaintiffs did not have to "show to a scientific certainty that defendant's [emissions], and defendant's [emissions] alone, caused the precise harm suffered by the plaintiffs."[137] Rather, circumstantial evidence, such as observing smoke and flares while smelling odors, in combination with excess testimony that elevated levels of pollutants were found in the plaintiffs' neighborhood following certain emission events, was sufficient to satisfy traceability requirements.[138]

The court also held that the forms of court action requested—"penalties for the Events and Deviations, an injunction enjoining Exxon from violating the Clean Air Act, a special master to monitor compliance with the injunctive relief, and a declaratory judgment that Exxon violated its Title V permits"—were all independently capable of redressing the alleged injuries, therefore satisfying redressability.[139] Despite satisfying the elements of

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134 Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 66 F. Supp. 3d 875, 891 (S.D. Tex. 2014).
135 *Id.* at 892.
136 *Id.* at 891–92.
137 *Id*. at 892.
138 *Id*. at 892–93.
139 *Id*. at 893.

standing, the Court denied the plaintiffs' request for any remedy, holding that the Clean Air Act penalty assessment factors for citizen suits weighed in favor of denying relief.[140]

The plaintiffs appealed, and the Fifth Circuit vacated the original decision and remanded for a proper assessment based on actionable violations.[141] On remand, Judge Hittner again determined that the plaintiffs had satisfied Article III standing using the same arguments described above.[142] He also denied requests for "declaratory judgment, injunctive relief, and appointment of a special master," but granted the request for penalties in the amount of $19,951,278.[143] While $19 million may seem like a win, the plaintiffs had originally sought $40 million, and were statutorily allowed to sue for up to $600 million based on the maximum daily fine per each day of violations.[144] This time, Exxon appealed, arguing in its brief that the district court had erred in holding that the plaintiffs had standing in its original 2014 opinion, despite not having raised this issue on the first remand when there had been no violations to support penalties.[145]

The defendants argued that the plaintiffs must prove standing for each alleged

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[140] Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 66 F. Supp. 3d 875, 904 (S.D. Tex. 2014) (quoting 42 U.S.C. § 7413(e)(1)) ("'In determining the amount of any penalty to be assessed under' the CAA in a citizen suit, the Court 'shall take into consideration (in addition to such other factors as justice may require)' the following penalty assessment factors: the size of the business, the economic impact of the penalty on the business, the violator's full compliance history and good faith efforts to comply, the duration of the violation as established by any credible evidence . . . , payment by the violator of penalties previously assessed for the same violation, the economic benefit of noncompliance, and the seriousness of the violation.").

[141] Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 824 F.3d 507, 533–34 (5th Cir. 2016).

[142] *Id.* at 537.

[143] Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., No. H-10-4969, 2017 WL 2331679, at *32 (S.D. Tex. 2017), *vacated and remanded*, 968 F.3d 357 (5th Cir. 2020).

[144] Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 968 F.3d 357, 365 (5th Cir. 2020). ("There is a cap on the penalty for each day of violation: $32,500 or $37,500 in this case, depending on when the violation occurred. Consequently, if Plaintiffs could sue only for 100 days of violations, they could at most recover roughly $3.5 million. In light of the more than 16,000 days of violations found in this case, the statutory cap exceeded $600 million.").

[145] *See* Brief of Appellants at *23–26, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., No. 17-20545, 2018 WL 447005 (5th Cir. Jan. 12, 2018); Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 968 F.3d 357, 364–65. (5th Cir. 2020).

Clean Air Act violation.[146] The Fifth Circuit distinguished the case from prior precedent in *Laidlaw* and *Texans United*, holding that this case was different in size and scope.[147] In those cases, plaintiffs had established standing for emissions violations of a single pollutant for 400–600 total days of violations.[148] The court held that due to the large number of alleged violations (16,000 in total) and the variety of pollutants (24), this case warranted a deviation from the "one-size-fits all" approach taken in *Laidlaw* and *Texans United*.[149] The court also expressed doubt about the link between the pollutants emitted and the cause of the alleged injury.[150] While the court acknowledged that "many of Exxon's emission violations were of a serious magnitude," the great variety of the alleged violations meant that the plaintiffs hadn't necessarily proved standing for all of the alleged violations.[151] The court admitted that its past decisions and those of other courts, including the Supreme Court, have allowed testimony similar to that provided by the plaintiffs "to support standing for multiple violations," though not the number and variety at issue here.[152]

