

A R T I C L E S

# Is Meat the New Tobacco? Regulating Food Demand in the Age of Climate Change

Lingxi Chenyang

Lingxi Chenyang is a J.D. candidate at Yale Law School and Ph.D. candidate in Philosophy at the University of Michigan.

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## Summary

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Switching from a meat-heavy to a plant-based diet is one of the highest-impact lifestyle changes for climate mitigation and adaptation. However, conventional demand-side energy policy has focused on increasing consumption of efficient machines and fuels. Regulating food demand has key advantages. First, food consumption is biologically constrained, thus switching to more efficient foods avoids unintended consequences of switching to more efficient machines, like higher overall energy consumption. Second, food consumption, like smoking, is primed for norm-shifting because it occurs in socially conspicuous environments. Indeed, while place-based bans and information regulation were essential in lowering the prevalence of smoking, the same strategies may be even more effective in reducing meat demand. Several policy reforms can be implemented at the federal level, from reform of food marketing schemes to publicly subsidized meal programs.

We do need to do all those legal regulations you are proposing, but if we really want to clean up the environment, we are also going to need to make lifestyle changes.

—Richard Nixon, to top EPA and CEQ officials, 1971<sup>1</sup>

At the 2018 conference of the United Nations (U.N.) Framework Convention on Climate Change in Katowice, Poland, delegates dined on beef with smoked bacon, dumplings with fried pork and beef, and cheeseburgers.<sup>2</sup> Had all 22,000 delegates chosen meat-based dishes, the 12-day conference would have spent the carbon equivalent of flying 5,200 people from New York to Los Angeles.

Fifty years prior, Dr. Paul Kotin, director of the Environmental Health Sciences Division at the National Institutes of Health, was testifying in the U.S. Congress about the health hazards of cigarettes when a senator interrupted, “Is it going to prejudice anybody if I smoke my pipe?” Dr. Kotin replied: “I trust it won’t prejudice anybody any more than my smoking my pipe will.”<sup>3</sup>

Addressing large-scale social problems like tobacco and climate change requires institutional and individual transformation. According to the latest Intergovernmental Panel on Climate Change (IPCC) report, “aggressive policies” are necessary to limit global warming to 1.5 degrees Celsius (°C) to avoid catastrophic harm on natural and human systems.<sup>4</sup> But lowering consumer demand for greenhouse gas (GHG)- and energy-intensive goods like food will be a “key element” of preventing global temperatures from reaching an ethically unacceptable level.<sup>5</sup> Switching from a meat-heavy to a plant-based diet is one of the highest-

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1. E-Mail from E. Donald Elliott, Professor of Law, Yale Law School, to author (Mar. 11, 2019) (on file with author) (referencing in-person interview with Roger Strelow, Chief of Staff of the Council on Environmental Quality).
2. Deena Shanker, *U.N. Conference Features Meat (and Emissions) Heavy Menu*, BLOOMBERG, Dec. 3, 2018, <https://www.bloomberg.com/news/articles/2018-12-03/un-climate-conference-features-meat-and-emissions-heavy-menu>.
3. See *infra* note 108 at 41.
4. Joeri Rogelj et al., IPCC, *Mitigation Pathways Compatible With 1.5°C in the Context of Sustainable Development*, in GLOBAL WARMING OF 1.5°C 93, 149 (V. Masson-Delmotte et al. eds., IPCC 2018), [https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15\\_Chapter2\\_Low\\_Res.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter2_Low_Res.pdf).
5. *Id.* at 97.

impact individual lifestyle changes for climate mitigation, avoiding four times more carbon dioxide (CO<sub>2</sub>) emissions than recycling and eight times more emissions than switching to efficient light bulbs.<sup>6</sup> There is significant room for improvement: U.S. per capita meat consumption is three times the global average and far above the recommended nutritional quantity.<sup>7</sup>

Despite growing public awareness about food's climate impacts,<sup>8</sup> conventional demand-side energy policy has focused on increasing consumption of more efficient transportation and home appliances using tax credits and other financing programs.<sup>9</sup> The much-anticipated Green New Deal extends this framework, proposing to overhaul transportation systems and upgrade buildings to "achieve maximal energy efficiency," yet it mentions nothing about shifting consumer demand toward low-emissions foods.<sup>10</sup> Part of the problem is that food is not conceived of as an energy resource, unlike the chemical, thermal, and electric energies used to power modern machines. This conceptual distinction is reflected in the separation of agriculture and energy in legislation and administrative agencies. But food is a chemical energy necessary to power human bodies. Modern food production also requires significant amounts of conventional energy inputs like petroleum. Different foods can therefore be distinguished based on conventional energy standards like efficiency and environmental impact.<sup>11</sup>

6. *Id.* at 112. See also Seth Wynes & Kimberly Nicholas, *The Climate Change Mitigation Gap: Education and Government Recommendations Miss the Most Effective Individual Actions*, 12 ENVTL. RES. LETTERS 1 (2017). Calls for drastic reductions in meat consumption have become pitched in the past year. See Damian Carrington, *Huge Reduction in Meat-Eating "Essential" to Avoid Climate Breakdown*, GUARDIAN, Oct. 10, 2018, <https://www.theguardian.com/environment/2018/oct/10/huge-reduction-in-meat-eating-essential-to-avoid-climate-breakdown>; Joel Achenbach, *Earth's Population Is Skyrocketing. How Do You Feed 10 Billion People Sustainably?*, WASH. POST, Oct. 10, 2018, <https://www.washingtonpost.com/health/2018/10/10/how-will-or-billion-people-eat-without-destroying-environment/>.
7. See Joseph Poore & Thomas Nemecek, *Reducing Food's Environmental Impacts Through Producers and Consumers*, 360 SCIENCE 987, 991 (2018). See also *infra* note 123.
8. See Carrington, *supra* note 6 and Achenbach *supra* note 6. See also Somini Sengupta, *New Diet Guidelines to Benefit People and the Planet: More Greens for All, Less Meat for Some*, N.Y. TIMES, Jan. 16, 2019, <https://www.nytimes.com/2019/01/16/climate/meat-environment-climate-change.html>.
9. See, e.g., Energy Policy and Conservation Act of 1975, Pub. L. No. 94-163, §§321-339, 89 Stat. 871 (mandating vehicle fuel economy standards); Energy Policy Act of 2005, Pub. L. No. 109-58, §§1332-37 (creating tax credit for energy-efficient appliances and construction of energy-efficient buildings); Energy Independence and Security Act of 2007, Pub. L. No. 110-140, §§102, 301-325, 121 Stat. 1492, (raising vehicle fuel efficiency standards and revising efficiency standards for home appliances and lighting); and Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343 §205 (creating tax credit for plug-in electric vehicles).
10. H.R.J. Res. 109, 116th Cong. (2019). See also Jedediah Britton-Purdy, *The Green New Deal Is What Realistic Environmental Policy Looks Like*, N.Y. TIMES, Feb. 14, 2019, <https://www.nytimes.com/2019/02/14/opinion/green-new-deal-ocasio-cortez-.html>.
11. Jonathan Lovvorn, *Clean Food: The Next Clean Energy Revolution*, 36 YALE L. & POL'Y REV. 283 (2018).

Modern meat production not only inefficiently converts edible grains and fossil fuels into human food, but also imposes concentrated, local environmental harms on communities. Substitutes include plant-based proteins like beans and peanut butter, plant-based "meats" like veggie burgers, cultured meat, and animal meat grown using climate-sustainable agricultural practices. Transitioning to a mix of these alternatives will likely result in lower fuel use and avoided deforestation to mitigate the effects of climate change. Eating less meat also aids adaptation by freeing up resources to address the food insecurity that will only be further exacerbated by climate change.<sup>12</sup> According to some estimates, shifting U.S. demand for beef to plant-based proteins alone can feed an additional 190 million people.<sup>13</sup>

Regulating food demand has several advantages over conventional demand-side energy policy.<sup>14</sup> First, because food consumption is biologically constrained, switching to more efficient foods may avoid unintended demand-side consequences of switching to more efficient machines, like higher overall energy consumption. Second, a large array of lower-emissions foods is already available, whereas switching to alternative fuels and machines requires substantially more time and money for research, development, and deployment at scale. Third, food consumption is primed for norm-shifting because food is purchased and eaten in conspicuous social situations, unlike fuel and electricity use. As a result, non-price strategies like informational campaigns and place-based food substitutions may be especially effective in shifting consumer demand away from conventionally-produced meat.

Similarly, tobacco for most of the 20th century was woven into the American social fabric, yet unraveled in the latter half-century.<sup>15</sup> Some of the most effective anti-tobacco regulations were place-based smoking bans and mass media

12. See Prasanna Gowda et al., *Agriculture and Rural Communities, in IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME II* 391 (D.R. Reidmiller et al. eds., U.S. Global Change Research Program 2018).
13. By comparison, 151 million children are stunted globally due to low dietary quality. Walter Willett et al., *Food in the Anthropocene: The EAT-Lancet Commission on Healthy Diets From Sustainable Food Systems*, 393 LANCET 447 (2019), available at [http://dx.doi.org/10.1016/S0140-6736\(18\)31788-4](http://dx.doi.org/10.1016/S0140-6736(18)31788-4). See also Gidon Eshel et al., *Environmentally Optimal, Nutritionally Aware Beef Replacement Plant-Based Diets*, 50 ENVTL. SCI. & TECH. 8164-68 (2016).
14. See, e.g., Energy Policy and Conservation Act of 1975, Pub. L. No. 94-163, 89 Stat. 871 (mandating vehicle fuel economy standards); Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (increasing vehicle fuel efficiency standards and revising efficiency standards for home appliances and lighting).
15. This comparison between meat and tobacco is not new. See, e.g., Elle Hunt, *Meatonomics' David Robinson Simon: "Everything I Envision for Meat Has Happened With Tobacco"*, GUARDIAN, June 7, 2017, <https://www.theguardian.com/lifeandstyle/2017/jun/07/meatonomics-david-robinson-simon-everything-i-envision-for-meat-has-happened-with-tobacco>.

campaigns that portrayed smoking as a socially unappealing habit. Though the comparison between tobacco and meat is far from perfect, reducing meat demand may be easier in several respects. First, historical and anthropological evidence suggests that humans are hypersensitive to information about foods, particularly pathogen-prone foods like meat.<sup>16</sup> Second, meat overconsumption in the United States seems to be sustained by food marketing and systemic information asymmetry about the ethically objectionable and potentially sickening conditions of modern animal agriculture. Third, multinational food conglomerates may have financial incentives to produce plant-based and cultured meats to mitigate growing social and environmental pressures on conventional meat production.

Several policy reforms can be implemented at the federal level to begin to reduce meat consumption. First, we should remove publicly imposed barriers to information about how meat is produced and its effects on human health and the environment. This includes challenging state-level prohibitions on recording animal feedlot operations and slaughterhouses. The federal beef and pork checkoff programs, which levy a tax on producers for generic research and marketing, should also be repealed. Trusted food certification programs like the National Organic Program should be updated to provide climate-relevant information to consumers and to incentivize producers to adopt climate-sustainable practices.

Second, place-based food substitutions should initially target schools, because children's food preferences are malleable and especially influenced by peers. School-age children are the biggest captive market for federally subsidized meals. To this end, the National School Lunch Program (NSLP) should be reformed to make more meat substitutes available.<sup>17</sup>

This Article will proceed as follows. Part I discusses the energy requirements and environmental impacts of modern industrial meat production compared with substitute foods. Part II elaborates on the overlooked policy advantages of demand-side food regulation over demand-side regulation of fuels and machines. Part III compares the challenges faced by anti-tobacco initiatives with meat reduction and articulates applicable policy strategies. Part IV elaborates on the policy recommendations mentioned above, and Part V concludes. Adopting these recommendations will not suffice to drastically reduce meat consumption, but they are steps in the right direction and

would create a friendlier environment for more drastic regulatory measures.

## I. The Case for Regulating Meat Consumption

### A. *The Inefficiency and Environmental Harms of Modern Meat Production*

Livestock accounts for between 14% and 18% of global anthropogenic GHG emissions, surpassing emissions from all transportation sectors.<sup>18</sup> Cattle contributes the lion's share of emissions at 65%, followed by 14% for chicken and eggs and 7% for pigs.<sup>19</sup> Modern meat production relies on raising large numbers of animals in confined feedlot operations, which require intensive cultivation of animal feed and external energy inputs.<sup>20</sup> As a result, much of livestock-related GHG emissions can be attributed to feed production: CO<sub>2</sub> is released from converting forests to cropland, intense soil tilling, and the petroleum-powered cultivation, fertilization, processing, and transportation of corn and soy used as feed crops.<sup>21</sup> Indeed, more than one-half of all cultivated land in Western nations is used to grow livestock feed.<sup>22</sup>

Livestock animals also directly emit potent GHGs like methane and nitrous oxide over their lifetimes, from digesting feed and excreting waste.<sup>23</sup> The resulting emissions are exacerbated by avoidable poor manure management.<sup>24</sup> Lastly, emissions are released from conventional energies like petroleum and other electricity-generating fuels used in housing and slaughtering animals, and for processing and distributing the resulting meat products.<sup>25</sup>

Meat is inherently less energy-efficient than plant foods because animals must convert plants into human food over a long period of gestation and rearing. Worse, only a portion of the animal's body mass—its muscular system—is ultimately eaten by American consumers. Beef and lamb are the least calorie-efficient, wasting 89%-97% of gross energy in feed per unit of edible meat, followed by pork at 90%-92% and chicken at 85%.<sup>26</sup>

16. See *infra* note 101.

17. Most of these policy recommendations have been raised elsewhere. See Jonathan Lovvorn, *Climate Change Beyond Environmentalism Part II: Near Term Climate Mitigation in a Post-Regulatory Era*, 30 GEO. ENVTL. L. REV. 203, 235 (2018) (discussing seven key tactics for reducing meat consumption); Debra L. Donahue, *Livestock Production, Climate Change, and Human Health: Closing the Awareness Gap*, 45 ELR 11112, 11120 (Dec. 2015) (discussing the conflict between the beef checkoff program and national dietary recommendations); Kevin Schneider, *Concentrating on Health Feeding Operations: The National School Lunch Program, "Cultured Meat," and the Path to a Sustainable Food Future*, 29 J. LAND USE & ENVTL. L. 145, 168 (2013) (arguing for imposing health standards on U.S. Department of Agriculture (USDA) food purchases for the NSLP).

