A Local Solution for a Global Problem: Technology-Forcing Municipal Ordinances to Promote Enhanced Efficiency Fertilizers

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Nitrogen pollution is one of the most pressing environmental problems in the U.S. today, with grave implications for human and environmental health. Agricultural activities release the most nitrogen pollution of any industry, but a combination of prescriptive regulation of farmers and voluntary adoption of best practices has not solved the problem. However, municipal ordinances encouraging the sale of EEFs (Enhanced Efficiency Fertilizers) could be a new approach to tackle nitrogen pollution. More than 11 million acres of corn farms, largely in just five states, apply fertilizer extremely inefficiently. These states could realize the most benefits from an EEF ordinance in the form of lowered costs for farmers, higher revenues for fertilizer companies, and fewer environmental and human health problems caused by nitrogen. This Note describes the issue of nitrogen fertilizer pollution in the U.S., provides the reasoning for a municipal minimum sales share EEF ordinance, and proposes a sample ordinance that a municipality in Illinois, Minnesota, Michigan, Nebraska, or Ohio could adopt to manage the most serious effects of nitrogen pollution on public health and the environment. This Note then analyzes the history of ordinances that municipalities have passed in order to regulate certain products similar to nitrogen fertilizers. The litigation that ensued after these ordinances passed illuminates the likely legal hurdles that an EEF ordinance would face.

I. INTRODUCTION

Nitrogen pollution is one of the most pressing environmental problems in the U.S. today, with grave implications for human health and climate change. Agricultural activities release the most nitrogen pollution of any industry, in the form of nitrogen oxides, ammonia, and nitrous oxide in the air, and nitrate and ammonium in the water.[1] A combination of prescriptive regulation of farmers and voluntary adoption of best practices has not solved the problem. Municipal ordinances encouraging the sale of Enhanced Efficiency Fertilizers (EEFs) could be a new approach to tackle nitrogen pollution.

EEFs most effectively raise crop yields and reduce the amount of fertilizer required on those croplands where farmers apply traditional fertilizers most inefficiently. 11.5 million acres of corn

1. UNIV. W. ENG., SCI. COMMC'N UNIT, NITROGEN POLLUTION AND THE EUROPEAN ENVIRONMENT (2013), https://ec.europa.eu/environment/integration/research/newsalert/pdf/IR6_en.pdf [https://perma.cc/QL9H-AWJT].

farms, largely in Illinois, Minnesota, Michigan, Nebraska, and Ohio, have fertilizer applied so wastefully that more than 40% of nitrogen added to fields is lost to the environment instead of contributing to the growth of the crop.[2] These states make up about 50% of all U.S. corn production.[3] Including city, township, and county governments, there are about 9,000 municipalities in these states that could realize the most benefits in the form of lowered costs for farmers and higher revenues for fertilizer companies from EEFs.[4]

This paper will lay out the problem of nitrogen fertilizer pollution in the U.S., provide the reasoning behind a municipal minimum sales share EEF ordinance, and propose a sample ordinance that a municipality in Illinois, Minnesota, Michigan, Nebraska, or Ohio could adopt to manage the most serious effects of nitrogen pollution problems on citizens and the environment. The paper will then analyze the history of ordinances that municipalities have passed in order to regulate certain products similar to nitrogen fertilizers. The litigation that ensued after these ordinances passed illuminates the likely legal hurdles that an EEF ordinance would face. The end of the paper will propose specific solutions that a municipality could use to make its ordinance more likely to succeed.

II. BACKGROUND

Nitrogen fertilizers increase crop growth and underpin global economic and population growth worldwide. Between 1950 and 1990, their global use increased tenfold, from 14 to 143 million tons, and crop yields increased in the same period, with average bushels per acre of corn rising from 30 to 130.[5] But adding nutrients to crops so zealously has resulted in diminishing additional returns and created serious environmental consequences.[6] Second only to

2. David Kanter & Timothy Searchinger, *A Technology-Forcing Approach to Reduce Nitrogen Pollution,* 1 NAT. SUSTAINABILITY 544, 544–52 (2018).

3. U.S. DEP'T AGRIC., NAT'L AGRIC. STATS. SERV., CROP PRODUCTION (2020), https://www.nass.usda.gov/Publications/Todays_Reports/reports/crop1120.pdf [https://perma.cc/QBN4-LVM2].

4. *Chartered Local Government*, BALLOTPEDIA, https://ballotpedia.org/Chartered_local_government#Total_charter_cities_by_state [https://perma.cc/TJ9H-4CR7] (last visited Dec. 6, 2021).