The court remarked that the "[p]laintiffs easily demonstrated that their members were injured."[153] In affirming the district court's ruling, the court mentioned the plaintiffs' testimony that members "regularly saw flares, smoke, and haze coming from the complex; smelled chemical odors; suffered from allergy-like or respiratory problems; feared for their health; refrained from outdoor activities; or moved away," and that each of these

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146 Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 968 F.3d 357, 365 (5th Cir. 2020).
147 *See id*. at 366.
148 *See id.*
149 *Id*.
150 *Id*.
151 *Id.* at 367.
152 *Id.*
153 *Id*.

experiences was sufficient to satisfy injury in fact under Article III.[154] Despite the fact that plaintiffs need not connect their injuries to the exact dates of violations, the court remanded the case again because "it [was] not apparent that all of Exxon's violations were capable of causing the types of injuries Plaintiffs' members suffered."[155]

The Fifth Circuit then laid out the following test for the plaintiffs on remand: the plaintiffs must prove (1) "that each violation in support of their claims 'causes or contributes to the kinds of injuries' they allege,"[156] and (2) "the existence of a 'specific geographic or other causative nexus' such that the violation could have affected their members."[157] A violation will automatically satisfy the first requirement if it "(1) created flaring, smoke, or haze; (2) released pollutants with chemical odors; or (3) released pollutants that cause respiratory or allergy-like symptoms."[158] The court stated that the geographic nexus inquiry would be unnecessary for certain violations that were visible, and, recognizing the arduous nature of the task, settled on the following two points of guidance for the district court on remand:

> 1. For any violation that could cause or contribute to flaring, smoke, or haze, the district court's findings have established traceability. The district court need only decide which violations fall within this category.
> 2. For violations that could not contribute to flaring, smoke, or haze, the district court should first consider whether the pollutant emitted could cause or contribute either to (a) chemical odors or (b) allergy-like or respiratory symptoms. If so, the district court will conduct the geographic nexus inquiry described above, finding it satisfied if the emission (i) violated a nonzero emissions standard, (ii) had to be reported under Texas regulations, or (iii) is otherwise proven to be of sufficient magnitude to reach Baytown neighborhoods outside the Exxon complex in quantities sufficient to cause

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154 *Id*. at 368.
155 *Id*. at 369.
156 *Id.* at 369–70 (quoting Pub. Int. Rsch. Grp. of N.J., Inc. v. Powell Duffryn Terminals, Inc., 913 F.2d 64, 72 (3d Cir. 1990)).
157 *Id.* at 370 (quoting Sierra Club, Lone Star Chapter v. Cedar Point Oil Co., Inc., 73 F.3d 546, 558 n.24 (5th Cir. 1996)).
158 *Id.*

chemical odors, allergy-like symptoms, or respiratory symptoms.[159]

The court held that plaintiffs had also satisfied the requirement for redressability.[160] Specifically, the court held that Exxon overstated the redressability requirement in its argument refuting standing; civil penalties are a deterrent to future violations and do not need to completely prevent future violations from occurring to serve this deterrent purpose.[161] Exxon's violations were susceptible to reductions in "frequency [or] magnitude," and Exxon was capable of implementing these reductions.[162] Even though Exxon could not address every root cause of its emission violations, as it claimed, it was capable of implementing measures to drastically reduce these violations, and the court was capable of imposing injunctions requiring it to do so, thereby satisfying redressability.[163]

When back on remand most recently (though perhaps not the last time), the district court focused on the issue of traceability.[164] The gap between the plaintiffs' allegations and what the defendants contended they were liable for was sizable: plaintiffs alleged 9,803 violations on limited remand while Exxon contended the plaintiffs' evidence only established traceability for five events resulting in a maximum of forty days of violations.[165] Based on guidelines from the court of appeals, the district court broke its analysis of traceability into three distinct types of violations: (1) flaring, smoke and haze violations, (2) violations involving chemical odors, and (3) violations involving allergy-like or respiratory symptoms.[166] For the first category, the court found that traceability was