18. See PIERRE J. GERBER ET AL., U.N. FOOD AND AGRICULTURE ORGANIZATION (FAO), *TACKLING CLIMATE CHANGE THROUGH LIVESTOCK: A GLOBAL ASSESSMENT OF EMISSIONS AND MITIGATION OPPORTUNITIES* 15 (2013), <http://www.fao.org/docrep/018/i3437e/i3437e.pdf>; U.S. Environmental Protection Agency (EPA), *Global Greenhouse Gas Emissions Data*, <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data> (last updated Apr. 13, 2017).

19. See FAO, *supra* note 18, at 46.

20. Currently, most U.S. pork and poultry and one-third of beef are feedlot-raised. See VACLAV SMIL, *SHOULD WE EAT MEAT? EVOLUTION AND CONSEQUENCES OF MODERN CARNIVORY* 122 (2013).

21. See *id.* at 146.

22. *Id.*

23. *Id.*

24. *Id.*

25. See Poore & Nemecek, *supra* note 7, at 991.

26. History suggests that there is little room for improvement: long-term analysis of U.S. livestock production shows that feed-to-meat ratios have generally remained stable for all staple livestock proteins throughout the 20th century, with the exception of chicken. See VACLAV SMIL, *Worldwide Trans-*

It is therefore unsurprising that reducing beef consumption has been identified as “indispensable for reaching the 2°C target with high probability,” over agricultural productivity and technical improvements.<sup>27</sup> In addition to the avoided emissions from meat production, lower demand for meat allows reforestation of cropland and grazing land, and avoids further conversion of forestland.<sup>28</sup> Forest conservation has been identified as the most cost-effective, technologically mature carbon storage option.<sup>29</sup> A whopping 12.6% of gross GHG emissions in the United States was offset by its forests in 2016, more than 20 times the sequestration capacity of the world’s largest carbon capture and storage projects combined.<sup>30</sup> By contrast, worldwide adoption of the meaty North American diet would double the current amount of cropland used.<sup>31</sup> Thus, eating less meat is a crucial tool for climate mitigation.

Reducing meat consumption is also a crucial climate adaptation strategy.<sup>32</sup> Higher temperatures adversely affect livestock growth, mortality, and reproduction.<sup>33</sup> Increased droughts lower the availability of forage and feed crops.<sup>34</sup> Heat stress has already caused costly production declines in livestock production, to the tune of \$1.2 billion for dairy alone in 2010.<sup>35</sup> Temperature increases may also increase livestock water consumption by a factor of three, to 24% of global human water use.<sup>36</sup> Extreme temperatures also increase the energy requirements and emissions output of climate-controlled facilities used to house industrially raised livestock.<sup>37</sup> Therefore, eating less meat not only relieves pressure on the food system to maintain current rates of meat production in the face of growing environmental constraints, but also allows flexible allocation of resources to address the food and water insecurity that will inevitably be exacerbated by climate change.<sup>38</sup>

*formation of Diets, Burdens of Meat Production, and Opportunities for Novel Food Proteins*, 30 ENZYME & MICROBIAL TECH. 305, 308 (2002).

27. Frederik Hedenus et al., *The Importance of Reduced Meat and Dairy Consumption for Meeting Stringent Climate Change Targets*, 124 CLIMATIC CHANGE 79, 91 (2014).
28. Bronson Griscom et al., *Natural Climate Solutions*, 111 PROC. NAT’L ACAD. SCI. 3709 (2014).
29. *Id.*
30. See AASHNA AGGARWAL ET AL., NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS, ACHIEVING THE MID-CENTURY STRATEGY GOALS FOR DEEP DECARBONIZATION IN AGRICULTURE AND FORESTRY 8-9 (2018); Simon Evans, *Around the World in 22 Carbon Capture Projects*, CARBON BRIEF, Oct. 7, 2014, <https://www.carbonbrief.org/around-the-world-in-22-carbon-capture-projects>.
31. Thomas Kastner et al., *Global Changes in Diets and the Consequences for Land Requirements for Food*, 109 PROC. NAT’L ACAD. SCI. 6868-72 (2012).
32. M. Melissa Rojas-Downing et al., *Climate Change and Livestock: Impacts, Adaptation, and Mitigation*, 16 CLIMATE RISK MGMT. 145, 158 (2017).
33. See Gowda et al., *supra* note 12.
34. *Id.*
35. *Id.*
36. Rojas-Downing et al., *supra* note 32, at 147-48.
37. *Id.* This assumes that feedlot operations do not transition to cleaner electricity sources.
38. See Gowda et al., *supra* note 12; Jonathan Lovvorn, *Climate Change Beyond Environmentalism I: Intersectional Threats and the Case for Collective Action*, 29 GEO. ENVTL. L. REV. 21-22 (2016) (“There is now widespread agreement that climate change will significantly disrupt the supply of food and water, and pose a significant risk to global food security.”).

Lastly, modern meat production also causes other environmental impacts, like soil erosion from monoculture feed production and local groundwater contamination from lagoons of animal waste—a problem exacerbated by extreme weather events.<sup>39</sup> Environmental pollution and high rates of antibiotic use in raising livestock impose chronic health risks on humans.<sup>40</sup>

Eating fish presents its own problems. Virtually all principal fishing regions and all commercially valuable species are overexploited or fished to capacity.<sup>41</sup> Fishing practices impose significant collateral damage to marine bycatch like dolphins and turtles.<sup>42</sup> While aquaculture (farmed) fish is twice as energy-efficient as poultry, the lowest-impact aquaculture systems still exceed impacts of vegetable protein production.<sup>43</sup> Western consumers also prefer to eat only carnivorous fish like salmon, tuna, and cod, which require wild fish for feed.<sup>44</sup> Other environmental impacts of aquaculture fish include concentrated production of waste products—excrement, antibiotics, and pathogens—that degrade local terrestrial and aquatic ecosystems, a problem mirrored by land-based animal agriculture.<sup>45</sup>

## B. Conventional Meat Substitutes

Meat is an important source of proteins, lipids, and minerals, and a gastronomic mainstay in American cuisine. In familiar American dishes, meat dominates other ingredients by volume. Take, for instance, sausage and bacon at breakfast, hamburgers at lunch, and meatloaf and steak for dinner. Indeed, the American diet has been marked by excessive meat consumption (and waste) since the colonial era.<sup>46</sup> Thus, near-term efforts to reduce meat consumption must consider filling the role of meat with nutritional and hedonic equivalents. The most successful substitutes will look, taste, and play the part of meat in its most familiar roles on the grill and the dining table.

### I. Plant-Based Proteins

Familiar plant-based proteins such as nut butter, quinoa, beans, hummus, and tofu provide excellent nutritional

39. See Vaclav Smil, *Eating Meat: Constants and Changes*, 3 GLOBAL FOOD SECURITY 67, 68 (2014); Kendra Pierre-Louis, *Lagoons of Pig Waste Are Overflowing After Florence. Yes, That’s as Nasty as It Sounds*, N.Y. TIMES, Sept. 19, 2018. See also Shannon Roesler, *Federalism and Local Environmental Regulation*, 48 U.C. DAVIS L. REV. 1111, 1157-60 (2015) (“[A]n animal feeding operation confines more than live animals; it congregates animals, feed, manure and urine, dead animals, and production operations on a small land area.”) (internal citations omitted).
40. Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations*, 118 PEDIATRICS e66 (2006); CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC), ANTIBIOTIC RESISTANCE THREATS IN THE UNITED STATES 36-37 (2013).
41. See SMIL, *supra* note 20, at 196.
42. *Id.*
43. See Poore & Nemecek, *supra* note 7, at 990.
44. See SMIL, *supra* note 20, at 198.
45. *Id.*
46. MAUREEN OGLE, IN MEAT WE TRUST: AN UNEXPECTED HISTORY OF CARNIVORE AMERICA 3-4 (2013).

substitutes for meat. Indeed, traditional Asian-Indian diets are predominantly plant-based.<sup>47</sup> Combinations of plant-based foods, like rice and beans, bread and peanut butter, and hummus and pita, often serve as complete and well-balanced sources of amino acids.<sup>48</sup>

Plant-based proteins vary widely in terms of energy efficiency and environmental impact, but the impacts of the lowest animal proteins far exceed the highest-impact vegetable substitutes.<sup>49</sup> Despite their nutritional adequacy and wide availability, relying on these foods alone may not be enough to spur a voluntary dietary transition in a meat-heavy food culture because they do not look or taste like meat. Still, these plant-based proteins will play a key role in a large-scale dietary transition.

## 2. Plant-Based “Meat”

Another attractive option is plant-based “meat” that is intentionally prepared to imitate the look, taste, and texture of processed meat products like hamburgers and hot dogs. Since processed meat is a quarter of all consumed meat, plant-based meat has the potential to displace significant meat consumption.<sup>50</sup> Plant-based meats have a long history in Asian cuisines, and their modern commercial counterparts in the West contain processed nuts, pulses (soy and pea), cereals (wheat), and mushrooms.<sup>51</sup> Some plant-based meats have carbon footprints 150 times smaller than the most carbon-intensive beef, 15 times smaller than farmed seafood, 11 times smaller than pork, and 6 times smaller than poultry.<sup>52</sup> Additional environmental benefits include significantly less waste, land, and water use.<sup>53</sup>

Some popular, processing-heavy plant-based meats like the Impossible Burger currently have carbon footprints similar to that of pork and chicken, but their efficiency and environmental impact may improve as the technology matures and processing shifts to cleaner electricity sources.<sup>54</sup> Unfamiliarity and lower palatability associated with plant-based meat have been identified as key barriers to

their general acceptance.<sup>55</sup> However, plant-based meat sales have maintained substantial growth in the past few years: more than 12% of U.S. households now purchase some type of plant-based meat.<sup>56</sup>

## 3. Cultured Meat

Another meat alternative in development is cultured or “lab-based” meat, which consists of muscle tissue produced outside of a living animal by growing animal stem cells in a medium synthesized from algae or conventional livestock feed.<sup>57</sup> Commercial-scale production is anticipated by 2021.<sup>58</sup> While cultured meat looks and tastes more like conventionally produced meat than plant-based meat, current technology indicates uncertainty about the environmental benefits of cultured meat relative to alternative proteins.

On the one hand, cultured meat uses less energy per unit of edible food than conventionally produced meat, which develops inedible structures like bones and organs over a long rearing time.<sup>59</sup> But cultured meat still “eats” plant material produced with conventional energy inputs and grows in energy-intensive industrial conditions. Thus, cultured meat uses more energy than pork and poultry, and far more than plant-based protein.<sup>60</sup>

## 4. Climate-Sustainable Meat

Lastly, meat produced using a mix of lower-emissions, nutrient-efficient, and climate-sustainable agricultural practices offers another alternative to conventionally produced meat. These practices include: (1) growing livestock on mixed crop and livestock farms, which facilitates more efficient management of animal feed and manure, instead of intensive feedlots; (2) feeding animals organic residues from crop harvesting and processing that are unsuitable for human consumption in place of grain feed; (3) replacing petroleum-synthesized fertilizers through the greater use of manure and rotated planting of leguminous plants; (4) reducing tillage to grow crops, which improves the carbon sequestration capacity of soil; (5) raising regionally adapted animals, which lowers energy requirements for feed and temperature control; (6) practicing better animal nutrition to improve the productivity of feed for increased

47. American Dietetic Association, *Position of the American Dietetic Association: Vegetarian Diets*, 109 J. OF AM. DIETETIC ASSOC. 1266, 1267 (2009).

48. E-Mail from Rebecca Boehm, Economist, Food & Environment Program at the Union of Concerned Scientists, to author (Mar. 11, 2019) (on file with author). See also Vernon Young & Peter Pellett, *Plant Proteins in Relation to Human Protein and Amino Acid Nutrition*, 59 AM. J. CLINICAL NUTRITION 1203S-12S (1994).

49. See Poore & Nemecek, *supra* note 7.

50. See, e.g., SMIL, *supra* note 20, at 311; Peter Alexander et al., *Could Consumption of Insects, Cultured Meat, or Imitation Meat Reduce Global Agricultural Land Use?*, 15 GLOBAL FOOD SECURITY 24 (2017); Carrie Daniel et al., *Trends in Meat Consumption in the United States*, 14 PUB. HEALTH NUTRITION 575 (2011).

51. See SMIL, *supra* note 20, at 188. See also Fuchsia Dunlop, *China: The Birthplace of Fake Meat*, ECONOMIST, Aug./Sept. 2018, <https://www.1843magazine.com/food-drink/china-the-birthplace-of-fake-meat>.

52. Durk Nijdam et al., *The Price of Protein: Review of Land Use and Carbon Footprints From Life Cycle Assessments of Animal Food Products and Their Substitutes*, 37 FOOD POL'Y 760, 770 (2012).

53. *Id.*

54. See Benjamin Goldstein et al., *Potential to Curb the Environmental Burdens of American Beef Consumption Using a Novel Plant-Based Beef Substitute*, 12 PLoS ONE e0189029 (2017), available at <https://doi.org/10.1371/journal.pone.0189029>.

55. Annet Hoek et al., *Replacement of Meat by Meat Substitutes. A Survey on Person- and Product-Related Factors in Consumer Acceptance*, 56 APPETITE 662 (2011) (finding that unfamiliarity and lower sensory attractiveness of overt meat substitutes were key determinants of their poor general acceptance among consumers in the United Kingdom and the Netherlands).

56. THE GOOD FOOD INSTITUTE, *THE PLANT-BASED ALTERNATIVES MARKET IS SKYROCKETING* (2018), <https://www.gfi.org/images/uploads/2018/09/Good-Food-Institute-Plant-Based-Nielsen-Data-Sheet-2018-0911-v3.pdf>.

57. Alexander et al., *supra* note 50, at 24.

58. *Id.*

59. *Id.*

60. Carolyn Mattick et al., *Anticipatory Life Cycle Analysis of In Vitro Biomass Cultivation for Cultured Meat Production in the United States*, 49 ENVTL. SCI. & TECH. 11941, 11945 (2015). See also John Lynch & Raymond Pierrehumbert, *Climate Impacts of Cultured Meat and Beef Cattle*, 3 FRONTIERS SUSTAINABLE FOOD SYS. (2019).

production of meat and milk; and (7) diversifying livestock and crop varieties, which can increase resilience against temperature, precipitation, and pathogenic risks induced by climate change.<sup>61</sup>

The most effective agricultural practices to adopt for a particular livestock operation, as well as resultant efficiency and emissions benefits, are region-specific.<sup>62</sup> Based on some estimates, incorporating these practices can reduce GHG emissions per unit of meat product by 18% compared with conventionally produced meat.<sup>63</sup> Adopted globally, these practices may reduce energy requirements for all agricultural and livestock production by 25%-50%.<sup>64</sup> Still, the GHG emissions of the lowest-impact animal products still vastly exceed average impacts of substitute vegetable proteins.<sup>65</sup>

Thus, American consumers cannot achieve climate mitigation or adaptation goals simply by replacing current quantities of consumed meat with sustainably produced meat.<sup>66</sup> Overconfidence in cultured meat is similarly ill advised due to environmental and technological uncertainties. Policies targeting meat reduction should therefore promote a combination of these substitute foods with an emphasis on displacing current meat consumption with plant-based proteins and plant-based meats. These foods are the most technologically mature, energy-efficient, and low-emissions alternatives to conventionally produced meat.

