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Manure Management for Climate Change Mitigation: Regulating CAFO Greenhouse Gas Emissions Under the Clean Air Act

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NOTES & COMMENTS

Manure Management for Climate Change Mitigation: Regulating CAFO Greenhouse Gas Emissions Under the Clean Air Act

KATRINA A. TOMAS*

Climate change is the defining challenge of our time, which if unbridled, will imperil our communities and the viability of future generations. Efforts to reduce global temperature rise require more than merely reforming carbon dioxide emissions from the energy and transportation sectors. Notably, climate solutions cannot be reached without simultaneously addressing the more potent methane and nitrous oxide gases. In the United States, intensive factory farms, legally known as Concentrated Animal Feeding Operations (“CAFOs”), are responsible for large emissions of these two greenhouse gases due to manure mismanagement. While there are no federal environmental regulations in place for mitigating CAFOs’ climate effects, existing greenhouse gas frameworks within the Clean Air Act may provide a solution. This Note analyzes Clean Air Act provisions that allow methane and nitrous oxide regulation and assesses the viability of applying these statute sections to CAFOs in order to curb emissions from the livestock sector and mitigate climate impacts.

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INTRODUCTION	532
I. ANIMAL AGRICULTURE AND CLIMATE CHANGE	536
II. ESTABLISHING THE EPA’S AUTHORITY OVER CAFOS UNDER THE CAA	541
A. <i>An Introduction: The EPA and the CAA</i>	541
B. <i>The Regulatory Framework</i>	543
C. <i>Greenhouse Gases Under the CAA</i>	545
D. <i>Potential Barriers to the EPA’s Authority: The Air Compliance Agreement</i>	549
III. CAA ENFORCEMENT IN PRACTICE	551
A. <i>Criteria Pollutant Provisions</i>	552
B. <i>New and Existing Source Performance Standards</i>	555
C. <i>Applying Section 111 to CAFOs</i>	559
1. THE LIKELIHOOD OF AGENCY ACTION	560
2. EXTERNAL SUPPORT FOR LISTING CAFOS	562
3. ADJUSTING THE CAFO MODEL.....	563
4. THE FEASIBILITY OF A NATIONAL STANDARD TODAY	566
CONCLUSION	567

INTRODUCTION

The main focus of climate policy within the United States centers on reducing fossil fuel consumption.¹ However, reducing carbon dioxide emissions from the energy and transportation sector alone will not mitigate climate change.² Concentrating emission modification efforts exclusively within the transportation and energy sectors is insufficient. Currently, methane, nitrous oxide, and other “non-[carbon dioxide] greenhouse gases contribute a third of

¹ See *Global Warming Solutions: Reduce Emissions*, UNION OF CONCERNED SCIENTISTS, <https://www.ucsusa.org/our-work/global-warming/solutions/global-warming-solutions-reduce-emissions#.W6ZXAXNKGNU> (last visited Sept. 22, 2018).

² INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014 SYNTHESIS REPORT: SUMMARY FOR POLICYMAKERS 17–18 (2014), https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf [hereinafter 2014 SYNTHESIS REPORT].

total anthropogenic [carbon dioxide] equivalent emissions.”³ Only with large simultaneous reductions in carbon dioxide and non-carbon dioxide emissions will there be any hope of meeting the 2050 target of limiting global temperature rise to less than two degrees Celsius set by the Intergovernmental Panel on Climate Change (“IPCC”).⁴

Methane and nitrous oxide are the two most abundant non-carbon dioxide greenhouse gases.⁵ Because they are more potent and have shorter atmospheric lifetimes than carbon dioxide, these gases hold the potential for more rapid reductions in radiative forcing than would be possible by controlling emissions of carbon dioxide alone.⁶ In the United States, agriculture is responsible for about eighty percent (80%) of nitrous oxide emissions and about thirty-five percent (35%) of methane emissions.⁷ The largest source of agricultural greenhouse gas emissions stems from the excretions of animals in the livestock industry.⁸ Enteric fermentation, which produces methane through the belching and exhalation of ruminants—mostly cows and sheep in the United States—“is responsible for 32% of all agricultural emissions and 25% of methane emissions in

³ William J. Ripple et al., *Commentary: Ruminants, Climate Change and Climate Policy*, NATURE CLIMATE CHANGE, Jan. 2014, at 2, 2.

⁴ See *id.*; see also 2014 SYNTHESIS REPORT, *supra* note 2, at 17–19; John C. Dernbach, *Creating Legal Pathways to a Zero-Carbon Future*, 46 ENVTL. L. REP. 10,780, 10,781 (2016).

⁵ Ripple et al., *supra* note 3, at 2; see *Overview of Greenhouse Gases: Methane Emissions*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane> (last visited Dec. 29, 2018); *Overview of Greenhouse Gases: Nitrous Oxide Emissions*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases#nitrous-oxide> (last visited Dec. 29, 2018).

⁶ See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 36 (2007), https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter 2007 SYNTHESIS REPORT].

⁷ U.S. EPA, EPA 430-R-18-003, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS 1990-2016, at ES-21 (2018) (stating that 25.9% of methane emissions came from enteric fermentation and 10.3% from manure management) [hereinafter EPA INVENTORY].

⁸ Peter Lehner & Nathan A. Rosenberg, *Legal Pathways to Carbon-Neutral Agriculture*, 47 ENVTL. L. REP. 10,845, 10,846–48 (2017).

the United States.”⁹ Moreover, “[m]anure management activities . . . releas[e] nitrous oxide and methane in quantities that total 16% of total [United States] agricultural emissions.”¹⁰

Emissions from both enteric fermentation and manure are a result of intensive factory farms, legally known as Concentrated Animal Feeding Operations (“CAFOs”), that have taken over the modern livestock industry.¹¹ Setting a national framework for methane and nitrous oxide emissions from CAFOs is paramount. Relying on states may provide localized standards that will undoubtedly help mitigation efforts. However, the lack of a federal emission threshold may cause corporate farms to move production to states with lax policies, thus creating a deterioration of standards known as a “race to the bottom.”¹²

In the United States, national frameworks for environmental compliance are set through regulations promulgated by the Environmental Protection Agency (“EPA” or “Agency”), an administrative agency.¹³ The EPA currently regulates carbon-based emissions from

⁹ *Id.* at 10,847.

¹⁰ *Id.*

¹¹ *National Pollutant Discharge Elimination System (NPDES): Animal Feeding Operations (AFOs)*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/npdes/animal-feeding-operations-afos> (last visited Sept. 22, 2018) [hereinafter *Animal Feeding Operations*]; see JAMES M. MACDONALD & WILLIAM D. MCBRIDE, U.S. DEP’T OF AGRIC., *THE TRANSFORMATION OF U.S. LIVESTOCK AGRICULTURE: SCALE, EFFICIENCY, AND RISKS* 3, 5–6, 12 (2009). The image of America as a mostly agrarian society has been “replaced by vast sheds hulking over the plains, housing tens of thousands of animals each,” prompting countries around the world to follow suit in the mass industrialization of animal agriculture. Fiona Harvey et al., *Rise of Mega Farms: How the US Model of Intensive Farming Is Invading the World*, *GUARDIAN* (July 18, 2017, 11:06 AM), <https://www.theguardian.com/environment/2017/jul/18/rise-of-mega-farms-how-the-us-model-of-intensive-farming-is-invading-the-world>.

¹² For a discussion on whether environmental regulation should be left to the states or the federal government, see generally Richard L. Revesz, *The Race to the Bottom and Federal Environmental Regulation: A Response to Critics*, 82 *MINN. L. REV.* 535, 538–540 (1997); Joshua D. Sarnoff, *A Reply to Professor Revesz’s Response in “The Race to the Bottom and Federal Environmental Legislation,”* 8 *DUKE ENVTL. L. & POL’Y F.* 295, 296–99 (1998).

¹³ See, e.g., *Overview of the Clean Air Act and Air Pollution*, U.S. ENVTL. PROTECTION AGENCY, <http://www.epa.gov/air/caa/> (last visited Dec. 29, 2018) [hereinafter *Overview of the Clean Air Act*].

cars, coal-fired power plants, and other greenhouse gas emitters under the Clean Air Act (“CAA”) by establishing a national standard for mitigating the industries’ production of greenhouse gases.¹⁴ The EPA needs to similarly hold the animal agriculture sector accountable by enforcing the existing CAA framework in order to ensure a decrease in methane and nitrous oxide emissions.

However, there are currently no federal environmental regulations in place for mitigating the livestock industry’s effects on climate change.¹⁵ Regulating CAFOs at the federal level under any environmental provision has only seen success through the Clean Water Act (“CWA”)—a statute administered by the EPA—for the purposes of controlling point source pollution into United States waterways.¹⁶ Nevertheless, controlling greenhouse gas emissions from CAFOs is not entirely an impossibility under existing federal environmental laws. Discrete provisions of the CAA—sections 108, 109, and 111—provide opportunities to set national greenhouse gas emission threshold standards for CAFOs.¹⁷

This Note seeks to analyze the CAA provisions that allow methane and nitrous oxide regulation and assess the viability of applying these statute sections to CAFOs. Part I provides background on the relationship between climate change and animal excretions from the livestock industry in the United States. Part II discusses the existing regulatory framework that governs CAFOs and greenhouse gas emissions. It explains that the EPA is empowered to and capable

¹⁴ See *Massachusetts v. EPA*, 549 U.S. 497, 532 (2007); see also 40 C.F.R. pt. 60 (2018).

¹⁵ “From an environmental quality standpoint, much of the interest in animal agriculture has focused on impacts on water resources,” which has resulted in regulatory provisions addressing CAFO impacts in the Clean Water Act (“CWA”). CLAUDIA COPELAND, CONG. RESEARCH SERV., RL32947, AIR QUALITY ISSUES AND ANIMAL AGRICULTURE: EPA’S AIR COMPLIANCE AGREEMENT 2–3 (2014) [hereinafter AIR QUALITY ISSUES]. The EPA’s attempts to regulate CAFOs under the CAA, Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”), and Emergency Planning and Community Right-to-Know Act (“EPCRA”) aimed at addressing pollution affecting air quality, rather than climate change. See *id.*

¹⁶ 40 C.F.R. § 122.42(e) (promulgated pursuant to the power delegated by 33 U.S.C. § 1342).

¹⁷ 42 U.S.C. §§ 7408, 7409, 7411 (2012). For purposes of clarity and accuracy, this Note provides citations to the corresponding U.S. Code sections of the CAA. Short-form citations are also to the U.S. Code sections.

of regulating CAFOs' greenhouse gas emissions through the CAA. Part III concludes by arguing for the application of existing CAA provisions to CAFOs and explains how to successfully navigate the legal roadblocks that seemingly prevent regulating CAFOs' greenhouse gas emissions.

I. ANIMAL AGRICULTURE AND CLIMATE CHANGE

In the United States, the animal agriculture industry has shifted considerably in recent years towards corporate or factory farms, known for regulatory purposes as Animal Feeding Operations ("AFOs") or Concentrated Animal Feeding Operations ("CAFOs"), depending on their size.¹⁸ The EPA defines CAFOs as any lot or facility where animals "have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period," and where "crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season."¹⁹ In effect, CAFOs "congregate animals, feed, manure, dead animals, and production operations on a small land area."²⁰ Currently, over ten billion food animals are raised and slaughtered every year in the United States alone.²¹

Admittedly, the industrialization of animal agriculture has made the industry more efficient and has consequently lowered consumer costs of animal products.²² However, these gains come with serious

¹⁸ See 40 C.F.R. § 122.23(b)(1)–(2); MACDONALD & MCBRIDE, *supra* note 11 (analyzing the major shift toward large-scale industrialized production systems in the U.S. livestock industry).