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159 *Id.* at 371.
160 *Id.* at 372.
161 *Id.*
162 *Id.*
163 *Id.*
164 Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 524 F. Supp. 3d 547, 555 (S.D. Tex. 2021).
165 *Id.*
166 *Id.* at 556–62.

established for any violation causing "smoke, opacity, or smoldering, or indicat[ing] an opacity percentage or emission of particulate matter," which came to a total of 273 violations over 588 days.[167] Conversely, the court found that plaintiffs had failed to establish traceability for "any violations that could have caused or contributed to haze based on the evidence presented about ozone."[168] The court determined that plaintiffs had erroneously assumed the production of ground level ozone satisfied the haze requirement.[169] For the second category—violations involving chemical odors—the court found that plaintiffs had established a total of 87 violations totaling 365 days of violations, a stark reining in of the plaintiffs' alleged 1,826 days of violations. [170] Lastly, the district court determined that plaintiffs had shown that violations involving highly reactive VOCs "could cause or contribute to respiratory or allergy like symptoms," and that per this finding the plaintiffs established a total of 138 violations totaling 890 days of violations.[171] In total, plaintiffs established 2,008 violations totaling 3,651 days of violations.[172] Again, the district court denied plaintiffs' requests for declaratory judgment, injunctive relief, and appointment of a special master, and lowered the penalty granted to $14,251,302.[173]

3. THIRD TIME'S THE CHARM

Exxon once again filed for appeal following the district court's most recent

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[167] *Id*. at 558.
[168] *Id*. at 559.
[169] *Id.* at 558–59.
[170] *Id.* at 559–60.
[171] *Id*. at 563–64.
[172] *Id*. at 565. These totals are greater than the numbers found for each of the three sections on this limited remand because they also include violations or days of violations that the Fifth Circuit found the plaintiffs had already established traceability for throughout each of the five counts from the original complaint. *Id.*
[173] *Id*. at 577.

decision.[174] In its third brief to the Fifth Circuit, Exxon argued that the recent Supreme Court decision in *TransUnion v. Ramirez* called for a reversal of the Fifth Circuit's prior opinions.[175] It alleged that the *TransUnion* finding of "no concrete harm, no standing," would mean that Exxon is only on the hook for, at most, 40 days of violations.[176]

Exxon claimed that *TransUnion* supports its argument that plaintiffs must prove every injury was caused by a violation in a manner that is concrete and particular.[177] It seems Exxon would have plaintiffs prove every alleged injury to be tied to a single violation, such that air molecules from a violation at the refinery traveled to the nose of a plaintiff and caused the odor they complained of or the cough they suffered from. If plaintiffs are not able to do so, they are not seeking to remedy any harm to themself but are "merely seeking to ensure a defendant's compliance with regulatory law."[178] Plaintiffs plainly rebutted the argument that *TransUnion* warranted a new decision.[179] They argued that *TransUnion* denied injury in fact and traceability based solely on the risk of future harm, and that it could be distinguished from the *Environment Texas* cases where the plaintiffs suffered tangible injuries.[180] The plaintiffs also pointed out that their risk of future harm was an Article III injury based on the certainty of the harm, as Exxon itself admitted that future emission events and violations are inevitable.[181] The plaintiffs further refuted

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174 *See* Supplemental Brief of Appellants, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 524 F. Supp. 3d 547 (S.D. Tex. 2021).

175 *Id*. at *9; *see* TransUnion LLC v. Ramirez, 141 S. Ct. 2190 (2021).

176 Supplemental Brief of Appellants at *3, *30, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 524 F. Supp. 3d 547 (S.D. Tex. 2021).

177 *Id*. at *19.

178 *Id*. at *15 (internal quotations omitted).

179 Supplemental Brief of Appellees at *1, *20, Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., No. 17-20545, 2021 WL 4824236 (S.D. Tex. Oct. 7, 2021).

180 *Id*.