## II. Advantages of Demand-Side Food Regulation

U.S. energy policy has centered on regulating and subsidizing suppliers of conventional energy rather than influencing consumer demand.<sup>67</sup> Climate mitigation goals, however, require strong, complementary supply- and demand-side policies.<sup>68</sup> Demand-side energy policy in the United States has focused on raising efficiency standards for energy-intensive machines like household appliances and cars and incentivizing

greater consumption of these machines.<sup>69</sup> But demand-side *food* intervention is uniquely attractive for four reasons.

First, switching to energy-efficient foods may avoid unintended demand-side consequences associated with switching to more efficient machines. In the past century, more efficient refrigerators, light bulbs, cars, and air-conditioners have paradoxically led to greater associated energy consumption.<sup>70</sup> This is known as the “rebound effect.”<sup>71</sup> Essentially, efficiency improvements push down costs at every level. Excess production and low consumption taxes keep energy inputs cheap.<sup>72</sup> As a result, end-users of energy-efficient machines can use them for longer, buy them in multiples and in larger volumes, and buy more complementary goods without feeling constrained.<sup>73</sup> The rebound effect is compounded by the fact that producers of goods and services across different industries also benefit from efficiency gains.<sup>74</sup> For instance, manufacturers of air conditioners can incorporate efficient refrigerator compressor technology to lower the cost of air conditioners, thereby increasing overall consumption of cooling services.

Efficiency gains may increase consumer welfare by providing better light, transportation, and temperature-control services. But efficient machines are often used to provide nonessential, ultimately wasted services like extra refrigerator and car storage. Indeed, one-half of all light-duty vehicles used for personal transportation in the United States are now vans, pickup trucks, and sport utility vehicles (SUVs), despite the steady increase of vehicle efficiency over the last three decades.<sup>75</sup> Cheaper, larger refrigerators have also paradoxically contributed to an increasing amount of food waste because we think purchased food will last longer.<sup>76</sup>

Increased use of cheaper energy services can also displace functionally equivalent human activities without

61. See, e.g., URS NIGGLI ET AL., FAO, *LOW GREENHOUSE GAS AGRICULTURE: MITIGATION AND ADAPTATION POTENTIAL OF SUSTAINABLE FARMING SYSTEMS* 16 (2009), <http://www.fao.org/tempref/docrep/fao/010/ai781e/ai781e00.pdf>; Rattan Lal, *Soil Carbon Sequestration to Mitigate Climate Change*, 123 *GEODERMA* 10 (2004); Mark Eisler & Michael Lee, *Steps to Sustainable Livestock*, 32 *NATURE* 507 (2014); VACLAV SMIL, *ENRICHING THE EARTH: FRITZ HABER, CARL BOSCH, AND THE TRANSFORMATION OF WORLD FOOD PRODUCTION* 206-11 (2004).

62. See Sara Dewey et al., *Opportunities to Address Climate Change in the Next Farm Bill*, HARV. ENVTL. L. REV. SYNDICATE (2017).

63. See Poore & Nemecek, *supra* note 7, at 991.

64. Global conversion of arable and permanent cropping systems to sustainable farming is estimated to mitigate 40% of the world's agricultural GHG emissions. See FAO, *supra* note 61, at 6, 11, 16.

65. See Poore & Nemecek, *supra* note 7, at 987.

66. See, e.g., Alexander et al., *supra* note 50, at 30.

67. See, e.g., Energy Policy and Conservation Act of 1975, Pub. L. No. 94-163, 89 Stat. 871 (mandating vehicle fuel economy standards); Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (increasing vehicle fuel efficiency standards and revising efficiency standards for home appliances and lighting).

68. Rogelj et al., *supra* note 4, at 95, 150, 161-62.

69. See, e.g., Energy Policy and Conservation Act of 1975, Pub. L. No. 94-163, 89 Stat. 871 (mandating vehicle fuel economy standards); Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (increasing vehicle fuel efficiency standards and revising efficiency standards for home appliances and lighting).

70. See David Owen, *The Efficiency Dilemma*, *NEW YORKER*, Dec. 20, 2010. See also Tilman Santarius, *Energy Efficiency, Human Behavior, and Economic Growth: Challenges to Cutting Energy Demand to Sustainable Levels*, 1652 *AIP CONF. PROC.* 70-81 (2015); VACLAV SMIL, *ENERGY AND CIVILIZATION: A HISTORY* 405 (2017) (“[H]igher energy efficiencies have been swamped by the combination of growing demand and larger populations, and although the global economy has become relatively less energy-intensive, its aggregate energy use has been increasing . . .”).

71. See Owen, *supra* note 70 and SMIL, *supra* note 70. See also Jack Barkenbus, *Supersizing the American Dream in an Era of Climate Change*, 38 *ELR* 10857 (Dec. 2008). In the following discussion, I elide distinctions between direct, indirect, demand-side, and supply-side rebound effects.

72. See SMIL, *supra* note 70, at 405-06 (discussing the historical relationship between efficiency gains, falling cost of fuels, and resulting decline in price of energy services such as lighting, heating, and transportation).

73. See Owen, *supra* note 70.

74. See Owen, *supra* note 70. See also Barkenbus, *supra* note 71.

75. U.S. EPA, *Highlights of CO<sub>2</sub> and Fuel Economy Trends* (“[T]he market shift towards SUVs has offset some of the fleetwide benefits that otherwise would have been achieved due to the increased fuel economy within each vehicle type.”), <https://www.epa.gov/fuel-economy-trends/highlights-co2-and-fuel-economy-trends> (last updated Jan. 11, 2018). See also Barkenbus, *supra* note 71, at 10861.

76. See Owen, *supra* note 70.

capturing associated health and social benefits. The ubiquity of cars used for short trips previously made on foot or bicycle has contributed to more sedentary and obesogenic lifestyles in the United States.<sup>77</sup> Increased refrigeration to preserve food has displaced low-emissions and culturally rich preservation techniques like pickling and fermentation.<sup>78</sup> The ubiquity of efficient microwaves plus the use of refrigeration throughout the food supply chain has shifted us toward increased production and consumption of convenient but less nutritious foods like frozen meals and desserts.<sup>79</sup> Even social communication and mental stimulation made speedier and more accessible by smartphones and social media platforms have been shown to crowd out face-to-face interactions, thereby deepening loneliness and depression.<sup>80</sup> In the past century, adoption of analogous technologies like radios and televisions has been shown to have similar effects on consumer satisfaction.<sup>81</sup> Such costs are difficult to predict and measure, and are almost never addressed in energy policy analysis.<sup>82</sup>

The exact size of the rebound effect, and whether it is sufficient to lead to a net increase in energy use (known as “backfire”) is disputed by economists.<sup>83</sup> The difficulty lies in tracking the long-run macroeconomic effects of a particular efficiency standard. Rebound management policies like a cross-industry carbon tax or excise taxes on larger vehicles can cabin these effects, but adoption requires additional political will and imposes administrative costs.<sup>84</sup> To the extent that policymakers are selecting among a suite of instruments to combat climate change, policies encouraging research, production, and consumption of more energy-efficient machines may rely on overestimations of effectiveness and underestimations of cost.<sup>85</sup>

Whatever the size of the rebound effect, it will not be an issue for dietary shifts for several reasons. Most importantly, overeating is deterred by gastric discomfort in a way that overusing cars and home appliances is not. In other words, the total volume of food consumed is capped by time and the total number of relatively fixed-

volume human stomachs. Replacing animal proteins with calorie- and fiber-matched plant proteins has specifically been found to induce similar levels of subjective satiety,<sup>86</sup> whereas the time spent using energy services like smartphones and the space available to be populated by energy-intensive machines are not so physically constrained.

Additionally, a spate of nutritional evidence points to the health benefits of substituting animal with plant proteins in developed countries.<sup>87</sup> And despite the enormous amount of food waste, there is no reason to expect that substitution toward plant-based proteins will lead to increased food production or waste. Rather, synthesizing human food at a lower trophic level would avoid huge food energy losses from synthesizing food at higher trophic levels.<sup>88</sup> While there are certainly *some* downstream demand-side effects of substituting meat for alternative foods, they are relatively more cabined. Thus, shifting diets toward plant-based proteins may avoid the unintended consequences associated with using more efficient machines.

Second, a greater array of technologically mature, low-emissions substitutes are ready to be deployed in demand-side food intervention—whereas demand-side energy intervention typically aims to transition to a handful of lower-emissions fuels or efficient machines yet to be developed or deployed at scale, typically at great expense and with potentially higher lock-in effects.<sup>89</sup> Human diets, on the other hand, have been sustained by a wide variety of ecologies throughout history, with a wide variety of resource and energetic constraints. Over time, cultures have improved upon the palatability as well as nutritional and health benefits of different combinations of foods. This rich knowledge about food production and preparation will be useful to draw on in adapting to changing climactic and ecological conditions.

By contrast, modern energy services like high-speed transportation and communication networks rely on more recent and centrally developed technologies, as well as geographically concentrated stores of energy resources.<sup>90</sup> Technological innovations and capital investments in the energy system are also likely more path-dependent than dietary transitions: consumer choice about home energy and transportation is often limited in a way that food choice is not. Thus, investing in large-scale transitions to lower-emissions fuels and more efficient machines may promise high collective payoffs in the short term. But doing so requires more time and resources and has uncertain adaptive value compared with demand-side food intervention.

77. See SMIL, *supra* note 70, at 351.

78. Nicola Twilley, *What Do Chinese Dumplings Have to Do With Global Warming?*, N.Y. TIMES, July 25, 2014 (“By removing constraints of proximity and seasonality, refrigeration can [reduce] the incredible regional variety and specificity of Chinese fruits and vegetables. . .”).

79. Tara Garnett, *Where Are the Best Opportunities for Reducing Greenhouse Gas Emissions in the Food System (Including the Food Chain)?*, 36 FOOD POL’Y S23, S29 (2011).

80. Hunt Allcott et al., *The Welfare Effects of Social Media* (Stanford Working Paper, 2019), available at <http://web.stanford.edu/~gentzkow/research/facebook.pdf>.

81. Sue Bowden & Avner Offer, *Household Appliances and the Use of Time: The United States and Britain Since the 1920s*, 47 ECON. HIS. REV. 725, 737 (1994) (“Despite its compulsive attraction (or perhaps because of it), television rated lower in enjoyment and satisfaction than most voluntary leisure activities, and rather lower than work . . . [T]he highest values were placed on interactions with children and with friends.”).

82. See, e.g., Rogelj et al., *supra* note 4, at 149, 157.

83. See, e.g., Kenneth Gillingham et al., *The Rebound Effect and Energy Efficiency Policy*, 10 REV. ENVTL. ECON. & POL’Y 68-88 (2016); Kenneth Gillingham et al., *The Rebound Effect Is Overplayed*, 493 NATURE 475 (2013).

84. See David Greene et al., *Feebates, Rebates, and Gas—Guzzler Taxes: A Study of Incentives for Increased Fuel Economy*, 33 ENERGY POL’Y 757 (2005).

85. See, e.g., Rogelj et al., *supra* note 4, at 149, 157.

86. Lone Nielsen et al., *Protein From Meat or Vegetable Sources in Meals Matched for Fiber Content Has Similar Effects on Subjective Appetite Sensations and Energy Intake—A Randomized Acute Cross-Over Meal Test Study*, 10 NUTRIENTS 96 (2018).

87. See *infra* note 125.

88. See *infra* Section I.A. See also *supra* note 26 and accompanying text.

89. See Zachary Liscow & Quentin Karpilow, *Innovation Snowballing and Climate Law*, 95 WASH. UNIV. L. REV. 387, 447-48 (2017); Christopher Weber & H. Scott Matthews, *Food-Miles and the Relative Climate Impacts of Food Choices in the United States*, 42 ENVTL. SCI. TECH. 3508 (2008).

90. See generally SMIL, *supra* note 70, at 295.

Third, a greater variety of policy instruments is available for demand-side food policy than for demand-side energy policy. One reason is that U.S. consumers spend more on food than on transportation and home energy combined.<sup>91</sup> The relative magnitude of spending suggests that food purchasing decisions are more salient to consumers and therefore more sensitive to regulatory intervention generally than conventional energy purchasing.

More importantly, individuals purchase and eat food frequently and conspicuously for almost all of their lives, choosing among many choices in many social spaces: at the dinner table, in school cafeterias, and eventually restaurants and bars. By contrast, consumers purchase gasoline, home energy, and many energy-intensive machines infrequently and inconspicuously for a smaller portion of their adult lives, choosing among relatively fewer options in fewer locations. Important exceptions include personal automobiles and rooftop solar panels, whose consumption is more visible and therefore more useful for social signaling than switching to green electricity or buying more efficient light bulbs and appliances.<sup>92</sup> Still, food is saturated with social significance in a way that conventional energy consumption is typically not.<sup>93</sup> Broccoli remains a detested childhood food, oysters are high status, and steak is masculine.

