

**RECONCILING ENVIRONMENTAL JUSTICE WITH CLIMATE
CHANGE MITIGATION:
A CASE STUDY OF NC SWINE CAFOs**

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INTRODUCTION: THE BIG PIG PROBLEM

For thirty years, the swine industry has externalized severe environmental and health harms onto poor communities of color in Eastern North Carolina.³ This “Big Pig” problem is caused by the confinement, consolidation, and concentration of industrial hog operations within the low, flat, and economically marginalized Coastal Plain.⁴

Big Pig’s rise was not inevitable. As recently as 1982, more than 11,000 small swine farms freckled nearly all of North Carolina’s 100 counties.⁵ Then came the “boom” of consolidation and industrialization that transformed hog

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4. See Bob Edwards & Anthony E. Ladd, *Environmental Justice, Swine Production and Farm Loss in North Carolina*, 20 SOC. SPECTRUM 263, 264 (2000) (discussing concentration of swine production on coastal plain and growing environmental justice concerns).
5. *Id.* at 268 (“Of the nearly 11,400 farms in 1982 producing hogs and pigs . . . almost 60 percent had less than 25 hogs.”)

production into a highly consolidated and vertically integrated industry.⁶ Between 1989 and 1995, vertically integrated corporations and their contract growers built 700 Concentrated Animal Feeding Operations⁷ (CAFOs) in Eastern North Carolina while 7,000 smaller hog farmers went out of business.⁸ The emergent “megalopolis”⁹ of confinement houses quartered 8.2 million pigs¹⁰ that produced twice as much manure as the population of New York City without a sewage treatment plant in sight.¹¹

The new mega-facilities are concentrated in a handful of socially and environmentally vulnerable communities in the Coastal Plain where the most prominent geological features are sandy soils, high water tables, and proximity to the coast.¹² Ten North Carolina counties in the Coastal Plain now account for ten percent of the entire swine inventory of the United States.¹³ Nearly every hog is grown under contract to be slaughtered at the world’s largest swine slaughter facility located in the small town of Tar Heel, North Carolina.¹⁴

The 2,300 North Carolina swine CAFOs operating today rely on the so-called lagoon and spray field system.¹⁵ Hog waste is flushed from confinement barns into uncovered and unlined earthen pits, where it partially digests before industrial sprinklers spray the effluent onto nearby cropland.¹⁶

6. *See id.* at 264, 267 (discussing “explosion” of the North Carolina swine industry).

7. CAFOs are Animal Feeding Operations (AFOs) distinguished by their size or their designation as significant polluters of surface waters. 40 C.F.R. § 122.23(b)-(c) (2020). AFOs are livestock farms that raise animals in confinement. *Id.* § 122.23(b)(1).

8. Edwards, *supra* note 4, at 267.

9. Joby Warrick & Pat Stith, THE NEWS & OBSERVER, *New Studies Show that Lagoons are Leaking*, THE PULITZER PRIZES (Feb. 19, 1995), <https://www.pulitzer.org/winners/news-observer-raleigh-nc>.

10. NAT’L AGRIC. STATISTICS SERV., U.S. DEP’T AGRIC., HOGS AND PIGS: FINAL ESTIMATES 1993-1997 6 (1998) (noting 8.2 million swine in North Carolina in 1995).

11. Hannah Connor, *Comprehensive Regulatory Review: Concentrated Animal Feeding Operations Under the Clean Water Act From 1972 to the Present*, 12 VT. J. ENVTL. L. 276, 276 (2011).

12. *Our State Geography in a Snap: The Coastal Plain Region* (Jan. 1, 2012), <https://www.ncpedia.org/geography/region/coastal-plain>.

13. *See* NAT’L AGRIC. STATISTICS SERV., U.S. DEP’T OF AGRIC., 2019 NORTH CAROLINA AGRICULTURAL STATISTICS: ONE HUNDRED YEARS AND COUNTING 42 (2019) (displaying swine data by county).

14. *See* Paul Blest, *A Stench in the Nostrils of God* (Feb. 20, 2020), <https://theoutline.com/post/8633/smithfield-pork-tar-heel-north-carolina-industrial-farms-lawsuits?zd=1&zi=tmcimmnh> (describing Tar Heel slaughter facility). Local citizens later sued the state for failing to conduct an environmental impact assessment of the facility, raising specific concerns about cumulative and indirect impacts caused by new hog operations built to satisfy this increased processing capacity. *See generally* Citizens for Clean Indus., Inc. v. Lofton, 427 S.E.2d 120 (1993).

15. *USGS Studies Influence of Animal Feeding Operations on Stream Water Quality*, STORMWATER REPORT (Aug. 5, 2015), <https://stormwater.wef.org/2015/08/usgs-studies-influence-animal-feeding-operations-stream-water-quality/>.

16. *See* Michelle Nowlin, *Sustainable Production of Swine: Putting Lipstick on a Pig?*, 37 VT. L. REV. 1079, 1084–85 (2013) (describing the mechanics of the lagoon and spray field system).

The lagoon and spray field system lies at the root of Big Pig's environmental harms, including water pollution, air pollution, antibiotic resistance, and nuisance conditions.¹⁷

This pollution harms human health, especially the health of people who live nearby. A comprehensive literature review found respiratory illness, MRSA, Q fever, and stress/mood disorders are all “consistently and positively associated” with living near a CAFO.¹⁸ Local data confirm the trend. Duke University researchers found that North Carolinians living near a swine CAFO experienced a broad range of worse health outcomes compared with a control group.¹⁹ Neighbors suffered higher rates of all-cause mortality, infant mortality, mortality from anemia, kidney disease, tuberculosis, septicemia, and low birth weight.²⁰ These negative outcomes robustly and inversely correlated with proximity to the nearest hog CAFO.²¹

North Carolinians do not bear these health costs equitably. The environmental and public health harms of this system are a black-and-white issue of environmental justice (EJ) because CAFOs were disproportionately built in politically disenfranchised communities of color.²² Beginning in the mid-1990s, community-based participatory research by University of North Carolina epidemiologist Steve Wing investigated the locations and community health impacts of CAFOs in Eastern North Carolina.²³ He found “a case study of environmental racism.”²⁴ Compared to the non-Hispanic white population, Black people and Native Americans are respectively 1.4 and 2.39 times more likely to suffer the consequences of living within three miles of a swine CAFO.²⁵

17. See generally *id.* at 1085–96 (describing negative impacts of CAFOs); CARRIER HRIBAR, NAT'L ASS'N OF LOCAL BDS. OF HEALTH, UNDERSTANDING CONCENTRATED ANIMAL FEEDING OPERATIONS AND THEIR IMPACT ON COMMUNITIES 5–11 (2010) (describing negative impacts of CAFOs).

18. Joan A. Casey et al., *Industrial Food Animal Production and Community Health*, 2 CURRENT ENVTL. HEALTH REP. 259, 259 (2015).

19. Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operation*, 79 N.C. MED. J. 278, 278 (2018).

20. *Id.* at 278, 281–84.

21. *Id.* at 278, 285.

22. See, e.g., STEVE WING & JILL JOHNSTON, DEP'T OF EPIDEMIOLOGY, UNIV. OF N.C., INDUSTRIAL HOG OPERATIONS IN NORTH CAROLINA DISPROPORTIONATELY IMPACT AFRICAN-AMERICANS, HISPANICS AND AMERICAN INDIANS 1 (2015); Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 ENVTL. HEALTH PERSP. A182, A183 (2013); Edwards, *supra* note 4, at 266.

23. See generally Steve Wing et al., *Community Based Collaboration for Environmental Justice: South-East Halifax Environmental Reawakening*, 8 ENV'T. & URBANIZATION 129 (1996) (describing environmental racism near hog production facilities).