¹⁹ 40 C.F.R. § 122.23(b)(1)(i).

²⁰ *Clean Water Act's National Pollutant Discharge Elimination System (NPDES) Program for Concentrated Animal Feeding Operations (CAFOs)*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/agriculture/agricultural-animal-production>, (last visited Dec. 14, 2018) [hereinafter *NPDES for CAFOs*]; see also *Animal Feeding Operations*, *supra* note 11.

²¹ Michelle Buckley, Comment, *This Waiting Game Stinks: The Lack of EPA Progress in Regulating Air Emissions from Animal Agriculture*, 2 ARIZ. J. ENVTL. L. & POL'Y 1, 1 (2011).

²² See MACDONALD & MCBRIDE, *supra* note 11, at 2. ("New technologies often reduce costs directly, by allowing more meat and milk to be produced for a given amount of land, feed, labor, and capital. . . . [L]ower industrywide farm costs lead to lower prices for farm commodities.").

externalities, such as harm to animal welfare²³ and antibiotic resistance as a result of routine use on animals.²⁴ Additionally, because of large scale productions, rural communities and low-income communities of color disproportionately suffer and are forced to deal directly with catastrophic air and water pollution.²⁵

Due to the number of animals raised in these facilities, CAFOs produce massive volumes of waste.²⁶ Under traditional agricultural practices, animal waste is deposited throughout the environments the livestock forage.²⁷ However, animals within CAFOs do not graze in pastures and are confined in anywhere from three to thirty buildings with slated cement floors, which allow the animal waste to collect in holding areas under the buildings.²⁸ Animal waste is abundant in these types of operations: one dairy farm with 2,500 cows produces as much waste as a city with around 411,000 residents.²⁹

Depending on the design of the CAFO, waste is either left in the pit beneath the building for months or flushed out with water

²³ See Lindsay Walton & Kristen King Jaiven, *Regulating Concentrated Animal Feeding Operations for the Well-Being of Farm Animals, Consumers, and the Environment*, in WHAT CAN ANIMAL LAW LEARN FROM ENVIRONMENTAL LAW? 89, 93 (Randall Abate ed., 2015).

²⁴ Ellen K. Silbergeld et al., *Industrial Food Animal Production, Antimicrobial Resistance, and Human Health*, 29 ANN. REV. PUB. HEALTH 151, 161–63 (2008); David Tillman et al., *Agricultural Sustainability and Intensive Production Practices*, 418 NATURE 671, 674 (2002).

²⁵ See, e.g., Carole Levine, *Environmental Justice or Environmental Racism: Something Smells in North Carolina*, NPQ (June 7, 2018), <https://nonprofitquarterly.org/2018/06/07/environmental-justice-or-environmental-racism-something-smells-in-north-carolina/>; Steve Wing & Susanne Wolf, *Intensive Livestock Operations, Health, and Quality of Life Among Eastern North Carolina Residents*, 108 ENVTL. HEALTH PERSP. 233, 235–37 (2000).

²⁶ See John Verheul, Student Article, *Methane as a Greenhouse Gas: Why the EPA Should Regulate Emissions from Animal Feeding Operations and Concentrated Animal Feeding Operations Under the Clean Air Act*, 51 NAT. RESOURCES J. 163, 168 (2011).

²⁷ Susan M. Brehm, Comment, *From Red Barn to Facility: Changing Environmental Liability to Fit the Changing Structure of Livestock Production*, 93 CALIF. L. REV. 797, 809 (2005).

²⁸ *Id.* at 808–09.

²⁹ EDWIN BARTH ET AL., U.S. ENVTL. PROT. AGENCY, RISK MANAGEMENT EVALUATION FOR CONCENTRATED ANIMAL FEEDING OPERATIONS 7 (John Haines & Laurel Staley eds., 2004).

throughout the day.³⁰ Because it can be difficult for land to absorb such high concentrations of animal waste, the waste on CAFOs is instead pumped into open-air retention ponds, known as waste storage lagoons, some of which can be as large as eight acres.³¹ Liquid manure is stored in lagoons until land becomes available on which to spread the waste.³² “When manure is left as a solid . . . on . . . pasture lands, it typically decomposes aerobically and produces little to no methane.”³³ However, when waste is stored or handled in a system that creates an anaerobic environment, such as the lagoons, the waste releases amounts of methane that are as much as ninety percent (90%) higher than those in grazing systems.³⁴

Ruminant production is the largest source of global anthropogenic methane emissions and is responsible for 25.9% of methane emissions in the United States.³⁵ Ruminant animals are herbivores that digest their food through the process of enteric fermentation in a multi-chambered stomach.³⁶ Cows and sheep are the highest produced ruminants in the United States.³⁷ Methane is produced as a

³⁰ See CARRIE HRIBAR, NAT’L ASS’N OF LOCAL BDS. OF HEALTH, UNDERSTANDING CONCENTRATED ANIMAL FEEDING OPERATIONS AND THEIR IMPACT ON COMMUNITIES 3 (Mark Schultz ed., 2010).

³¹ See ROBBIN MARKS, NATURAL RESOURCE DEFENSE COUNCIL AND THE CLEAN WATER NETWORK CESSPOOLS OF SHAME: HOW FACTORY FARM LAGOONS AND SPRAYFIELDS THREATEN ENVIRONMENTAL AND PUBLIC HEALTH 36 (2001).

³² See *id.* While waste absorbed on land does not emit as many greenhouse gases, it often leads to a host of other environmental concerns—namely the contamination of groundwater, the spread of airborne diseases, and noxious fumes that disproportionately affect the poor communities surrounding CAFOs. See DOUG GURIAN-SHERMAN, UNION OF CONCERNED SCIENTISTS, CAFOs UNCOVERED: THE UNTOLD COSTS OF CONFINED ANIMAL FEEDING OPERATIONS 3–5 (2008).

³³ Lehner & Rosenberg, *supra* note 8, at 10,855.

³⁴ Paul Jun et al., *CH₄ and N₂O Emissions from Livestock Manure*, in NAT’L GREENHOUSE GAS INVENTORIES PROGRAMME, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, BACKGROUND PAPERS – IPCC EXPERT MEETINGS ON GOOD PRACTICE GUIDANCE AND UNCERTAINTY MANAGEMENT IN NAT’L GREENHOUSE GAS INVENTORIES 321, 338 tbl.10 (Buendia et al. eds., 2002).

³⁵ Ripple et al., *supra* note 3, at 2. Enteric fermentation (which results from ruminant production) is responsible for 25.9% of methane emissions in the United States. EPA INVENTORY, *supra* note 7, at ES-21.

³⁶ Ripple et al., *supra* note 3, at 2.

³⁷ Lehner & Rosenberg, *supra* note 8, at 10,847.

by-product of microbial digestive processes in these animals, and is released through belching and breathing.³⁸

It is estimated that there are more than 18,000 CAFOs and 450,000 AFOs in the United States.³⁹ Unsurprisingly, these industrial facilities emit significant amounts of greenhouse gases like methane and nitrous oxide.⁴⁰ Greenhouse gases absorb infrared radiation from the sun as it reflects off the Earth's surface, trapping the heat in the atmosphere.⁴¹ Human activities increased the concentration of greenhouse gas emissions in the Earth's atmosphere, causing global climate change.⁴²

Greenhouse gases vary in their warming influence on the climate system due to their different radiative properties and lifetimes in the atmosphere.⁴³ These warming influences are often expressed through a common metric based on the radiative property of carbon dioxide.⁴⁴ Therefore, while carbon dioxide may be the most prevalent of the greenhouse gases, and often the focus of climate change concern, it is by no means the most potent gas.⁴⁵ Illustratively, nitrous oxide has a global warming potential 265–298 times that of carbon dioxide on a 100-year frame.⁴⁶ Nitrous oxide emissions will

³⁸ *Id.*; Ripple et al., *supra* note 3, at 2.

³⁹ RICHARD JONES ET AL., U.S. ENVTL. PROT. AGENCY, REPORT NO. 17-P-0396, ELEVEN YEARS AFTER AGREEMENT, EPA HAS NOT DEVELOPED RELIABLE EMISSION ESTIMATION METHODS TO DETERMINE WHETHER ANIMAL FEEDING OPERATIONS COMPLY WITH CLEAN AIR ACT AND OTHER STATUTES 1 (2017).

⁴⁰ See EPA INVENTORY, *supra* note 7, at ES-21.

⁴¹ *Glossary of Climate Change Terms*, U.S. ENVTL. PROTECTION AGENCY, https://19january2017snapshot.epa.gov/climatechange/glossary-climate-change-terms_.html#G (last visited Dec. 29, 2018) (definitions of “Greenhouse Effect” and “Greenhouse Gas (GHG)”).

⁴² See 2007 SYNTHESIS REPORT, *supra* note 6, at 36.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ Ripple et al., *supra* note 3, at 2.

⁴⁶ *Greenhouse Gas Emissions: Understanding Global Warming Potentials*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials> (last visited Dec. 14, 2018) [hereinafter *Understanding Global Warming Potentials*]; see also Carbon Brief & Duncan Clark, *How Long Do Greenhouse Gases Stay in the Air?*, GUARDIAN (Jan. 16, 2012, 2:00 AM), <https://www.theguardian.com/environment/2012/jan/16/greenhouse-gases-remain-air> [hereinafter *Greenhouse Gases*].

also be the primary cause of stratospheric ozone destruction this century.⁴⁷ Similarly damaging, methane has a global warming potential that is 28–36 times that of carbon dioxide over a 100-year frame.⁴⁸ Further, the atmospheric lifespan of methane and nitrous oxide is about 12 years and about 114 years respectively, compared to the 20–200 year lifespan of carbon dioxide.⁴⁹ Therefore, decreasing methane and nitrous oxide, rather than carbon dioxide, will potentially result in more rapid reductions in climate forcing.⁵⁰

According to the EPA's national greenhouse gas emissions annual inventory, agriculture represents 8.6% of the nation's total greenhouse gas emissions and 76.7% of its nitrous oxide emissions.⁵¹ Additionally, the EPA states that methane emissions from enteric fermentation and manure management represent 25.9% and 10.3% of total methane emissions, respectively.⁵² Methane and nitrous oxide compose 10% and 6%, respectively, of total greenhouse gas emissions in the United States.⁵³ Undeniably, animal agriculture, representing less than 1% of the national GDP, contributes significantly to climate change.⁵⁴

The modern structure of the livestock industry, specifically the current waste storage system, is responsible for animal agriculture's

⁴⁷ See R. W. Portmann et al., *Stratospheric Ozone Depletion Due to Nitrous Oxide: Influences of Other Gases*, 367 PHIL. TRANSACTIONS ROYAL SOC'Y B 1256, 1263 (2012).

⁴⁸ *Understanding Global Warming Potentials*, *supra* note 46.