Thus, food policy can strategically target fewer social environments to influence a large number of individuals. Demand-side energy regulation, on the other hand, seems restricted to expensive financial incentives and quasi-mandatory choice defaults targeting many more individuals and households.<sup>94</sup> Information campaigns designed to

persuade and strengthen attitudes may also have a greater effect on food consumption than on energy consumption. Consumers likely welcome and seek out such information to reduce the search costs of choosing among literally tens of thousands of foods.<sup>95</sup>

This prediction is borne out by the fact that the food system is one of the largest advertisers in the economy—much more ubiquitous, frequent, and lucrative than advertising of utilities, appliances, and gasoline.<sup>96</sup> Modern food advertising promotes consumer selection in an overabundant market by associating particular food products to superior taste and nutrition properties, as well as socially constructed properties like identity and status. A 2006 Burger King advertisement, for instance, featured a mob of men waving signs saying “Eat this meat,” singing “I am Man, I am incorrigible, and I am way too hungry to settle for chick food.”<sup>97</sup>

As a result, non-price regulatory intervention for food may be easier to adopt and cheaper to implement than price-based energy regulation. Non-price interventions are generally less expensive to implement than subsidies, and require less political willpower to adopt than taxes.<sup>98</sup> Indeed, voters are likely to switch to meat substitutes if convinced of their superiority or of meat’s inferiority along salient dimensions; whereas paying more for the same gasoline at the pump will be a difficult sell absent massive investment in alternative modes of transportation or a fundamental cultural shift around transportation.<sup>99</sup> Moreover, effective non-price interventions may build the political support for interventions that are more expensive or restrictive, like excise taxes.<sup>100</sup>

Lastly, demand-side food regulation may affect a greater number of consumers than predicted without continued regulatory intervention. Food preferences are transmitted between different social groups, across generations, and from visible and trusted public figures to the general popu-

91. See U.S. BUREAU OF LABOR STATISTICS, U.S. DEPARTMENT OF LABOR, CONSUMER EXPENDITURES IN 2016 (2018), <https://www.bls.gov/opub/reports/consumer-expenditures/2016/pdf/home.pdf>.

92. See STEVEN SEXTON & ALISON SEXTON, CONSPICUOUS CONSERVATION: THE PRIUS EFFECT AND WILLINGNESS TO PAY FOR ENVIRONMENTAL BONA FIDES 22 (2011) (unpublished manuscript) (finding that consumers are willing to pay more for Priuses than substitutes in more Democratic communities), [https://are.berkeley.edu/fields/erep/seminar/s2011/Prius\\_Effect\\_V1.5.3.pdf](https://are.berkeley.edu/fields/erep/seminar/s2011/Prius_Effect_V1.5.3.pdf); Samuel Dastrup et al., *Understanding the Solar Home Price Premium: Electricity Generation and “Green” Social Status*, 56 EUR. ECON. REV. 961 (2012) (finding that households in highly Democratic and Green communities pay a higher premium for solar panels); Cass Sunstein & Lucia Reisch, *Automatically Green: Behavioral Economics and Environmental Protection*, 38 HARV. ENVTL. L. REV. 127 (2014).

93. See Marion Nestle et al., *Behavioral and Social Influences on Food Choice*, 56 NUTRITION REV. S51 (1999) (“Family and friends provide a source of modeling and peer pressure for consuming particular foods . . . and for trying new foods.”).

94. A notable exception is the O-Power program, which artificially increases the conspicuousness of home energy consumption by providing personalized feedback reports to customers. However, such programs require repeated intervention to be effective and seem to trigger backlash effects from certain ideological groups. See, e.g., Hunt Allcott, *Social Norms and Energy Conservation*, 95 J. PUB. ECON. 1082, 1093 (2011); HUNT ALLCOTT & TODD ROGERS, THE SHORT-RUN AND LONG-RUN EFFECTS OF BEHAVIORAL INTERVENTIONS 28 (National Bureau of Economic Research, Working Paper No. 18492, 2012); DORA COSTA & MATTHEW KAHN, ENERGY CONSERVATION “NUDGES” AND ENVIRONMENTALIST IDEOLOGY: EVIDENCE FROM A RANDOMIZED RESIDENTIAL ELECTRICITY FIELD EXPERIMENT 15-19 (National Bureau of Economic Research, Working Paper No. 15939, 2010), available at <https://www.nber.org/papers/w15939.pdf>. Such backlash effects may be tempered where consumers have face-to-face contact. See discussion *infra* Part III and note 218.

95. Americans choose among more than 40,000 food items in grocery stores, hundreds to thousands of restaurants in the top cities, and an average of 130 items within those restaurants. See MICHAEL RUHLMAN, GROCERY: THE BUYING AND SELLING OF FOOD IN AMERICA 31 (2017); Matt Wolf, *Restaurant Growth Index*, RESTAURANT BUS., Mar. 2011, at 26-32, available at <https://www.nielsen.com/content/dam/corporate/us/en/public%20factsheets/restaurant-growth-index.pdf>; Patricia Cobe, *Consumer Trends: Does Menu Size Matter?*, RESTAURANT BUS., Nov. 21, 2018, available at <http://www.restaurantbusinessonline.com/consumer-trends/does-menu-size-matter>.

96. See Nestle et al., *supra* note 93, at S52 (“The U.S. food system is the economy’s largest advertiser. Successful campaigns target specific groups, reach a broad audience and repeat messages frequently.”).

97. Lisa Young & Marion Nestle, *Portion Sizes and Obesity: Responses of Fast-Food Companies*, 28 J. PUB. HEALTH & POL’Y 238-48 (2007).

98. See Allcott, *supra* note 94.

99. Alex Ward, *Thousands in France Are Protesting the Gas Tax—And Their President*, VOX, Nov. 27, 2018, <https://www.vox.com/2018/11/27/18113124/paris-gas-tax-riots-france-macron>.

100. Indeed, the policy recommendations articulated here will lay the groundwork for a meat tax. See, e.g., Marco Springmann et al., *Health-Motivated Taxes on Red and Processed Meat: A Modelling Study on Optimal Tax Levels and Associated Health Impacts*, 13 PLOS ONE e0204139 (2018) (describing optimal taxation of red meat according to its \$285 billion global health cost), <https://doi.org/10.1371/journal.pone.0204139>; Richard Conniff, *The Case for a Carbon Tax on Beef*, N.Y. TIMES, Mar. 17, 2018, <https://www.nytimes.com/2018/03/17/opinion/sunday/carbon-tax-on-beef.html>.

lation.<sup>101</sup> In the modern food economy, food preferences frequently cross national borders thanks to multinational food conglomerates and restaurant chains, increased travel and immigration, and cheap shipping costs. American fast food has expanded internationally in the past few decades, in parallel with the incorporation of foods from other cultures into the American diet. Thus, meeting demand-side food targets in the United States could have significant intergenerational and international effects. This will be crucial for climate mitigation and adaptation goals given the projected global increase in meat demand and overall food consumption.<sup>102</sup>

In conclusion, shifting consumer demand for meat toward more energy-efficient foods should be taken seriously in any climate mitigation or adaptation policy. Not only is conventionally produced meat environmentally expensive to consume compared to cheaper nutritional substitutes, but demand-side food regulation may be more cost effective and impactful compared with demand-side regulation of conventional energy.

### III. Lessons From Anti-Tobacco Regulation

Attempting to erode a deeply ingrained habit like excessive meat consumption requires looking at an equally ambitious regulatory effort as a blueprint. Like meat, cigarettes were overconsumed by Americans, to their detriment, throughout the 20th century. Cigarettes were deeply embedded in America's social experience. People smoked regularly and conspicuously, for pleasure and out of habit, and the cigarette came to mean virtually all things to everyone.<sup>103</sup> And like meat, cigarettes were also produced by large, vertically integrated multinational conglomerates buttressed by lax regulations, farming subsidies, and captured legislators.<sup>104</sup>

Against these odds, the anti-tobacco movement lowered the prevalence of smoking from 45% of the population in 1953 to a continuously dwindling 14% in 2018.<sup>105</sup> Anti-tobacco regulation utilized a suite of instruments, including advertising restrictions, package-labeling requirements, place-based bans, taxes, and tort litigation against manufacturers. In combination with private place-based bans and

incentives, these efforts collectively shifted cultural norms surrounding smoking from a routine, publicly acceptable practice in office buildings, airplanes, and even hospitals to a semi-private habit triggering disgust and moral judgment.<sup>106</sup> Indeed, the success of anti-tobacco regulation is owed in large part to the cultural and moral reform movement against tobacco.

Of course the analogy between meat and tobacco is imperfect. Meat is a nutrient-dense food, whereas tobacco has no health benefits. However, the anti-tobacco movement is the largest, best-documented, and most successful reduction effort in the United States in the modern era. So it is worth culling lessons from anti-tobacco to meet the challenges of consumption in the age of climate change. This part compares the ethics, culture, and economy of cigarettes versus meat, and ultimately concludes that regulating meat overconsumption could be easier than regulating smoking in several respects.<sup>107</sup>

Start with the ethics: smoking and eating meat both impose existential harms on consumers and third parties. Smoking has been identified as a causal factor of various cancers and cardiovascular disease.<sup>108</sup> Meat overconsumption is correlated with an increased risk of colorectal cancer, cardiovascular disease, and obesity.<sup>109</sup> These are pressing health problems in the United States, where average meat consumption far exceeds the optima correlated with desirable health indicators.<sup>110</sup> And for both habits, there is a long latency between consumption and onset of disease.<sup>111</sup>

Secondhand smoke in the aggregate also imposes substantial health risks on nonconsenting family members and other bystanders. Eating meat, on the other hand, depends on a production system that causes unnecessary suffering on animals raised in inhumane conditions.<sup>112</sup> A meaty diet contributes substantially to the destructive effects of climate change on human and non-human communities.

101. See Emma Boyland et al., *Food Choice and Overconsumption: Effect of a Premium Sports Celebrity Endorser*, 163 J. PEDIATRICS 339 (2013) (finding that children exposed to a celebrity endorsement of branded potato chips consumed significantly more of that brand than competitor brand); Paul Rozin, *The Socio-Cultural Context of Eating*, in FOOD CHOICE ACCEPTANCE AND CONSUMPTION 83-101 (H.L. Meiselman & H.J.H. MacFie eds., 1996); Daniel Fessler & Carlos Navarrete, *Meat Is Good to Taboo: Dietary Proscriptions as a Product of the Internalization of Psychological Mechanisms and Social Processes*, 3 J. COGNITION & CULTURE 1 (2003).

102. See Sharon Friel et al., *Public Health Benefits of Strategies to Reduce Greenhouse-Gas Emissions: Food and Agriculture*, 374 LANCET 2016 (2009); Marco Springmann et al., *Options for Keeping the Food System Within Environmental Limits*, 562 NATURE 519, 520 (2018).

103. ALLAN M. BRANDT, *THE CIGARETTE CENTURY* 100 (2009).

104. Notably, cigarette and food company mergers were frequent throughout the era of anti-tobacco regulation. See Michael Pollan, *Introduction* to MARION NESTLE, *FOOD POLITICS: HOW THE FOOD INDUSTRY INFLUENCES NUTRITION AND HEALTH* 14 (10th ed. 2013).

105. CDC, *Smoking & Tobacco Use: Data and Statistics*, [https://www.cdc.gov/tobacco/data\\_statistics/index.htm](https://www.cdc.gov/tobacco/data_statistics/index.htm) (last reviewed Jan. 17, 2018).

106. Paul Rozin & Leher Singh, *The Moralization of Cigarette Smoking in the United States*, 8 J. CONSUMER PSYCHOL. 321-37 (1999) (finding that beliefs that smoking is immoral correlate more highly with disgust than do beliefs about the health effects of cigarettes).

107. This comparative approach sidesteps theoretical questions posed by other law and norms scholars about the general relationship between law and norms and the extent to which the law ought to shape norms. See, e.g., Robert Ellickson, *Law and Economics Discovers Social Norms*, 27 J. LEGAL STUD. 537 (1998); Richard Posner, *Social Norms and the Law: An Economic Approach*, AM. ECON. REV., May 1997, at 365; Robert Cooter, *Decentralized Law for a Complex Economy: The Structural Approach to Adjudicating the New Law Merchant*, 144 U. PA. L. REV. 1643 (1996); Lisa Bernstein, *Merchant Law in a Merchant Court*, 144 U. PA. L. REV. 1765 (1996). But see Ann Carlson, *Recycling Norms*, 89 CAL. L. REV. 1231, 1300 (2001) (“[T]he characteristics of the behavioral changes needed matter deeply in choosing the appropriate mix of regulatory tools[.]”).

108. CDC, *REDUCING TOBACCO USE: A REPORT OF THE SURGEON GENERAL* 48 (2000).

109. An Pan et al., *Red Meat Consumption and Mortality Results From 2 Prospective Cohort Studies*, 172 JAMA INTERNAL MED. 555 (2012) (large-scale prospective longitudinal study showing that consumption of processed and unprocessed red meat is associated with an increased risk of premature mortality from all causes including cardiovascular disease and cancer).

110. See *infra* note 123.

111. BRANDT, *supra* note 103, at 111.

112. See, e.g., SMIL, *supra* note 20, at 144 (discussing the maltreatment of chickens in broiler houses and pigs in feedlots); FAO, *supra* note 61, at 7.

For smoking, broadcasting information about its private and bystander harms built the momentum behind and enforcement for decades of increasingly restrictive smoking bans. This then laid the groundwork for adoption of higher excise taxes and successful litigation. In particular, publication of the 1972 Surgeon General's report on the detrimental health effects of secondhand smoke led to a national call for nonsmokers' rights.<sup>113</sup> A steady year-to-year decline in smoking followed.<sup>114</sup> But a prior report on the health risks of *firsthand* smoke was insufficient to trigger this strong public response against cigarettes.<sup>115</sup> Smokers were perceived as informed consumers voluntarily incurring health risks, and the tobacco industry seized upon American values of autonomy and skepticism of government paternalism to constrain the effects of information that cigarettes caused private harm.<sup>116</sup>

Identifying the "innocent victim" of secondhand smoke marked a turning point in the culture of smoking because it allowed anti-tobacco advocates to portray smokers as selfishly disregarding the health and well-being of nonsmokers.<sup>117</sup> A decade after the 1972 Surgeon General's report, the federal government, most states, and hundreds of localities had imposed some form of smoking ban in public spaces like parks, restaurants, and schools, while cigarettes were removed entirely from military rations.<sup>118</sup> Many private facilities like restaurants and workplaces voluntarily became smoke-free.<sup>119</sup> Due to the change in cultural norms surrounding smoking, these place-based bans enjoyed widespread compliance, obviating the need for costly formal enforcement.<sup>120</sup> Workplace smoking bans were particularly effective: by lowering the number of cigarettes smoked per workday, restrictions eventually eroded the personal habit for millions of workers.<sup>121</sup>

Broadcasting the private and third-party harms of a meaty diet will be an important strategy to shift cultural norms when paired with the transformation of food environments. However, there are key differences between the perceived harms of eating meat and smoking cigarettes, which suggest that the paths toward reduction will not be identical. The following discussion flags some of these differences and speculates about their potential import.

