

SENATE BILL 1383 STINKS: CALIFORNIA'S ATTEMPT TO REGULATE DAIRY CATTLE METHANE EMISSIONS

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Climate change is no longer a prediction; it is a reality. Part of the climate change conversation revolves around increased methane emissions, focusing on the agricultural industry as a culprit. To address these concerns, the California legislature recently passed Senate Bill 1383, which aims to reduce methane emissions from one agricultural industry in particular—dairies. This far-fetched bill is the first in the country to attempt to regulate methane from dairy cattle. With so much uncertainty surrounding this bill's effects, this Comment argues that the bill will hurt the dairy industry more than it helps combat climate change. This Comment also proposes possible alternatives to regulating dairy methane emissions while enabling the California dairy industry to stay afloat.

INTRODUCTION

Just a couple hours north of Los Angeles lies the dusty crossroads of Tulare County, where a distinct odor fills the air from east to west. As dairies surround the perimeter of the county, the odor is common to locals. A whiff of the money-making cattle serves as a reminder that the county is the number one milk producer in the nation.¹ Unbeknownst to many, the cows are also a top producer of another substance—methane. The phrases “climate change” and “greenhouse gas” bring to mind scenes of industrial factories releasing black clouds of air pollution. However, a neglected and perhaps surprising source of such gases is the world's dairy industry. Climate change is a local and global threat.² Like many other states, California has begun to experience

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1. USDA, DAIRY CATTLE AND MILK PRODUCTION 2 (2014), https://www.nass.usda.gov/Publications/Highlights/2014/Dairy_Cattle_and_Milk_Production_Highlights.pdf [<https://perma.cc/3EBQ-M7QE>].

2. See Mary D. Nichols, *California's Climate Change Program: Lessons for the Nation*, 27 UCLA J. ENVTL. L. & POL'Y 185, 186 (2009), <https://escholarship.org/content/qt7tr3k4xp/qt7tr3k4xp.pdf> [<https://perma.cc/GG7U-QV2L>].

consequences of climate change.³ Over the last century, the “Golden State has seen a seven-inch rise in sea level,” eroding its coastal communities.⁴ California has endured years of severe drought, threatening “one of the most productive agricultural regions in the world.”⁵ Climate change has also had a major impact on California's severe wildfire season—an impact dramatically illustrated in the last few years when records were set for the largest state fires in both 2017 and 2018, with over 1.3 million acres burned in 2018 alone.⁶

Methane is a potent greenhouse gas that has increasingly contributed to such climate change across the nation. According to the Environmental Protection Agency (“EPA”), the agricultural industry is one of the largest methane emitters in the United States.⁷ To curb its negative effect on our environment, federal and state governments have implemented regulations to reduce the amount of methane emissions in the United States.⁸ Most recently, California has taken a different approach toward regulating methane emissions by aiming its efforts at one particular industry—dairies.

California dairies seem to be a target for state environmental regulations in general, but in 2016 the California legislature passed Senate Bill 1383 in an attempt to reduce dairy methane levels by 40% by 2030.⁹ Dairies are a large contributor of California’s total methane emissions due to their manure management and cattles’ special digestive system.¹⁰ Senate Bill 1383 is the first of its kind. No other states, nor the federal government have taken

3. *Id.*

4. *Id.*

5. *Id.*

6. *See Incidents Overview*, CAL. DEP’T OF FORESTRY & FIRE PROT., <https://www.fire.ca.gov/incidents> [<https://perma.cc/A6YL-A9RC>]; Kristine Phillips, Sarah Kaplan & Meith McMillan, *A Record ‘You Don’t Want to See’: Mendocino Complex Fire Has Become California’s Largest Ever*, WASH. POST (Aug. 7, 2018, 11:02 AM), https://www.washingtonpost.com/news/post-nation/wp/2018/08/06/wildfires-continue-to-char-california-but-one-fire-is-in-a-destructive-league-of-its-own/?utm_term=.87b5037ff9e9 [<https://perma.cc/4HUK-84G7>].

7. *Overview of Greenhouse Gases*, U.S. EPA, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases#CO2> lifetime [<https://perma.cc/G3EC-UA5Z>] (last updated Apr. 11, 2019).

8. *See Nichols*, *supra* note 2 at 187.

9. S.B. 1383, 2016 Leg., 2015-2016 Reg. Sess. (Cal. 2016).

10. *Carbon, Methane Emissions and the Dairy Cow*, PENNSTATE EXTENSION, <https://extension.psu.edu/carbon-methane-emissions-and-the-dairy-cow> [<https://perma.cc/CMG4-P2J8>] (last updated May 5, 2016).

regulatory action to reduce methane levels particularly from dairy farms.¹¹ In fact, this is the first time that any “governmental body . . . will regulate greenhouse gas emissions from animal agriculture.”¹² Perhaps the lack of regulation is because such oversight may do more harm than good.

Essentially, farmers view the new law as a form of state government overreach and over-regulation of the dairy industry. The law’s target methane reduction of 40% is ambitious, especially considering that methane is produced by a cow’s natural design.¹³ While there is ongoing research to explore mitigation through changes in cattle diets, there is still uncertainty regarding its long-term effects.¹⁴ Further, there are financial concerns and funding uncertainty pertaining to California’s ambitious methane regulation. While federal and state funding have been set aside to help with the transition, such funding will likely be insufficient to address the need of the massive industry. The regulations are not cost-efficient, especially in the wake of an already struggling industry. Since California is America’s largest dairy producer,¹⁵ the increase in price for the dairy farmer to manage his cattle will ultimately be passed off to the consumer at the local grocery store.

I. WHAT IS METHANE?

Methane, like carbon dioxide, is a naturally occurring greenhouse gas in the atmosphere. Greenhouse gases affect the environment by absorbing heat and trapping it in the atmosphere, which allows less heat to be released back

11. *Legally Brief: California Air Resources Board Commits to Regulate Methane Emissions by Dairy Industry*, ANIMAL LEGAL DEF. FUND, (June 29, 2017) [hereinafter *Legally Brief*]. <https://aldf.org/article/legally-brief-california-air-resources-board-commits-to-regulate-methane-emissions-by-dairy-industry/> [https://perma.cc/37CZ-3XS9]; see also *California’s Holy-Cow Idea*, BLOOMBERG (Dec. 4, 2017, 8:00 AM), <https://www.bloomberg.com/opinion/articles/2017-12-04/california-s-holy-cow-idea> [https://perma.cc/4F8A-8AVN].

12. *Legally Brief, supra*.

13. Allison N. Hatchett, *Bovines and Global Warming: How the Cows Are Heating Things Up and What Can Be Done to Cool Them Down*, 29 WM. & MARY ENVTL. L. & POL’Y REV. 767, 767 (2005), <https://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1122&context=wmelpr> [https://perma.cc/E347-P8HE].

14. See Diane Nelson, *Can Seaweed Cut Methane Emissions on Dairy Farms?*, UC DAVIS (May 24, 2018), <https://www.ucdavis.edu/news/can-seaweed-cut-methane-emissions-dairy-farms/> [https://perma.cc/L66S-SW8G].

15. USDA, MILK PRODUCTION (2018), <https://downloads.usda.library.cornell.edu/usda-esmis/files/h989r321c/m613n309x/37720h893/mkpr1218.pdf> [https://perma.cc/2H85-7AE3].

into space.¹⁶ This greenhouse effect is a natural process, and without it the “Earth’s temperature would be below freezing.”¹⁷ However, human activities have increased the production of greenhouse gases, leading to the unnatural warming of the Earth’s climate.¹⁸

Not all greenhouse gases are the same in terms of their ability to trap heat in the earth’s atmosphere. For example, while carbon dioxide makes up 81% of all U.S. greenhouse gas emissions, methane is much more effective at absorbing heat than carbon dioxide.¹⁹ Methane accounts for only 10% of U.S. greenhouse gas emissions, but its comparative impact on global warming “is more than [twenty-five] times greater than carbon dioxide over a 100-year period.”²⁰ Though methane is a more intense climate changer than carbon dioxide, it has a much shorter lifetime.²¹ Methane lives in the atmosphere for twelve years while carbon dioxide can remain in the atmosphere for centuries.²² Thus, it is no surprise that most attempts to combat climate change center on carbon dioxide.²³ However, policymakers have recently begun to focus their efforts on methane reduction due to its higher efficiency of trapping radiation.²⁴

A. Sources of Methane

Globally, human activities account for over 60% of methane emissions.²⁵ Methane is emitted from a number of sources including energy, industry, waste management, and agriculture.²⁶ Methane is the principal component of natural gas so the largest source of methane in the United States is derived from natural gas and petroleum systems.²⁷ Although the agricultural industry

16. *Greenhouse Gases*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., <https://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php> (last visited Oct. 12, 2018).