24. *Id.* at 129. Wing uses “environmental racism” to describe how “[i]nstitutional racism connects with exposure to environmental hazards when inequalities of political and economic power result in a discriminatory pattern of location of polluting industries and wastes.” *Id.* at 131.

25. WING & JOHNSTON, *supra* note 22, at 6.

Lagoons break down solid and liquid waste into gasses, creating air pollution.²⁶ Liquid waste sprayed onto fields runs off or seeps into groundwater.²⁷ CAFOs emit volatile organic compounds (VOCs) like dimethyl sulfide, ammonia, hydrogen sulfide, and particulate matter.²⁸ Antibiotic-resistant pathogens travel through both air and water vectors.²⁹

Now, as global concern over climate change drives corporate demand to decarbonize supply chains, market forces exert pressure for converting existing lagoon and spray field CAFOs into biogas factories. Biogas mitigates GHG emissions by combusting methane into CO₂ while generating revenue from electricity sales and carbon offset credits.³⁰ Reconciling the interests of EJ, local natural resources, and the global climate requires agribusiness to reinvest some of this financial boon into the clean technologies they have promised—and shirked—for decades.

CHAPTER I: RISE OF THE RESISTANCE

North Carolina became the fastest-growing swine-producing state in the country during the early 1990s.³¹ From the very beginning of that boom, a clutch of grassroots community groups formed to oppose the lagoon and spray field system.³² They asked local government leaders to slow construction.³³ Residents rightly feared that large swine farms promising economic development would instead deliver air pollution, noxious odors, groundwater contamination, surface water pollution, the loss of independent family farms, farmland loss, and the loss of rural vitality and institutions.³⁴ One group, the Concerned Citizens of Tillery, successfully pushed county

26. Dan Charles, *Big Companies Bet On Cleaner Power From Pig Poop Ponds* (Nov. 22, 2019), <https://www.npr.org/sections/thesalt/2019/11/22/781565978/big-companies-bet-on-cleaner-power-from-pig-poop-ponds> (“On most farms, that gas just goes floating off into the air — and contributes to the overheating of the planet. Methane is a greenhouse gas with a warming impact at least 25 times greater, per pound, than carbon dioxide.”).

27. See generally Casey et al., *supra* note 18 (discussing the impacts of swine CAFOs, including to ground- and surface water).

28. HRIBAR, *supra* note 17, at 5.

29. See Casey et al., *supra* note 18, at 260 (summarizing the transmission of antibiotic-resistant pathogens).

30. U.S. DEP’T OF AGRIC. ET AL., *BIOGAS OPPORTUNITIES ROADMAP 12* (2014); NAT’L RENEWABLE ENERGY LAB., *ENERGY ANALYSIS: BIOGAS POTENTIAL IN THE UNITED STATES 1* (2013).

31. Edwards, *supra* note 4, at 263.

32. Elisabeth Stoddard, *Neoliberal Governance and Environmental Risk*, in *POLITICAL ECOLOGIES OF MEAT* 137, 146 (Jody Emel & Harvey Neo, eds., 2015). These groups included the Concerned Citizens of Tillery, the Alliance for a Responsible Swine Industry, the Rural Empowerment Association for Community Help, and the North Carolina Environmental Justice Network. *Id.*

33. See *id.* (describing pressures the community groups put on the state).

34. Steve Wing, *Social Responsibility and Research Ethics in Community-Driven Studies of Industrialized Hog Production*, 110 *ENV’T. HEALTH PERSP.* 437, 438 (2002).

officials to enact a local health ordinance requiring basic environmental protections missing from state laws.³⁵ Other groups ensured that anti-CAFO zoning ordinances proliferated at the county level.³⁶ But legal challenges and state preemption ultimately de-clawed local resistance.³⁷

Then a series of catastrophic lagoon breaches and hurricanes in the mid-1990s transmuted a local environmental problem into a political problem for state government. Operational deficiencies caused a lagoon breach in 1995 that spilled 25 million gallons of hog waste into the New River.³⁸ In 1996, *The (Raleigh) News and Observer* published a Pulitzer-Prize-winning series, “Boss Hog,” exposing how corporate swine interests had captured the legislature and wrought a toxic landscape in Eastern North Carolina.³⁹ During Hurricane Floyd in 1999, heavy rains caused at least five lagoons to burst; forty-seven other lagoons flooded, spilling their contents into the landscape.⁴⁰

Responding to community groups, the widespread spills, and the “Boss Hog” press, Governor Hunt convened the Blue Ribbon Commission on Agricultural Waste to study swine CAFO pollution.⁴¹ The Commission’s report found egregious violations and urged legislative action.⁴² In 1997, the legislature put a temporary moratorium on new lagoons that prohibited new lagoon and spray field waste management systems, absent strict environmental performance standards.⁴³ Since 1997, no new lagoons have been lawfully built, absent exceptions to the moratorium.⁴⁴ Thousands of existing lagoons were grandfathered in, and dozens of new lagoons were built under moratorium exceptions.⁴⁵

35. *Id.*

36. *Id.*

37. *See, e.g.*, *Craig v. Cty. of Chatham*, 565 S.E.2d 172 (2002) (finding a town ordinance to be preempted by state law).

38. *Huge Spill of Hog Waste Fuels an Old Debate in North Carolina*, N.Y. TIMES, June 25, 1995, § 1, at 21.

39. *See The News & Observer (Raleigh, NC)*, THE PULITZER PRIZES, <https://www.pulitzer.org/winners/news-observer-raleigh-nc> (last visited May 1, 2020) (naming the “Boss Hog” article series as the 1996 Pulitzer Prize Winner in Public Service); Pat Stith et al., *THE NEWS & OBSERVER, Boss Hog: The Power of Pork, North Carolina’s Pork Revolution*, THE PULITZER PRIZES (Feb. 19, 1995), <https://www.pulitzer.org/winners/news-observer-raleigh-nc> (describing the relationship between the hog industry and North Carolina).

40. Nowlin, *supra* note 16, at 1088.

41. *See* DAVID KIRBY, *ANIMAL FACTORY* 144, 147 (2010) (describing the research of “the governor’s Blue Ribbon Commission on Agricultural Waste”).

42. *Id.*

43. *See generally* 1997 N.C. Sess. Laws 458 (codified as amended at N.C. GEN. STAT. § 143-215.10A (2013)) (enacting a moratorium on the construction or expansion of swine farms and lagoons).

44. *CAFO Wars Continue* (Mar. 12, 2019), <https://www.yadkinriverkeeper.org/news/2019/3/12/cafo-wars-continue>.

45. Talia Buford, *A Hog Waste Agreement Lacked Teeth, and Some North Carolinians Say They’re Left to Suffer* (Nov. 23, 2018), <https://www.propublica.org/article/a-hog-waste-agreement-lacked-teeth>.

The 1997 law also added state permitting and inspection requirements—a landmark victory at the time.⁴⁶ North Carolina’s Department of Environmental Quality (DEQ) requires facilities with more than 250 hogs to have either a state permit or a permit under the Clean Water Act’s National Pollution Discharge Elimination System (NPDES).⁴⁷ Virtually all hog farms use the State’s general permit rather than its more stringent federal counterpart.⁴⁸ Optimism over the inspection and permit system was short lived. Permitting fell far short of community hopes, in large part because DEQ has consistently issued permits without considering the additional burden placed on communities of color.⁴⁹ Inspections suffer from funding cuts and public records exemptions.⁵⁰

Indeed, if the permit system had lived up to its facial promises, the disproportionate burden borne by communities of color would at least have been much lighter. But DEQ’s swine permits are fundamentally flawed. They are predicated on the legal fiction that regulated facilities do not pollute public waters; they are classified as non-discharge facilities.⁵¹ The fiction that these facilities do not discharge rests on magical thinking backed by models.⁵² Permittees must spray waste at “agronomic rates,” meaning that nitrogen applied through manure balances with the theoretical nitrogen uptake by crops.⁵³ Yet the permit does not require ground- or surface-water monitoring except when regulators observe permit violations, a catch-22.⁵⁴ Worse, the permit exempts from the definition of a discharge any waste that

and-some-north-carolinians-say-left-to-suffer; *Despite Moratorium, More Hog Farms Built in North Carolina in Past 10 Years* (Mar. 23, 2007), <https://thepigsite.com/news/2007/03/despite-moratorium-more-hog-farms-built-in-north-carolina-in-past-10-years-1>.