To start, the health risks of eating small amounts of meat are low, whereas light or intermittent smoking is nearly as

dangerous as regular smoking.<sup>122</sup> For Japanese adults, consuming less than 30% of Americans' daily meat intake has been shown to correlate with relatively benign health outcomes.<sup>123</sup> Indeed, it would be surprising if avoidance of such a large and nutrient-dense food group like meat produces better health outcomes across different human populations. On the other hand, meat abstinence may be an easy rule of thumb for achieving health goals in developed and rapidly industrializing countries characterized by sedentary lifestyles, caloric excess, and long-term meat overconsumption.<sup>124</sup> Vegetarianism in North America and Europe has been associated with lower prevalence of lifetime obesity, heart disease, and various cancers.<sup>125</sup>

Americans are responsive to health-based claims for food reduction and avoidance. Concerns regarding overconsumption of fat and cholesterol in the early 1980s led consumers to substitute away from fatty animal products like beef and whole milk and toward poultry and skim milk.<sup>126</sup> This dietary transition was initiated by the release of the 1977 *Dietary Goals* U.S. Senate report on the association between cardiovascular disease and fat and cholesterol.<sup>127</sup> Government-sanctioned dietary advice mobilized public support and advocacy from public health organizations,

122. Rebecca Schane et al., *Health Effects of Light and Intermittent Smoking: A Review*, 121 PMC 1518 (2010).

123. See Masanori Nagao et al., *Meat Consumption in Relation to Mortality From Cardiovascular Disease Among Japanese Men and Women*, 66 EUR. J. CLINICAL NUTRITION 687 (2012) (finding no connection between moderate meat consumption—up to 714 grams per week—and premature death). See also Rashmi Sinha et al., *Meat Intake and Mortality: A Prospective Study of Over Half a Million People*, 169 ARCHIVES INTERNAL MED. 562 (2009); Eliza Barclay, *A Nation of Meat Eaters: See How It All Adds Up*, NAT'L PUB. RADIO, June 27, 2012 (noting that individual Americans ate 270.7 pounds per year in 2007, or 2,358.68 grams per week), <https://www.npr.org/sections/thesalt/2012/06/27/155527365/visualizing-a-nation-of-meat-eaters>; World Cancer Research Fund, *Recommendations and Public Health and Policy Implications*, in DIET, NUTRITION, PHYSICAL ACTIVITY, AND CANCER: A GLOBAL PERSPECTIVE 29 (2018) (recommending no more than 350-500 grams of red meat per week for Western consumers and "little, if any" processed meat), <https://www.wcrf.org/sites/default/files/Cancer-Prevention-Recommendations-2018.pdf>; ECONOMIC RESEARCH SERVICE, USDA, LIVESTOCK, DAIRY, AND POULTRY OUTLOOK 22 (2018), available at <https://www.ers.usda.gov/webdocs/publications/91043/ldp-m-294.pdf?v=5913.4>.

124. See Willett et al., *supra* note 13, at 8-15 (reviewing available evidence regarding healthfulness of global diets and concluding that optimal intake of red meat ranges between 0 and 28 grams per day and poultry between 0 and 58 grams per day); Friel et al., *supra* note 102, at 2016-25.

125. Joan Sabate & Michelle Wien, *Vegetarian Diets and Childhood Obesity Prevention*, 91 AM. J. CLINICAL NUTRITION 1525S-9S (2010) (meta-analysis finding that vegetarian diets are associated with lower prevalence of obesity among adults and children in the United States and Europe); Michael Burr & Peter Sweetnam, *Vegetarianism, Dietary Fiber, and Mortality*, 36 AM. J. CLINICAL NUTRITION 872 (1982) (finding negative association between vegetarianism and mortality from cardiovascular disease); Paul Appleby et al., *Mortality in Vegetarians and Comparable Nonvegetarians*, 103 AM. J. CLINICAL NUTRITION 218-30 (2016) (finding that vegetarians in the United Kingdom had significantly lower risk of deaths than regular meat eaters from circulatory disease, malignant cancer, lymphatic/hematopoietic tissue cancer, and respiratory disease). But see Gary Fraser, *Vegetarian Diets: What Do We Know of Their Effects on Common Chronic Diseases?*, 89 AM. J. CLINICAL NUTRITION 1607S-12S (2009) (confirming consistency of previous studies, but noting the need to use "more refined dietary categories than simply vegetarian and nonvegetarian"); SMIL, *supra* note 20, at 187 (casting doubt on the claim that vegetarianism leads to notable quality-of-life and longevity gains).

126. See Daniel et al., *supra* note 50.

127. See MARION NESTLE, *FOOD POLITICS: HOW THE FOOD INDUSTRY INFLUENCES NUTRITION AND HEALTH* 40 (10th ed. 2013).

113. CDC, *supra* note 108, at 40-48.

114. *Id.*

115. The earlier 1964 Surgeon General's report on the firsthand health effects of smoking was followed by a 0.5% decline in prevalence and then record sales of cigarettes in 1966. BRANDT, *supra* note 103, at 257.

116. BRANDT, *supra* note 103, at 280.

117. This logic also heightened the state's interest in controlling behaviors previously viewed as outside its purview. BRANDT, *supra* note 103, at 282, 287.

118. *Id.*

119. Jonathan Gruber, *Tobacco at the Crossroads: The Past and Future of Smoking Regulation in the United States*, 15 J. ECON. PERSP. 198 (2001).

120. PETER JACOBSON & JEFFREY WASSERMAN, RAND, *TOBACCO CONTROL LAWS: IMPLEMENTATION AND ENFORCEMENT* 50 (1997).

121. CDC, *supra* note 108, at 204-06 ("a smoker's personal, habit-derived cue to smoke after a meal or on a work break . . . may be weakened (and eventually even canceled) by a social, policy-derived cue not to smoke if the person is in a smoke-free restaurant or worksite").

and eventually changed how the food industry produced and marketed food.<sup>128</sup> Public sensitivity to food-related information seems robust but somewhat indiscriminate, given the rise of fad diets in recent decades.<sup>129</sup>

Consumers are even more sensitive to information about food safety. The 2003 outbreak of mad cow disease hurt the beef industry overall but was a boon to organic meats.<sup>130</sup> The proliferation of state laws prohibiting food disparagement in the past two decades shows that the immense financial liability created by the confluence of mass media and hypersensitivity to food safety has not been lost on the food industry.<sup>131</sup> To date, 13 states have adopted agricultural disparagement statutes, with the common aim of arming agricultural producers against persons who criticize the quality or safety of foods.<sup>132</sup>

Public sensitivity to food-related information may be explained by consumers' desire to lower search costs in the overabundant modern food market. Anthropologists theorize that human communication about the location and quality of food is evolutionarily primary, developing even before tool use.<sup>133</sup>

On the other hand, American consumers are averse to being told what to eat, as evidenced by the recent political backlash to Rep. Alexandria Ocasio-Cortez's (D-N.Y.) proposed Green New Deal.<sup>134</sup> This antagonism aligns with the initial public response to the tobacco wars and the more recent sugar wars. Spurred by Big Tobacco, critics of anti-tobacco had utilized ominous themes of Big

Brother to decry the "health and safety" fascists.<sup>135</sup> Similar complaints of paternalism fueled by the American Beverage Association were lobbed against New York's soda ban and Philadelphia's soda tax.<sup>136</sup> Still, sustained public health advocacy and place-based bans have shifted public opinion and dramatically reduced consumption of both cigarettes and sugary sodas.<sup>137</sup> Easy access to low-calorie substitutes in the latter case has facilitated a quicker and less contentious transition.<sup>138</sup> Thus, raising awareness about the private health and safety risks of meat overconsumption and the benefits of substitute foods will remain an important policy strategy in reducing meat consumption.

Whereas smoking inflicts visible harms on bystanders, eating meat does not. Additionally, the number of vegetarians in the United States has hovered around a marginal 5% in the past century.<sup>139</sup> By contrast, the majority of Americans were nonsmokers prior to anti-tobacco regulation. When reports about the health risks of secondhand smoking emerged, the newly victimized nonsmoker class began to present a visceral moral challenge to smokers. Nonsmokers started to develop heightened sensitivities to cigarette smoke.<sup>140</sup> In turn, smokers started to view violations of the new norm against public smoking as inviting personal embarrassment.<sup>141</sup> Many smokers quit in the increasingly hostile environment. In short, disseminating information about the bystander harms of smoking changed the social dynamic surrounding smoking, which kept the monitoring and enforcement costs for thousands of smoking bans at a minimum.

Despite this key difference between meat and cigarettes, food—and meat in particular—has been a principal target of taboos across cultures.<sup>142</sup> In Western societies, selective moral concern for cats and dogs living in close proximity to humans underwrites robust taboos against their consumption. Unfamiliar organ meats and edible species like crickets and snakes elicit strong societal disgust reactions. Taboos and disgust function to eliminate certain foods from the domain of choice. Evolutionary psychologists the-

128. Most notable promoters included the U.S. Department of Health and Human Services, USDA, the World Health Organization, the National Cancer Institute, and the American Heart Association, which created a certification program for lean "heart healthy" meats. The Senate report similarly influenced consumers and food producers in the United Kingdom. See FEDERAL TRADE COMMISSION, INFORMATION AND ADVERTISING POLICY: A STUDY OF FAT AND CHOLESTEROL CONSUMPTION IN THE UNITED STATES, 1977-1990 (1996), available at 108 WL 625258 ("[E]ach information source may amplify the effectiveness of the other information sources, leading to a fuller information environment in which consumer learning can progress more rapidly."); David Southgate, *Dietary Change: Changing Patterns of Eating, in FOOD CHOICE ACCEPTANCE AND CONSUMPTION*, supra note 103, at 382-86; Ann La Berge, *How the Ideology of Low Fat Conquered America*, 63 J. HIST. MED. & ALLIED SCI. 139 (2008).

129. Sophie Egan, *Paleo, Keto, Fasting, Whole 30: Why Food Tribes Are on the Rise*, WASH. POST, May 16, 2018.

130. OGLE, supra note 46, at 255-56.

131. Leah Carlson, *Pink Slime by Any Other Name Is Still Lean Finely Textured Beef*, 19 DRAKE J. AGRIC. L. 191 (2014).

132. ALA. CODE §6-5-620 (2014); FLA. STAT. ANN. §865.065 (2014); GA. CODE ANN. §2-16-1 (2014); LA. REV. STAT. ANN. §3:4501 (2013); MISS. CODE ANN. §69-1-251 (2014); OHIO REV. CODE ANN. §2307.81(A) (West 2014). Following implementation of food disparagement laws, Oprah Winfrey was sued by Texas ranchers for a comment she made on air that hearing about the mad cow disease "has just stopped me cold from eating another burger!" See *Texas Beef Group v. Winfrey*, 11 F. Supp. 2d 858, 864, 26 Media L. Rep. (N.D. Tex. 1998), aff'd, 201 F.3d 680, 28 Media L. Rep. (BNA) 1481, 45 Fed. R. Serv. 3d 1370 (5th Cir. 2000) ("The action for defamation is to protect the personal reputation of the injured party as distinguished from an action for disparagement which is to protect the economic interest of the injured party against pecuniary loss.").

133. Jeffrey A. Kurland & Stephen J. Beckerman, *Optimal Foraging and Hominid Evolution: Labor and Reciprocity*, 87 AM. ANTHROPOLOGIST 73-93 (1985) (arguing that cooperative foraging incorporating information exchange may have preceded tool use during the course of hominid evolution).

134. THE BBC NEWS, *Do Democrats Want to Take Away Americans' Hamburgers?*, BBC NEWS, Mar. 1, 2019.

135. BRANDT, supra note 103, at 281.

136. *A Soda Ban Too Far*, N.Y. TIMES, June 1, 2012, <http://www.nytimes.com/2012/06/01/opinion/a-soda-ban-too-far.html>.

137. Anahad O'Connor, *Putting Sugary Soda Out of Reach*, N.Y. TIMES, Nov. 3, 2016, <https://www.nytimes.com/2016/11/08/well/eat/putting-sugary-soda-out-of-reach.html>; Vauhini Vara, *There's Now a Soda Tax in Philadelphia, but Not Because Sugar Is Bad for You*, NEW YORKER, June 16, 2016, <https://www.newyorker.com/business/currency/theres-now-a-soda-tax-in-philadelphia-but-not-because-sugar-is-bad-for-you>.

138. See O'Connor, supra note 137.

139. R.J. Reinhart, *Snapshot: Few Americans Vegetarian or Vegan*, GALLUP, Aug. 1, 2018, <https://news.gallup.com/poll/238328/snapshot-few-americans-vegetarian-vegan.aspx>.

140. "What was fragrant became foul; what was attractive became repulsive; a public behavior became virtually private." BRANDT, supra note 103, at 315. Evolutionary psychologists theorize that disgust is an adaptive reaction to the prospect of harm introduced by one's neighbors. See Fessler & Navarrete, supra note 101, at 16.

141. BRANDT, supra note 103, at 303.

142. Animal food products pose unique threats in virtue of harboring a wide range of bacteria and protozoans. Some nonhuman species share inhibitory reactions toward unfamiliar meat. Fessler & Navarrete, supra note 101. See also Dorothy Lee, *Cultural Factors in Dietary Choice*, 5 AM. J. CLINICAL NUTRITION 166 (1957).

orize that “widespread avoidances” of food in a community may self-reinforce by becoming “imbued with moral rectitude” while members seek to sanction actions they find aversive.<sup>143</sup> Meat consumption has been restricted in this manner on a national level. India continues to consume the least amount of meat per capita due to the high proportion of Hindus and Buddhists, bucking the tight link between higher incomes and higher meat demand.<sup>144</sup>

Secular ethical arguments for vegetarianism in Western industrialized countries have largely failed to trigger any collective reduction in meat consumption.<sup>145</sup> Arguments connecting meat overconsumption with visual evidence of extreme weather events, human displacement, and ecosystem degradation will likely be more successful than appeals to abstract principles. Indeed, audiovisual evidence of animal suffering in meat production has played, and will continue to play, a crucial role in reducing meat consumption. Media coverage of animal abuse in feedlots and slaughterhouses has been shown to shift consumer demand for pork and poultry toward non-meat foods.<sup>146</sup>

Negative media coverage also constrains supply by inflicting reputational damage on suppliers. In 2008, undercover footage by the Humane Society showing crippled cows being shoved with forklifts in a California slaughterhouse prompted the largest meat recall in U.S. history and eventually led the meatpacking company to declare bankruptcy.<sup>147</sup> A similar investigation publicized by Compassion Over Killing in 2012 led to federal shutdown of an entire slaughterhouse and ties cut between several national restaurant chains and the supplier.<sup>148</sup> Whistleblowing events have also propelled institutional action: animal protection legislation and private industry purchasing commitments

have progressed rapidly in the past decade in response to public concern about animal welfare.<sup>149</sup>

One explanation for the strong public reaction to audiovisual recording of meat production and slaughter is that it triggers empathy toward nonhuman animals, an attitude strengthened by the ubiquity of pet ownership.<sup>150</sup> Public backlash to animal welfare whistleblowing events in other industries seems to signal pervasive asymmetric information in markets for goods and services produced using animals. For instance, the “Blackfish effect” refers to the sustained public outcry and subsequent financial misfortune of Seaworld following the premier of a documentary exhibiting Seaworld’s confinement of killer whales.<sup>151</sup>

Another explanation is that animal pain, animal sickness, and food contamination are perceived to be closely associated events, making ethical concern for abused livestock animals and harm-avoidant disgust toward eating meat mutually reinforcing attitudes.<sup>152</sup> Regardless of the precise explanation, meat overconsumption in Western societies seems to be sustained by concealment of production, which results in consumer misinformation or denial. This is unsurprising: Americans are living farther away from livestock populations now than ever before, and industrial animal agriculture takes place behind the opaque walls of warehouses.<sup>153</sup> Thus, releasing audiovisual information about the actual conditions of meat production still holds massive potential to transform cultural norms against meat eating.