5. Janet Larsen, *Heat and Drought Ravage U.S. Crop Prospects – Global Stocks Suffer*, EARTH POL'Y INST. (Sept. 14, 2012), http://www.earth-policy.org/data_highlights/2012/highlights30 [https://perma.cc/3NDX-3V79].

6. HAL GORDON ET AL., NAT'L RES. CONSERVATION SERV., THE VALUE OF NUTRIENT MANAGEMENT (2020),

climate change, nitrogen pollution might be the most significant environmental threat on earth. Modern agricultural practices release thousands of tons of nitrogen fertilizer into the environment every day, causing environmental damage in the form of toxic algal blooms, fish kills, marine dead zones, harm to the ozone layer, and greenhouse gas emissions.[7] The effects on human well-being are just as severe. U.S. tourism and fishing industries in the Gulf of Mexico lose billions of dollars annually from a vast dead zone spanning thousands of square miles.[8] And polluted groundwater has forced homeowners across the Midwest to stop using wells, while utilities must pay increasingly more to remove nitrogen from polluted waterbodies.[9] Left unfiltered, drinking water with nitrates above the legal limit of 10 ppm can cause deadly blue baby syndrome in infants.[10] Higher rates of colon, kidney, and stomach cancers are associated with drinking water nitrate levels even as low as 5 ppm.[11]

Strong U.S. environmental laws, including the Clean Water Act (CWA), the Clean Air Act (CAA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), regulate many of the pollutants that threaten human and environmental health. But it has been difficult to regulate nitrogen fertilizers due to agricultural exceptions that exist in many significant environmental regulatory schemes. The CWA expressly

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https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcseprd1577015&ext=pdf (explaining that from 1950 to 1990, the total amount of cropland harvested in the U.S. actually shrank 15% even as yields continued to grow, highlighting how effectively fertilizers increase yields). *See also* U.S. DEP'T AGRIC, CENSUS OF AGRICULTURE 1950 (1950), http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1950/05/06/1820/41667073v5p6ch1.pdf [https://perma.cc/D5T5-PRR8]; U.S. DEP'T AGRIC, CENSUS OF AGRICULTURE 1992 (1992) http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1992/01/51/1992-01-51-figures.pdf [https://perma.cc/MVD9-5JDM].

7. B.G. Katz, *Exploring the Widespread Impacts of Ongoing Nitrogen Pollution*, EOS (Sept. 23, 2020), https://eos.org/editors-vox/exploring-the-widespread-impacts-of-ongoing-nitrogen-pollution [https://perma.cc/5VEV-C4UC].

8. *Nitrogen Washing Off Midwest Farms Cause Billions in Annual Damage to Gulf of Mexico Fisheries and Marine Habitat*, UNION OF CONCERNED SCIENTISTS (June 1, 2020), https://www.ucsusa.org/about/news/nitrogen-farms-cause-24-billion-gulf-dead-zone-damage [https://perma.cc/2BS2-5KP6].

9. Clay Masters, *Des Moines Water Utility Can't Sue Drainage Districts for Monetary Damages*, IOWA PUB. RADIO (Jan. 27, 2017), https://www.iowapublicradio.org/2017-01-27/des-moines-water-utility-cant-sue-drainage-districts-for-monetary-damages [https://perma.cc/8G3V-8WR8].

10. Craig Cox, *Trouble in Farm Country: Ag Runoff Fouls Tap Water Across Rural America,* ENV'T WORKING GRP. (Aug. 2017), https://www.ewg.org/tapwater/trouble-in-farm-country.php [https://perma.cc/N8NX-X69Q].

11. *Id.*

exempts from regulation, "agricultural storm water discharges and return flows from irrigated agriculture," while the CAA gives the EPA wide discretion to "exempt entirely" from regulation any substance used as a nutrient in agriculture.[12] Agricultural interests, through lobbying and litigation, have adeptly channeled the respect for farmers that is deeply rooted in American culture to prevent regulation of many nitrogen fertilizers.[13]

Farm groups vehemently oppose environmental regulation of farms in any form except voluntary incentives. Therefore, a growing portion of U.S. Farm Bills, which appropriate money for agriculture every few years, focus on incentives to motivate farmers to voluntarily adopt practices that are less polluting.[14] Although support for these programs is growing, there is little evidence that they have meaningful effects on the nitrogen pollution problem.[15]

With prescriptive federal regulation of farms thus far too ineffective and incentives-based voluntary regulation of farms largely inadequate, a strategy that focuses on the fertilizer industry would be another important approach in the fight against nitrogen pollution. In contrast to the approximately two million farms in the U.S., only a handful of corporations dominate the U.S. fertilizer market.[16] There are just five companies controlling 84% of U.S. production of urea and ammonia, the basic forms of nitrogen fertilizers.[17] This level of market consolidation suggests the possibility of successful environmental regulation. The Montreal Protocol's banning of Chlorofluorocarbons and the Corporate Average Fuel Economy (CAFE) standards that increased car fuel efficiency are both examples of successful environmental regulations

12. Clean Water Act, 33 U.S.C. §§ 1251–1388; J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law,* 27 Ecology L. Q. 263, 307 (2000).