⁴⁹ *Greenhouse Gases*, *supra* note 46.

⁵⁰ *Id.* Climate forcing is defined as “the change in radiant energy retained by Earth owing to emissions of long-lived greenhouse gases.” Ripple et al., *supra* note 3, at 2.

⁵¹ EPA INVENTORY, *supra* note 7, at 5-1.

⁵² *Id.*

⁵³ *Overview of Greenhouse Gases*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases> (last visited Dec. 29, 2018).

⁵⁴ According to the Economic Research Service, the output of America's farms contributed about one percent (1%) of GDP. Because animal agriculture, is only a percentage of this total farm output, its contribution to the GDP would be less than one percent (1%). See *Ag and Food Sectors and the Economy*, U.S. DEP'T OF AGRIC.: ECON. RES. SERV., <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/> (last visited Dec. 14, 2018). For the full report, see ECON. RESEARCH SERV., U.S. DEP'T OF AGRIC., NO. 078, AG AND FOOD STATISTICS: CHARTING THE ESSENTIALS, OCTOBER 2017 (2017).

disproportionate contribution to greenhouse gas emissions. Confining liquid waste in open-air lagoons promotes the decomposition of livestock manure under anaerobic conditions, which accelerates the production of methane.⁵⁵ Furthermore, these waste lagoons contribute to nitrous oxide emissions by facilitating the nitrification-denitrification process: “Nitrification occurs aerobically and converts [the nitrogen in manure, ammonia,] into nitrate, while denitrification occurs anaerobically, and converts the nitrate to [nitrous oxide].”⁵⁶

In 2016, the total agricultural emissions of primarily carbon dioxide, nitrous oxide, and methane in the United States amounted to about 560 million metric tons of carbon dioxide equivalent.⁵⁷ The alarming amount of emissions from CAFOs amidst the rising concerns of climate change’s deleterious global effects demand heightened environmental regulations at the federal level under the CAA.

II. ESTABLISHING THE EPA’S AUTHORITY OVER CAFOs UNDER THE CAA

A. *An Introduction: The EPA and the CAA*

Since its adoption in 1963, the CAA has been implemented by the United States government for the regulation of airborne pollutants.⁵⁸ The CAA is administered by the EPA, the federal agency tasked with the enforcement and implementation of federal environmental statutes.⁵⁹ Under the CAA, the EPA can use an endangerment finding to classify a specific substance as a “pollutant” once scientific evidence is presented concerning the substance’s harmful

⁵⁵ See Jun et al., *supra* note 34, at 322.

⁵⁶ *Id.* at 323.

⁵⁷ EPA INVENTORY, *supra* note 7, at 5-1.

⁵⁸ Clean Air Act, Pub. L. No. 88-206, 77 Stat. 392 (codified as amended at 42 U.S.C. §§ 7401–7671q (2012)).

⁵⁹ See *Overview of the Clean Air Act*, *supra* note 13.

effects.⁶⁰ Subsequently upon classification, the EPA is able to regulate the pollutant's release into the atmosphere.⁶¹ In effect, the EPA establishes threshold emission standards under the CAA for regulated entities.

As this Note explains, the EPA is empowered to use the CAA to regulate greenhouse gases.⁶² Consequently, the EPA classified methane and nitrous oxide as pollutants.⁶³ As large emitters of these gases, CAFOs should be subject to CAA regulations because federal oversight by the EPA would allow for the establishment of a national threshold emission standard for these livestock facilities. While relying on states' air pollution statutes may provide localized standards that will undoubtedly help climate change mitigation efforts, it could nevertheless instigate a race to the bottom among corporate farms, who may decide to move their CAFOs to states with more lenient emission regulations.

The EPA regulates carbon-based emissions from cars, coal-fired power plants, and other greenhouse gas emitters under the CAA by establishing a national standard for mitigating the industries' production of greenhouse gases.⁶⁴ The EPA needs to similarly hold the animal agriculture industry accountable by enforcing the existing CAA framework against CAFOs in order to ensure a decrease in methane and nitrous oxide emissions across the livestock sector. The EPA has the power through the CAA to implement a national greenhouse gas emission threshold for the animal agriculture industry, ensuring compliance by all CAFOs in the United States.

⁶⁰ The CAA authorizes the EPA to regulate "air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a)(1). Through this expressed authority from Congress, the EPA is able to issue endangerment findings supported by scientific evidence. For a climate-specific explanation of the EPA's regulatory authority to initiate endangerment findings under the CAA see, NAT. RES. DEF. COUNCIL, *EPA'S ENDANGERMENT FINDING: THE LEGAL AND SCIENTIFIC FOUNDATION FOR CLIMATE ACTION* (2017).

⁶¹ See Verheul, *supra* note 26, at 165.

⁶² See *infra* Section III.C.

⁶³ John M. Broder, *E.P.A. Clears Way for Greenhouse Gas Rules*, N.Y. TIMES (Apr. 17, 2009), <http://www.nytimes.com/2009/04/18/science/earth/18endanger.html>.

⁶⁴ See 40 C.F.R. pt. 60 (2018); see also *Massachusetts v. EPA*, 549 U.S. 497, 506, 532 (2007) (determining that "greenhouse gases fit well within the [CAA]'s capacious definition of 'air pollutant,'" thus granting the EPA authority to regulate carbon-based emissions from various sources).

B. *The Regulatory Framework*

The EPA has yet to issue formalized regulations specifically addressing CAFO emissions of methane and nitrous oxide. Thus, relying on the existing CAA framework is paramount.⁶⁵ No efforts have been made by the EPA to pass explicit air standards for CAFOs, and experts suggest regulations tailored specifically to CAFO greenhouse gas emissions are unlikely.⁶⁶ In fact, explicit federal regulation aimed at protecting environmental quality from CAFO production only concerns the facilities' impacts on water resources.⁶⁷ The improper storage of animal waste "can harm water quality through surface runoff, direct discharges, spills, and leaching into soil and groundwater."⁶⁸ While environmental regulations of CAFOs can be seen explicitly carved out in the CWA, the little leverage the act provides has been difficult to successfully solidify.⁶⁹

The CWA authorizes the EPA to directly regulate the discharge of a pollutant from any point source by requiring such a source to obtain a National Pollutant Discharge Elimination System ("NPDES") permit.⁷⁰ In 2003, the EPA attempted to issue specific effluent limitation guidelines for CAFOs,⁷¹ which required an NPDES permit application unless the facility demonstrated there was no potential for discharge.⁷² However, the Second Circuit struck

⁶⁵ Bruce Myers & Linda Breggin, *Tackling the Problem of CAFOs and Climate Change: A New Path to Improved Animal Welfare?*, in *WHAT CAN ANIMAL LAW LEARN FROM ENVIRONMENTAL LAW?* 117, 130–31 (Randall S. Abate ed., 2015).

⁶⁶ *Id.*

⁶⁷ AIR QUALITY ISSUES, *supra* note 15, at 2.

⁶⁸ *Id.*

⁶⁹ See Verheul, *supra* note 26, at 165.

⁷⁰ 40 C.F.R. § 122.45 (2018) (concerning calculation of NPDES permit conditions).

⁷¹ National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs), 68 Fed. Reg. 7176 (Feb. 12, 2003) (to be codified at 40 C.F.R. pts. 9, 122, 123 & 412).

⁷² *Id.* at 7202–03 ("[A]n unpermitted CAFO that does in fact discharge pollutants to waters of the U.S., with or without a determination of 'no potential to discharge,' would be in violation of the Clean Water Act.") (codified at 40 C.F.R. § 122.23(d)(1)–(2) (2003), *invalidated by* *Waterkeeper All., Inc. v. EPA*, 399 F.3d 486, 505 (2d Cir. 2005)).

down the 2003 rule's mandatory permit requirement because it extended beyond the statutory scope of the CWA, which merely authorizes, rather than mandates, the EPA to regulate the discharge of pollutants.⁷³ Following the decision, the EPA revised their rule with more lenient requirements.⁷⁴ Unfortunately, and perhaps unsurprisingly, this revised rule was similarly struck down by the Fifth Circuit, because imposing liability for facilities merely *proposing* to discharge pollutants would still be an unlawful extension of the CWA.⁷⁵ Both cases emphasize the EPA's limited authority to regulate CAFOs through the CWA.⁷⁶

These CWA decisions will not pose problems for CAFO regulation through the CAA because the CAA provides a number of regulatory tools to address air pollution problems created by CAFOs through an already existing framework. As statutes, the CWA and the CAA are similar in their grant of authority because they both empower the EPA to set threshold standards for pollutant emissions.⁷⁷ However, in both the CWA cases discussed above, the courts' issue surrounded the EPA's proposed rules, which expanded

⁷³ *Waterkeeper*, 399 F.3d at 505 (citing *Nat. Res. Def. Council v. EPA*, 859 F.2d 156, 170 (D.C. Cir. 1988)).

⁷⁴ Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines for Concentrated Animal Feeding Operations in Response to the *Waterkeeper* Decision, 73 Fed. Reg. 70,418, 70,427 (Nov. 20, 2008) (to be codified at 40 C.F.R. pts. 9, 122, 412) ("EPA is requiring CAFOs to seek permit coverage if *they discharge or propose to discharge pollutants . . .*") (emphasis added).

⁷⁵ *Nat'l Pork Producers Council v. EPA*, 635 F.3d 738, 751 (5th Cir. 2011) ("[T]he EPA's authority is limited to the regulation of CAFOs that discharge.").

⁷⁶ *National Pork Producers Council* relied heavily on the analysis presented in *Waterkeeper*, and ultimately struck down the requirement provision of the revised rule under a similar analysis: "Because the issues presented in *Waterkeeper* are similar to the issues presented here, we find the Second Circuit analysis to be instructive and persuasive." *Id.* at 750. "These cases leave no doubt that there must be an actual discharge into navigable waters to trigger the CWA's requirements and the EPA's authority." *Id.* at 751.

⁷⁷ Robinson Meyer, *How the U.S. Protects the Environment, from Nixon to Trump*, ATLANTIC (Mar. 29, 2017), <https://www.theatlantic.com/science/archive/2017/03/how-the-epa-and-us-environmental-law-works-a-civics-guide-pruitt-trump/521001/> (describing how both the CAA and the CWA give the EPA authority to set standards for "what kinds of toxic air pollutants can be released" and "what pollutants can be released into lakes, streams, and rivers").

the scope of the CWA unlawfully.⁷⁸ Here, adequately regulating CAFOs' emissions of greenhouse gases would not require an expansion of already delineated authority. The CAA can be utilized to empower the EPA to regulate greenhouse gas emissions from CAFOs through sections 108, 109, and 111 of the statute.⁷⁹ Most significantly, the EPA can use the existing CAA provisions to regulate CAFO emissions of methane and nitrous oxide, ultimately creating a national framework by setting an emission threshold for all CAFO facilities nationwide.

C. Greenhouse Gases Under the CAA

The CAA, originally enacted in 1963 but further developed in subsequent amendments, regulates ambient air quality, stationary mobile source emissions, and hazardous air pollutants through the administration of permits.⁸⁰ The CAA establishes two provisions under which the EPA may grant permits: (1) the preconstruction permits, known as New Source Review, under Title I, Parts C and D, and (2) the operating permit under Title V.⁸¹ Through these provisions, the EPA is able to provide permits for polluters, and thus require a threshold emission standard.⁸²

⁷⁸ See *Nat'l Pork Producers Council*, 635 F.3d at 749, 751; *Waterkeeper*, 399 F.3d at 506, 519, 524.