Another similarity between cigarettes and meat eating is that promotional efforts play a substantial role in initiating and sustaining consumption. Advertising to children is especially effective. Distribution of cigarettes in military rations between World War I and the Vietnam War transformed the cigarette into a patriotic product.<sup>154</sup> The tobacco industry then tailored the cigarette’s national appeal for different demographic groups according to changing social

143. Fessler & Navarrete, *supra* note 101, at 17. Psychologists more or less echo this theory. See Rozin, *supra* note 101, at 101 (“[I]t is highly likely that disgust is communicated and acquired in social situations, with verbalizations and the disgust face as critical parts of the social context . . . Expressions of disgust by others, on line, have major influences on an individual’s food choices.”).

144. See Organisation for Economic Co-Operation and Development, *Meat Consumption (Indicator)*, <https://data.oecd.org/agroutput/meat-consumption.htm> (last visited Feb. 11, 2019). See also SMIL, *supra* note 20, at 63-66 (discussing proscriptions on consuming animals in Jewish, Buddhist, Christian, and Hindu societies); Matthew Ruby et al., *Compassion and Contamination. Cultural Differences in Vegetarianism*, 71 *APPETITE* 340-48 (finding that Indian vegetarians more strongly endorsed the ethics of purity attending to disgust compared with omnivorous peers).

145. Meat consumption following publication of Peter Singer’s canonical *Animal Liberation* in 1975 continued to increase through the 1980s. See Daniel et al., *supra* note 50, at 575. However, Singer’s book did lead to the creation of a variety of animal advocacy organizations with diffuse aims; they range from nonideological groups like the American Society for the Prevention of Cruelty to Animals, which seeks to improve the treatment of domestic animals, to militant vegan groups like the Animal Liberation Front, which engages in property destruction of facilities from meat trucks to animal-testing laboratories. See SMIL, *supra* note 20 at 143. Arguably, these groups were crucial in initiating later media-based animal advocacy efforts.

146. Glynn Tonsor & Nicole Oynk, *Impacts of Animal Well-Being and Welfare Media on Meat Demand*, 62 *J. AGRIC. ECON.* 59 (2011).

147. Will Potter, *Sentinel Species: The Criminalization of Animal Rights Activists as “Terrorists,” and What It Means for Civil Liberties in Trump’s America*, 95 *DENV. L. REV.* 877, 892 (2018).

148. *Id.* at 892-93.

149. See Lovvorn, *supra* note 17, at nn.154, 156-64.

150. See generally Frederic Leroy & Istvan Praet, *Animal Killing and Postdomestic Meat Production*, 30 *J. AGRIC. & ENVTL. ETHICS* 74-76 (2017); Public backlash to animal welfare whistleblowing events in other industries seems to signal pervasive asymmetric information in markets for goods and services produced using animals: consumers care about but are unaware of their true animal welfare attributes. The “Blackfish effect” refers to the sustained public outcry and subsequent financial misfortune of SeaWorld following the premier of a documentary exhibiting SeaWorld’s confinement of killer whales. SeaWorld ended its orca program three years after the documentary premiered. See Caty Chattoo, *Anatomy of “The Blackfish Effect,”* *HUFFINGTON POST*, Mar. 26, 2017, [https://www.huffingtonpost.com/caty-borum-chattoo/anatomy-of-the-blackfish-\\_b\\_9511932.html](https://www.huffingtonpost.com/caty-borum-chattoo/anatomy-of-the-blackfish-_b_9511932.html).

151. Seaworld ended its orca program three years after the documentary premiered. See Caty Chattoo, *Anatomy of “The Blackfish Effect,”* *HUFFINGTON POST*, Mar. 25, 2016, [https://www.huffingtonpost.com/caty-borum-chattoo/anatomy-of-the-blackfish-\\_b\\_9511932.html](https://www.huffingtonpost.com/caty-borum-chattoo/anatomy-of-the-blackfish-_b_9511932.html).

152. See Paul Rozin et al., *Moralization and Becoming a Vegetarian: The Transformation of Preference Into Values and the Recruitment of Disgust*, 8 *PSYCHOL. SCI.* 67-73 (1997) (finding that disgust is associated with vegetarianism on moral as opposed to health or ecological grounds).

153. See OGLE, *supra* note 46, at 262; Leroy & Praet, *supra* note 150, at 73.

154. See, e.g., BRANDT, *supra* note 103, at 52-54 (“Promotional efforts, tightly tied to wartime patriotism and morale, proved impressively successful in transforming a popular, if marginal, product and behavior into a cultural idiom.”).

mores of the time.<sup>155</sup> For women, the cigarette was sold as a mark of beauty and sexual allure, and for men, masculinity and independence.<sup>156</sup> In response to anti-tobacco regulation and plummeting rates of smoking in the 1970s, tobacco companies seized on the sticky effects of early-age smoking by aggressively targeting teenagers.<sup>157</sup> For teenage boys, cartoon ambassadors like Joe Camel promised in-group status for a pack of cigarettes.<sup>158</sup> When these efforts were again curtailed by U.S. regulation, tobacco companies recruited new smokers in foreign markets using the same advertising strategies.<sup>159</sup>

Aggressive advertising campaigns hide negative attributes of products from consumers. Advertising also constructs desirability on the cheap by, for instance, showing images of famous and attractive people sharing a cigarette. The effects are magnified for intrinsically addictive substances like nicotine, and when the audience is too young to discern the advertiser's motives.<sup>160</sup> The anti-tobacco movement tried to correct this skewed informational environment by directly communicating negative information about tobacco, restricting tobacco advertising, mandating information disclosure from producers, and undermining public trust in industry informants.

Regulation of socially relevant information about cigarettes proved to be extremely effective. States and localities that heavily invested in mass media anti-smoking campaigns experienced sharp declines in cigarette consumption.<sup>161</sup> Successful campaigns displayed sickly images of longtime smokers and famous actors making emotional appeals to quit smoking.<sup>162</sup> For teenagers, the "Truth" campaign flipped the cool factor of smoking with edgy encouragements to "rebel" against tobacco companies committing corporate misconduct.<sup>163</sup> In addition to disseminating fact-based information about the health risks of smoking, regulating socially relevant information was essential to erode the social allure of smoking.

America's meaty diet predates wartime rations and mass advertising.<sup>164</sup> However, federal subsidies and public-private promotional effort have sustained and continue to sus-

tain overconsumption.<sup>165</sup> Federal nutrition pamphlets in the 1940s promoted high levels of animal consumption by labeling meat, eggs, and dairy as half of all food types.<sup>166</sup> Like tobacco advertising, private promotional strategies for meat products appeal to the same basic human desires for community, social status, sex, and vitality.<sup>167</sup> Foreign diets have also been targeted by these promotional strategies in the past few decades.<sup>168</sup> And like smoking, adult food habits are shaped by childhood eating patterns.<sup>169</sup> The food industry has drilled down on this basic psychological fact with massive spending on advertising targeting children.<sup>170</sup>

However, reducing meat consumption may avoid the kind of industry resistance that met anti-tobacco efforts for three reasons. First, reducing meat requires affirmatively promoting substitutes. Aggressively promoting meat substitutes may be especially effective given dynamic consumer tastes and the consumer-driven nature of the food industry.<sup>171</sup> Indeed, a variety of foods from other cultures have been incorporated into the American diet throughout the 20th century, including now standard foods like the hamburger, chicken noodle soup, and macaroni and cheese.<sup>172</sup> Organic and local food sales have also skyrocketed in the past two decades due to environmental and health concerns.<sup>173</sup>

Second, vertically integrated food production allows meat producers to make meat substitutes. For example, Tyson Foods, the largest meat processor in the United States, not only owns the processing plants and food commodities capable of eventually being used to produce plant-based and cultured meats,<sup>174</sup> but Tyson's access to numerous marketing and distribution channels, including grocery retailers, hospitals, and school cafeterias, allows it to rapidly push new food products to domestic and interna-

155. CDC, THE HEALTH CONSEQUENCES OF SMOKING—50 YEARS OF PROGRESS: A REPORT OF THE SURGEON GENERAL 708, 774 (2014) ("For anyone growing up in the 1950s and 1960s . . . the marketing of cigarettes was so commonplace that the [Federal Trade Commission] report[ed] that it is virtually impossible for Americans of almost any age to avoid cigarette advertising.")

156. BRANDT, *supra* note 103, at 57, 98.

157. Longitudinal research shows that advertising increases smoking overall, while the tobacco industry's internal documents show consistent dose-response relationship between advertising efforts and initiation and progression of tobacco use among young people. CDC, *supra* note 155, at 797. One tobacco executive stated on record that young smokers between the ages of 14 and 24 "represent tomorrow's cigarette business." BRANDT, *supra* note 103, at 7.

158. BRANDT, *supra* note 103, at 387-90.

159. *Id.* at 449-70.

160. Robert Pitofsky, *Beyond Nader: Consumer Protection and the Regulation of Advertising*, 90 HARV. L. REV. 664-65, 676 (1977).

161. CDC, *supra* note 155, at 777.

162. BRANDT, *supra* note 103, at 269.

163. Gruber, *supra* note 119, at 207-08.

164. See OGLE, *supra* note 46.

165. See discussion *infra* Section IV.A.2. Wartime economy during World War II signaled the last major shift in meat consumption, with meat "rationing" increasing red meat consumption among civilians to 30% above current levels, and military consumption almost six times that of current levels. See SMIL, *supra* note 20, at 83.

166. See NESTLE, *supra* note 127, at 33-37.

167. See discussion *infra* Section IV.A.2.

168. *Id.*

169. See discussion *infra* Section IV.A.2. See, e.g., Sven Olov Daunfeldt et al., *Habit Formation in Food Consumption*, in THE OXFORD HANDBOOK OF THE ECONOMICS OF FOOD CONSUMPTION AND POLICY 770, 778 (Jayson L. Lusk et al. eds., Oxford Univ. Press 2011) (meta-study finding that food consumption is characterized by habit formation); Leann Birch, *Development of Food Preferences*, 19 ANN. REV. NUTRITION 41-62 (1999) (finding that manifestation of genetic predispositions for sweet, salty, and energy-dense foods depends on childhood food availability and child-feeding patterns).

170. See NESTLE, *supra* note 127, at 175-96.

171. "The Achilles Heel of large-scale animal abuse industries is and always has been that they are controlled to some extent by buyer preferences." Lovvorn, *supra* note 17, at 232.

172. See HELEN VEIT, MODERN FOOD, MORAL FOOD: SELF-CONTROL, SCIENCE, AND THE RISE OF MODERN AMERICAN EATING IN THE EARLY TWENTIETH CENTURY 123, 124 (2013).

173. Direct supplier-to-consumer ("local") food sales doubled between 1997 and 2007, whereas organic food sales increased almost sevenfold between 1997 and 2009. PARKE WILDE, FOOD POLICY IN THE UNITED STATES: AN INTRODUCTION 53-54 (2013). See also discussion *infra* Section IV.A.3.

174. See Adam Jones, *Tyson Foods Corn and Soybean Costs*, MARKET REALIST, Dec. 11, 2014, <https://marketrealist.com/2014/12/tyson-foods-corn-soybean-costs>.

tional consumers.<sup>175</sup> Most importantly, Tyson has enough capital to fund, acquire, and patent emerging food technologies.<sup>176</sup> Cigarette companies, on the other hand, could not make a substitute that avoided the harms of tobacco. Their recruitment of young smokers was therefore a life-or-death response to government regulation.<sup>177</sup>

Third, the food industry is subject to looming environmental constraints in the age of climate change, unlike the tobacco industry in the age of anti-tobacco regulation. Producing meat alternatives not only allows conglomerates to avoid socially imposed financial liabilities like animal welfare investigations, environmental regulation, and the unpredictable price of fuels used to sustain the refrigeration- and transportation-dependent supply chain; it may also mitigate the environmentally imposed risks of modern animal agriculture, like disease transmission and changing weather patterns, by producing food using fewer resource inputs from lower trophic levels. It's no wonder that large food conglomerates like Tyson, Kellogg, and Cargill have been keen to invest in competitor products like plant-based and cultured meats.<sup>178</sup> Thus, the capital requirements and lower financial risks of selling plant-based and cultured meats could align environmental, public health, animal welfare, and business interests to facilitate a massive dietary transition quickly and inexpensively.

In sum, reducing meat consumption may be easier than reducing smoking for a number of reasons. First, evidence from recent history and evolutionary psychology suggests that humans are hypersensitive to information about food and especially primed to adopt aversions to animal-based foods. Food avoidance behaviors are communicated and reinforced in social situations by moral attitudes and disgust reactions. Second, systemic visual information asymmetry about the conditions of industrial animal agriculture seems to play a large role in sustaining meat overconsumption. Animal welfare groups are willing to close this information gap by using audiovisual recording to facilitate direct observation. Third, food industries that supply, distribute, and sustain high demand for meat products have financial incentives to produce lower-emissions substitutes like plant-based and cultured meats. Thus, the government should at minimum facilitate the capacity of third parties to disseminate information about how meat is

produced. Where government can change the architecture of food environments, it should substitute meat products with alternatives.

#### IV. Policy Recommendations for Reducing Meat Consumption

In this part, I discuss four legal and policy recommendations for facilitating consumer transitions to lower-emissions diets, with a focus on reducing absolute meat consumption. Due to the outsized role that farm subsidies play in U.S. food production, demand-side interventions must be paired with appropriate supply-side reforms.<sup>179</sup> The specific recommendations discussed here are relatively costless and implemented at the federal level. But the two strategies underlying these recommendations—disseminating salient food-related information and changing food environments—will be essential in inducing dietary shifts at any level.