46. See generally 1997 N.C. Sess. Law 458 (describing permitting requirements); N.C. GEN. STAT. § 143-215.10C (discussing applications and permits to construct or operate an animal waste management system); *id.* § 143-215.10F (discussing inspection program).

47. N.C. GEN. STAT. § 143-215.10C(a)(1); 15A N.C. ADMIN. CODE ch. 02T (2018).

48. See *List of Permitted Animal Facilities*, N.C. DEP’T ENVTL. QUALITY (Nov. 6, 2019), https://files.nc.gov/ncdeq/List_OF%20Permitted_Animal_Facilities2019-11-06.xls (listing data on permitted animal facilities in North Carolina).

49. *Infra*, Chapter III; Complaint at 34–41, *Waterkeeper Alliance, Inc. v. N.C. Dep’t of Env’tl. Quality* (Sept. 3, 2014), <https://earthjustice.org/sites/default/files/files/North-Carolina-EJ-Network-et-al-Complaint-under-Title-VI.pdf>.

50. Stoddard, *supra* note 32, at 148–49.

51. STEPHEN L. HARDEN, U.S. DEP’T. OF THE INTERIOR, SURFACE-WATER QUALITY IN AGRICULTURAL WATERSHEDS OF THE NORTH CAROLINA COASTAL PLAIN ASSOCIATED WITH CONCENTRATED ANIMAL FEEDING OPERATIONS 2 (2015).

52. See, e.g., *id.* at 47 (discussing analysis to identify differences in watersheds associated with either having or not having CAFO manure effects).

53. N.C. GEN. STAT. § 143-215.10C(e)(6)–(7); *id.* § 413-215.10C(f); see also DEP’T OF ENVTL. QUALITY, N.C. ENVTL. MGMT. COMM’N, SWINE WASTE MANAGEMENT SYSTEM GENERAL PERMIT 1, 3 (2014) [hereinafter GENERAL PERMIT] (listing permit requirements).

54. See generally DEP’T ENVTL. QUALITY, *supra* note 53 (showing no ground or surface water monitoring requirement).

spills during a 25-year, 24-hour storm event—defined as the strongest storm with a probable recurrence interval of 25 years.⁵⁵ Eastern North Carolina has experienced two 1,000-year storms in the past four years.⁵⁶

In 2000, North Carolina’s then Attorney General Mike Easley reached an agreement with Smithfield and its subsidiaries to identify replacement technology for grandfathered lagoons.⁵⁷ Smithfield committed to fund research on new environmentally superior waste treatment technologies (ESTs).⁵⁸ The company agreed to install ESTs on all company-owned farms within three years from the date that the “designee” determined that they met environmental performance standards and proved “technically, operationally, and economically feasible.”⁵⁹ Smithfield also agreed to provide assistance for their contract farmers to install ESTs.⁶⁰

The environmental performance standards specified ESTs must 1) eliminate all animal waste discharges to surface and ground water; and substantially eliminate 2) atmospheric ammonia emissions; 3) odor detectable beyond the farm boundary; 4) disease-transmitting vectors and airborne pathogens; and 5) nutrient and heavy metal contamination of soil and groundwater.⁶¹ Notably, the Smithfield Agreement left out methane as a pollutant subject to performance standards, as had the moratorium legislation before it.⁶²

An engineering committee under the Smithfield Agreement labored to set standards based on different interpretations of “substantially eliminate.” For example, the committee decided that, in the case of ammonia emissions, “substantially eliminate” meant a 60% reduction compared to a typical swine farm.⁶³ In the intervening years, multiple ESTs tested on North Carolina

55. *Id.* at 2.

56. See James Bruggers, *After Back-to-Back Hurricanes, North Carolina Reconsiders Climate Change* (Dec. 27, 2018), <https://insideclimatenews.org/news/27122018/hurricane-damage-north-carolina-climate-change-2018-year-review-florence-michael-matthew> (describing major rain events in North Carolina); Jason Samenow, *Florence was Another 1,000-year Rain Event. Is This the New Normal as the Planet Warms?* (Sept. 18, 2018), <https://www.washingtonpost.com/weather/2018/09/18/florence-was-another-year-rain-event-is-this-new-normal-planet-warms/> (explaining the increase in number of rare storms).

57. Agreement between the Attorney General of North Carolina et al., at 1–6 (July 25, 2000), https://projects.ncsu.edu/cals/waste_mgmt/smithfield_projects/agreement.pdf [hereinafter Smithfield Agreement].

58. *Id.* at 2–3.

59. *Id.* at 3–5.

60. *Id.* at 13.

61. *Id.* at 4.

62. See generally *id.* (showing no methane provisions).

63. SMITHFIELD AGREEMENT ADVISORY PANEL ENGINEERING SUBCOMMITTEE, ENVIRONMENTALLY SUPERIOR PERFORMANCE CRITERIA DEFINITIONS: RECOMMENDATIONS DOCUMENT 2,

swine farms proved capable of meeting—and far exceeding—the environmental performance standards.⁶⁴ The third generation of a treatment technology called Super Soils “was documented to remove approximately 99% of total suspended solids, 98% of [chemical oxygen demand], 99% of TKN (Total Kjeldahl nitrogen), 100% ammonia, 92% phosphorus, 95% copper, and 97% zinc from the flushed manure. Fecal coliform reductions were measured to be 99.98%.”⁶⁵

A separate economic subcommittee set out to define “economically feasible.”⁶⁶ A majority of the subcommittee agreed on a standard that would keep at least 88% of swine farms in business.⁶⁷ Four dissenting members, representing swine companies and an agricultural bank, wrote a dissenting report contending that the standard should be “no net increase in cost” compared to the lagoon and spray field system.⁶⁸ Industry’s dissent contradicted the terms of the Smithfield Agreement: “The parties understand and agree that alternative technologies that cost more than the lagoon and spray field system may be determined to be economically feasible.”⁶⁹ As early as 2006, designee Dr. C. Mike Williams concluded that Super Soils “comprise an unconditional Environmentally Superior Technology for new farms” meeting all EST requirements and economic feasibility.⁷⁰

Seven years into the Smithfield Agreement, the lagoons and spray fields operated unabated.⁷¹ In 2007, frustrated community groups championed a bill that would have banned all new lagoons and prohibited any swine facility from installing new waste treatment systems without adopting ESTs.⁷² It would have given grants to any producers who installed any of the five waste

[http://projects.ncsu.edu/cals/waste_mgmt/smithfield_projects/phase1report04/Appendix%20D\(Engineering\).pdf](http://projects.ncsu.edu/cals/waste_mgmt/smithfield_projects/phase1report04/Appendix%20D(Engineering).pdf).

64. See C.M. WILLIAMS, ANIMAL & POULTRY WASTE MGMT. CTR., N.C. STATE UNIV., EVALUATION OF GENERATION 3 TREATMENT TECHNOLOGY FOR SWINE WASTE 2 (2013) (noting second and third generation technologies achieved efficient environmental performance at reduced costs).

65. *Id.* at 3.