17. *The Greenhouse Effect*, UNIV. CORP. FOR ACAD. RES. (2011), <https://scied.ucar.edu/longcontent/greenhouse-effect> [<https://perma.cc/E5PF-P48>].

18. *Id.*

19. *Overview of Greenhouse Gases*, *supra* note 7.

20. *Id.*

21. Patti Nyman, *Methane vs. Carbon Dioxide: A Greenhouse Gas Showdown*, under *Global Warming Potential*, ONE GREEN PLANET, <http://www.onegreenplanet.org/animalsandnature/methane-vs-carbon-dioxide-a-greenhouse-gas-showdown/> [<https://perma.cc/KR3U-LQBC>].

22. *Overview of Greenhouse Gases*, *supra*.

23. *Id.*

24. *Id.*

25. *Id.*

26. *Id.*

27. *Id.*

was responsible for 9% of U.S. greenhouse gas emissions in 2016,²⁸ when livestock and manure management is combined, agriculture is responsible for approximately 30% of U.S. methane emissions.²⁹

Just like humans, when cattle eat, gases build up in their intestines and must be expelled. However, ruminant animals such as cattle, sheep, and goats, have special digestive systems that allow them to convert otherwise unusable plant material into a sustainable meal.³⁰ Ruminant animals have four compartments in the stomach instead of one.³¹ Of the four compartments, the rumen is the largest section where most of the digestion takes place.³² The rumen breaks down grass and other coarse vegetation that animals with one stomach (e.g., humans, chickens and pigs) are unable to digest.³³ This advantageous digestive system allows the animals to expel methane into the environment through a process called “enteric fermentation.”³⁴ Enteric fermentation accounts for approximately one quarter of U.S. methane emissions.³⁵ In addition to enteric fermentation, an animal’s feed quality and intake also affect methane emissions.³⁶ “In general, lower feed quality and/or higher feed intake leads to higher [methane] emissions.”³⁷ Additionally, the manner in which livestock manure is treated and stored contributes to methane emissions. Methane is produced when manure is stored in lagoons and holding tanks.³⁸ In 2016, manure management accounted for 10% of the nation’s total methane emissions.³⁹

B. Methane Emissions from Dairies

Dairies seem to have a bad reputation when it comes to calculating U.S. methane emissions, and for good reason. Cattle, as ruminant animals, are by far the largest methane emitters among their fellow livestock, followed by

28. *Sources of Greenhouse Gas Emissions*, U.S. EPA, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> [<https://perma.cc/4UXM-5G85>] (last updated Sept. 13, 2019).

29. *Overview of Greenhouse Gases*, *supra* note 7.

30. *Bovines and Global Warming*, *supra* note 13.

31. *Id.* at 774–75.

32. *Id.*

33. *Id.*

34. *Id.* at 767.

35. *Overview of Greenhouse Gases*, *supra*.

36. U.S. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016, at 5-3 (2018), https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf [<https://perma.cc/FN42-7E7Q>].

37. *Id.*

38. *Overview of Greenhouse Gases*, *supra*.

39. *Id.*

swine and horses respectively.⁴⁰ In 2016, the EPA estimated that both dairy and beef cattle produced a total of 164.2 million metric tons of carbon dioxide equivalents of methane gas (MMT CO₂ Eq.) compared to 170.1 MMT CO₂ Eq. produced by livestock as a whole.⁴¹ For conversion purposes, one “MMT CO₂ Eq. has the same volume as the air in about 200,000 hot air balloons.”⁴² Methane is produced on dairy farms mainly through enteric fermentation and manure storage.⁴³ In fact, enteric methane is the second largest source of methane emissions in the United States.⁴⁴ Enteric methane emissions predominantly result from the animals belching or exhaling.⁴⁵ Contrary to popular belief, only 5% of methane from a dairy cow actually comes out the back end of the animal.⁴⁶ Interestingly enough, however, “[b]eef cattle remain the largest contributor of methane emissions from enteric fermentation, accounting for 71 percent in 2016, [while] [e]missions from dairy cattle in 2016 accounted for 25 percent.”⁴⁷

Treatment and storage of manure at dairy farms is another producer of methane emissions. When manure is stored or treated in systems as a liquid, such as lagoons and ponds, the decomposition of the manure tends to produce methane.⁴⁸ On the other hand, when manure is treated as a solid (e.g., in stacks or drylots) or deposited on a pasture or range, it tends to produce little to no methane.⁴⁹ Across the United States, the majority of managed manure is handled as a solid, producing low amounts of methane.⁵⁰ Unfortunately for the dairy industry, the general trend in manure management has seen an increase in the use of liquid systems.⁵¹ These lagoon-type systems are preferred because costs are lower compared to other systems and they are

40. INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016, *supra* note 36.

41. *Id.* at 5-3, 5-4 tbl. 5-3.

42. *Conversion of 1 MMT CO₂ to Familiar Equivalents*, CAL. AIR RES. BD. (Oct. 29, 2007), <https://www.arb.ca.gov/cc/factsheets/1mmtconversion.pdf> [<https://perma.cc/VXA2-9JDF>].

43. *Sources of Greenhouse Gas Emissions*, *supra* note 28.

44. *Overview of Greenhouse Gases*, *supra* note 7.

45. HORACIO AGUIRRE-VILLEGAS ET AL., UNIV. OF WISC. EXTENSION, METHANE EMISSIONS FROM DAIRY CATTLE 2 (2016), <https://learningstore.uwex.edu/Assets/pdfs/A4131-01.pdf> [<https://perma.cc/PHW2-T3AS>].

46. *Id.*

47. INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016, *supra* at 5-3.

48. *Id.* at 5-9.

49. *Id.*

50. *Id.* at 5-10.

51. *Id.*

able to contain larger amounts of runoff.⁵² Additionally, new regulations by the EPA aimed at land fertilization have exacerbated this problem.⁵³ These regulations have shifted manure management practices at smaller-sized dairies, “to storage and management of the manure on site.”⁵⁴

1. A Decline in Dairies Leads to Methane Concentration

The national dairy cattle population has generally been on the decline since 1990.⁵⁵ In 1970, the total number of dairy farming operations across the United States was 648,000, this drastically fell to just 40,219 in 2017.⁵⁶ During this same time period the total number of dairy cows dropped from 12 million in 1970 to 9.39 million in 2017.⁵⁷ This decline in both dairy farms and the total number of cows has led to an increase in concentrated dairy operations with the average herd size rising from a mere nineteen cows per farm in 1970 to an average of 234 cows per farm in 2018.⁵⁸ Despite the overall decline in dairy farming operations, the increase in the average herd size is an issue because cattle populations become more concentrated.

The concentration of cows on large farms known as concentrated animal feeding operations (“CAFO”) leads to a host of environmental concerns, including methane emissions. This is primarily because CAFOs raise a large number of animals in a confined area, leading to endless amounts of enteric fermentation, and a large amount of manure. Because of the large-scale operations, dairy farmers on CAFOs have found ways to make their cattle

52. Donald L. Pfost & Charles D. Fulhage, *Dairy Manure Management Systems in Missouri*, UNIV. MO. EXTENSION (Apr. 2004), <https://extension2.missouri.edu/eq301> [<https://perma.cc/C3DT-SQL6>].

53. INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016, *supra* note 36 at 5-10.

54. *Id.*

55. *Id.*

56. USDA, CHANGES IN THE SIZE AND LOCATION OF U.S. DAIRY FARMS 2, https://www.ers.usda.gov/webdocs/publications/45868/17034_err47b_1_.pdf?v=41746 [<https://perma.cc/JCX2-TA5K>]; USDA, NORTHEASTERN REGION ANNUAL MILK PRODUCTION REPORT 1 (2018), https://www.nass.usda.gov/Statistics_by_State/Maryland/Publications/News_Releases/2018/Northeast%202017%20Annual%20Milk%20Production%20Report%20.pdf [<https://perma.cc/E4KR-62MB>].