##### A. Information Regulation

Providing consumers with salient information about different foods lowers high search costs in an abundant and diverse food market. Meeting climate mitigation and adaptation goals requires disseminating information about climate-relevant attributes like mitigation and adaptation value, as well as intersectional food attributes such as health, environmental impact, and animal welfare. The government is a trusted informant, but nongovernmental organizations and food producers are more ubiquitous informants. This section recommends removing government-imposed barriers to private information dissemination and updating trusted public food certification programs to reflect climate goals.

##### 1. Challenge State “Ag-Gag” Laws

Several states have passed agricultural gag order (“ag-gag”) laws that functionally disable undercover investigations of feedlots and animal slaughter facilities to curb resultant economic losses. Ag-gag laws criminalize behaviors such as trespass of animal production facilities by false pretenses, video or audio recording of facilities, and failure to submit a video to law enforcement within a certain amount of time.<sup>180</sup> Currently, six of the top livestock and poultry slaughtering states have active ag-gag laws, one of which is being challenged on First Amendment grounds in pend-

175. *Id.*

176. See Amanda Little, *Tyson Isn't Chicken*, BLOOMBERG, Aug. 15, 2018, <https://www.bloomberg.com/news/features/2018-08-15/tyson-s-quest-to-be-your-one-stop-protein-shop>.

177. BRANDT, *supra* note 103, at 391. Tellingly, the tobacco industry's other adaptive strategy was to acquire food conglomerates. See Pollan, *supra* note 104.

178. Tyson is also beginning to market itself as a “protein” rather than meat producer. See Greg Trogger, *Why Tyson, the Largest Meat Processor in the U.S., Is Investing in Fake Meat*, CHI. TRIB., Apr. 20, 2018; Matt Ball, *Transforming the Meat Industry From the Inside Out*, GOOD FOOD INST., Dec. 4, 2017 (observing that leading meat producers are actively investing in and acquiring plant-based companies and cultured meat companies), <https://www.gfi.org/transforming-the-meat-industry-from-the-inside>; Times Wire Services, *Kellogg Agrees to Buy Veggie-Burger Maker*, L.A. TIMES, Oct. 2, 1999 (reporting that the world's largest cereal maker purchased the now legacy U.S. manufacturer of plant-based meat).

179. See, e.g., Dewey et al., *supra* note 62.

180. See, e.g., N.C. GEN. STAT. §99A-2(a) (2016); IOWA CODE ANN. §717A.3A (2012) (criminalizing obtaining access to an agricultural production facility by false pretenses); MO. ANN. STAT. §578.013 (2012) (criminalizing video recording of farm animal believed to be “subjected to abuse or neglect” and mandating submission of videotape to law enforcement); Montana Farm Animal and Research Facilities Protection Act, H.B. 120, 1991 Leg., Reg. Sess. (Mont. 1991) (codified at MONT. CODE §81-30-101 (2015)) (criminalizing entering an animal facility to take pictures by photograph, video camera, or other means with the intent to commit criminal defamation).

ing litigation by animal advocacy groups.<sup>181</sup> Federal courts have been extremely receptive to First Amendment challenges.<sup>182</sup> Continuing to challenge ag-gag laws is a costless way to reduce market failure from information asymmetry in the meat products market.

## 2. Reform the Federal Commodity Checkoff Program

Another policy distorting the information and food environment is the federal commodity checkoff program. Overseen by the U.S. Department of Agriculture (USDA), the checkoff program levies a mandatory sales and import tax on producers of particular food commodities, like beef. The funds are then spent by trade associations on generic promotional efforts. For instance, the beef checkoff forbids “reference to a brand or trade name of any beef product” without approval of USDA and the National Cattlemen’s Beef Board.<sup>183</sup> The checkoff program is responsible for national advertising slogans like “Beef. It’s What’s for Dinner” and “Pork: The Other White Meat.” Checkoff programs are a cost-effective way to increase consumer demand for commodity foods and decrease demand for competing commodities.<sup>184</sup> Every checkoff dollar assessed on beef returns \$11.<sup>185</sup>

In addition to advertising, checkoff funds are used to finance partnerships with grocery stores, frozen food suppliers, and major fast food restaurants to launch products containing excess commodity foods. The National Cattlemen’s Beef Board, for instance, has used checkoff funds to launch beefy fast foods like the Steak Grilled “Stuff” Burrito and the Philly Cheese Steak Pizza, increasing sales of beef to one million pounds per week.<sup>186</sup> Funds are also used to finance research and innovative consumer education. The pork checkoff reaches millennial consumers by funding creation of pork cooking videos by YouTube “social

influencers,” which amassed a total of 1.7 million views in 2017.<sup>187</sup> The beef checkoff has been used to increase consumer perceptions regarding the “importance of beef in a balanced diet” by targeting classroom teachers and Girl Scout clubs as well as trusted “thought leaders” like pediatricians and obstetricians.<sup>188</sup> “Whimsical” YouTube recipes like the “Veal Meatloaf Cupcake” were also funded using the checkoff “in an effort to bring parents and kids together in the kitchen.”<sup>189</sup>

Since the 1980s, checkoff funds have been used to promote U.S. meat exports and American-style meat consumption using domestic promotional techniques in developing foreign markets.<sup>190</sup> Beef exports to Japan, South Korea, Hong Kong, and Taiwan have more than tripled in the past decade.<sup>191</sup>

Against challenges from small beef producers, the U.S. Supreme Court in *Johanns v. Livestock Marketing Ass’n*<sup>192</sup> deemed such programs to be government speech immune from First Amendment scrutiny. The implication of the ruling is that food producers who desire to differentiate their commodity based on origin or production attributes can be legally compelled to fund promotion of competitor commodities through generic advertising. A cattleman who wishes to integrate crop production or regionally adaptive animal species into their operation must contribute to the fund that promotes all beef.

As government speech, current implementation of meat checkoff programs is inconsistent with key climate mitigation and adaptation goals. Mandatory contribution to generic promotional efforts removes incentives for individual producers to differentiate and market their commodity on production attributes like climate sustainability. Without these incentives, U.S. consumers are also deprived of an important source of private information about the rela-

181. See *People for the Ethical Treatment of Animals, Inc. v. Stein*, 737 Fed. Appx. 122 (4th Cir. 2018); *Animal Legal Def. Fund v. Reynolds*, 297 F. Supp. 3d 901 (S.D. Iowa 2018).

182. See, e.g., *Animal Legal Def. Fund v. Reynolds*, No. 17-cv-362 2019, WL 140069, 49 ELR 20007 (S.D. Iowa Jan. 9, 2019) (holding that Iowa’s “ag-gag” law is “content-based” speech restriction that fails intermediate scrutiny under the First Amendment); *Animal Legal Def. Fund v. Wasden*, 878 F.3d 1184 (9th Cir. 2018) (striking down Idaho “ag-gag” law on similar grounds); *Animal Legal Def. Fund v. Herbert*, 263 F. Supp. 3d 1193 (D. Utah 2017) (striking down Utah’s “ag-gag” law on similar grounds).

183. 7 C.F.R. §1260.169(d) (2018).

184. Harry Kaiser, *Effect of Generic Advertising on Food Demand*, in THE OXFORD HANDBOOK OF THE ECONOMICS OF FOOD CONSUMPTION AND POLICY, *supra* note 169, at 695, 704-07 (meta-study finding that (1) generic advertising has statistically significant positive impact on demand; (2) revenue increases caused by generic advertising are disproportionately large relative to industry costs; and (3) generic advertising of one product (beef) has a negative impact on competing products (pork)).

185. USDA Agricultural Marketing Service (AMS), *Cattlemen’s Beef Board*, <https://www.ams.usda.gov/rules-regulations/research-promotion/beef> (last visited Feb. 11, 2019).

186. CATTLEMEN’S BEEF PROMOTION AND RESEARCH BOARD (BEEF BOARD), 2002 ANNUAL REPORT: CONNECTING CATTLEMEN TO CONSUMERS (last visited Mar. 11, 2019), <https://www.beefboard.org/uDocs/ACF17B5.pdf>. See generally Beef Board, *Cattlemen’s Beef Board National Annual Reports*, <https://www.beefboard.org/library/annual-reports.asp> (last visited Feb. 11, 2019).

187. See Jenna Bieri, *Making Pork Famous*, PORK CHECKOFF, Oct. 19, 2018, <https://www.pork.org/blog/making-pork-famous/>.

188. See Sarah Milov, *Promoting Agriculture: Farmers, the State, and Checkoff Marketing, 1935-2005*, 90 BUS. HIST. REV. 510, 514 (2016).

189. See Beef Board, *Make It Memorable. Make It Veal*, <https://www.beefitswhatsfordinner.com/cooking/cooking-veal> (last visited Feb. 11, 2019).

190. The foreign promotional program is administered by the U.S. Meat Export Federation, a trade group, in partnership with USDA. See Milov, *supra* note 188, at 522. Beef exports to Japan, South Korea, Hong Kong, and Taiwan have more than tripled in the past decade. See U.S. MEAT EXPORT FEDERATION, TOTAL U.S. BEEF EXPORTS 2008-2017 (2018), <https://www.usmef.org/downloads/Beef-2008-to-2017.pdf>. The U.S. Meat Export Federation also seized the second largest funding allocation in the Market Access Program, which finances promotional activities for both generic and branded U.S. agricultural products abroad. See USDA Foreign Agricultural Service, *MAP Funding Allocations—FY 2018*, <https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2018> (last visited Feb. 11, 2019).

191. See U.S. MEAT EXPORT FEDERATION, TOTAL U.S. BEEF EXPORTS 2008-2017 (2018), <https://www.usmef.org/downloads/Beef-2008-to-2017.pdf>. The U.S. Meat Export Federation also seized the second largest funding allocation in the Market Access Program, which finances promotional activities for both generic and branded U.S. agricultural products abroad. See USDA Foreign Agricultural Service, *MAP Funding Allocations—FY 2018*, <https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2018> (last visited Feb. 11, 2019).

192. *Johanns v. Livestock Mktg. Ass’n*, 544 U.S. 550, 564-67 (2005) (holding that mandatory payments from cattle sellers to fund the beef promotion program raise no free speech violations).

relationship between food production and climate change.<sup>193</sup> Further, the use of funds to boost meat consumption internationally contributes to the steady increase of global agricultural emissions, and helps to ensure inefficient allocation of human-edible grains and water resources in the face of climate-induced scarcity. Thus, meat checkoff programs are broadly inconsistent with the recommendations of the IPCC and the U.S. Global Change Research Program.<sup>194</sup>

Promoting increased consumption of meat with checkoff funds is also inconsistent with stated public nutrition recommendations.<sup>195</sup> The *Dietary Guidelines for Americans* report published jointly by USDA and the U.S. Department of Health and Human Services explicitly identifies “lower intakes of meats . . . as characteristics of healthy eating patterns,” and as associated with “reduced risk of [cardiovascular disease]” and obesity.<sup>196</sup> The report also acknowledges that American consumers are currently eating above the recommended quantity.<sup>197</sup> However, the combined \$115 million in checkoff funds for pork and beef in 2017 dwarfed checkoff support for recommended foods like fruits, vegetables, and grains.<sup>198</sup>

Checkoff-funded promotional messages regarding the importance of meat in a balanced diet perpetuate an incomplete information environment. Partnerships with food distributors like fast-food restaurants perpetuate an unhealthy food environment. These efforts are particularly unjustifiable when used to target children on social media, in classrooms and after-school programs, and in their own homes.

Several costless legislative and regulatory actions are available. Contribution to meat checkoffs can be deemed entirely voluntary via legislative enactment.<sup>199</sup> While a voluntary cross-checkoff proposal died in Congress in 2017, it could be re-proposed in light of the Green New Deal and its commitment to reduce GHG emissions in the agricultural sector.<sup>200</sup> Lighter-touch regulatory interventions include mandating a portion of checkoff funds to be set aside for research and implementation of climate-sustainable livestock practices, pursuant to the Secretary

of Agriculture’s authority to approve checkoff spending.<sup>201</sup> USDA could also require any meat promotional material to include labels recommending reduced meat intake in line with *Dietary Guidelines* recommendations.

### 3. Reform the National Organic Program

In addition to removing sources of misinformation about high-emissions food, the federal government can incentivize dissemination of information about climate-sustainable attributes of different food products by modifying popular environmentally focused certification programs.

The National Organic Program governs standards for organically produced foods and use of the word “organic” on all domestic food labels.<sup>202</sup> The program is managed by USDA under the Food, Agriculture, Conservation, and Trade Act of 1990.<sup>203</sup> USDA defines “organic production” as the “use of cultural, biological, and mechanical practices that support cycling of on farm resources, promote ecological balance, and conserve biodiversity.”<sup>204</sup>

Domestic sales for organic products have outpaced overall food sales since 2000, despite significant price premiums attached to organic foods.<sup>205</sup> These sales trends signal that how food is produced is highly salient to consumers. As a result, a social premium is now attached to the organic label. In response to consumer demand, major supermarkets and restaurants have expanded organic food offerings, while organic production has more than tripled in size.<sup>206</sup> In response to increased international demand for organic foods, USDA has entered into agreements with foreign countries ascertaining the equivalency of national organic standards for food imports and exports.<sup>207</sup>

Current organic standards primarily specify appropriate input materials in crop and livestock production, while prohibiting inputs such as genetically engineered seeds, synthetic fertilizers, and antibiotics.<sup>208</sup> Organic standards may promote more efficient and lower-emissions livestock production compared with nonorganically produced foods, but they currently fall short of climate sustainability goals. For instance, current organic livestock standards permit inefficient practices like separating livestock from crop production entirely, feeding ruminants large amounts

193. Private promotional campaigns not only amplify information regarding the link between food production and climate change, but exposure to advertising claims may also lead consumers to attend to government information about climate change. See FEDERAL TRADE COMMISSION, *supra* note 128.

194. See *supra* notes 4 and 12.

195. See also Parke Wilde, *Federal Communication About Obesity in the Dietary Guidelines and Checkoff Programs*, 14 OBESITY 967-73 (2006).

196. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES & USDA, 2015-2020 DIETARY GUIDELINES FOR AMERICANS 25 (8th ed. 2015), [https://health.gov/dietaryguidelines/2015/resources/2015-2020\\_Dietary\\_Guidelines.pdf](https://health.gov/dietaryguidelines/2015/resources/2015-2020_Dietary_Guidelines.pdf).