66. See CHANTAL LINE CARPENTIER ET AL., MAJORITY REPORT FROM THE ECONOMICS SUBCOMMITTEE OF THE ADVISORY PANEL TO THE DESIGNEE UNDER THE AGREEMENTS BETWEEN ATTORNEY GENERAL OF NORTH CAROLINA AND SMITHFIELD FOODS, PREMIUM STANDARD FARMS AND FRONTLINE FARMERS REGARDING RECOMMENDATIONS ON ECONOMIC FEASIBILITY DETERMINATIONS 30–31 (2005),

https://projects.ncsu.edu/cals/waste_mgmt/smithfield_projects/phase3report06/pdfs/Appendix%20D.pdf (presenting letter within majority report seeking to define “economically feasible”).

67. See *id.* at 6, 20 (agreeing with 12% reduction in swine operation to obtain better waste handling).

68. *Id.* at 3.

69. Smithfield Agreement, *supra* note 57, at 10.

70. MIKE WILLIAMS, DEVELOPMENT OF ENVIRONMENTALLY SUPERIOR TECHNOLOGIES: PHASE 3 REPORT 6 (2006).

71. See Stoddard, *supra* note 32, at 147 (noting that five ESTs had been developed, yet none were implemented); Buford, *supra* note 45 (noting that hog farmers continued to store hog waste in lagoons).

72. Stoddard, *supra* note 32, at 147.

management technologies approved as ESTs through the Smithfield Agreement.⁷³

After passing the NC Senate with unanimous support, then-Governor Mike Easley pulled the bill before it could pass the House.⁷⁴ It was replaced with a bill developed with industry support.⁷⁵ The new bill retained the ban on construction of any new lagoons without ESTs, but dispensed with the regulations on expanding facilities.⁷⁶ Perhaps most significantly, the new bill substituted comprehensive financial support for ESTs with a pilot program for producers to capture lagoon methane and sell it at subsidized prices for electricity generation.⁷⁷ As one commentator noted, “the legislation rolled back the more restrictive regulations in the original bill and turned the industry’s hog waste into a commodity that was to be subsidized by the state’s citizens.”⁷⁸

Methane capture could be a revenue source because it was not regulated at all. Methane itself is odorless and thus not covered by North Carolina odor standards.⁷⁹ While state water quality permits for swine are weak, air permits for swine are nonexistent.⁸⁰ Like the Clean Air Act regulations before, and the Smithfield Agreement that would follow, the state swine permit contains no standards for methane emissions.⁸¹ Omitting methane preserved Clean Air Act loopholes that allowed CAFOs to emit unlimited atmospheric methane, which in turn allows these emissions sources to meet “additionality” requirements of voluntary carbon markets.⁸² Thusly were the seeds sown for the nascent biogas industry, now on the rise twenty years later.

Community groups rose in opposition to the lagoon and spray field system. Throughout the 1990s and 2000s, they erected zoning restrictions, filed nuisance suits, and catalyzed the state’s legislature and executive

73. *Id.*

74. *Id.*

75. 2007 N.C. Sess. Laws 523 (codified at N.C. GEN. STAT. § 143-215.10I); *see also North Carolina Finalizes Swine Lagoon Ban* (Sept. 20, 2007), <https://www.nationalhogfarmer.com/news/newsflash/north-carolina-finalizes-lagoon-ban> (discussing new bill).

76. *North Carolina Finalizes Swine Lagoon Ban*, *supra* note 75.

77. Stoddard, *supra* note 32, at 147–48.

78. *Id.* at 148.

79. Lan Luo, *Properties of Methane Gas* (Feb. 23, 2020), <https://sciencing.com/properties-methane-gas-5090934.html>; *see generally* 15A N.C. ADMIN. CODE 02D § .1800 (2000) (lacking methane in odor standards).

80. *See generally* GENERAL PERMIT, *supra* note 53 (listing permitting requirements). The general permit applies to any swine animal feeding operation in North Carolina, but it does not regulate air pollution. *Id.*

81. *See generally id.* (containing no standards for methane emissions).

82. *See* Steven Ferrey, *When 1+1 No Longer Equals 2: The New Math of Legal “Additionality” Controlling World and U.S. Global Warming Regulation*, 10 MINN. J. L. SCI. & TECH. 591, 591–94 (2009) (describing “additionalities”).

powers to pass a lagoon moratorium, implement a permitting regime, and pressure industry into a landmark agreement.⁸³ Yet 25 years into the lagoon and spray field era, activism had failed to stop—let alone reverse—the environmental, social, or human health problems caused by concentrated swine.⁸⁴ By the early 2010's, the environmental and EJ communities began to look for new strategies.

CHAPTER II: NEW ACTORS CHANGE STRATEGIC LANDSCAPE

Around 2014, three new actors emerged to challenge the status quo: a mature and coordinated EJ community; well-resourced plaintiffs' attorneys; and corporate sustainability divisions of major firms.⁸⁵ Each opened a new legal assault against Big Pig's pollution. Each sought different remedies: compensatory and punitive monetary damages for past harms; change to the regulatory schema that account and correct for permitting inequities to prevent future harms; and emissions accounting and reductions in order to decarbonize the corporate supply chain.⁸⁶ Each remedy comes with a significant price tag, at least up front. But, while the infrastructure to capture methane for biogas will lower GHG emissions, it will not improve the daily lives of nearby residents.⁸⁷ The extent to which climate mitigation and EJ interests get reconciled will mold the legal and physical landscape for a generation to come.

Title VI Complaint

By 2014, the community organizations that first resisted the CAFO boom had blossomed into a coordinated network of environmental justice leaders. In 2014, Earthjustice, on behalf of the North Carolina Environmental Justice Network, the Rural Empowerment Association for Community Help, and the Waterkeepers Alliance, filed a complaint with the Environmental Protection

83. See generally Stoddard, *supra* note 32, at 137–49 (describing community groups' actions throughout the history of swine CAFOs).

84. See Lily Kuo, *The World Eats Cheap Bacon at the Expense of North Carolina's Rural Poor*, QUARTZ (Jul. 14, 2015), <https://qz.com/433750/the-world-eats-cheap-bacon-at-the-expense-of-north-carolinas-rural-poor/> (outlining the struggles of activists and those affected by swine CAFOs).

85. See CHRISTINE BALL-BLAKELY, ANIMAL LEGAL DEF. FUND, *CAFOs: PLAGUING NORTH CAROLINA COMMUNITIES OF COLOR* 30–37 (2018) (discussing coordinated community movement against CAFOs).

86. *Id.*

87. See Nicole, *supra* note 22, at A188 (noting methane digester will not, on its own, reduce odors, pathogens, and heavy metals).

Agency's (EPA) Office of Civil Rights.⁸⁸ The complaint alleged that the lagoon and spray field system disproportionately impacted communities of color with many types of pollution and that the state, through its permitting system, failed to address these racial disparities in violation of Title VI of the federal Civil Rights Act.⁸⁹

After preliminary investigation, the EPA issued a Letter of Concern to DEQ in 2017.⁹⁰ Its investigators found "adverse impacts from industrial swine operations on communities of color"⁹¹ and "retaliation, threats, intimidation, and harassment by swine facility operators and pork industry representatives" against residents who filed complaints.⁹² The letter seemingly rattled DEQ officials, who did not wait for the EPA to complete its full investigation before settling in 2018.⁹³ The settlement terms, negotiated with the same community organizations that DEQ had ignored for decades, put new arrows in the quivers of communities fighting for greater protections from CAFO pollution.⁹⁴ Among other terms, state officials agreed to propose specific updates to the state swine general permit;⁹⁵ develop and implement an Environmental Justice tool;⁹⁶ and take steps to broaden community participation in state permitting processes.⁹⁷

Nuisance Suits

In 2014, plaintiffs' attorneys filed nuisance suits on behalf of 500+ neighbors of swine CAFOs claiming that the lagoon and spray field system harmed the use and enjoyment of their property.⁹⁸ This was not the first

88. *See generally* Complaint Under Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d, 40 C.F.R. Part 7, (2014) at 1, <https://earthjustice.org/sites/default/files/files/North-Carolina-EJ-Network-et-al-Complaint-under-Title-VI.pdf> (submitting administrative complaint to the EPA Office of Civil Rights).