57. CHANGES IN THE SIZE AND LOCATION OF U.S. DAIRY FARMS, *supra*; USDA, MINN. AG NEWS—MILK PRODUCTION (2018), https://www.nass.usda.gov/Statistics_by_State/Minnesota/Publications/Livestock_Press_Releases/2018/MN-Milk-Production-02-18.pdf [<https://perma.cc/P38Q-57BH>].

58. CHANGES IN THE SIZE AND LOCATION OF U.S. DAIRY FARMS, *supra*; Jim Dickrell, *Licensed Dairy Farm Numbers Drop to Just Over 40,000*, MILK (Feb. 21, 2018), <https://www.milkbusiness.com/article/licensed-dairy-farm-numbers-drop-to-just-over-40000> [<https://perma.cc/FK2A-MWRH>].

much more efficient, such that there are less greenhouse gases emitted per unit of milk produced.⁵⁹ The problem arises when these large cattle populations produce huge amounts of manure that the operations manage poorly. For example, according to the EPA:

Some states have seen increases in their dairy cattle populations as the industry becomes more concentrated in certain areas of the country and the number of animals contained on each facility increases. These areas of concentration, such as California, New Mexico, and Idaho, tend to utilize more liquid-based systems to manage (flush or scrape) and store manure. Thus, the shift toward larger dairy cattle . . . facilities has translated into an increasing use of liquid manure management systems, which have higher potential CH₄ [methane] emissions than dry systems.⁶⁰

To combat this shift in manure management and subsequent increase of methane emissions, air pollution regulations have crept their way into dairies and industry in general.⁶¹

2. Methane Emissions Across the California Dairy Industry

In 2017, agriculture accounted for 8% of California's total greenhouse gas emissions, primarily from methane and nitrous oxide.⁶² The main sources of these emissions are enteric fermentation and manure management.⁶³ Dairies alone were responsible for approximately 60% of statewide agricultural emissions.⁶⁴ California is home to over 1.7 million dairy cows.⁶⁵ It is no secret that dairy cattle produce methane as part of their natural

59. Beth Gardiner, *How Growth in Dairy Is Affecting the Environment*, N.Y. TIMES (May 1, 2015), <https://www.nytimes.com/2015/05/04/business/energy-environment/how-growth-in-dairy-is-affecting-the-environment.html> [<https://perma.cc/Y5P7-MFQ5>].

60. INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016, *supra* note 36, at 5-10.

61. See Alessandro Hall, *Under New Pollution Regulations, Milk Producers Seek Profit in Dairy Air*, STAN. UNIV. (Apr. 24, 2018), <https://west.stanford.edu/news/blogs/and-the-west-blog/2018/california-methane-dairy-farms> [<https://perma.cc/6RX7-3EER>].

62. CAL. AIR RES. BD., CALIFORNIA GREENHOUSE GAS EMISSIONS FOR 2000 TO 2017 15 (2019), https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2017/ghg_inventory_trends_00-17.pdf [<https://perma.cc/H3JV-U9SN>].

63. *Id.*

64. *Id.*

65. CAL. DEP'T OF FOOD & AGRIC., CALIFORNIA DAIRY STATISTICS ANNUAL 2017 3 (2017), <https://perma.cc/WE7X-CD3X>.

digestive system. Therefore, these figures should come as no surprise considering California is the top dairy producing state.⁶⁶

II. FEDERAL REGULATION OF METHANE

A. *The Clean Air Act*

The EPA is the federal agency in charge of enforcing and regulating greenhouse gas emissions across the United States.⁶⁷ In 1963, Congress passed the first set of air pollution laws—the Clean Air Act.⁶⁸ Seven years later in 1970, Congress passed the Clean Air Act Amendments, which many consider to be the first modern air pollution regulations.⁶⁹ It was not until 2007, in the landmark case of *Massachusetts v. EPA*,⁷⁰ that the United States Supreme Court held that the federal government, including the EPA, has the authority to regulate methane and other greenhouse gases under the Clean Air Act.⁷¹

To protect public health across the nation, “the Clean Air Act requires the EPA to establish national air quality standards for certain” pervasive air pollutants.⁷² The EPA set air quality standards for the most prevalent air pollutants at the time of the Act’s passage: ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead.⁷³ The Clean Air Act also contains specific provisions to address acid rain, regional haze, and air pollution from an increased number of motor vehicles on roadways and from the expansion of industrial plants.⁷⁴ The Act mandates that new stationary sources (e.g., new power plants and factories) must use the most readily available technology to reduce their carbon footprint, while existing sources are allowed less stringent standards.⁷⁵ Congress recognized that new pollution problems

66. DAIRY CATTLE AND MILK PRODUCTION, *supra* note 1.

67. ERIC NJUKI & BORIS E. BRAVO-URETA, AGRIC. & APPLIED ECON. ASS’N, ALTERNATIVE POLICIES TO ADDRESS EMISSIONS IN U.S. DAIRY FARMING 1 (2016), http://www.choicesmagazine.org/UserFiles/file/cmsarticle_558.pdf [<https://perma.cc/Q49A-V5W6>].

68. RON SHEFFIELD, AIR QUALITY REGULATION OF ANIMAL AGRICULTURE 1 (2012), <https://articles.extension.org/sites/default/files/Regulation.pdf> [<https://perma.cc/N8CW-U346>].

69. *Id.* at 2.

70. *Massachusetts v. EPA*, 549 U.S. 497, 528 (2007).

71. NJUKI & BRAVO-URETA, *supra*.

72. *Clean Air Act Requirements and History*, U.S. EPA, <https://www.epa.gov/clean-air-act-overview/clean-air-act-requirements-and-history> [<https://perma.cc/Z7A7-788E>] (last updated Jan. 10, 2017).

73. *Id.*

74. *Id.*

75. *Id.*

would emerge after the passage of the Clean Air Act, so it drafted the Act with general authorities that can be used to address such subsequent pollution problems.⁷⁶ An example of a pollution problem that surfaced over time was the discovery of greenhouse gas emissions and their contribution to global warming.⁷⁷ It was not until recently that scientists began to discover the significant role that cattle methane production plays in climate change.⁷⁸

The Clean Air Act provides general provisions that allow it to regulate greenhouse gas emissions, but the Act is not well suited to regulate air pollution from animal agricultural activities.⁷⁹ This is mostly because the Clean Air Act focuses on controlling “major sources” that emit amounts of air pollutants that exceed the threshold levels.⁸⁰ However, because pollutant quantities emitted from dairy farms typically do not exceed the specified threshold or are not classified as a pollutant regulated under the Act, they generally are able to escape most Clean Air Act regulatory programs.⁸¹ But dairies are not completely safe from all federal environmental regulation.

B. Animal Agriculture Reporting Exemptions

At the federal level, dairies are already subject to some environmental regulation,⁸² but methane emissions from dairies are not regulated. One example of federal environmental regulation involves Concentrated Animal Feeding Operations (“CAFOs”), where livestock, including dairy cattle are kept and raised in confined situations.⁸³ The EPA requires CAFOs to apply for permits issued by a designated regulatory authority within each state.⁸⁴ Because of the concentrated nature of the facilities, there is a significant risk

76. *Id.*

77. *Id.*

78. JULIA WOLF ET AL., REVISED METHANE EMISSIONS FACTORS AND SPATIALLY DISTRIBUTED ANNUAL CARBON FLUXES FOR GLOBAL LIVESTOCK 1 (2017), <https://cbmjournals.biomedcentral.com/track/pdf/10.1186/s13021-017-0084-y> [<https://perma.cc/KZ83-ZUEV>].

79. Kyle Weldon, *Regulating What Can't Be Measured: Reviewing the Current State of Animal Agriculture's Air Emission Regulation Post-Waterkeeper Alliance v. EPA*, 19 Vt. J. Envtl. L. 246, 255 (2018).

80. CLAUDIA COPELAND, CONG. RES. SERV., RL 32948, AIR QUALITY ISSUES AND ANIMAL AGRICULTURE: A PRIMER 9 (2010), <http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32948.pdf> [<https://perma.cc/QR2E-GKBG>].