197. *Id.*

198. NATIONAL PORK BOARD CHECKOFF SYSTEM, CHECKOFF DISTRIBUTION REPORT 2017 (2018), <https://www.pork.org/wp-content/uploads/2018/02/DIST-YTD-2017.pdf>; BEEF BOARD, 2017 CATTLEMEN’S BEEF BOARD ANNUAL REPORT (2017), <https://www.beefboard.org/news/files/FY2018/2017CBBAnnualReport2.pdf>.

199. Currently, only producers of certified “organic” and “100% organic” beef and pork products are exempt. 7 C.F.R. §§1230.102 and 1260.302 (2015). See also Voluntary Checkoff Program Participation Act, S. 740, 115 Cong. (2017).

200. Voluntary Checkoff Program Participation Act, S. 740, 115th Cong. (2017).

201. 7 U.S.C. §2904.4(C).

202. 7 U.S.C. §§6503, 6504, as amended by the Agriculture Improvement Act of 2018, Pub. L. No. 115-334, 132 Stat. 4490.

203. *Id.*

204. USDA Natural Resources Conservation Service, *What Is Growing Organic?*, <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?cid=nrceprd1353135> (last visited Feb. 11, 2019).

205. Catherine Greene et al., *Growing Organic Demand Provides High-Value Opportunities for Many Types of Producers*, USDA, Feb. 6, 2017, <https://www.ers.usda.gov/amber-waves/2017/januaryfebruary/growing-organic-demand-provides-high-value-opportunities-for-many-types-of-producers/>; Elanor Starmer, *Growth and Opportunity in the Organic Sector*, USDA, Nov. 10, 2016, <https://www.usda.gov/media/blog/2016/11/10/growth-and-opportunity-organic-sector>.

206. Starmer, *supra* note 205.

207. See USDA AMS, *Organic Certification—International Trade Partners*, <https://www.ams.usda.gov/services/organic-certification/international-trade> (last visited Feb. 11, 2019).

208. 7 U.S.C.A. §6508 (2018).

of human-edible grain, and raising regionally maladaptive animal species.<sup>209</sup> Standards also specify no requirements regarding reduced soil tillage, recycling livestock manure, or other practices that improve soil carbon sequestration.<sup>210</sup>

Modifying livestock organic standards harnesses the growing consumer demand for organic foods, social premium attached to the organic label, and public trust in government certification programs to incentivize livestock producers to transition to climate-sustainable operations.<sup>211</sup> This would spread the cost of climate adaptation from producers to consumers who can afford it. But unlike direct subsidies to producers, climate-tailored organic standards may facilitate private information dissemination about climate change, as well as better consumer uptake of information about the relationship between consumption and climate change generally.<sup>212</sup> This enhanced information environment may have other positive spillover effects, like shifting consumer demand toward other climate-sustainable products. Ultimately, modifying organic standards must be paired with other efforts to reduce absolute meat consumption, insofar as resultant increases in organic meat consumption may offset its benefits.<sup>213</sup>

## B. Publicly Subsidized Food Environments

An equally important mechanism to encourage meat reduction is to change the food environments where consumers purchase and eat food. This recommendation is not only in line with lessons from the anti-tobacco movement, but also supported by research showing that increasing the convenience of a desired behavioral change is more effective than virtually any other policy option.<sup>214</sup> Changing publicly subsidized food environments like school cafeterias and canteens will be crucial to facilitate mass dietary shifts for three reasons.

First, the government has control over these food environments and therefore has a duty to act. Indeed, the gov-

ernment influences private food choice not just by granting selective crop subsidies, but also by shaping food environments for captive customers.<sup>215</sup> Even governmental inaction exerts direct influence. The passively enforced beef checkoff program allows private trade groups to aggressively market foods to children in public schools, which contributes to the overrepresentation of red meat in adult diets.

School children are especially vulnerable, given their relative inability to discern informant motives, forced membership in influential peer groups, and relatively malleable dietary preferences.<sup>216</sup> As one school official opines:

It must be the dream of marketing executives. The law requires your future customers to come to a place 180 days a year where they must watch and listen to your advertising messages exclusively. Your competitors are not allowed access to the market. The most important public institution in the lives of children and families gives its implied endorsement to your products. The police and schools enforce the requirement that the customers show up and stay for the show.<sup>217</sup>

In short, responsible exercise of governmental authority is imperative in school cafeterias.

Second, cafeterias where repeat consumers eat together are prime locations to get individuals to make dietary shifts due to background social norms. Indeed, workplace smoking bans were effective because they harnessed background norms of cooperation and compliance. Often, a critical mass of visible adherents is required to signal the presence of a local norm. But model behavior by local leaders has also been shown to trigger voluntary adoption of costly desirable behavior within neighborhoods.<sup>218</sup>

In some contexts, even written signs describing the existence of a local norm are effective in inducing desirable behavior, despite the absence of face-to-face or repeat interactions. For instance, U.S. hotel guests were more likely to reuse towels when they read signs saying that previous guests in that particular room reused towels.<sup>219</sup> One explanation

209. 7 C.F.R. §§205.236-.240 (2018). See discussion *supra* Section I.B.4.

210. 7 C.F.R. §205(C) (2018). While a livestock producer seeking certification under the National Organic Program must submit an “organic system plan” to its certifying agent, which may include “the method of applying manure” and “information about planned crop rotation sequences,” there are no hard requirements for planting leguminous cover crops on farmland, recycling manure into the soil, or using crop residue as feed or soil additive. Similarly, while organic livestock producers must manage a pasture in compliance with organic land requirements, these standards are vaguely oriented toward soil fertility and non-contamination rather than improving the carbon sequestration capacity of soil. 7 C.F.R. §§205.237(c)-(d), 205.240(a), 205.202(a), 205.203 (2018).

211. New climate-focused organic certification standards could be implemented in conjunction with new supply-side policies in the 2018 Farm Bill, such as the conservation stewardship program and soil carbon sequestration project. Agriculture Improvement Act of 2018, Pub. L. No. 115-334, §§2308(d), 2307(c), 2401, 132 Stat. 4490. To foster maximum participation, the “organic” label could be gradated corresponding to degrees of climate sustainability achieved by a particular operation.

212. See *supra* notes 128 and 160.

213. Julius McGee, *Does Certified Organic Farming Reduce Greenhouse Gas Emissions From Agricultural Production?*, 32 AGRIC. & HUM. VALUES 255 (2015) (finding that rises in certified organic farmland between 2000 and 2008 are positively correlated with GHG emissions from agricultural production due to rise in corporate participation, which facilitates weakening of certification standards and increases the overall scale of organic production).

214. Carlson, *supra* note 107, at 1275.

215. RICHARD THALER & CASS SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* 10-11 (2008).

216. See Rozin, *supra* note 101, at 95-97, 192-94 (discussing studies suggesting that children’s food preferences are highly influenced by peer choices); Patricia Crawford et al., *The Ethical Basis for Promoting Nutritional Health in Public Schools in the United States*, 8 PREVENTING CHRONIC DISEASE A98 (2011).

217. See NESTLE, *supra* note 127, 188.

218. See Gordon Kraft-Todd et al., *Credibility-Enhancing Displays Promote the Provision of Non-Normative Public Goods*, 563 NATURE 245-48 (2018) (finding that more residents installed solar panels when community recruiters who engaged in face-to-face outreach also installed solar panels). This effect may be especially pronounced for food choice. See also Fessler & Navarrete, *supra* note 101, at 17-18 (discussing the adaptive value of mimicking the food choices of locals and prestigious individuals: “in ancestral populations prestige was often an accurate index of the utility of a given actor’s behaviors[.]” thus an effective strategy was to “imitate the beliefs and practices of high-status individuals”).

219. This was in comparison to signs describing towel reuse of other citizens, men and women, environmentally concerned persons, and guests of that hotel. See Noah Goldstein et al., *A Room With a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels*, 35 J. CONSUMER RES. (2003). But see Gerd Bohner & Lena Schlüter, *A Room With a Viewpoint Revisited: Descriptive Norms and Hotel Guests’ Towel Reuse Behavior*, 8 PLoS ONE e104086 (2014) (finding that German hotel guests responded more to signs describing environmentalist behavior).

for why local norms exert such strong influence on individual behavior is that they signal effective and appropriate behavior in one's spatially immediate settings and circumstances.<sup>220</sup> Children's food choices are especially influenced by the food choices of peer groups and admired figures.<sup>221</sup>

Lastly, public institutions are especially impactful consumers. Their catering decisions not only exert greater influence on the food system than individual consumer decisions, given the sheer volume of food purchased, but also influence later catering decisions: getting public institutions to buy and serve meat alternatives educates personnel on how to acquire and prepare new foods. Indeed, even a small change in an institution's catering repertoire can have large benefits. For instance, one Florida school district was able to avoid 2.3 million pounds of CO<sub>2</sub> emissions over two years merely by eliminating meat once a week and replacing beef with plant-based meat in one dish eight times per year.<sup>222</sup>

The vast majority of public food purchasers like federal workplaces and hospital cafeterias are unregulated at the state and federal levels. These institutions will need to voluntarily adopt plant-based menus, like the thousands of restaurants and workplaces that voluntarily became smoke-free before federal and state smoking bans were adopted. Doing so requires seeking new food contractors and, for larger actors like municipalities, developing legally binding ordinances and nonbinding resolutions.<sup>223</sup> Changing these food environments will depend on pressure from individual members and private organizations.

One exception is the NSLP. It is the most expensive nutrition program used by governmental agencies to directly purchase food, and the largest single source of food for schools.<sup>224</sup> The NSLP covers food for more than 50 million children each day for free or at reduced price.<sup>225</sup> Overseen by the Food and Nutrition Service (FNS) of USDA, the NSLP provides partially processed foods—"USDA Foods"—or cash reimbursement to schools for meals that meet program requirements.<sup>226</sup> USDA is mandated to spend at least 12% of total NSLP funds on USDA Foods.<sup>227</sup>

Reforming three parts of the NSLP can avoid substantial carbon emissions and better align with USDA's *Dietary Guidelines*. First, Congress can require FNS to gradually substitute commodity meat purchases for palatable plant-based proteins like tofu and black bean burgers, as well as organic meats. FNS works with schools to determine which USDA Foods to purchase, but FNS has wide dis-

cretion in purchasing decisions.<sup>228</sup> More than 45% of the funds in 2015 were used to purchase beef, pork, and poultry compared to 2% spent on grains, seeds, and nuts.<sup>229</sup>

Second, USDA can require commercial food processors to adopt technologies for processing bulk USDA Foods into plant-based proteins and plant-based meat. Of the total amount of USDA Foods given to schools, 40% is diverted by schools to commercial processors to be prepared into unhealthy processed meats like chicken nuggets.<sup>230</sup> Processors must be approved by USDA and currently include large food conglomerates like Cargill and Tyson that have invested in developing plant-based meat.<sup>231</sup>

Lastly, FNS can update nutrition standards for NSLP-reimbursable meals to allow for more plant-based foods.<sup>232</sup> Currently, schools are required to serve a certain quantity of meat or meat alternate per day.<sup>233</sup> This is inconsistent with the USDA *Dietary Guidelines* and authoritative medical evidence, which suggests that Americans should be eating much less meat, especially processed meat, to reduce the prevalence of various cancers.<sup>234</sup> Thus, FNS should expand the category of acceptable meat alternatives to include mushroom and wheat protein foods. FNS could also gradually transition to a requirement of 70% meat alternates in the current "meat or meat alternate" category.

## V. Conclusion

A national dietary shift away from meat is an essential step in meeting climate mitigation and adaptation goals. The successful anti-tobacco campaign shows that it is possible to encourage massive reduction in consumption of a product that is both privately and socially desirable. But regulation sensitive to the social dynamics of consumption behavior is key. Due to the variety of personal and ethical reasons for reducing meat consumption, and the decentralized nature of food consumption and procurement, food producers, advocacy groups, and local organizations will play a crucial role in inducing this dietary shift. The government should facilitate these private efforts by removing obstacles to information disclosure, updating existing food certification standards, and leading the way by procuring more plant-based foods for publicly subsidized meals.

220. See Goldstein et al., *supra* note 219.

221. See Rozin, *supra* note 101.

222. KARI HAMERSCHLAG ET AL., FRIENDS OF THE EARTH, SCALING UP HEALTHY, CLIMATE-FRIENDLY SCHOOL FOOD 12 (2018).

223. KARI HAMERSCHLAG ET AL., FRIENDS OF THE EARTH, MEAT OF THE MATTER: A MUNICIPAL GUIDE TO CLIMATE-FRIENDLY FOOD PURCHASING (2017).

224. Julia McCarthy, *Greening Eggs and Ham: Using the National Environmental Policy Act to Assess Animal-Agricultural Pollution From The National School Lunch Program*, 19 VT. J. ENVTL. L. 191, 194-95 n.14 (2018).

225. Pub. L. No. 79-396, §2, 60 Stat. 230, 230 (1946) (codified as amended at 42 U.S.C. §§1751-1763).w

226. 7 C.F.R. §210.3(a) (2017). National School Lunch Act, 42 U.S.C. §§1755.6, 1765.16.

227. 42 U.S.C. §1755.6(e).

228. See also USDA, FNS, WHITE PAPER: USDA FOODS IN THE NATIONAL SCHOOL LUNCH PROGRAM 8 (2016).

229. *Id.* The vast majority of beans in the USDA Foods inventory are canned or dried. USDA FNS, *NSLP USDA Foods Product Information Sheets*, <https://www.fns.usda.gov/fdd/nslp-usda-foods-fact-sheets> (last published July 20, 2017).

230. USDA, USDA FOODS FURTHER PROCESSING 2 (2018), <https://fns-prod.azureedge.net/sites/default/files/fdd/Processing-Fact-Sheet.pdf>. See also PHYSICIANS COMMITTEE FOR RESPONSIBLE MEDICINE, IMPROVING USDA FOODS IN THE NATIONAL SCHOOL LUNCH PROGRAM (2014), <http://docplayer.net/67663116-Improving-usda-foods-in-the-national-school-lunch-program.html>.

231. See USDA FNS, *NPA Approved Processors*, <https://www.fns.usda.gov/fdd/npa-approved-processors> (last published Mar. 23, 2018). See also discussion *supra* Part III.

232. 7 C.F.R. §§210.1(a), 210.10(c) (2018).

233. *Id.* §210.10(c)(2)(i).

234. See *supra* notes 123 and 196.