89. *Id.* at 3, 12–13.

90. Letter from EPA External Civil Right Compliance Office, Office of General Counsel, to William G. Ross, Jr., Acting Secretary, North Carolina Department of Environmental Quality, (Jan. 12, 2017), <http://waterkeeper.org/wp-content/uploads/2017/01/Letter-to-Complainants-in-Case-11R-14-R4-Forwarding-Letter-of-Concern-to-NC-DEQ-1-12-2017.pdf>.

91. *Id.* at 3.

92. *Id.* at 4.

93. Settlement Agreement between N.C. Dep't. of Env'tl. Quality et. al. (May 3, 2018), https://files.nc.gov/ncdeq/documents/files/Final%20Settlement%20Agreement_attachments%20and%20sig.pdf.

94. *See id.* at 1 (naming parties to the agreement).

95. *Id.* at 4–5.

96. *Id.* at 6.

97. *Id.* at 7–8.

98. *See, e.g.*, Complaint of Linda Atkinson, et al., In re NC Swine Farm Nuisance Litig., No. 5:15-cv-00013-BR, 2017 WL 5178038 (E.D.N.C. Nov. 8, 2017); Complaint of Bertha Lee Carter Battle et al., In re NC Swine Farm Nuisance Litig., No. 5:15-cv-00013-BR, 2017 WL 5178038 (E.D.N.C. Nov. 8,

attempt to use nuisance law to rein in CAFO pollution, nor even the first to produce eye-catching verdicts.⁹⁹ Nuisance suits proliferated nationwide in the late 1990s.¹⁰⁰ In 2010, a Missouri court awarded neighbors \$11 million in damages caused by a swine mega-farm owned by Premium Standard Foods, a Smithfield subsidiary.¹⁰¹

Earlier nuisance actions floundered in North Carolina. Former U.S. Senator Robert Morgan sued a swine CAFO in the mid-1990s claiming that fumes from the lagoons were “often so noxious that at times it burns their eyes and noses, making it difficult for [plaintiffs] to see and breathe.”¹⁰² Senator Morgan lost the case. In contrast, the civil actions brought in 2014 to abate nuisances caused by the lagoon and spray field system have been groundbreaking.¹⁰³

Two strategic choices help explain the revival of common law remedies to hold Big Pig accountable. First, the cases name Smithfield, not the contract growers who grow most of Smithfield’s hogs, even though some of the targeted farms were owned by contract growers.¹⁰⁴ The court found that the contract growers were not a necessary party to the litigation,¹⁰⁵ successfully opening up the \$15 billion multi-national company¹⁰⁶ to damages without pinning them on the contract growers. In the process, plaintiffs reaped a

2017); Complaint of Alex Bordeaux et. al., In re NC Swine Farm Nuisance Litig., No. 5:15-cv-00013-BR, 2017 WL 5178038 (E.D.N.C. Nov. 8, 2017).

99. Leah Douglas, “Finally, Somebody Heard What the People Were Saying was Happening to Them” (May 1, 2018), <https://www.motherjones.com/food/2018/05/the-growing-grassroots-opposition-to-industrial-hog-farming-just-scored-a-major-victory/>.

100. Lisa Sorg, *Neutering Nuisance Laws in North Carolina* (Nov. 15, 2017), <http://www.nepolicywatch.com/2017/11/15/neutering-nuisance-laws-north-carolina/>.

101. See *Owens v. ContiGroup Cos.*, 344 S.W.3d 717 (Mo. Ct. App. 2011) (affirming the lower court’s decision to award plaintiffs over \$11 million in damages); Allan Ripp, *Missouri Jury Awards Residents \$11 Million in Damages From Living Under Cloud of Stench Caused by Industrial Hog Farms*, SPEER L. FIRM (Mar. 5, 2010), <https://www.prnewswire.com/news-releases/missouri-jury-awards-residents-11-million-in-damages-from-living-under-cloud-of-stench-caused-by-industrial-hog-farms-86643287.html>.

102. *Parker v. Barefoot*, 502 S.E.2d 42, 44 (1998), *overruled by Parker v. Barefoot*, 519 S.E.2d 315 (1999).

103. In re NC Swine Farm Nuisance Litig., No. 5:15-cv-00013-BR, 2017 WL 5178038 (E.D.N.C. Nov. 8, 2017); Barry Yeoman, *Here are the Rural Residents Who Sued the World’s Largest Hog Producer Over Waste and Odors—and Won*, FOOD & ENVTL. REPORTING NETWORK (Dec. 20, 2019), <https://thefern.org/2019/12/rural-north-carolinians-won-multimillion-dollar-judgments-against-the-worlds-largest-hog-producer-will-those-cases-now-be-overturned/>.

104. Complaint of Linda Atkinson et al., *supra* note 98; Complaint of Bertha Lee Carter Battle et al., *supra* note 98; Complaint of Alex Bordeaux et. al., *supra* note 98; Yeoman, *supra* note 103.

105. *In re NC Swine Farm Nuisance Litig.*, No. 15-cv-00013, 2017 BL 176858, at *6 (finding that the company was in full control of grower operations and awards, directed the type and amount of feed, directed waste disposal method and, in several cases, directed the siting of the contract grower’s operation).

106. Buford, *supra* note 45.

tactical advantage by focusing on decisions made by corporate officers rather than overstretched family farmers.

Second, plaintiffs' attorneys filed in federal court.¹⁰⁷ They relied on the diversity jurisdiction created by Smithfield, a Virginia corporation, owning all of the hogs through Murphy-Brown, a corporation registered in Delaware and controlled by Smithfield through a wholly owned subsidiary also registered in Delaware.¹⁰⁸

The cases presented temporary nuisance claims.¹⁰⁹ Complainants alleged that the hog facilities caused a range of problems—such as odors, ammonia emissions, pests, and truck noise—negatively affecting the use of plaintiffs' property.¹¹⁰ Plaintiffs suffered health effects that included burning eyes, respiratory problems, headaches, anxiety, and spikes in blood pressure.¹¹¹ Plaintiffs' claims alleged harms that ESTs were designed to remedy or prevent. The complaints allege additional wrongdoing that merit punitive damages.¹¹² Specifically, the plaintiffs alleged that the defendant and their executives knew about the nuisance, had the EST technology and financial resources to take corrective action, and failed to do so negligently and improperly.¹¹³

Five jury pools have produced verdicts in these cases that ranged from the hundreds of thousands to hundreds of millions of dollars.¹¹⁴ The largest reached \$473.5 million,¹¹⁵ later reduced to \$94 million by mandatory state caps on punitive damages.¹¹⁶ Smithfield appealed and key issues from the first five trials are now before the Fourth Circuit, which heard oral arguments on January 31, 2020.¹¹⁷

One of the big questions is whether the amended "Right to Farm" law, passed to deter nuisance suits, should apply retroactively. In the wake of the first large verdicts, the North Carolina legislature updated the State's Right

107. Third Amended Complaint, *McKiver v. Murphy-Brown, LLC*, No. 7:14-cv-00180-BR, 2018 WL 4189408 (E.D.N.C. Feb. 12, 2018).

108. *Id.* ¶¶ 25–28.

109. *Id.* ¶¶ 220–35.

110. *Id.* ¶ 3.

111. *Id.* ¶ 31, 219; Yeoman, *supra* note 103.