⁷⁹ See *infra* Part IV.

⁸⁰ See *Clean Air Act Overview: Evolution of the Clean Air Act*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act> (last visited Dec. 16, 2018).

⁸¹ 42 U.S.C. §§ 7475, 7503, 7661 (2012); see U.S. ENVTL. PROT. AGENCY, FACT SHEET: NEW SOURCE REVIEW (NSR) (2015), <https://www.epa.gov/sites/production/files/2015-12/documents/nsrbasicsfactsheet103106.pdf> [hereinafter FACT SHEET: NEW SOURCE REVIEW].

⁸² See 42 U.S.C. §§ 7475, 7503, 7661; CLAUDIA COPELAND, CONG. RESEARCH SERV., RL33632, CLEAN AIR PERMITTING: IMPLEMENTATION AND ISSUES 1 (2016) [hereinafter CLEAN AIR PERMITTING] (describing Congress' intent in adopting the operating permit programs, which includes the "clarification of pollution control requirements, simplification of procedures for modifying a source's control obligations, . . . and enhancing states' ability to administer other significant CAA responsibilities"); FACT SHEET: NEW SOURCE REVIEW, *supra* note 81 ("New Source Review . . . requires industrial facilities to install modern pollution control equipment when they are built or when making a change that increases emissions significantly," by requiring owners and operators to obtain permits "limiting air emissions before they begin construction").

The preconstruction permit provision applies to new sources or the modification of existing sources that emit a threshold level of pollutants.⁸³ The Title V Operating Permits Program created through the 1990 CAA amendments, expanded the number of sources requiring federal permits by “stipulating that all major pollution sources and other designated sources must obtain operating permits . . . to ensure compliance with the CAA.”⁸⁴ Prior to the 1990 amendments, existing sources would require permits only if they were subsequently modified and increased their air emissions.⁸⁵ This is significant in the CAFO context because pursuant to the 1990 amendments, existing CAFOs—not just new or modified facilities—could be subject to CAA permits.

At the time of the CAA’s initial drafting, climate change was not the environmental movement’s top policy priority. However, as the Supreme Court identified in *Massachusetts v. EPA*, the landmark 2007 decision affirming the EPA’s ability to regulate greenhouse gases, “[w]hile the Congresses that drafted [the CAA] might not have appreciated the possibility that burning fossil fuels could lead to global warming, they did understand that without regulatory flexibility, changing circumstances . . . would soon render the . . . Act obsolete.”⁸⁶ Therefore, despite the Act’s expansion and development across the years, the statute has maintained a flexibility that welcomes interconnections between its provisions to create new policy regimes.

In *Massachusetts*, the Court determined unambiguously that greenhouse gases can be air pollutants under the CAA.⁸⁷ In its holding, the Court ordered the EPA to determine whether emissions of greenhouse gases “may reasonably be anticipated to endanger public health or welfare.”⁸⁸ In 2009, the EPA administrator issued its endangerment finding asserting that the current and projected con-

⁸³ 42 U.S.C. § 7475; FACT SHEET: NEW SOURCE REVIEW, *supra* note 81.

⁸⁴ CLEAN AIR PERMITTING, *supra* note 82, at 1.

⁸⁵ *Id.*

⁸⁶ *Massachusetts v. EPA*, 549 U.S. 497, 532 (2007).

⁸⁷ *Id.* (“Because greenhouse gases fit well within the [CAA’s] capacious definition of ‘air pollutant,’ we hold that EPA has the statutory authority to regulate the emission of such gases . . .”).

⁸⁸ *Id.* at 532–33 (quoting 42 U.S.C. § 7521(a)(1)).

centrations of greenhouse gases—including methane and nitrous oxide—threaten existing and future generations.⁸⁹ The final rule was published in the federal register at the end of 2009 and made effective in 2010.⁹⁰ An endangerment finding is a prerequisite for the applicability of most sections of the CAA.⁹¹ The EPA thus has the authority to list and regulate methane and nitrous oxide as pollutants under the CAA.⁹²

However, agricultural operations have long been exempt from many provisions of environmental laws, and it may appear that regulating CAFO air emissions through the CAA may fall through a similar loophole.⁹³ Following “the first Agricultural Adjustment Act of 1933, Congress and the courts . . . built a safety net of statutory exclusions and economic subsidies”⁹⁴ to support industrialized animal production, a practice known as “agricultural exceptionalism.”⁹⁵ Agricultural exceptionalism is premised on the idea that the

⁸⁹ Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,495, 66,516 (Dec. 15, 2009) (“The Administrator finds that the air pollution is the combined mix of six key directly-emitted, long-lived and well-mixed greenhouse gases . . . , which together, constitute the root cause of human-induced climate change These six greenhouse gases are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.”); U.S. ENVTL. PROT. AGENCY, GREENHOUSE GAS EMISSIONS: ENDANGERMENT AND CAUSE OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES UNDER SECTION 202(A) OF THE CLEAN AIR ACT, <https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean> (last visited Jan. 26, 2019).

⁹⁰ See Endangerment and Cause or Contribute Findings for Greenhouse Gases Under section 202(a) of the Clean Air Act, 74 Fed. Reg. at 66,546.

⁹¹ 42 U.S.C. § 7408(a)(1)(A).

⁹² Pursuant to the finding, the EPA must list all six greenhouse gases as pollutants under preconstruction and operating permit requirements as well as issue air quality criteria for each of the greenhouse gases identified in the endangerment finding within 12 months of listing them. *Id.* § 7408(a)(1)–(2).

⁹³ See, e.g., Kael K. Bowling, *Old MacDonald Had a Right to Farm: Putting a Humane Twist on Missouri’s Right-to-Farm Amendment*, 22 DRAKE J. AGRIC. L. 137, 139 (2017); Jason Foscolo & Michael Zimmerman, *Alternative Growth: Forsaking the False Economies of Industrial Agriculture*, 25 FORDHAM ENVTL. L. REV. 316, 321–27 (2014).

⁹⁴ Foscolo & Zimmerman, *supra* note 93, at 316.

⁹⁵ “Agriculture receives many exceptions or exemptions in labor, bankruptcy, and antitrust laws.” Bowling, *supra* note 93, at 139. Federal insurance programs cover crop losses due to natural disasters, and farmers have their own bankruptcy

importance of food for human survival should entitle the agriculture industry to a “special legal and regulatory advantage.”⁹⁶ Born alongside the modern environmental movement, agricultural exceptionalism has lead policymakers to concede to agricultural interest against competing environmental concerns, which has riddled federal environmental statutes with multiple farm and agriculture related concessions.⁹⁷

An example of such a carve-out includes the farm exemptions that perforate the CWA’s prohibition against discharge pollutants. Although agricultural waste directly discharged into water is a pollutant under the CWA,⁹⁸ “other provisions of the statute put discharges of agricultural wastewater, stormwater, and fill material largely beyond regulatory reach.”⁹⁹ In the context of mitigating climate change through the regulation of CAFOs’ greenhouse gas emissions, farms do not benefit from any express exemptions in the CAA like they do under the CWA.¹⁰⁰ Nevertheless, in practice, agreements between the EPA and the livestock sector may potentially allow CAFOs to bypass CAA regulations with regards to greenhouse gas emissions.

code. Foscolo & Zimmerman, *supra* note 93, at 316–17. Further, the agriculture sector is exempt from anti-trust laws in the Capper-Volstead Act. *Id.*

⁹⁶ Foscolo & Zimmerman, *supra* note 93, at 316; see Susan A. Schneider, *A Reconsideration of Agricultural Law: A Call for the Law of Food, Farming, and Sustainability*, 34 WM. & MARY ENVTL. L. & POL’Y REV. 935, 935–36 (2010).

⁹⁷ Foscolo & Zimmerman, *supra* note 93, at 317 (“Yet rather than reach a middle ground that balanced agriculture and environmental conservation, policymakers largely yielded to agricultural exceptionalism—nearly every major federal environmental statute passed since the 1970s has included carve-outs for farms.”). Congress, and states following the federal government’s example, have largely prevented the intersection of environmental regulation onto farming practices: “farms remained largely unburdened by environmental law, yet move steadily up the ranks of the worst threats to the environment.” J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 ECOLOGY L.Q. 263, 267–68 (2000).

⁹⁸ 33 U.S.C. § 1362(6) (2012).

⁹⁹ See Ruhl, *supra* note 97, at 293–94.

¹⁰⁰ *Id.* at 305.

D. *Potential Barriers to the EPA's Authority:
The Air Compliance Agreement*

A potential impediment to the EPA's authority over CAFOs via CAA regulations is the Air Compliance Agreement, under which the EPA compromised some of its ability to regulate animal agriculture from 2005 onward.¹⁰¹ This Agreement allowed the EPA to provide CAFOs and AFOs temporary immunity from civil liability under the CAA's permit provisions—Title I, Parts C and D, and Title V—in exchange for CAFOs allowing the EPA to monitor emissions at selected facilities.¹⁰² The immunity would extend as long as the monitoring study was in place and would protect CAFOs from being held liable for violations of the CAA, the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”), and the Emergency Planning and Community Right-to-Know Act (“EPCRA”).¹⁰³

While the Air Compliance Agreement created an immunity rather than an exemption, the Agreement provided a “sweeping liability shield for violations of environmental laws,” which made regulation of CAFOs who signed the agreement impossible.¹⁰⁴ Of the nearly 2,681 CAFOs that signed agreements with the EPA, only twenty-five were selected to participate in monitoring, but all who signed up were protected by the EPA's covenant not to sue.¹⁰⁵ Without the power to civilly sue CAFOs, the EPA would not be able to enforce regulations unless there was a criminal violation.¹⁰⁶ Further, “hindered by a lack of adequate, accurate, scientifically credible data,” the EPA argued it could not establish emission thresholds for its permits, thus leaving the industry without a standard to even potentially violate.¹⁰⁷

¹⁰¹ Animal Feeding Operations Consent Agreement and Final Order, 70 Fed. Reg. 4958 (Jan. 31, 2005).

¹⁰² *Id.* at 4963. Paragraph 26 details the EPA's release of covenants not to sue with respect to certain Emission Units located at participating farms. *Id.*

¹⁰³ *Id.* at 4962 (“[T]his agreement resolves Respondent's civil liability for certain potential violations of the [CAA], CERCLA and/or EPCRA at [Participating Company's] Farm(s) . . .”).

¹⁰⁴ AIR QUALITY ISSUES, *supra* note 15, at Summary.

¹⁰⁵ *See id.* at 4, 7, 10.

¹⁰⁶ Animal Feeding Operations Consent Agreement and Final Order, *supra* note 101, at 4958–59.

¹⁰⁷ AIR QUALITY ISSUES, *supra* note 15, at 3.