81. *Id.*

82. NJUKI & BRAVO-URETA, *supra* note 67, at 3.

83. *Id.*

84. *Id.*

of animal waste being discharged into bodies of water.⁸⁵ To prevent this type of pollution, CAFOs are regulated under the National Pollutant Discharge Elimination System (“NPDES”).⁸⁶ The Clean Water Act of 1972 created the NPDES program in an effort to protect the public health from groundwater pollution.⁸⁷

Under the NPDES program, dairy operations that maintain more than 700 dairy cows or 1000 heifers are designated as large Concentrated Animal Feeding Operations (CAFOs) and therefore must comply with NPDES rules. Under this program, all CAFOs must implement a nutrient management plan that includes provisions for: ensuring adequate manure storage capacity; proper handling of dead animals and chemicals; keeping animals out of surface water; using site-specific conservation practices; and developing ways to test manure and soil.⁸⁸

1. Greenhouse Gas Reporting Program

While these environmental regulations on livestock do not specifically address methane emissions from dairies, in 2009 the EPA implemented a strict Greenhouse Gas Reporting Program, which requires mandatory reporting of greenhouse gas emissions for animal agriculture that includes dairy cattle.⁸⁹ The reporting rule only applies to those operations that produce a certain threshold of greenhouse gas emissions.⁹⁰ While the Reporting Program does not regulate emissions, it does allow the EPA to gather large-scale emissions data to decide if future regulation is necessary.⁹¹ Only dairy farms with an average cattle head population of over 3,200 are required to report.⁹² This means only a handful of farms actually must report. For perspective, only one county in California, the top dairy producing state, averages a cattle herd population over the 3,200 cattle head threshold.⁹³ In comparison, the average number of cattle per dairy across the other counties is only 1,300 cattle.⁹⁴ Therefore, the program’s aim to collect emission

85. *Id.*

86. *Id.*

87. *Id.*

88. *Id.*

89. SHEFFIELD, *supra* note 68, at 6.

90. *Id.*

91. *Id.*

92. *Id.*

93. CALIFORNIA DAIRY STATISTICS ANNUAL 2017, *supra* note 65, at 3.

94. *Id.*

reports from livestock was amiss because it only applied to a handful of farms.

2. CERCLA and EPCRA

Two other federal environmental laws, the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”) and the Emergency Planning and Community Right-to-Know Act (“EPCRA”) “have reporting requirements that are triggered when specified” amounts of certain hazardous substances are emitted into the atmosphere.⁹⁵ Importantly for dairies, several types of hazardous substances that are emitted from cattle manure are included.⁹⁶ Under CERCLA and EPCRA, “a facility that releases a ‘reportable quantity’ of certain hazardous substances must provide notification of the release to the Nation Response Center” (for CERCLA), or state and local government agencies (for EPCRA).⁹⁷

Interestingly enough, livestock operations are exempt from reporting air emissions originating from animal waste under CERCLA and EPCRA.⁹⁸ In 2005, a group from the poultry industry petitioned the EPA to create an exemption for agricultural operations under the two Acts claiming these releases posed “little to no risk to public health, while reporting imposes an undue burden on the regulated community and government responders.”⁹⁹ A few years later in 2008, the EPA granted the exemption, claiming that “the rule is justified because of the resource burden to industry of complying with reporting requirements, since the agency cannot foresee a situation where a response action would be taken as a result of notification of releases of hazardous substances from animal waste at farms.”¹⁰⁰ Under the CERCLA exemption, the rule relieves all livestock operations from reporting hazardous substance releases from animal waste.¹⁰¹ However, under the EPCRA there is only a partial exemption.¹⁰² Although most farms are similarly exempt from reporting, the exemption does not apply to CAFOs that contain more than 1,000 head of cattle.¹⁰³

95. COPELAND, *supra* note 78, at 16.

96. *Id.*

97. *Id.*

98. *Id.* at 19.

99. *Id.* at 18.

100. *Id.* at 18–19.

101. *Id.* at 19.

102. *Id.*

103. *Id.*

The exemption for agriculture was criticized by many environmental groups, so much so that in April 2017, in the case of *Waterkeeper Alliance v. Environmental Protection Agency*, 853 F.3d 527, 537–38 (D.C. Cir. 2017), the D.C. Circuit ordered the removal of the agriculture exemption for dairy and other livestock operations from both CERCLA and EPCRA.¹⁰⁴ As a response to the D.C. Circuit decision, the EPA filed a motion in October 2017 “requesting that the court extend its stay on requiring livestock farm compliance with CERCLA and EPCRA until January 2018.”¹⁰⁵ The EPA also issued a clarification that reporting under EPCRA was still “not necessary because the air emissions are associated with routine agricultural operations, which are exempt.”¹⁰⁶ Despite the issuance of interpretation by the EPA, there has been much confusion on who should be reporting emissions and how.¹⁰⁷

Since the farm exemption rule is no longer in place, farms are legally required under CERCLA to report emissions of hazardous substances from animal waste that are above the threshold amount.¹⁰⁸ “One major problem, which was noted by the court, is that there has been no determination of how these emissions should be measured. It is unclear how farmers are expected to know whether their emissions are above reportable quantity, or how they are to measure them for reporting.”¹⁰⁹ This problem appears in California, the United States’ largest dairy producing state, as the state attempts to regulate methane emissions arising from livestock and dairy farms.¹¹⁰

104. *Waterkeeper Alliance v. EPA*, 853 F.3d 527, 537–38 (D.C. Cir. 2017). (The D.C. Circuit decision applies to the agricultural industry as a whole, not just those farms within the court’s jurisdiction.) See *EPA Releases Guidance on Reporting Air Emissions of Hazardous Substances from Animal Waste at Farms*, U.S. EPA (Oct. 26, 2017), <https://www.epa.gov/newsreleases/epa-releases-guidance-reporting-air-emissions-hazardous-substances-animal-waste-farms> [<https://perma.cc/H6Y5-Y59S>].

105. Nat’l Milk Producers Fed’n, *NMPF Endorses New Legislation on Air Emissions Reporting Requirement*, DAIRY HERD MGMT. (Feb. 13, 2018, 8:24 PM), <https://www.dairyherd.com/article/nmpf-endorses-new-legislation-air-emissions-reporting-requirement> [<https://perma.cc/6SJ6-PK64>].

106. *Id.*

107. Tiffany Dowell, *DC Circuit Court: Farms Must Report Air Emissions, Exemption Unlawful*, TEX. A&M AGRILIFE EXTENSION (May 1, 2017), <https://agrillife.org/texasaglaw/2017/05/01/waterkeepers-case> [<https://perma.cc/BY9W-PVKF>].

108. *Id.*

109. *Id.*

110. See Bloomberg View, *California is smart to regulate cow farts*, THE TRIBUNE (last updated Dec. 4, 2017, 3:08 PM), <https://www.sanluisobispo.com/opinion/editorials/article187975784.html> [<https://perma.cc/8E8B-ZEX4>].

III. CALIFORNIA REGULATION OF METHANE

A. California Global Warming Solutions Act of 2006

In 2006, the California Legislature passed the California Global Warming Solutions Act in a widespread effort to combat climate change. The Act requires the state to reduce its greenhouse gas emissions to the levels recorded in 1990 by the year 2020.¹¹¹ The reduction would be accomplished through enforcement of a statewide cap on greenhouse gas emissions based on the 1990 emissions levels.¹¹² In order to implement the cap, the California Air Resources Board (“CARB”) was required to adopt regulations to achieve “technologically feasible and cost-effective greenhouse gas emission reductions.”¹¹³ This included establishing a mandatory reporting system to track compliance with greenhouse gas emission limits.¹¹⁴ According to the CARB, the Act was “the first program in the country to take a comprehensive, long-term approach to addressing climate change.”¹¹⁵

B. California Senate Bill 1383

In September 2016, California Governor Jerry Brown signed into law Senate Bill 1383 as a response to the reduction goals set out in the California Global Warming Solutions Act of 2006.¹¹⁶ Similar to the prior legislation, Senate Bill 1383 had a goal of “establishing methane emissions reduction targets in a statewide effort to reduce emissions of short-lived climate pollutants in various sectors of California’s economy.”¹¹⁷ The CARB was the designated agency responsible for monitoring and regulating sources of greenhouse gas emissions by the California Global Warming Solutions Act of 2006.¹¹⁸ The bill required the board to begin implementing the comprehensive strategy to eliminate short-lived climate pollutants that was

111. *Assembly Bill 32 Overview*, CAL. AIR RES. BD., <https://www.arb.ca.gov/cc/ab32/ab32.htm> [<https://perma.cc/Y78P-ZJHQ>] (last reviewed Aug. 5, 2014).