112. Third Amended Complaint, *supra* note 107, ¶ 236–39.

113. *Id.* ¶ 230.

114. *McKiver v. Murphy-Brown, LLC*, No. 7:14-CV-180-BR, 2018 WL 10322917, at *1 (E.D.N.C. May 7, 2018).

115. *See* Verdict, James Jacobs, et al., v. Murphy-Brown LLC, No. 7:14-CV-237-BR (E.D.N.C. Aug. 13, 2018) (outlining the amount of recovery and punitive damages each plaintiff was entitled to, which adds up to \$473.5 million).

116. N.C. GEN. STAT. §1D-25(b) (2019).

117. *See Oral Argument Calendar*, U.S. COURT OF APPEALS FOR THE FOURTH CIRCUIT, <https://www.ca4.uscourts.gov/oral-argument/cal/january-2020-session> (last visited May 2, 2020) (setting the oral argument date for *Joyce McKiver v. Murphy-Brown, LLC* for Friday, January 31, 2020).

to Farm law to make it virtually impossible for similarly situated neighbors to bring these kind of nuisance claims in the future.¹¹⁸ Based on this claim, an appellate court could overturn a key lower court ruling or remand for procedural reasons.¹¹⁹ On the other hand, if the Fourth Circuit upholds the damage awards, Smithfield may find that installing technology they have resisted for decades will no longer seem so “economically infeasible.”¹²⁰

Corporate Sustainability

Independent of the EJ communities’ concerns, a major shift in the industry’s handling of waste is on the horizon. Retailers have begun adopting GHG reduction targets throughout their supply chains to “green” their corporate image and demonstrate that private law can step in where governments have failed.¹²¹ In 2012, Walmart began conditioning purchase orders on suppliers’ use of a “Sustainability Index” that rates product sustainability across 100 metrics.¹²² Then, in 2017, Walmart set a goal of avoiding one billion metric tons of GHGs by 2030.¹²³ Walmart flexed its monopsony power as the nation’s largest grocery store over suppliers like Smithfield.¹²⁴ These “green” commitments are pushing suppliers like Smithfield to reduce emissions or risk the loss of critical retail outlets.

At the same time, energy companies and their corporate customers are demanding renewable and low-carbon feedstock for their power plants and

118. N.C. GEN. STAT §§ 106-701, 106-702 (2019). In nuisance actions against agricultural and forestry operations, plaintiffs must be the legal possessor of the property; the property must lie within ½ mile of the nuisance source; and the action must be filed within 1 year of the operations establishment or major change causing the nuisance. *Id.* Section 106-702 limits compensatory damages to the reduction in fair market value of the affected property and limits punitive damages to cases where there has been a criminal conviction or civil enforcement action by an environmental regulatory agency. *Id.*

119. *See* Parker v. Barefoot, 502 S.E.2d 42 (N.C. Ct. App. 1998) (overruled by Parker v. Barefoot, 519 S.E.2d 315 (1999) on the grounds that the jury was given improper instructions regarding the nuisance statute).

120. Anne Blythe, *Jury Awards More than \$25 Million to Duplin County Couple in Hog-Farm Case* (June 29, 2018), <https://www.newsobserver.com/news/local/article214096384.html>.

121. *See, e.g., More Than 300 Companies Commit to Set Science-Based Emissions Reduction Targets*, WORLD RES. INST., <https://www.wri.org/our-work/top-outcome/more-300-companies-commit-set-science-based-emissions-reduction-targets> (last visited May 2, 2020) (showing that companies make their own rules they must follow to reduce GHG).

122. *Walmart Announcements New Commitments to Drive Sustainability Deeper into the Company’s Global Supply Chain* (Oct. 25, 2012), <https://corporate.walmart.com/newsroom/2012/10/25/walmart-announces-new-commitments-to-drive-sustainability-deeper-into-the-companys-global-supply-chain>.

123. *Walmart on Track to Reduce 1 Billion Metric Tons of Emissions from Global Supply Chains by 2030* (May 8, 2019), <https://corporate.walmart.com/newsroom/2019/05/08/walmart-on-track-to-reduce-1-billion-metric-tons-of-emissions-from-global-supply-chains-by-2030>.

124. *Project Gigaton*, <https://www.walmartsustainabilityhub.com/project-gigaton> (last visited May 2, 2020).

pipelines. North Carolina's Renewable Energy Portfolio Standard provides a growing market for waste-to-energy projects.¹²⁵ North Carolina's Clean Energy Plan, a product of the governor's executive order¹²⁶ to meet Paris Accord targets, requires significant reductions in the State's energy-related GHG emissions.¹²⁷ Increasing demand further, there are growing opportunities to sell carbon credits from manure management practices into voluntary markets.¹²⁸

Broadly, there are two kinds of market pressure at play. On the one hand, major corporate retailers of low-cost meat, like Walmart, are demanding a lower carbon footprint from their supply chain.¹²⁹ On the other hand, natural gas pipeline project investors are hoping to offer renewable gas.¹³⁰ Together, market signals point in the direction of "greening" the corporate sustainability chain for major corporations on the food side, but also "greening" the gas side.

The loophole that ignores methane creates the business opportunity. If either the EPA or the states regulated methane emissions from CAFOs, methane captured for electricity production could neither be credited toward Walmart's reduction targets nor used to generate carbon offset credits, which require mitigation beyond baseline levels (the "additionality" requirement).¹³¹ In a counterfactual world with a methane mandate, there would be no new economic rents¹³² to divvy up through private law arrangements between corporate sustainability offices, hog producers, and electricity companies.

125. N.C. GEN. STAT. § 62-133.8 (2019) (promoting the development of renewable energy and energy efficiency in the state).

126. North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy, N.C. Exec. Order No. 80 (Oct. 29, 2018).

127. N.C. DEP'T ENVTL. QUALITY, NORTH CAROLINA CLEAN ENERGY PLAN: TRANSITIONING TO A 21ST CENTURY ELECTRICITY SYSTEM (2019).

128. CALIFORNIA AIR RES. BD., DRAFT SHORT-LIVED CLIMATE POLLUTANT REDUCTION STRATEGY 11 (2015).

129. Pippa Stevens, *Behind Walmart's Push to Eliminate 1 Gigaton of Greenhouse Gases by 2030* (Dec. 15, 2019), <https://www.cnn.com/2019/12/15/walmarts-project-gigaton-is-its-most-ambitious-climate-goal-yet.html>.

130. *Renewable Natural Gas Production*, U.S. DEP'T OF ENERGY, https://afdc.energy.gov/fuels/natural_gas_renewable.html (last visited May 2, 2020).

131. See generally Umair Irfan, *Can You Really Negate Your Carbon Emissions? Carbon Offsets, Explained* (Feb. 27, 2020), <https://www.vox.com/2020/2/27/20994118/carbon-offset-climate-change-net-zero-neutral-emissions> (explaining that "additionality" is a key principle to consider when making a reliable offset). The article draws the example of an additionality as "a counterfactual: Does buying this specific offset lead to a reduction of greenhouse gas emissions that would not have happened otherwise?" *Id.*

132. NANCY CARTWRIGHT, COUNTERFACTUALS IN ECONOMICS: A COMMENTARY 1 (2007) (counterfactuals are "causal surrogates" that defines causal relationships in economics).