The goal of the Agreement, therefore, was in part “to generate scientifically credible data to provide for the characterization of emissions from all major types of AFOs.”¹⁰⁸ Enforcement of federal environmental laws, including the CAA, requires accurate measurement of emissions to determine whether regulated pollutants are emitted in quantities that exceed specified thresholds.¹⁰⁹ The EPA, however, believed that existing data provided a poor basis for regulating and managing air emissions from CAFOs.¹¹⁰

Environmentalists, along with state and local air quality officials, criticized the Agreement, contending that it would unfairly shield participating producers while placing thousands of communities at risk.¹¹¹ Further, because only twenty-five farms in ten states would be monitored, critics argued that it was too limited in scope to satisfy its objective of determining scientifically credible emission estimates.¹¹² A legal challenge to the Air Compliance Agreement was brought by several environmental groups, although it was dismissed when the D.C. Circuit held that the agreements constitute discretionary agency action not reviewable by the court.¹¹³ Further, three years after initiating the study, it was still unclear whether the EPA would acquire the necessary information to develop emission protocols because the monitoring study did not include the recommended animal and geographic regional pairings or provide an adequate sample size.¹¹⁴

¹⁰⁸ Animal Feeding Operations Consent Agreement and Final Order, *supra* note 101, at 4960.

¹⁰⁹ *See id.* (“The purpose of the monitoring study is to: collect data and aggregate it with appropriate existing emissions data; analyze the monitoring results; and create tools . . . that AFOs could use to determine whether they emit pollutants at levels that require them to apply for permits under the CAA or submit notifications under CERCLA or EPCRA.”).

¹¹⁰ *See* AIR QUALITY ISSUES, *supra* note 15, at 3.

¹¹¹ John Heilprin, *Environmentalists Blast Agriculture Plan*, MRT (May 5, 2003, 7:00 PM), <https://www.mrt.com/news/article/Environmentalists-Blast-Agriculture-Plan-7918515.php>.

¹¹² AIR QUALITY ISSUES, *supra* note 15, at 7.

¹¹³ *Ass’n of Irrigated Residents v. EPA*, 494 F.3d 1027, 1030–31 (D.C. Cir. 2007) (stating that the “analysis of this case begins and ends with subject matter jurisdiction”).

¹¹⁴ U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-08-944, CONCENTRATED ANIMAL FEEDING OPERATIONS: EPA NEEDS MORE INFORMATION AND A CLEARLY DEFINED STRATEGY TO PROTECT AIR AND WATER QUALITY FROM POLLUTANTS OF CONCERN 1, 37–39 (2008), <http://www.gao.gov/new.items/d08944.pdf>.

Despite providing a “safe harbor” provision from civil enforcement of permitting requirements under the CAA, the EPA retained the authority to criminally prosecute CAFOs and respond to imminent and substantial endangerments to public health or the environment.¹¹⁵ Moreover, the Agreement only specifically exempted CAFOs from civil violations from volatile organic compounds (“VOCs”),¹¹⁶ hydrogen sulfide, particulate matter, and ammonia.¹¹⁷ The language in the Agreement explicitly states that the EPA’s releases and covenant not to sue do not extend to emissions of gases beyond the four named.¹¹⁸ Importantly, none of the four named gases are greenhouse gases; therefore, it is clear that methane, carbon dioxide, and nitrous oxide were not contemplated in the Agreement.

As the EPA did not cede its ability to regulate greenhouse gas emissions from the livestock industry, the EPA would not be barred from enforcing the provisions of the CAA against CAFOs with regards to greenhouse gas emissions. Having established the EPA’s authority under the CAA, this Note will now determine the most effective provisions of the Act for regulating CAFOs in order to mitigate climate change.

III. CAA ENFORCEMENT IN PRACTICE

As emitters of greenhouse gases, CAFOs could fall under the CAA’s stationary source regulations. Under these regulations, mitigating greenhouse gas emissions from CAFOs can be best achieved via two portions of the Act: (1) emission-based standards through the criteria pollutants provisions in sections 108 and 109 of the Act;

¹¹⁵ Animal Feeding Operations Consent Agreement and Final Order, *supra* note 101, at 4958–4959.

¹¹⁶ The EPA defines VOCs as “any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions,” except those designated by the EPA as having “negligible photochemical reactivity.” 40 C.F.R. § 51.100(s)(1) (2018).

¹¹⁷ Animal Feeding Operations Consent Agreement and Final Order, *supra* note 101, at 4963 (explicitly only including VOCs, hydrogen sulfide, particulate matter, and ammonia in its definition of “Emission Unit”).

¹¹⁸ *Id.*

and (2) individual source standards under the New Source Performance Standards (“NSPS”) of section 111.¹¹⁹ Section 112 of the CAA, another stationary source regulation, is inapplicable to greenhouse gases because it empowers the EPA to regulate hazardous pollutants deemed “toxic.”¹²⁰

Sections 108 and 109 set limits for acceptable pollutant concentrations in the air, while section 111 sets limits for those concentrations at individual stationary sources.¹²¹ However, section 111 offers the most complete answer to the CAFO greenhouse gas emissions problem because the EPA can reasonably read section 111(d) to apply broadly to both new and existing sources of greenhouse gases. Sections 108 and 109 are trickier to apply to CAFOs because of their reliance on regional concentrations of pollutants.¹²²

A. *Criteria Pollutant Provisions*

Sections 108 and 109 of the CAA govern the National Ambient Air Quality Standards (“NAAQS”), which specify the maximum permissible concentration of an air pollutant in a region’s ambient air.¹²³ Once the EPA has created the required endangerment finding for a pollutant, “there is no discretion provided by the statute not to list the pollutant.”¹²⁴ After the EPA sets a NAAQS limit, each state develops State Implementation Plans (“SIPs”) detailing how the state’s air quality control regions will comply with the standard.¹²⁵

¹¹⁹ 42 U.S.C. §§ 7408–7409, 7411 (2012).

¹²⁰ *Id.* § 7412(b)(2) (listing established hazardous pollutants determined by Congress and reviewed by the EPA administrator).

¹²¹ *Id.* §§ 7408–7409, 7411.

¹²² After the EPA revises National Ambient Air Quality Standards under sections 108 and 109 of the CAA, state and local governments are responsible for developing and implementing plans to monitor air quality in their respective regions. *Id.* § 7410; see *NAAQS Implementation Process*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/criteria-air-pollutants/naaqs-implementation-process> (last visited Dec. 17, 2018). For an example of one of these plans, see *Air Plan Approval; Tennessee; NO_x SIP Call and CAIR*, 83 Fed. Reg. 64,497, 64,497 (proposed Dec. 17, 2018) (to be codified at 40 C.F.R. pt. 52).

¹²³ 42 U.S.C. § 7409(b)(1)–(2).

¹²⁴ *Nat. Res. Def. Council v. Train*, 411 F. Supp. 864, 868 (S.D.N.Y. 1976).

¹²⁵ 42 U.S.C. § 7410.

Some CAFO emissions are already regulated under sections 108 and 109; there is a NAAQS for particulate matter¹²⁶ and the EPA has the authority to regulate ammonia as a precursor to particulate matter.¹²⁷ NAAQS implementation works best for localized emissions because the permitting structure assesses ambient air locally through air quality control regions.¹²⁸ This presents problems for greenhouse gas regulations because greenhouse gases disperse throughout the globe upon release into the atmosphere. Greenhouse gases are often classified as “well-mixed,” meaning their concentration is similar around the world regardless of where the emissions arise.”¹²⁹ For this reason, regulating CAFO emissions of methane and nitrous oxide under the NAAQS/SIPs program becomes problematic because in order to set a limit, there needs to be a quantifiable regional concentration.

Moreover, explicitly applying NAAQS to greenhouse gases is an overreach of agency authority according to the Supreme Court in *Utility Air Regulatory Group v. EPA* (“*UARG*”).¹³⁰ In a 2010 regulation, the EPA attempted to explicitly apply NAAQS to greenhouse gases.¹³¹ The EPA planned to tailor its program based on specific greenhouse gas emissions by adopting a “phase-in approach” that would apply Prevention of Significant Deterioration (“PSD”) to large industrial sources at greenhouse gas threshold levels that are

¹²⁶ The most recent set of NAAQS for particulate matter was promulgated in 2013. *Particulate Matter (PM) Standards – Table of Historical PM NAAQS*, U.S. ENVTL. PROTECTION AGENCY, https://www3.epa.gov/ttn/naaqs/standards/pm/s_pm_history.html (last visited Sept. 22, 2018); see National Ambient Air Quality Standards for Particulate Matter, 78 Fed. Reg. 3086, 3086 (Jan. 15, 2013) (to be codified at 40 C.F.R. pts 50, 51, 52, 53 & 58).

¹²⁷ J. Nicholas Hoover, Note, *Can’t You Smell That Smell? Clean Air Act Fixes for Factory Farm Air Pollution*, 6 STAN. J. ANIMAL L. & POL’Y 1, 11 (2013).

¹²⁸ See 42 U.S.C. §§ 7407(d), 7410.

¹²⁹ *NAAQS May Help EPA Achieve Greenhouse Gas Reductions, Should Clean Power Plan Not Survive Challenges*, DUKE NICHOLAS INST. ENVTL. POL’Y SOLUTIONS: NEWS (Jan. 5, 2017), <https://nicholasinstitute.duke.edu/articles/naaqs-may-help-epa-achieve-greenhouse-gas-reductions-should-clean-power-plan-not-survive>.

¹³⁰ *Util. Air Regulatory Grp. v. EPA*, 134 S. Ct. 2427, 2445 (2014).

¹³¹ The regulation seeks to tailor “the applicability criteria that determine which [greenhouse gas] . . . sources become subject to the [Prevention of Significant Deterioration] and title V programs of the CAA.” Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31,514, 31,516 (June 3, 2010).

as “close to the [CAA’s] statutory levels as possible.”¹³² The PSD program applies to areas that are in attainment of NAAQS in order to ensure that new major sources or new modifications do not worsen areas that currently have acceptable air quality.¹³³

Despite the EPA believing the CAA was not “ambiguous with respect to the need to cover [greenhouse gas] sources under the PSD program,”¹³⁴ *UARG* held that the agency had exceeded its reach under the CAA.¹³⁵ According to the Court, while *Massachusetts* held that the Act-wide definition of “air pollutant” includes greenhouse gases, the term “air pollutant” in PSD permitting provisions has routinely been given a narrow, “context-appropriate” meaning.¹³⁶ In sum, *Massachusetts* does not override narrow definitions of “air pollutant” found in discrete provisions of the CAA.¹³⁷ According to the Court, the EPA cannot “treat greenhouse gases as a pollutant for purposes of defining a ‘major emitting facility’”— such as a CAFO—in the PSD context.¹³⁸

Following *UARG*, in 2015, the D.C. Circuit issued an amended decision in *Coalition for Responsible Regulation v. EPA*, which ordered the EPA’s proposed regulation vacated to the extent it requires a stationary emitter to obtain a PSD permit if greenhouse gases are the only pollutant.¹³⁹ For CAFOs, this means greenhouse gas regulation under sections 108 and 109 is only possible for facilities large enough to produce pollutants that would trigger NAAQS regulation for particulate matter, volatile organic compounds, or other gases explicitly covered.¹⁴⁰ As operations become larger, it becomes more

¹³² *Id.* at 31,523.

¹³³ 40 C.F.R. § 52.21 (2018).

¹³⁴ Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. at 31,548 n.31.

¹³⁵ *Util. Air Regulatory Grp.*, 143 S. Ct. at 2445.