112. *Assemb. 32, 2006 Leg., 2005-2006 Sess. (Cal. 2006)*.

113. *Id.*

114. *Id.*

115. *Assembly Bill 32 Overview, supra*.

116. S.B. 1383, *supra* note 9.

117. *Short-Lived Climate Pollutants (SLCP): Organic Waste Methane Emissions Reductions*, CALRECYCLE, <https://www.calrecycle.ca.gov/climate/slcp> [<https://perma.cc/MV8N-PV6X>] (last updated Apr. 16, 2019).

118. S.B. 1383, *supra*.

developed under a prior bill no later than January 1, 2018.¹¹⁹ The goal of Senate Bill 1383 is to reduce statewide methane emissions by 40% by the year 2030.¹²⁰

Senate Bill 1383 directs reduction efforts at one California industry in particular—dairies. According to the bill, “[t]he state board, in consultation with the [D]epartment [of Food and Agriculture], shall adopt regulations to reduce methane emissions from livestock manure management operations and dairy manure management operations . . . by up to 40 percent below the dairy sector’s and livestock sector’s 2013 levels by 2030.”¹²¹ The bill requires that 75% of such reductions come solely from dairy operations within the state.¹²² Under Senate Bill 1383, the regulations would not take effect until on or after January 1, 2024.¹²³

According to the bill, CARB is required to take certain actions prior to adopting regulations to ensure that the best available strategy for farmers and the environment is implemented. The bill requires CARB to work with a broad range of stakeholders (including dairy representatives, government permitting agencies, and environmental stakeholders) “to identify and address technical, market, regulatory, and other challenges and barriers to the development of dairy methane emissions reduction projects.”¹²⁴ The regulations shall only be adopted if the CARB determines the regulations are technologically feasible as well as economically feasible considering milk and live cattle prices in addition to the commitment of state, federal, and private funding.¹²⁵ Regarding dairy emissions, the bill specifically states that:

Enteric emissions reductions shall be achieved only through incentive-based mechanisms until the state board, in consultation with the department, determines that a cost-effective, considering the impact on animal productivity, and scientifically proven method of reducing enteric emissions is available and that adoption of the enteric emissions reduction

119. *Id.*

120. *Id.*

121. *Id.*

122. Georgina Gustin, *In California's Methane-Reduction Crosshairs, Dairy Industry Faces Regulation for the First Time*, INSIDE CLIMATE NEWS (Oct. 25, 2016), <https://insideclimatenews.org/news/24102016/methane-gas-global-warming-climate-change-california-dairy-industry-regulation-first-time-jerry-brown> [<https://perma.cc/Y5AA-Y2PG>].

123. S.B. 1383, *supra* note 9.

124. *Id.*

125. *Id.*

method would not damage animal health, public health, or consumer acceptance.¹²⁶

In March 2017, CARB adopted its Short-Lived Climate Pollutant Reduction Strategy (“SLCP Plan”), which outlined future steps for implementing Senate Bill 1383.¹²⁷ The SLCP Plan states, “the State will work to support improved manure management practices through financial incentives, collaboration to overcome barriers, and other market support.”¹²⁸ Pursuant to the bill, CARB, together with a broad range of stakeholders, convened the Dairy and Livestock Greenhouse Gas Reduction Working Group in May 2017.¹²⁹ At the meeting, three subgroups were formed “to develop policy recommendations in specific areas: Fostering Markets for Non-Digester Projects (Subgroup #1); Fostering Markets for Digester Projects (Subgroup #2); and Research Needs, Including Enteric Fermentation (Subgroup #3).”¹³⁰ These groups consisted of representatives from the dairy industry, academia, conservation groups, the technology and fabrication industry, and local, state, and federal agencies.¹³¹ The groups met regularly to develop recommendations that were presented to the state agencies at the final Working Group meeting on December 3, 2018.¹³² While this working group is a step forward in implementing the bill, “[a]chieving the dairy methane reductions called for in the SLCP Plan, without dislocation of California’s dairy farm families and the tens of thousands of jobs they create, will require careful planning and effective and timely collaboration.”¹³³

126. *Id.*

127. CAL. EPA, CAL. AIR RES. BD., SHORT-LIVED CLIMATE POLLUTANT REDUCTION STRATEGY 67 (2017), https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf [<https://perma.cc/8HTA-U3P7>].

128. *Id.*

129. *Final Dairy and Livestock Greenhouse Gas Reduction Working Group Meeting Scheduled*, CAL. AIR RES. BD. (Oct. 8, 2018, 12:46 PM), <https://content.govdelivery.com/accounts/CARB/bulletins/21223cd> [<https://perma.cc/2A2U-YH9M>].

130. *Id.*

131. *See Recommendations to the State of California’s Dairy and Livestock Greenhouse Gas Reduction Working Group*, California Air Resources Board 4, 15, 26 (Nov. 26, 2018), https://arb.ca.gov/cc/dairy/dairy_subgroup_recommendations_to_wg_11-26-18.pdf [<https://perma.cc/3MPN-R67L>].

132. *Id.* at 3.

133. *Implementing California’s New Dairy Methane Reduction Efforts*, DAIRY CARES (Apr. 2017) <https://www.dairycares.com/dairymethanereduction> [<https://perma.cc/6TBU-UFRC>].

C. Senate Bill 1383 Hurts More Than It Helps

California's effort to regulate methane from dairy cattle has turned the state into a laughing stock across the nation.¹³⁴ In fact, this regulation has been described as “an irrational tipping point – even for California.”¹³⁵ Although California Senate Bill 1383 is generally supported by environmental activists, dairy farmers have a far different perspective on the law.¹³⁶ Many California dairymen view the law as just another form of governmental overreach by their state representatives.¹³⁷

Senate Bill 1383 was targeted the dairy industry in particular because the author of the bill claims “that dairies have ‘failed to reduce [methane] emissions voluntarily.’”¹³⁸ However, that simply is not true. “Since the end of World War II, dairy farmers in California and the rest of the nation have reduced the overall carbon ‘hoofprint’ of a glass of milk by 63 percent.”¹³⁹ The challenge of reducing methane emissions could reshape the 1,300 dairy farms¹⁴⁰ that comprise the California industry. For example, an environmental regulatory regime seeking to impose a limit on the emissions of GHGs could impose a cap on such pollutants or levy a monetary cost on emissions. The regulation of GHGs from dairy operations would result in two major tradeoffs: (1) farmers subject to the regulation may be forced to adjust their production of milk downwards in order to reduce emissions below some predetermined threshold; or (2) farmers may be required to incur additional costs of cleanup through fines, penalties or mandated installation of anaerobic digesters.¹⁴¹

134. See Thomas Del Beccaro, *How California Regulations Are Polluting The World*, FORBES (Mar. 8, 2017, 12:59 PM), <https://www.forbes.com/sites/thomasdelbeccaro/2017/03/08/how-california-regulations-are-polluting-the-world/#3047cd0a22fd> [<https://perma.cc/63M5-L5UX>].

135. *Id.*

136. See Carol Ryan Dumas, *California Dairy Industry Fights ‘Unachievable’ Methane Mandate*, CAPITAL PRESS (Aug. 30, 2016), https://www.capitalpress.com/state/california/california-dairy-industry-fights-unachievable-methane-mandate/article_566e7fe3-8573-5b2c-8034-a9c184a342e2.html [<https://perma.cc/62PB-LVR8>].

137. *Id.*

138. Chuck Alhem, *California Dairies are Committed to Sustainability*, THE FRESNO BEE (Mar. 30, 2016, 7:25 AM), <https://www.fresnobee.com/opinion/opn-columns-blogs/article69034567.html> [<https://perma.cc/56YR-PEEU>].