Instead, climate change has created market signals that are pushing integrators to reduce the carbon embedded in their supply chain and pulling them into new biogas revenue streams.¹³³ Smithfield inventoried all of its lagoons in response to Walmart's demands.¹³⁴ In 2016, Smithfield promised to reduce its GHG emissions 25% below 2010 levels by the year 2025.¹³⁵ Two years later, Smithfield explained that it would meet this goal by retrofitting existing lagoons with "manure-to-energy" capabilities, including across 90% of Smithfield-owned hog-finishing facilities in North Carolina.¹³⁶ All told, the company expects to capture 85,000 tons of methane each year to generate renewable natural gas.¹³⁷

In fall 2018, Smithfield and the energy company Dominion committed to spend at least \$250 million to build biogas infrastructure in North Carolina, Virginia, and Utah.¹³⁸ A year later, the companies announced they were doubling that commitment to \$500 million dollars in an effort "to become the largest renewable natural gas supplier in the U.S."¹³⁹ The first North Carolina project, which will collect methane from 19 farms in the hog belt, will be constructed in 2020 and produce approximately 300,000 dekatherms.¹⁴⁰ Once refined, the gas will be injected into the ever-expanding Piedmont

133. 2018 *Integrated Report, Case Study: Expanding Our Efforts to Generate Renewable Energy* SMITHFIELD FOODS SUSTAINABILITY, <https://www.smithfieldfoods.com/integrated-report/2018/environment/case-study-expanding-our-efforts-to-generate-renewable-energy-2> (last visited May 2, 2020).

134. Maggie Monast, *What Food Companies Can Learn from Smithfield Foods Exceeding its Grain Sustainability Goal*, ENVTL. DEF. FUND (Feb. 25, 2019), <http://blogs.edf.org/growingreturns/2019/02/25/smithfield-exceeds-grain-sustainability-goal/>.

135. Press Release, Smithfield Foods, Smithfield Foods Leads Industry as First Major Protein Company to Adopt Greenhouse Gas Reduction Goal (Dec. 5, 2016), <https://www.smithfieldfoods.com/press-room/company-news/smithfield-foods-leads-industry-as-first-major-protein-company-to-adopt-greenhouse-gas-reduction-goal>.

136. Press Release, Smithfield Foods, Smithfield Foods Announces Landmark Investment to Reduce Greenhouse Gas Emissions (Oct. 25, 2018), <https://www.smithfieldfoods.com/press-room/company-news/smithfield-foods-announces-landmark-investment-to-reduce-greenhouse-gas-emissions>.

137. Steven Mufson, *Companies Launch Plan to Capture Methane from Hog Manure Lagoons* (Nov. 27, 2018), <https://www.washingtonpost.com/energy-environment/2018/11/27/companies-launch-plan-capture-methane-hog-manure-lagoons/>.

138. 2018 *Integrated Report*, *supra* note 133.

139. Press Release, Smithfield Foods, Dominion Energy and Smithfield Foods Invest Half Billion Dollars to Become Largest Renewable Natural Gas Supplier in U.S. (Oct. 23, 2019), <https://www.smithfieldfoods.com/press-room/company-news/dominion-energy-and-smithfield-foods-invest-half-billion-dollars-to-become-largest-renewable-natural-gas-supplier-in-us>.

140. John Downey, *How Dominion Energy, Smithfield Foods Plan to Make NC a Leader in Renewable Natural Gas*, CHARLOTTE BUS. J. (Dec. 2, 2019) <https://www.bizjournals.com/charlotte/news/2019/12/02/how-dominion-energy-smithfield-foods-plan-to-make.html>.

Natural Gas pipeline system.¹⁴¹ Once complete, the companies are planning an even larger project comprising at least 30 farms in Duplin County.¹⁴²

Of the three new actors to arrive in the 2010s, at this moment it is only clear that the last—the private law of corporate interests—will make a lasting impact on the CAFO landscape. The CAFO and biogas revolution is already under construction; the EJ organizations and long-suffering neighbors of these facilities are still waiting on their remedies.

CHAPTER III: RECONCILING CLIMATE CHANGE MITIGATION WITH ENVIRONMENTAL JUSTICE

Actors will be required to take swift and dramatic action to reduce GHG emissions in order to avoid the worst impacts of climate change. But reducing GHGs does not correct for historical inequity rooted in racism and other systems of oppression. As Smithfield and others reap the profits of climate mitigation, representatives of the people must compel them to finally fix the continuing, immediate, and localized environmental harms of their production system.

Reducing GHG emissions from CAFOs is essential given their contribution to methane emissions. On the mitigation side, agriculture contributes 9.3% to U.S. GHG emissions.¹⁴³ Livestock manure management alone produces methane and nitrous oxide that account for 13% of agricultural emissions (CO₂ equivalent).¹⁴⁴ Waste-to-energy (WTE) projects capture methane for biogas generation, which mitigates GHG emissions.¹⁴⁵

But WTE is not the same as ESTs, which correct the local environmental and public health harms associated with industrial hog farming.¹⁴⁶ The cheapest way to build an anaerobic digester that captures methane from a lagoon is to simply cover the lagoon with an impermeable layer of material.¹⁴⁷ An anaerobic digester requires no material improvement to the

141. *Id.*

142. *Id.*

143. See U.S. ENVTL. PROT. AGENCY, EPA 430-R-20-002, INVENTORY OF GREENHOUSE GAS EMISSIONS AND SINKS 5-1 (2020) (providing 2018 GHG percentages in the U.S.).

144. *Id.* at 5-2 (showing that manure management contributed 9.9% and 3.1% of total estimated agricultural release of methane and nitrous oxide, respectively).

145. Richard L. Skaggs et al., *Waste-to-Energy Biofuel Production Potential for Selected Feedstocks in the Conterminous United States*, 82 RENEWABLE & SUSTAINABLE ENERGY REV. 2640, 2640–41 (2017).

146. See generally *id.* at 2640 (concluding WTE is a way to divert wastes, such as those from hog farms, in a way that potentially eliminates or significantly reduces adverse effects of waste resources on public health, safety, welfare, and the environment).

147. PETER WRIGHT, OVERVIEW OF ANAEROBIC DIGESTION SYSTEMS FOR DAIRY FARMS 1-2 (2001).

existing lagoon and spray field system.¹⁴⁸ In contrast, Smithfield Foods' plans to install anaerobic digesters on existing lagoons do not mention any intent to implement the ESTs promised by—and developed through—the Smithfield Agreement.¹⁴⁹

Alarming, WTE technology on its own may actually worsen the impacts of the lagoon and spray field system.¹⁵⁰ Three areas of concern are already apparent. First, covering and pressurizing lagoons will increase downward pressure on the cesspools, most of which remain unlined.¹⁵¹ The few lagoons constructed after 1997 were required to have a clay or synthetic lining to limit hydraulic conductivity,¹⁵² which nonetheless have been shown to seep and leach into the environment even under normal operating conditions.¹⁵³ Second, trapping gasses under lagoon covers further concentrates available nutrients within the lagoon effluent that gets sprayed onto fields.¹⁵⁴ Finally, the distribution of biogas will impose additional, disproportionate burdens on communities of color. For example, getting the gas to market increases truck traffic and requires many miles of in-ground piping to transport unrefined gas to processing facilities.¹⁵⁵ The Grady Road project alone requires 30 miles of pipeline to move methane from farms to the plant.¹⁵⁶

Dr. C. Mike Williams understood that dismantling the lagoon and spray field system went hand-in-hand with generating new sources of revenue from a new waste management system.¹⁵⁷ His 2006 report under the Smithfield Agreement called for “expeditious” investment in further research to improve waste management technologies, as well as “institutional incentives, public policies, and markets related to the sale of byproducts (with priority on energy production) that will reward farmers for utilizing technologies

148. WILLIAM F. TOOLEY, NAT'L RES. CONSERVATION SERV., NRCS 69-3A75-0-123, AEROBIC TREATMENT OF MANURE LAGOONS SHOWING ENVIRONMENTAL AND ECONOMIC BENEFITS WITH ECOSYSTEM SERVICE PAYBACKS 1, 5 (2013).