¹³⁶ *Id.* at 2439.

¹³⁷ *Id.* at 2440–41.

¹³⁸ *Id.* at 2449.

¹³⁹ *Coal. for Responsible Regulation, Inc. v. EPA*, 606 F. App’x 6, 8 (D.C. Cir. 2015).

¹⁴⁰ As previously discussed, the EPA has already issued NAAQS for particulate matter, which CAFOs do emit. *See* National Ambient Air Quality Standards for Particulate Matter, 78 Fed. Reg. 3086, 3086 (Jan. 15, 2013) (to be codified at 40 C.F.R. pts 50, 51, 52, 53 & 58). Therefore, greenhouse gas regulation of CAFO emissions is possible for facilities large enough to trigger particulate matter NAAQS.

likely that some operations meet the emission thresholds for major sources. Regardless, seeking to regulate CAFOs' greenhouse gas emissions through this provision could only occur indirectly and is thus not necessarily the ideal method for mitigating emissions.

B. *New and Existing Source Performance Standards*

The second regulatory pathway for CAFOs under the CAA focuses on individual sources of emissions. Under section 111 of the CAA, the EPA may regulate the various pollutants emitted from a single source category.¹⁴¹ When listing a category, the EPA must make an endangerment finding¹⁴² and then promulgate performance standards for new sources in the category.¹⁴³ These performance standards, unlike NAAQS, are not pollutant specific, but category specific.¹⁴⁴ The EPA has broad power to define and revise source categories of pollution and has listed a large number of such categories in the Code of Federal Regulations.¹⁴⁵ Unfortunately, CAFOs have not yet been listed.¹⁴⁶

Section 111's New Source Performance Standards ("NSPS") cap the level of achievable emissions by the best system of emission reduction ("BSER") for all regulated pollutants as determined by the EPA administrator.¹⁴⁷ Following an identification of the BSER, the Agency must then set performance standards, usually expressed as emission rates based on the emissions performance the EPA believes can be achieved through application of its identified system.¹⁴⁸ The performance standard determines the stringency of the

¹⁴¹ 42 U.S.C. § 7411(b)(1)(B) (2012) (indicating that sources are to be regulated, not pollutants).

¹⁴² *Id.* § 7411(b)(1)(A) ("[The Administrator] shall include a category of sources in such list if in his judgement it causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare.").

¹⁴³ *Id.* § 7411(b)(1)(B).

¹⁴⁴ *See id.* ("The Administrator shall publish proposed regulations, establishing Federal standards of performance for new sources within such category.").

¹⁴⁵ 40 C.F.R. pt. 60 (2018) (including emission guidelines for Large Municipal Waste Combustors, Municipal Solid Waste Landfills, Infectious Waste Incinerators, etc.).

¹⁴⁶ *Id.*; *see infra* Section III.C.

¹⁴⁷ 42 U.S.C. § 7411(a)(1).

¹⁴⁸ *See id.* § 7411(a), (d); *see also* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg.

regulation.¹⁴⁹ However, as clarified by section 111(b)(5), “nothing in this section shall be construed to require . . . any . . . source to install and operate any particular technological system . . . to comply with any new source standard of performance.”¹⁵⁰ This offers a tremendous amount of flexibility to regulated entities, who are free to adopt any measure so long as they meet emission standards.

Section 111(b) was issued as a NSPS, generally implying that existing, unmodified stationary emission sources are not subject to performance standards under this section.¹⁵¹ While being constructed, these unmodified sources must comply with NSPS but are not required to meet future performance standards.¹⁵² This is the case because many emissions from existing sources are regulated by the NAAQS programs in sections 108 and 109, or the hazardous air pollutant program in section 112 of the CAA. However, not every air pollutant is either a criteria pollutant with corresponding NAAQS or hazardous pollutants subject to compliance with section 112. For such pollutants, section 111(d) of the CAA provides a mechanism for implementing existing emissions performance standards (“ESPS”).¹⁵³

Section 111(d) has only very rarely been used, largely because there are few pollutants with significant health or welfare impacts that have not been regulated under NAAQS or section 112.¹⁵⁴ However, greenhouse gases conveniently fall into this regulatory gap. Under section 111(d), the EPA can require states to submit plans for establishing, implementing, and enforcing standards for existing

64,662, 64,664 n.1 (Oct. 23, 2015) (to be codified in 40 C.F.R. pt. 60) (“Under CAA section 111(a)(1) and (d), the EPA is authorized to determine the BSER and to calculate the amount of emission reduction achievable through applying the BSER.”).

¹⁴⁹ See 42 U.S.C. § 7411(b)(1)(B).

¹⁵⁰ *Id.* § 7411(b)(5).

¹⁵¹ *Id.* § 7411(b)(6) (“Any new or modified fossil fuel fired stationary source which commences construction prior to the date of publication of the proposed revised standards shall not be required to comply with such revised standards.”).

¹⁵² *Id.*

¹⁵³ *Id.* § 7411(d).

¹⁵⁴ Robert R. Nordhaus & Ilan W. Gutherz, *Regulation of CO₂ Emissions from Existing Power Plants Under § 111(d) of the Clean Air Act: Program Design & Statutory Authority*, 44 ENVTL. L. REP. 10,366, 10,372–73 (2014) (noting that criteria and toxic pollutants are “two categories that encompass the vast majority of known air pollutants”).

sources, provided that the pollutants already have a standard of performance for new stationary sources and are not covered by any other provision of the CAA.¹⁵⁵ Prior to approving a state's plan, the agency must set national goals that each individual state's plan must achieve.¹⁵⁶ The EPA essentially indicates the substantive guidelines for state plans, which effectively set the minimum stringency of the ESPS.¹⁵⁷

The EPA's authority to regulate greenhouse gases under 111(d), however, has come under scrutiny with opponents claiming it as an overreach of agency power.¹⁵⁸ Thus far, the EPA's only effort to regulate greenhouse gas emissions under the ESPS program is reflected in its proposed rules for power plants, which would create a new source performance standard for carbon dioxide emissions for coal-fired power facilities.¹⁵⁹ This is most notably seen in the Obama Administration's Clean Power Plan. Obama's EPA, through the Clean Power Plan, sought to establish state-specific emission rate-based goals that would be implemented under section 111(d) to curb carbon dioxide emissions from fossil fuel burning plants.¹⁶⁰

A close reading of section 111(d) indicates that the "any existing source for any air pollutant" language of the provision can be read

¹⁵⁵ 42 U.S.C. § 7411(d)(1).

¹⁵⁶ *Id.*

¹⁵⁷ See 40 C.F.R. §§ 60.22–23 (2018).

¹⁵⁸ See William Yeatman, *Primer: The Ongoing Controversy over Whether Clean Air Act §111(d) Authorizes EPA's Clean Power Plan*, GLOBAL WARMING.ORG (July 2, 2014), www.globalwarming.org/2014/07/02/primer-the-ongoing-controversy-over-whether-clean-air-act-§111d-authorizes-epas-clean-power-plan/ (arguing that House version of 1990 CAA section 111(d) amendment controls and that it precludes the EPA from regulating hazardous air pollutant sources, not just pollutants, under section 111(d)).

¹⁵⁹ See, e.g., Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (to be codified in 40 C.F.R. pt. 60); Carbon Pollution Standards for Modified and Reconstructed Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34,960 (proposed June 18, 2014) (to be codified at 40 C.F.R. pt. 60); Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 1430 (proposed Jan. 8, 2014) (to be codified at 40 C.F.R. pts. 60, 70, 71, & 98).

¹⁶⁰ See *Fact Sheet: Clean Power Plan Overview*, U.S. ENVTL. PROTECTION AGENCY, <https://archive.epa.gov/epa/cleanpowerplan/fact-sheet-clean-power-plan-overview.html> (last visited Dec. 31, 2018) (noting that the Clean Power Plan is flexible: "reflecting the different needs of different states").

to include greenhouse gases, evading potential problems created by the Court's decision in *UARG*.¹⁶¹ Recall that the Court in *UARG* did not accept the broad definition of "pollutant" settled in *Massachusetts*,¹⁶² which included greenhouse gases.¹⁶³ Instead, *UARG* decided the definition of "pollutant" should be determined based on the context of the specific section at issue.¹⁶⁴ Nevertheless, a contextual reading of the language in section 111(d) favors the broad application of "pollutant" offered in *Massachusetts*.

Section 111(d) states that the EPA may regulate "any existing source of any air pollutant" so long as it is not already regulated under sections 108, 109, or 112 and could be regulated as a new source under section 111(b).¹⁶⁵ There is no pollutant-specific restriction, unlike in the PSD context where the EPA's regulations have interpreted air pollutant as limited to "regulated" air pollutants.¹⁶⁶ Section 111(d) is merely limited by its statutory language which is still broad: pollutants must already have a standard of performance for new stationary sources and must not be covered by any other provision of the CAA.¹⁶⁷

Ultimately, courts will likely uphold the EPA's current interpretation of section 111(d), which supports the regulation of greenhouse gas emissions from source categories. The categorization is unlikely to dramatically expand agency authority because section 111(d) gives states and regulated parties the flexibility to reduce greenhouse gas emissions based on their individual infrastructure.¹⁶⁸ Utilizing the regulatory options under section 111(d) would drastically help climate mitigation efforts, specifically when utilized to enforce emissions from the animal agriculture industry.

¹⁶¹ 42 U.S.C. § 7411(d)(1)(2012).

¹⁶² *Massachusetts v. EPA*, 549 U.S. 497, 555–56 (2007) (Scalia, J., dissenting) (criticizing the majority's reliance on the CAA's "capacious definition of 'air pollutant'").

¹⁶³ *Id.* at 528–29 (majority opinion).

¹⁶⁴ *Util. Air Regulatory Grp. v. EPA*, 143 S. Ct. 2427, 2439 (2014).

¹⁶⁵ 42 U.S.C. § 7411(d).

¹⁶⁶ *Util. Air Regulatory Grp.*, 143 S. Ct. at 2440; 40 C.F.R. § 52.21(a)(2), (b)(1) (2018).

¹⁶⁷ 42 U.S.C. § 7411(d).

¹⁶⁸ See Letter from Thomas Carbonell, Env'tl. Def. Fund Dir. of Regulatory Policy, to Journalist (2015), https://www.edf.org/sites/default/files/content/clean-powerplan_strong_legal_foundation.pdf; *Fact Sheet: Clean Power Plan Overview*, *supra* note 160.

Regulating CAFOs under section 111(b) and (d) would give the CAA maximum regulatory effect because it would allow the regulation of both existing and new sources of greenhouse gas pollution directly. The EPA's regulatory authority here is distinct from its power under sections 108 and 109 of the CAA, which in practice only allows regulation of a CAFO's greenhouse gas emissions if the facility is already in need of permits for other emissions.¹⁶⁹ Additionally, enforcing compliance of emission standards under sections 111(b) and (d) have the potential to create sufficient incentives to alter harmful livestock industry practices.