181 *Id.* at *20 n.6.

the combining of injury in fact and traceability into one single requirement, which it claims Exxon had attempted to do in its citing of *TransUnion*.[182] Additionally, plaintiffs reiterated that traceability is not the equivalent of a but-for test of causation, but that it only requires a "causal relationship," and that neither the Supreme Court nor the Southern District of Texas "has ever held that but-for causation is always needed."[183]

The Fifth Circuit shot down both of Exxon's arguments regarding the alleged Supreme Court overhaul of standing in *TransUnion*.[184] The court stated that *TransUnion* did not overrule its previous *Environment Texas* decision, nor the cases it relied on.[185] Instead of *TransUnion* altering injury in fact requirements, as defendants claimed, it merely "reaffirmed the well-established rule that a violation of a federal law alone is not an Article III injury."[186] However, as the Fifth Circuit explained, that was not the case here: plaintiffs suffered multiple "concrete harms that have long been a basis for constitutional standing . . . . [including] interference with recreation, breathing and smelling polluted air, and allergy-like or respiratory problems."[187] The plaintiffs were not, contrary to what Exxon asserted, "merely seeking to ensure [Exxon's]'compliance with regulatory law.'"[188] The Fifth Circuit also refuted Exxon's claim that traceability requires but-for cause.[189] Not only do none of the cases Exxon cited in its brief support this position, but the Supreme Court has also never said that but-for causation is required to establish traceability.[190] The Fifth

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182 *Id.* at *27.
183 *Id.* at *27–29 (citing Khodara Env't, Inc. v. Blakey, 376 F.3d 187, 195 (3d Cir. 2004)).
184 Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 47 F.4th 408, 415 (5th Cir. 2022).
185 *Id.* at 416.
186 *Id.*
187 *Id.* (citing Env't Tex. Citizen Lobby, Inc. v. ExxonMobil Corp., 968 F.3d 357, 364 (5th Cir. 2020)).
188 *Id.* (alteration in original) (quoting TransUnion LLC v. Ramirez, 141 S. Ct. 2190, 2206 (2021)).
189 *Id.* at 417.
190 *Id.* ("Although a but-for causal connection is *sufficient* to establish traceability . . . the Supreme Court has never said such proof is *required*." (emphasis in original)).

Circuit went on to reiterate that requiring but-for causation to prove traceability would cut against over three decades of precedent, and that other circuits have also agreed with this conclusion.[191]

Not every member of the three-judge panel agreed with this analysis, though.[192] In his dissenting opinion, Judge Oldham remarked that "only our *en banc* court can clean this up."[193] Judge Oldham took issue with the majority's implementation of standing in gross and particularly with traceability.[194] He argued that regardless of difficulty, plaintiffs must prove individual traceability for each specific violation they allege, as he contends Article III standing requires.[195]

4. GOING FORWARD

The Fifth Circuit has now taken up ExxonMobil's *en banc* appeal.[196] How the *en banc* Court rules will have a massive impact on citizen suits, environmental justice, and environmental law as a whole—both in Texas and throughout the United States. Exxon's proposed adoption of a but-for test for traceability, bolstered by Judge Oldham's dissenting opinion, would set back decades of citizen suit litigation and throw standing requirements for these suits into the deep end. Despite the complexity of this case, the Fifth Circuit was able to delineate a recognizable test for determining the traceability of two dozen air pollutants that were emitted from the refinery in a variety of ways and which cause an even wider array of harms to human and environmental health. Using this test, the district court

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191 *Id.* at 418 (referencing cases from other circuits explicitly stating but-for causation is not required to prove traceability).
192 *Id.* at 423 (Oldham, J., dissenting).
193 *Id.*
194 *Id.* at 424.
195 *Id.* at 426.
196 Order on Petition for Rehearing En Banc, No. 17-20545, 2023 WL 2229665, at *1 (5th Cir. Feb. 24, 2023).

was then able to determine whether traceability had been established for each violation.

At both the trial and appellate levels, courts have shown how to deal with difficult issues of standing within the confines of Supreme Court decisions. Attempting to deviate from this through an *en banc* review by the Fifth Circuit is a grave mistake. Though it is not expressly in the court's purview to do so, the Fifth Circuit (and all courts) should think long and hard about the barriers it imposes on communities who rely on citizen suits to protect their health and livelihood.

Blake graduated from the University of Texas School of Law with his J.D. in 2023. He was a senior staff editor on the Texas Environmental Law Journal *and a member of* Texas Law Review. *He could not have written this article without the instruction and guidance of Kelly Haragan and David G. Nix and support from the entire TELJ staff.*