149. Greg Barnes, *Smithfield's Plans to Cover Hog Lagoons Could Spur N.C. Biogas Industry* (Jan. 4, 2019), <https://www.northcarolinahealthnews.org/2019/01/04/smithfields-plans-to-cover-hog-lagoons-could-spur-n-c-biogas-industry/>.

150. Steve Davies, *Smithfield Converting Manure to Energy at Hog Farms in Three States* (Oct. 30, 2018), <https://www.agri-pulse.com/articles/11609-smithfield-converting-manure-to-energy-at-hog-farms-in-three-states>.

151. Nowlin, *supra* note 16, at 1084.

152. 15A N.C. ADMIN. CODE. 2T.0505 (2013).

153. Nowlin, *supra* note 16, at 1087 n.59 (citing J.M. Ham, *Seepage Losses from Animal Waste Lagoons: A Summary of a 4-year Investigation in Kansas*, 45.4 TRANSACTIONS OF THE ASAE 983, 983 (2002)).

154. ROSE M. STENGLEIN ET AL., IMPERMEABLE COVERS FOR ODOR AND AIR POLLUTION MITIGATION IN ANIMAL AGRICULTURE: A TECHNICAL GUIDE 7 (2011).

155. Downey, *supra* note 140.

156. *Id.*

157. WILLIAMS, *supra* note 70, at 5.

[that] yield improvements and environmental benefits over the current lagoon spray field system.”¹⁵⁸ Fourteen years later, industry has found an energy market for its byproducts, but shows no sign of implementing ESTs.

Market incentives for biogas production will only grow as urgency for climate action opens a firehose of private funding to de-carbonize agriculture. As one business-oriented environmental group notes, “When the world’s largest pork producer set out to reduce greenhouse gas emissions from its full supply chain, it sent a powerful signal to the industry at large: By cutting emissions it’s also creating new business opportunities.”¹⁵⁹

The public sector is ready to sweeten the pot. Cap-and-trade systems and renewable fuel standards commodify carbon offsets to provide additional revenue streams for companies that mitigate emissions.¹⁶⁰ Markets are already in place under both California and New England’s carbon budgets.¹⁶¹ Renewable fuel standards, both state and federal, create price premiums for sellers of biogas and biofuels.¹⁶² Leading presidential candidates,¹⁶³ think tanks,¹⁶⁴ and academics¹⁶⁵ have outlined bold proposals to help farmers generate additional revenues from climate-friendly practices including manure management.

For nearly two decades Smithfield Foods has argued that economic infeasibility precludes taking the necessary steps to install ESTs.¹⁶⁶ Like a

158. *Id.* at 47.

159. Maggie Monast, *How one Company’s Plan to turn Pollution into a Commodity Could Change an Entire Industry*, ENVTL DEF. FUND (Dec. 12, 2018), <https://www.edf.org/blog/2018/12/12/how-one-companys-plan-turn-pollution-commodity-could-change-entire-industry>.

160. *How Cap and Trade Works*, ENVTL. DEF. FUND, <https://www.edf.org/climate/how-cap-and-trade-works> (last visited Mar. 27, 2020).

161. Jackson Morris & Bruce Ho, *California Leads Off: Now RGGI Must Grab the Climate Baton*, NAT. RES. DEF. COUNCIL (July 19, 2017), <https://www.nrdc.org/experts/jackson-morris/california-leads-now-rggi-must-grab-climate-baton>.

162. *Overview for Renewable Fuel Standard*, EPA (Jan. 19, 2017), <https://www.epa.gov/renewable-fuel-standard-program/overview-renewable-fuel-standard>.

163. *See, e.g.*, Liz Crampton, *Sen. Bernie Sanders’ Plan to Expand Agriculture and Rural Policies* (May 5, 2019), <https://www.politico.com/story/2019/05/05/bernie-sanders-agriculture-rural-policies-1302634>.

164. *See, e.g.*, Bidisha Bhattacharyya, Ryan Richards, & Rita Clifton, *Building a 100 Percent Clean Future Can Drive an Additional \$8 Billion a Year to Rural Communities* (Jan. 8, 2020), <https://www.americanprogress.org/issues/green/reports/2020/01/08/479168/building-100-percent-clean-future-can-drive-additional-8-billion-year-rural-communities/>.

165. *See, e.g.*, Aashna Aggarwal et al., *Achieving the Mid-Century Strategy Goals for Deep Decarbonization in Agriculture and Forestry* (Duke Univ. Nicholas Inst. For Env’tl. Pol’y Solutions, Working Paper No. NI WP 18-02, 2018) (proposing the adoption of a national carbon bank, among other policy changes, to reduce U.S. GHG emissions).

166. *See, e.g.*, MAJORITY REPORT FROM THE ECONOMICS SUBCOMMITTEE OF THE ADVISORY PANEL TO THE DESIGNEE UNDER THE AGREEMENTS BETWEEN ATTORNEY GENERAL OF NORTH CAROLINA AND SMITHFIELD FOODS, PREMIUM STANDARD FARMS AND FRONTLINE FARMERS REGARDING RECOMMENDATIONS ON ECONOMIC FEASIBILITY DETERMINATIONS 3–4 (2005) (asserting that the economic feasibility of installing ESTs could be supported, but only up to a cost of \$400,000 for an “average” farm of 4320 head of cows).

leaking lagoon, that argument hardly holds water now that the poop—a headache to manage, even if poorly—is suddenly a revenue stream unto itself. It's an old adage that “you can't make a silk purse out of a sow's ear,” but with a nod from regulators the swine industry will fill a silk purse from a sow's rear. With that windfall comes the opportunity to harmonize the EJ and corporate sustainability interests by investing the new revenue from low-CO₂ pork and biogas production into ESTs.

Now is the time for farmers, industry executives, lawmakers, and NC regulators to seize the opportunity to end the public health and EJ crisis caused by the lagoon and spray field system. Turning the moral imperative—fixing the lagoon and spray field system—into reality requires robust policy along the following lines:

1. Parties to the Smithfield Agreement should agree that converting a lagoon into a biogas plant is a major change to an existing waste management system that triggers mandatory EST implementation;
2. Farmers and state regulators should add new permit conditions to reflect the consequences of lagoon covers on existing waste management systems, including requirements for increased surface- and groundwater testing upstream and downstream of installed digesters; and
3. Lawmakers should repeal Right to Farm and enact a lagoon-and-spray-field conversion program to help farmers transition either to ESTs or to return to pastured pork production.

CONCLUSION

Any lessons from reconciling EJ with climate mitigation in North Carolina will be broadly applicable across the country. The Big Pig problem is a microcosm of the national movement toward decarbonizing agriculture. There is huge and growing investment in limiting GHGs and generating carbon credits in agricultural systems. With this focus comes a real threat of ignoring—or even worsening—other environmental, health, and justice problems.

Climate change threatens life on earth as we know it. Avoiding the worst effects of climate change requires emissions reductions from all sectors. As long as swine CAFOs exist, they must capture and destroy methane. Similarly, so long as corn and soy monocultures blanket the Midwest, they

must use conservation tillage, cover cropping, and other conservation practices to mitigate NO_x.

However urgent and dire the climate crisis may be, paying for GHG mitigation should not prop up a system that is poisoning our water, air, and bodies. GHG sources do not exist in a policy vacuum; swine CAFOs in NC are embedded in a landscape of poor communities of color that have suffered their immediate consequences for a generation. In this context, the rise of biogas is both a risk and an opportunity. The risk in turning methane into a profit center is that industry will produce (and capture) more of it at the expense of non-commodified public goods like drinkable water or breathable air. The opportunity lies in how these revenues could be invested to finally implementing the ESTs that industry has resisted for decades. Seizing the opportunity will require a public mobilization on behalf of the communities that have combatted the lagoon and spray field system for the past 30 years.