C. Applying Section 111 to CAFOs

As an initial matter, the EPA must list CAFOs as a category of sources under section 111(b) and (d) in order for the standards to apply. Section 111(b) empowers the EPA to specify categories of stationary emissions sources that “cause[], or contribute[] significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare.”¹⁷⁰ As previously explained, the statutory test is whether the group of *sources* emits air pollutants that endanger health or welfare. The EPA has broad discretion to determine and revise these “source categories.”¹⁷¹ The Agency lists the categories in the Code of Federal Regulations, covering sources in most major industrial sectors of the economy.¹⁷² While non-profit organizations have petitioned for CAFO inclusion, unfortunately, the EPA has not yet listed CAFOs as a source category under section 111.¹⁷³ It remains difficult to assess the likelihood of Agency action

¹⁶⁹ See *Util. Air Regulatory Grp.*, 134 S. Ct. at 2445; *Coal. for Responsible Regulation, Inc. v. EPA*, 606 F. App'x 6, 8 (D. C. Cir. 2015).

¹⁷⁰ 42 U.S.C. § 7411(b)(1)(A).

¹⁷¹ See *id.*

¹⁷² See 40 C.F.R. pt. 60 (2018) (including emission guidelines for Large Municipal Waste Combustors, Municipal Solid Waste Landfills, Infectious Waste Incinerators, etc.).

¹⁷³ Humane Soc'y of the United States et al., Petition to List Concentrated Animal Feeding Operations Under Clean Air Act Section 111(b)(1)(A) of the Clean Air Act, and to Promulgate Standards for Performance Under Clean Air Act Sections 111(b)(1)(B) and 111(d) at 3 (Sept. 21, 2009), <http://www.humane.society.org/assets/pdfs/litigation/hsus-et-al-v-epa-cafo-cao-petition.pdf> [hereinafter Petition to List Concentrated Animal Feeding Operations]; see *infra* Section IV.C.1.

because section 111 does not require listing a source category.¹⁷⁴ Nevertheless, as this subsection explains, making CAFOs regulated entities under the provision would improve public welfare and mitigate climate change by affecting industry manure management policies, thus supporting a listing.

1. THE LIKELIHOOD OF AGENCY ACTION

Determining the probability of the EPA listing CAFOs as a categorical source under section 111 of the CAA is difficult because the Agency retains broad discretion to identify a source through an endangerment finding.¹⁷⁵ Despite this uncertainty, the EPA should list CAFOs as a regulated category under section 111 not only because methane and nitrous oxide emissions endanger public health and welfare, but also because similar sources are already regulated. The list of regulated entities is diverse: the Code of Federal Regulations contains over ninety separate standards of performance covering sectors from “Large Municipal Waste Combustors” to “Existing Sewage Sludge Incineration Units.”¹⁷⁶ Particularly compelling here are the standards of performance and emission guidelines for municipal waste landfills.¹⁷⁷ Although admittedly animal agriculture and waste landfills are distinct facilities, the source of emissions from these two entities are in fact analogous.

Similar to municipal waste centers, CAFOs emit dangerously large amounts of methane and nitrous oxide as a result of their waste management systems.¹⁷⁸ In fact, one dairy farm with 2,500 cows produces as much waste as a city with around 411,000 residents.¹⁷⁹ Although as an industry CAFOs serve a distinct function to waste centers, both facilities endanger public health and the environment through the emissions of greenhouse gases as a result of biological

¹⁷⁴ See 42 U.S.C. § 7411(b)(1)(A).

¹⁷⁵ Section 111(b) states that “the Administrator shall . . . publish (and from time to time thereafter shall revise) a list of categories of stationary sources;” therefore, there are no statutory constraints on the EPA’s authority to identify and list sources. See *id.*

¹⁷⁶ See 40 C.F.R. pt. 60.

¹⁷⁷ *Id.* § 60.30c–.36c.

¹⁷⁸ See Lehner & Rosenberg, *supra* note 8, at 10,855.

¹⁷⁹ BARTH ET AL., *supra* note 29, at 7.

waste.¹⁸⁰ Consequently, similar to municipal waste facilities, CAFOs should also be listed as a source category under section 111.

While the EPA has broad discretion to revise and add sources, citizen groups are empowered to propose a listing and compel agency action. In 2009, the Humane Society of the United States, along with several environmental organizations, petitioned the EPA to add CAFOs to the list of sources regulated under sections 111(b) and (d), on the grounds that they are stationary source emitters of greenhouse gases, which cause, or contribute significantly to, air pollution and can endanger public health and welfare.¹⁸¹ Furthermore, the groups asserted that regulation of CAFO emissions was effective, reasonable, and would ensure the use of new technologies for mitigation efforts.¹⁸²

After the EPA failed to acknowledge the petition, the groups filed a federal lawsuit compelling response by the Agency.¹⁸³ In 2016, the District Court for the District of Columbia dismissed the suit on purely procedural grounds due to lack of jurisdiction.¹⁸⁴ The court found jurisdiction arose under the CAA,¹⁸⁵ rather than the Administrative Procedure Act,¹⁸⁶ and the advocacy group plaintiffs failed to meet the CAA's notice requirements.¹⁸⁷ Decidedly, the court did not conclude that listing CAFOs as a category source under the CAA was unlawful; the court's decision rested entirely on procedural inadequacies, rather than a judgment based on the merits.¹⁸⁸ Essentially, the court did not state that listing CAFOs would be unreasonable or an overreach of agency authority. Therefore, this case should not deter further petitions issued by advocacy groups, nor should it discourage a direct listing by the EPA.

¹⁸⁰ See *Sources of Greenhouse Gas Emissions: Commercial/Residential*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#commercial-and-residential> (last visited Jan. 2, 2019).

¹⁸¹ Petition to List Concentrated Animal Feeding Operations, *supra* note 173, at 3.

¹⁸² *Id.* at 63–67.

¹⁸³ Complaint for Declaratory and Injunctive Relief, *Humane Soc'y of the United States v. McCarthy*, 209 F. Supp. 3d 280 (D.D.C. 2016) (No. 15-cv-0141).

¹⁸⁴ *Humane Soc'y of the United States*, 209 F. Supp. 3d at 286.

¹⁸⁵ 42 U.S.C. § 7401 (2012).

¹⁸⁶ 5 U.S.C. § 552 (2012).

¹⁸⁷ *Humane Soc'y of the United States*, 209 F. Supp. 3d at 286–88.

¹⁸⁸ *Id.*

Unfortunately, the EPA rejected the petition at the end of 2017, claiming a need for “more accurate methodologies for estimating [CAFO air] emissions.”¹⁸⁹ In its letter to petitioners, the Agency explained that once it “has sufficient information on CAFO emissions, it will determine the appropriate regulatory approach to address those emissions.”¹⁹⁰ The EPA’s alleged need for additional information seems suspicious, as the Agency has supposedly been monitoring CAFO emissions since 2005.¹⁹¹ Continued pressure from advocacy groups could compel the EPA to conclude its study of CAFOs and finally list animal agriculture facilities as source categories under the CAA.

2. EXTERNAL SUPPORT FOR LISTING CAFOS

Additionally, the policy implications of regulating the animal agriculture sector under section 111 encourages listing CAFOs as a category source of air pollutants. Section 111 offers the most effective answer to the CAFO greenhouse gas emissions problem because it allows for direct regulation of these animal agriculture facilities. The definition of performance standards under section 111 is exceptionally broad as it permits the EPA to consider “nonair quality health and environmental impact” in setting standards.¹⁹² Further, the provision allows the EPA to “distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards.”¹⁹³ Thus, in setting national goals for CAFO greenhouse gas emissions, the Agency can still customize its standards to the diversity of CAFO facilities—which vary in size and type.¹⁹⁴

Further, under section 111 all CAFOs would be regulated uniformly as a source category, thus establishing a national threshold

¹⁸⁹ Letter from E. Scott Pruitt, Adm’r, Env’tl. Prot. Agency, to Jonathan Lovvorn & Daneil Lutz, The Humane Soc’y of the United States at 3 (Dec. 15, 2017), <https://www.regulations.gov/document?D=EPA-HQ-OAR-2017-0638-0003> (follow link titled “View Document”).

¹⁹⁰ *Id.* at 4.

¹⁹¹ See Animal Feeding Operations Consent Agreement and Final Order, *supra* note 101.

¹⁹² 42 U.S.C. at § 7411(a)(1)(2012).

¹⁹³ *Id.* § 7411(b)(2).

¹⁹⁴ See 40 C.F.R. §§ 122.23, 122.42 (2018).

standard of emissions.¹⁹⁵ As mentioned previously, under section 111(b)(5) the EPA cannot force a specific industry technology system;¹⁹⁶ however, CAFOs would still be subject to uniform emission standards established by the provision.¹⁹⁷ Moreover, the standards implemented under section 111 could require specific work practices if certain emissions would be too difficult to measure—as has been done in coal processing plants.¹⁹⁸ Because the bulk of CAFO methane and nitrous oxide emissions derive from concentrated manure and enteric fermentation,¹⁹⁹ work practice regulations—or even traditional emission standards under section 111(d)—would force CAFOs to confront their waste management policies.

3. ADJUSTING THE CAFO MODEL

If the EPA listed CAFOs as a source category under section 111(b) and (d)—in accordance with policy rationales described above—new and existing CAFOs would have to alter their manure management practices to diminish methane and nitrous oxide emissions. Ending the CAFO model entirely by moving animals out of metal buildings and onto grazing lands is a potential industry policy choice. Liquid manure stored in anaerobic environments within lagoons release ninety percent (90%) more methane than solid manure that decomposes aerobically in grazing systems.²⁰⁰ While pasture-raised livestock may produce less methane, the grazing system is

¹⁹⁵ Recall that because under section 111 standards are implemented against source categories rather than specific pollutants, each listed category is regulated uniformly depending on specified emission criteria for that source. *See* 40 C.F.R. pt. 60.

¹⁹⁶ 42 U.S.C. § 7411(b)(5).

¹⁹⁷ *Id.* § 7411(b). For examples of different emission criteria for various listed categories see 40 C.F.R. pt. 60.

¹⁹⁸ After finding it “difficult and prohibitively expensive to measure actual [particulate matter] emissions from individual open storage [coal] piles or roadways,” the EPA implemented work practice standards for open storage piles of coal, rather than emission limitations. Standards of Performance for Coal Preparation and Processing Plants, 74 Fed. Reg. 51,950, 51,950, 51,954 (Oct. 8, 2009) (to be codified at 40 C.F.R. pt. 60).

¹⁹⁹ *See* EPA INVENTORY, *supra* note 7, at ES-21, 5-1; Ripple et al., *supra* note 3, at 2–3.

²⁰⁰ Jun et al., *supra* note 34, at 322; *see* Lehner & Rosenberg, *supra* note 8, at 10,855 (“When manure is left as a solid . . . on . . . pasture land[], it typically decomposes aerobically and produces little to no methane.”).

resource intensive and often requires land-clearing and deforestation—both of which contribute significantly to climate change.²⁰¹

Another potential solution, digesters, has emerged within the animal agriculture industry as a new technology to curb greenhouse gas emissions from animal waste.²⁰² Anaerobic digesters capture methane from CAFO manure management systems and convert it to biogas, a renewable energy source.²⁰³ Biogas—consisting of fifty to seventy percent (50–70%) methane, can be used onsite to power farms or it can be sold for use offsite.²⁰⁴ However, digesters are expensive and only possible financially by the largest CAFOs, therefore likely incentivizing the growth of CAFO facilities.²⁰⁵ Furthermore, digesters address only a portion of the methane emissions, and none of the nitrous oxide emissions, resulting from livestock production.²⁰⁶ They also cannot alleviate enteric fermentation, caused by the breathing and belching of ruminants, which represents a much larger share of methane emissions than manure waste.²⁰⁷

Additionally, while this Note concerns the climate change impacts of CAFOs, these facilities do not exist in a vacuum and have

²⁰¹ See, e.g., Paul West et al., *Leverage Points for Improving Global Food Security and the Environment*, 345 SCI. 325, 326 (identifying Brazil and Indonesia as agents for reducing agriculture's impact on climate change through tropical deforestation).