139. *Id.*

140. CALIFORNIA DAIRY STATISTICS ANNUAL 2017, *supra* note 65, at 3.

141. NJUKI AND BRAVO-URETA, *supra* note 67, at 3.

1. California: The Nation's Dairy Queen

Dairy is one of America's most important industries, accounting for over \$5.3 billion in annual U.S. exports.¹⁴² In 2017, the United States had over nine million cows across the nation.¹⁴³ According to the United States Department of Agriculture, this is spread amongst only 40,219 dairy farms, compared to nearly 650,000 dairies in 1970.¹⁴⁴ Although the number of dairy farms has declined drastically, "cows are producing more milk than ever," as cows are consolidated on larger conventional farms.¹⁴⁵ "In 1987, half of American dairy farms had 80 or fewer cows; by 2012, that figure had risen to 900 cows."¹⁴⁶

As the number one dairy state, California produces approximately 20% of the nation's milk¹⁴⁷ across 1,331 dairies.¹⁴⁸ Despite being the top milk producing state in the United States, the California dairy industry has been on the decline.¹⁴⁹ Almost 600 dairies have closed in the last decade.¹⁵⁰ Smaller dairies are consolidating into larger operations and some are even shutting down completely or moving out of state.¹⁵¹ "For California in 2017, compared to the previous year, total milk production was down 1.7 percent, the number of dairy cows declined 0.2 percent, milk per cow dropped 1.5 percent, and the number of dairies decreased by 4.4 percent."¹⁵²

142. *2017 U.S. Dairy Trade and Processing*, PROGRESSIVEDAIRYMAN, <https://www.progressivepublish.com/downloads/2018/general/2017-pd-stats-lowres.pdf> [<https://perma.cc/36GR-4N7D>].

143. *Id.*, under *2017 U.S. Dairy Statistics*.

144. Phil McCausland, *Best advice to U.S. dairy farmers? 'Sell Out as Fast as You Can'*, NBC NEWS (last updated June 30, 2018, 9:59 AM), <https://www.nbcnews.com/news/us-news/best-advice-u-s-dairy-farmers-sell-out-fast-you-n887941> [<https://perma.cc/9WVZ-G3L9>].

145. *Id.*

146. *Id.*

147. *Real California Milk Facts*, CAL. MILK ADVISORY BD., http://www.californiadairyroom.com/sites/default/files/Fact_Sheets_Milk_May2018.pdf [<https://perma.cc/ND9V-QQPA>] (last updated May 2018).

148. CALIFORNIA DAIRY STATISTICS ANNUAL 2017, *supra* note 65, at 3.

149. *Id.* at 1.

150. Paul Sousa & Michael Boccadoro, *Manure Methane Emission Reductions*, DAIRY CARES, https://arb.ca.gov/cc/dairy/documents/mainwkickoff/dairy_sector_presentation.pdf [<https://perma.cc/7SKG-92WW>].

151. *California Continues to Lose Dairies*, DAIRY CARES (Mar. 2017), <https://www.dairycares.com/dairyfarmdecline> [<https://perma.cc/V3HL-C24N>].

152. CALIFORNIA DAIRY STATISTICS ANNUAL 2017, *supra* at 1.

Why is the industry seeing a drop in its numbers? There are a number of reasons why maintaining dairy operations in California has become so challenging. First, 99% of these dairies are family owned and operated.¹⁵³ Second, the substantially high labor costs, energy costs and regulations make it increasingly difficult for these family farms to keep up financially.¹⁵⁴ Lastly, dairymen are also constantly competing with animal activist groups, fluctuating milk prices, plant-based milk substitutes such as almond milk or soy milk, and the never-ending legislation over water rights.¹⁵⁵

2. Senate Bill 1383's Potential Effects on California Dairies

The biggest issue that Senate Bill 1383 poses is the excessive cost on farmers who are already struggling in the dairy industry.¹⁵⁶ Dairymen “say the new law, along with the money and necessary equipment needed to comply with it, could deal the industry a fatal blow as it already struggles with low milk prices, rising labor costs, and drought.”¹⁵⁷

Notably, Senate Bill 1383 does provide some safeguards for California dairymen by stating that regulations should only be implemented if they are cost effective.¹⁵⁸ In fact, lawmakers have already set aside \$50 million to provide for methane digesters.¹⁵⁹ Digesters are machines that capture the gases released through manure and convert them into renewable energy to produce electricity, heat or hot water.¹⁶⁰ However, \$50 million does not even come close to funding needed to meet the target emission reductions. \$50 million would only buy about eighteen to twenty-two digesters.¹⁶¹ California

153. Dairy Cares Newsletter, *More with Less: A Way of Life for California Dairies*, CAL. DAIRY RES. FOUND. (Mar. 1, 2017), <http://cdrf.org/2017/03/01/less-way-life-california-dairies/> [<https://perma.cc/2RVA-ZXNR>].

154. *California Continues to Lose Dairies*, *supra* note 151.

155. Hall, *supra* note 61.

156. Kurtis Alexander, *Climate Fight Targeting Cows May Reshape California Dairies*, S.F. CHRONICLE (last updated Sept. 29, 2017, 8:17 PM), <https://www.sfchronicle.com/bayarea/article/Climate-fight-targeting-cows-may-reshape-9401293.php> [<https://perma.cc/RC3M-PYZE>].

157. *Id.*

158. S.B. 1383, *supra* note 9.

159. Adam Ashton, *California's Dairy Industry Knows How to Cut its Greenhouse Gas Emissions, but Can it Afford to?*, SACRAMENTO BEE (Sep. 17, 2016, 4:00 AM), <https://www.sacbee.com/news/local/environment/article101657322.html>.

160. 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, 367 (2011).

161. Ashton, *supra*.

dairy farmers submitted funding requests that total \$143,079,566—almost three times the Department of Food and Agriculture’s allotted funding.¹⁶²

Methane digesters, while seen as a possible solution to reducing emissions, pose their own disadvantages. As described above, methane digesters are expensive. It may be financially feasible for large dairy operations to purchase these costly digesters, but without more government funding, smaller farms cannot afford them.

Second, slashing methane emissions by improving manure management through expensive digesters seems counterintuitive. The majority of methane emissions produced from dairies stems from enteric fermentation, rather than from the manure.¹⁶³ The problem is that digesters only affect manure management, not enteric fermentation, leaving the largest contributor to methane emissions unaddressed.¹⁶⁴

Third, implementing digesters failed in the past, which leaves dairy farmers skeptical about their substantial investment if the regulation is subject to change when the equipment is unsuccessful.¹⁶⁵ Senator Cathleen Galgiani acknowledged the skepticism in her comments to the California Senate: “We tried to incentivize dairy digesters back in around 2007, 8, and 9. [T]hey were successful in the beginning but then we had problems with local air districts where they determined that the generators that were connected with the digesters emitted NOx and therefore, they didn't meet local requirements.”¹⁶⁶ If methane digesters were previously unsuccessful, farmers are reluctant to invest in such expensive, unreliable machines.

SB 1383 could hurt farmers by changing cattle diets. Research is being conducted on implementing new feed or supplements to reduce methane associated with enteric fermentation.¹⁶⁷ The problem is that new feed could

162. *2018 Dairy Digester Research & Development Program*, CAL. DEPT. FOOD & AGRIC. 8, https://www.cdfa.ca.gov/oefi/ddrdp/docs/2018_DDRDP_Applicants.pdf [<https://perma.cc/TXY7-LSDC>].

163. Di Camillo, *supra* note 160, at 378.

164. *Id.* at 378–79.

165. Hall, *supra* note 61.

166. California Senate Floor Session 5:50 (June 1, 2016), <https://www.senate.ca.gov/media/senate-floor-session-352/video> [<https://perma.cc/AF4P-TPDQ>].

167. *See* Nelson, *supra* note 14.

be expensive, and there is also not enough research on the long-term effects of the change in diet.¹⁶⁸

While some larger dairy operations were a step ahead of Senate Bill 1383 and began implementing ways to convert greenhouse gases into energy, smaller farms were already fighting to keep up in an overregulated and struggling industry.¹⁶⁹ “From air and water quality rules to reporting odometer readings on farm vehicles, regulations make it difficult for farmers to do business in California.”¹⁷⁰ Other obstacles for dairymen include groundwater extraction limitations, scarce labor and increasing state minimum wage, encroaching urban development driving up land prices, and the Trump Administration’s war on trade which has led to tariffs that have pushed dairy prices down.¹⁷¹ The chief executive of the Western Union Dairymen refers to California as a “regulatory nightmare for farmers.”¹⁷² Unless they receive adequate funding for methane digesters, smaller family farms will be forced to close up shop or move out of state.¹⁷³ In fact, the number of California dairies has dropped by more than 500 in the last decade.¹⁷⁴ Many of these dairies have moved to other states because of enticing simpler regulations, promises of lower costs, and an abundance of cheap real estate.¹⁷⁵ For example, Texas’s dairy cattle population has increased from 17,000 in 2000 to over 200,000 in 2010.¹⁷⁶

The heart of the issue is that no dairy farm is exactly the same. California dairy operations vary greatly in size, manure handling practices, and location. What works for northern dairies may be entirely different from what works for dairies in the Central Valley. There is “no silver bullet” to reducing

168. *Id*; Gosia Wozniacka, *Can We Grow Enough Seaweed to Help Cows Fight Climate Change?* CIVIL EATS (Jun. 3, 2019), <https://civileats.com/2019/06/03/can-we-grow-enough-seaweed-to-help-cows-fight-climate-change/> [<https://perma.cc/FE82-MX4Q>].