²⁰² See THE WHITE HOUSE, CLIMATE ACTION PLAN – STRATEGY TO REDUCE METHANE EMISSIONS 6–7 (2014), https://obamawhitehouse.archives.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.

²⁰³ *Id.* at 6 (“Biogas systems are proven and effective technology to process organic waste and generate renewable energy.”).

²⁰⁴ *Id.* at 7 (“The Dairy Power project report findings show a \$3 billion market potential through the products and co-products developed by mature digester systems that process manure and commercial food waste, with additional value for potential nutrient trading markets . . .”).

²⁰⁵ See Nicole G. Di Camillo, Comment, *Methane Digesters and Biogas Recovery—Masking the Environmental Consequences of Industrial Concentrated Livestock Production*, 29 UCLA J. ENVTL. L. & POL'Y 365, 375–78 (2011).

²⁰⁶ See *id.* at 374–75 (critiquing methane digesters as an expensive, and at best, partial solution to CAFO greenhouse gas emissions).

²⁰⁷ See *id.* at 372–73, 378–79 (explaining that bio-digesters are meant to mitigate emissions from manure, rather than other biological processes, and that enteric digestion produces the majority of methane emissions related to livestock production).

created considerable externalities that digesters are incapable of addressing: harm to animal welfare,²⁰⁸ antibiotic resistance,²⁰⁹ and air and water pollution for surrounding, predominately low-income communities of color.²¹⁰ Thus, digesters, appearing facially beneficial in the climate change mitigation context, potentially distract from other impacts of CAFOs.²¹¹ Nevertheless, although a partially deficient solution, digesters would ameliorate greenhouse gas emissions from CAFOs more than maintaining the status quo. Further, digesters would presumably appeal to industry because adding the technology is theoretically simpler than readjusting CAFOs completely towards a grazing model.

It is worth noting that decreasing the size of CAFOs by limiting the number of animals per facility or the quantity of CAFOs nationally would decrease the amount of waste and enteric fermentation produced—thus simply diminishing methane and nitrous oxide emissions in accordance with a section 111 regulation. This policy choice, however, depends on consumer preferences for animal products. Meat consumption continues to rise in the United States,²¹² caused by industry oversupply and agriculture subsidies provided by taxpayer dollars that incentivize consumption.²¹³ Consumer preferences for plant-based diets, as opposed to those heavy in meat and dairy products, would amplify section 111 regulations by diminishing the demand for CAFOs. Ultimately, this policy action relies on educating the public about the environmental harms and public welfare externalities created by animal agriculture.²¹⁴

²⁰⁸ See Walton & Jaiven, *supra* note 23, at 93.

²⁰⁹ Tillman et al., *supra* note 24, at 674.

²¹⁰ See, e.g., Levine, *supra* note 25; Wing & Wolf, *supra* note 25, at 235–37.

²¹¹ See Di Camillo, *supra* note 205, at 375–80.

²¹² Zlati Meyer, *Beef Is Back on the Grill and Its Sales Are Heating Up, Too*, USA TODAY (July 3, 2017, 11:48 AM), <https://www.usatoday.com/story/money/2017/07/03/americans-eat-more-beef-and-meat-trend-thats-expected-continue/435331001/>.

²¹³ Marya Torrez, *Accounting for Taste: Trade Law Implications of Taxing Meat to Fight Climate Change*, 27 GEO. INT'L ENVTL. L. REV. 61, 63 (2014) (explaining that the subsidization of animal agriculture “creates a perverse incentive for individuals to over-consume animal products at great cost not only to the environment but also to human health . . .”).

²¹⁴ In 2015, the U.S. Department of Agriculture (“USDA”) and the U.S. Department of Health and Human Services (“HHS”) considered incorporating sus-

4. THE FEASIBILITY OF A NATIONAL STANDARD TODAY

Establishing a national standard for CAFOs under section 111(b) and (d) is an effective use of the existing CAA framework because it would allow the regulation of both existing and new sources of greenhouse gas pollution directly. However, under President Trump's administration—which has proposed a repeal of the Obama administration's Clean Power Plan—expecting the EPA to take action against the powerful agriculture sector seems naively optimistic.²¹⁵ Recall that, historically, agricultural exceptionalism has led policymakers to concede to agricultural interest against competing environmental concerns.²¹⁶

In light of these circumstances, it is necessary to use legislation at the state and local levels in order to reduce greenhouse gas emissions from CAFOs, even if only incrementally. Several states have sought to curb agricultural impacts on climate change by passing laws or initiatives in support of soil carbon sequestration, which aims to decrease the amount of methane and other carbon-based greenhouse gases.²¹⁷ While most of these programs address climate

tainability concerns in their dietary guidelines. BARBARA E. MILLEN ET AL., SCIENTIFIC REPORT OF THE 2015 DIETARY GUIDELINES ADVISORY COMMITTEE, at Part D, Chapter 5 (2015). Although USDA and HHS rejected the inclusion of sustainability issues in the final guideline, it remains increasingly important to educate the public about the tangible environmental impacts of their food choices. See Allison Aubrey, *New Dietary Guidelines Will Not Include Sustainability Goal*, NPR (Oct. 6, 2015, 6:16 PM), <https://www.npr.org/sections/thesalt/2015/10/06/446369955/new-dietary-guidelines-will-not-include-sustainability-goal>.

²¹⁵ See Lisa Friedman & Brad Plumer, *E.P.A. Announces Repeal of Major Obama-Era Carbon Emissions Rule*, N.Y. TIMES (Oct. 9, 2017), <https://www.nytimes.com/2017/10/09/climate/clean-power-plan.html>; see also Nadja Popovich & Tatiana Schlossberg, *23 Environmental Rules Rolled Back in Trump's First 100 Days*, N.Y. TIMES (May 2, 2017), <https://www.nytimes.com/interactive/2017/05/02/climate/environmental-rules-reversed-trump-100-days.html>.

²¹⁶ Foscolo & Zimmerman, *supra* note 93, at 317; see *supra* Section II.C.

²¹⁷ Hawaii House Bill 1578 establishes the Carbon Farming Task Force to identify agricultural practices to promote carbon sequestration. H.B. 1578, 29th Leg., Reg. Sess. (Haw. 2017). Minnesota passed a law in 2015 requiring permanent vegetative buffers on farmland bordering lakes and streams, which will increase soil carbon sequestration in addition to decreasing pollutant run-off. 2015 Minn. Laws 1st Spec. Sess. Ch. 4 (S.F. 5) (codified as amended in scattered sections of MINN. STAT. chs. 103A–114b (2018)). The Oklahoma Carbon Sequestration Enhancement Act quantifies carbon sequestration in order to market emissions in the future. OKLA. STAT. tit. 27A § 27A-3-4-101 (2019).

implications from farming and agricultural practices generally, California's State Legislature specifically directed its Air Resources Board to reduce methane emissions from dairy farms through strict emission standards.²¹⁸

CONCLUSION

Emissions from both enteric fermentation and manure, a result of intensive factory farms known as CAFOs,²¹⁹ must be regulated under a national framework in order to properly mitigate the United States's contribution to climate change. Setting national standards—as opposed to relying exclusively on state action—would allow an industry wide compliance and prevent CAFOs from concentrating in states with lenient regulations.

Relying on the existing CAA framework is essential as no formalized regulations exist specifically addressing CAFO emissions of methane and nitrous oxide.²²⁰ The EPA is empowered to regulate greenhouse gases under the CAA and can address emissions from CAFOs under stationary source provisions in sections 108, 109, and 111 of the Act.²²¹ Section 111 performance standards, unlike those in sections 108 and 109, are category specific rather than pollutant specific.²²² Further, regulating CAFOs under section 111 is more efficient and effective because it permits the direct oversight of both existing and new sources of methane and nitrous oxide emissions.²²³ The EPA's regulatory authority here is distinct from its power under sections 108 and 109, which only allow regulation of a CAFO's greenhouse gas emissions if the facility needs permits for other pollutants.²²⁴

For section 111 to apply, the EPA must list CAFOs as a source category—which it has not yet done despite petitions from citizen

²¹⁸ CAL. HEALTH & SAFETY CODE § 39730 (West 2018); AIR RES. BD., CAL. ENVTL. PROT. AGENCY, SHORT-LIVED CLIMATE POLLUTANT REDUCTION STRATEGY 7–8 (2017).

²¹⁹ NPDES for CAFOs, *supra* note 11; *see also* *Animal Feeding Operations*, *supra* note 11.

²²⁰ AIR QUALITY ISSUES, *supra* note 15, at 3.

²²¹ 42 U.S.C. §§ 7408, 7409, 7411 (2012).

²²² *See id.* § 7411(b)(1)(B).

²²³ *See id.* § 7411(b), (d).

²²⁴ *See* Util. Air Regulatory Grp. v. EPA, 134 S. Ct. 2427, 2445 (2014); Coal. for Responsible Regulation, Inc. v. EPA, 606 F. App'x 6, 8 (D. C. Cir. 2015).

groups.²²⁵ The likelihood of the EPA listing CAFOs as a source is uncertain because the Agency has broad discretion to revise its categorizations.²²⁶ Despite this uncertainty, the EPA should list CAFOs as a category because similar sources are regulated—such as municipal waste centers.²²⁷ Moreover, making CAFOs regulated entities under the provision would improve public welfare and mitigate climate change by affecting industry manure management policies—thus supporting a listing.

In assessing their waste storage policies, the livestock sector could adopt several potential solutions: (1) end the CAFO model entirely by raising only grass-fed animals, although this raises climate change concerns as a result of the necessary land-clearing;²²⁸ (2) utilize methane digesters, which do not address methane and nitrous oxide emissions from enteric fermentation;²²⁹ or (3) decrease operation size, which would only be viable from the industry's perspective if the public demanded less meat and dairy products. Adopting methane digesters is the most likely outcome, as it presumably presents the least damage to the agriculture industry from the solutions presented. Albeit an incomplete answer, digesters would at least address some of CAFOs' climate change impacts.

Climate change is the defining challenge of our time. However, it remains politically divisive. While substantive legal reform addressing CAFOs impact on climate change at the federal level is potentially only distantly achievable, it is necessary to confront this issue in the hopes of proper mitigation.

²²⁵ *Humane Soc'y of the United States v. McCarthy*, 209 F. Supp. 3d 280, 286 (D.D.C. 2016).

²²⁶ *See* 42 U.S.C. § 7411(b)(1)(A).

²²⁷ 40 C.F.R. § 60.30c-.36c (2018).

²²⁸ *See, e.g.,* West et al., *supra* note 201, at 326.

²²⁹ *See* Di Camillo, *supra* note 205, at 372–73.