169. See Kurtis Alexander, *supra* note 156.

170. Michael J. Crumb, *States Woo Calif. Dairymen With Less Regulation*, SAN DIEGO UNION-TRIBUNE (Apr. 11, 2010, 11:49 PM), <http://www.sandiegouniontribune.com/sdut-states-woo-calif-dairymen-with-less-regulation-2010apr11-story.html> [<https://perma.cc/9DX3-S65P>].

171. Michael Hiltzik, *California's Dairy Farmers were Struggling to Regain Profitability. Then Came the Trade Wars*, L.A. TIMES (Oct. 26, 2018, 10:35 AM), <https://www.latimes.com/business/hiltzik/la-fi-hiltzik-caltrump-dairy-20181026-story.html> [<https://perma.cc/PT8J-TG3M>].

172. Crumb, *supra*.

173. See *id*.

174. *Id*.

175. *Id*.

176. *Id*.

methane emissions because of the diversity of dairy operations.¹⁷⁷ As a result, the California dairy industry will need an array of specialized solutions.

3. Senate Bill 1383's Potential National Effects

Although Senate Bill 1383 only applies to California dairies, its effects will likely be felt across the country. Since California produces one fifth of the nation's milk,¹⁷⁸ consumers in all states will likely see milk prices increase because higher prices for the farmer get passed down to the consumer.¹⁷⁹ If the price of milk increases, there may be a shift to non-dairy milk products, such as almond milk, but this transition poses its own problems. Producing plant-based milk products cause their own environmental harm. For example, almonds are one of the most water-intensive crops, taking "15 gallons of water to produce just 16 almonds."¹⁸⁰ Additionally, a shift to almond milk would be unsustainable because almond trees are very temperamental, requiring certain soil and climate conditions that are only available in limited areas of the country.¹⁸¹ Further, if dairies go under, then many other industries will also be affected. The farmers who produce cattle feed, the middlemen who package and pasteurize the milk, and the trucking businesses that transport the milk to stores will all be in jeopardy.

Another nationwide consequence of Senate Bill 1383 is resource shuffling. Resource shuffling occurs when state policy initiates emission reductions in one area, while it increases emissions elsewhere.¹⁸² These contrasting effects create the false impression that the state policy is achieving net emission reductions from the atmosphere.¹⁸³

177. Sousa & Boccadoro, *supra* note 150.

178. *Dairy Commodity Fact Sheet*, HILMAR CHEESE 1 (2017), <https://www.hilmarcheese.com/wp-content/uploads/2017/06/AgintheClassroomDairyFactSheet.pdf> [<https://perma.cc/966G-URBV>].

179. See Kenneth Artz, *New California Methane Regulations Expected to Raise Meat and Dairy Prices*, HEARTLAND INST. (Nov. 11, 2016), <https://www.heartland.org/news-opinion/news/new-california-methane-regulations-expected-to-raise-meat-and-dairy-prices> [<https://perma.cc/D3QA-2QWE>].

180. Deborah Fleischer, *Almond Milk is Taking a Toll on the Environment*, UNIV. CAL. S.F. (Jan. 2018), <https://sustainability.ucsf.edu/3.713> [<https://perma.cc/JLC6-6GQ7>].

181. *California's Mediterranean Climate*, CAL. ALMONDS: BLOG (June 11, 2015), <http://www.almonds.com/blog/orchard/california%E2%80%99s-mediterranean-climate> [<https://perma.cc/3DQA-CEZA>].

182. Danny Cullenward, *Leakage in California's Carbon Market*, 27 ELEC. J. 36, 37 (2014).

183. *Id.*

To illustrate, California policies triggered resource shuffling in California’s carbon market. California is the only western state to price greenhouse gas emissions, so California companies are incentivized to transfer their high-emitting activities outside the state and replace them with cleaner ones.¹⁸⁴ For instance, Southern California Edison (“SCE”) imported its electricity for years from a coal-fired facility in New Mexico.¹⁸⁵ However, in 2013 when California initiated its carbon market, SCE sold its interests to an Arizona utility.¹⁸⁶ Since coal produces the highest greenhouse gas emissions, whatever replacement SCE selects will be cleaner than coal, and thus, SCE will report a reduction in emissions.¹⁸⁷ Although this transaction will reduce reported emissions in California, it “will not reduce net greenhouse gas emissions to the atmosphere.”¹⁸⁸ The coal facility will continue to produce the same amount of pollution as before, the only difference being that it serves Arizona customers, not California.¹⁸⁹

Similar to the resource shuffling in the California carbon market, Senate Bill 1383 will likely shuffle dairy methane emissions across state lines. To avoid the increased regulation costs, some California dairymen are simply closing their doors and moving their dairies out-of-state.¹⁹⁰ California continues to lose cows to other states where feed and labor are cheaper and water is abundant.¹⁹¹ In fact, from 2010 to 2017 California lost 100,000 dairy cattle, whereas Iowa, Kansas, Nebraska and South Dakota collectively gained approximately 100,000 cattle head.¹⁹² Dairy cattle leaving California will inevitably result in reduced methane emissions across the state, which is the goal of Senate Bill 1383. The issue is that these methane emissions are still being released into the atmosphere, just in a different state. Therefore, Senate

184. *Id.*

185. Danny Cullenward, *How California’s Carbon Market Actually Works*, 70 BULLETIN OF ATOMIC SCIENTISTS 35, 35 (2014), <https://journals.sagepub.com/doi/pdf/10.1177/0096340214546834?download=true> [<https://perma.cc/SSP7-3G3H>].

186. *Id.*

187. *Id.*

188. *Id.*

189. *Id.*

190. *See States Dangle Water to Tempt California Dairy Farmers*, NBC NEWS (Feb. 10, 2015, 12:44 PM), <https://www.nbcnews.com/business/economy/states-dangle-water-tempt-california-dairy-farmers-n303806> [<https://perma.cc/FGT8-P7R7>].

191. *Id.*

192. Justin Fox, *Devin Nunes Isn’t the Only Dairy Farmer Souring On California*, BLOOMBERG (Oct. 4, 2018), <https://www.bnbloomberg.ca/devin-nunes-isn-t-the-only-dairy-farmer-souring-on-california-1.1147610> [<https://perma.cc/WQ4B-7LPV>]; USDA, MINN. AG. NEWS—MILK PRODUCTION (2018), *supra* note 57.

Bill 1383 ultimately results in resource shuffling of methane emissions through a scheme that does not reflect actual climate benefits.

D. Possible Solutions for Regulating Dairy Methane Emissions

Under the Clean Air Act, the EPA could regulate methane emissions from dairies. If all dairies were placed under federal regulation, then dairies nationwide would be subject to the same regulations. This would help even the playing field since Senate Bill 1383 puts California dairies at a disadvantage. However, federal regulation targeting dairy methane emissions could be a daunting task especially since the dairy industry is concentrated in only a handful of states.¹⁹³ Furthermore, local dairymen likely do not want legislators from other states telling them how to run their farm practices. Emissions from California dairies are a large percentage of the state's total methane emissions, so those emissions need to be regulated to a certain extent. If California wants to fund digesters, so be it, but the state cannot expect small family farms to pay for these expensive machines.

1. Incentive-Based System

A more effective method for reducing dairy methane emissions is an incentive-based system. This type of system would likely be more appealing to dairymen because they can decide whether to participate. Giving dairy farmers an option would help alleviate the fear of government overregulation. For example, instead of mandating dairies to purchase expensive methane digesters, California could offer incentives for those who do. The California grant program, Dairy Power Production Program (“DPPP”),¹⁹⁴ provides a great framework for a potential incentive-based system. In the early 2000s, DPPP provided dairy farmers with funding for digesters and also paid the farmers 5.7¢ per kilowatt-hour (kWh) of generated electricity over a maximum period of five years.¹⁹⁵ A case study of one Northern California dairy illustrates the positive results of the program.¹⁹⁶

193. See USDA, MILK PRODUCTION, DISPOSITION, AND INCOME, 2017 SUMMARY 6 (Apr. 2018), <https://downloads.usda.library.cornell.edu/usda-esmis/files/4b29b5974/4j03d209m/qr46r324g/MilkProdDi-04-26-2018.pdf> [<https://perma.cc/SQ2H-U4LG>] (Approximately 50% of the U.S. dairy industry is concentrated in only 5 states: California, Wisconsin, Idaho, New York, and Michigan.).

194. See Deanne M. Camara Ferreira, Note, *Global Warming and Agribusiness: Could Methane Gas from Dairy Cows Spark the Next California Gold Rush?*, 15 WIDENER L. REV. 541, 553 (2010).

195. *Id.* at 554.

196. *Id.*

According to the DPPP report, a Northern California dairy had 245 cows and installed a digester that generated and consumed on-site electricity.¹⁹⁷ Prior to installation, the dairy farm's electricity usage was 20,375 kWh/month (kilowatt hours/month).¹⁹⁸ After installation, the digester produced an average of 21,066 kWh/month.¹⁹⁹ Thus, the digester completely offset the dairy's electricity demand with an estimated savings of \$18,275 a year, and produced electricity excess.²⁰⁰ Excess electricity was then banked for credit through an incentive called net metering.²⁰¹ Net metering allows for the banked credits to be deducted from future electricity charges.²⁰² Both the on-farm electricity offset and the net metering provide farmers with great cost-saving incentives to install methane digesters on their dairies.

However, the biggest obstacle to implementing methane digesters is the cost.²⁰³ The DPPP report indicated that one of the largest revenue streams for methane digester projects comes from power purchase agreements.²⁰⁴ These agreements allow farmers to sell excess generated electricity back to the utility company.²⁰⁵ In California, this was not a viable option under DPPP due to utility deregulation and utility company reluctance to support distributed generation.²⁰⁶ However, utility companies seem to be discussing the implementation of power purchase agreement.²⁰⁷ These agreements are vital because it can provide some financial relief to farmers bearing the up-front costs of installation and maintenance of methane digester equipment.²⁰⁸

Digester manure management could result in reduced methane emissions for California.²⁰⁹ This will only happen if lawmakers offer support for

197. *Id.*

198. W. UNITED RES. DEV., INC., DAIRY POWER PRODUCTION PROGRAM: DAIRY METHANE DIGESTER SYSTEM PROGRAM EVALUATION REPORT 24 (2009), <https://www.energy.ca.gov/2009publications/CEC-500-2009-009/CEC-500-2009-009.PDF> [<https://perma.cc/7WFR-75LE>].

199. *Id.*

200. *Id.* at 24–25.

201. Ferreira, *supra* note 194 at 554–555.

202. *Id.*

203. *Id.*; W. UNITED RES. DEV., INC., *supra* at 6.

204. *See* W. UNITED RES. DEV., INC., *supra* at 115.

205. *Id.* at 7.

206. *Id.* at 115.

207. *Id.* at 115–116; *see* Kasey Krifka, *California Dairy Digester Helping to Balance the Grid*, CLIMATE TRUST (Mar. 7, 2016), <https://climatetrust.org/california-dairy-digester-helping-to-balance-the-grid/> [<https://perma.cc/6JA5-QC5E>].

208. Ferreira, *supra* at 553.

209. *Id.*

incentive programs and policies. Although Senate Bill 1383 has set aside funding for the purchase of digesters, it is insufficient to address the industry's needs. To reduce methane, California will need an incentive-based system, like the DPPP, along with purchase power agreements. Perhaps the only way for California to achieve its target greenhouse gas reduction through methane emissions, while preserving its dairy industry, is to incentivize dairies to want to do the same.

2. Cap-and-Trade System

California could also utilize a cap-and-trade system to address dairy methane emissions. Currently, California has a carbon dioxide cap-and-trade program for large industrial facilities, electricity suppliers, and fuel distributors.²¹⁰ Under this program, a percentage of an entity's reduction obligation can be met using external offsets, including manure management projects.²¹¹ Although these projects could already be helping reduce dairy methane emissions, they are voluntary, and one of many other approved offsets.²¹² A new system modeled after the existing programs and aimed at methane rather than carbon dioxide, would be more appropriate and sustainable for dairies.

In California's current California cap-and-trade program, carbon dioxide tons are traded and all emissions of greenhouse gases are fungible once translated to carbon dioxide.²¹³ Unlike California's current program that considers all types of emissions from all sectors, the system proposed above is for a single gas in a single sector. A cap-and-trade system works by setting a cap, or percentage, of total methane emissions that can be emitted by a particular industry.²¹⁴ This cap gets stricter over time, hence a reduction in emissions.²¹⁵ The total amount of the cap gets split into allowances, which allows each dairy to emit a certain amount of methane.²¹⁶ The trade part is a market where dairies that reduce their emissions faster can sell their

210. DAVID R. WOOLEY & ELIZABETH MORSS, CLEAN AIR ACT HANDBOOK § 10:22 (2019).

211. *Id.*

212. *Id.*

213. *See Cap and Trade FAQs*, DUKE UNIV., <https://nicholasinstitute.duke.edu/focal-areas/cap-and-trade/cap-and-trade-faqs> [<https://perma.cc/A849-VPUM>].

214. WOOLEY & MORSS, *supra*.

215. *Id.*

216. *See How Cap and Trade Works*, ENVTL. DEF. FUND, <https://www.edf.org/climate/how-cap-and-trade-works> [<https://perma.cc/GXJ4-AMS9>].

allowances to dairies that pollute more.²¹⁷ This gives dairies flexibility in how they reduce emissions and incentivizes them to cut their pollution quicker. In order for this system to be successful, a method of measuring the baseline and the change is necessary.

Efforts to reduce methane emissions through a cap-and-trade program should focus on larger dairies for three reasons. First, a significant portion of dairy methane comes from larger, more concentrated dairies.²¹⁸ Second, these larger farms either already have digesters²¹⁹ or they have the financial resources to pay for digesters to reduce their emission output. Third, to protect its dairy industry, California needs to ensure small dairies do not leave the state or get priced out of the market. A cap-and-trade program could also ensure that small farms are protected while still reducing methane emissions.

For this system to be successful, a cap must be set based on current emission outputs across the California dairy industry. An allowance based on current practices would be given to small dairy farms. A dairy farm is considered a “small farm” if it has less than 500 cows.²²⁰ An allowance of 20-30% less would be given to larger dairies. These larger dairies could buy allowances from the smaller dairies that retire their production or implement mechanisms to reduce pollution. Other options include purchasing methane digesters or implementing best practices to reduce emissions output. It is important that these initial allowances be realistic and gradually decrease over time, so as not to push dairies out of state, or significantly increase prices for consumers. This type of system would ensure a decrease in overall methane emissions while protecting small dairies from going out of business—the current fear of Senate Bill 1383.

CONCLUSION

Senate Bill 1383 is a bold step for California in its fight against climate change. It is the first response across the nation to specifically target dairies’ methane emissions. While the reduction in emissions is important, an attack on an already struggling dairy industry is likely not the best move for California. A more balanced approach to further California’s abatement goals

217. *Id.*

218. *See* U.S. EPA, *supra* note 33, at 5-10.

219. *See* CAL. DEP’T OF FOOD & AGRIC. DAIRY DIGESTER RES. AND DEV. PROGRAM, REPORT OF FUNDED PROJECTS (2015-2017) 10-12 (2018), https://www.cdfa.ca.gov/oefi/ddrdp/docs/DDRDP_Report_February2018.pdf [<https://perma.cc/63VQ-DHJT>].

220. USDA, *supra* note 53, at 3.

is to incentivize farmers to reduce emissions on their own accord. Although Senate Bill 1383 will not take effect until 2024, lawmakers should think fast as California dairies continue to leave the state in hopes of greener pastures and less regulation elsewhere.