13. *See* Sonia Weil, *Big-Ag Exceptionalism: Ending the Special Protection of the Agricultural Industry*, 10 DREXEL L. REV. 183 (2017).

14. *See, e.g.,* Peter Lehner, *The 2018 Farm Bill is Surprisingly Climate Conscious*, FARM BILL L. ENTER. (Feb. 8, 2019), http://www.farmbilllaw.org/2019/02/08/the-2018-farm-bill-is-surprisingly-climate-conscious/ [https://perma.cc/6S5Q-JZJD].

15. Anne Schechinger et al., *Voluntary Programs to Reduce Farm Run-off Still Aren't Working*, ENV'T WORKING GRP. (May 11, 2015), https://www.ewg.org/agmag/2015/05/voluntary-programs-reduce-farm-run-still-aren-t-working [https://perma.cc/DWE9-7GQU].

16. U.S. DEP'T OF AGRIC., FARMS AND LAND IN FARMS: 2018 SUMMARY (2019), https://www.nass.usda.gov/Publications/Todays_Reports/reports/fnlo0419.pdf [https://perma.cc/S5R5-R5A9].

17. Kanter, *supra* note 2, at 547.

that changed the behavior of a few companies that controlled a market.[18]

Although the U.S. fertilizer industry only indirectly controls how farmers apply nitrogen fertilizer, many fertilizer companies already have products that render application more effective.[19] EEF is a blanket term for any fertilizer that either slows the release of nutrients (a controlled release, coated fertilizer) or alters the chemical conversion of nutrients into other forms that are less likely to be lost to the environment (an inhibitor).[20]

Worldwide, agricultural practices today are staggeringly inefficient, wasting more than 50% of the nitrogen fertilizer applied to crops.[21] Crops, as well as the farm animals that eat them, lose the benefit of this powerful growth nutrient to runoff, while the fertilizers degrade the environment. In the U.S., EEFs only make up 12% of the fertilizer market.[22] According to a study by David Kanter and Timothy Searchinger, increasing that percentage could engender economic benefits for both farmers and the fertilizer industry, while protecting public health and the environment at the same time.[23] Their study estimated that if EEF use in areas where nitrogen fertilizer application is most inefficient increased from 12% of the fertilizer market today to 30% by 2030, industry profits would increase 7% because of the higher prices paid for EEFs.[24] The rate at which crops utilize fertilizers, Nitrogen Uptake Efficiency, would increase average farm yields and could, on average, offset the higher cost of EEFs compared to normal fertilizers.[25] Most importantly, a 30% level of EEF use would also mitigate $5 billion dollars in environmental damages and human harm because of multiple benefits including smaller anoxic dead zones,[26] lower N_2O

18. *Id*.

19. Gary Hergert et al. *Enhanced Efficiency Fertilizers: Will They Enhance My Fertilizer Efficiency?*, U.S. DEP'T. OF AGRIC., https://efotg.sc.egov.usda.gov/references/public/UT/EnhancedEfficiencyFertilizers.pdf [https://perma.cc/T8AX-686N].

20. *Fertilizer 101: Enhanced Efficiency Fertilizers*, THE FERTILIZER INST. (May 23, 2014), https://www.tfi.org/the-feed/fertilizer-101-enhanced-efficiency-fertilizers [https://perma.cc/5V8T-WHGY].

21. U.S. ENV'T PROT. AGENCY, SCI. ADVISORY BD., REACTIVE NITROGEN IN THE UNITED STATES: AN ANALYSIS OF INPUTS, FLOWS, CONSEQUENCES, AND MANAGEMENT OPTIONS (2011).

22. Kanter, *supra* note 2, at 549.

23. *Id*.

24. *Id*.

25. *Id*.

26. UNION OF CONCERNED SCIENTISTS, *supra* note 8.

emissions,[27] higher levels of organic matter in soil,[28] and more water-retention capacity in the ground.[29]

This paper will explore the legal feasibility of a technology-forcing approach for fertilizer companies, increasing their sale of EEFs through municipal ordinances.

A. The Current Fertilizer Application Regime

Today, the dominant paradigm in U.S. fertilizer management is the "4 Rs" system.[30] The 4 Rs stand for the right source, the right rate, the right time, and the right place.[31] The scientific community, in partnership with agricultural industry groups, developed this concept in the 1980s in light of the complexity of agricultural systems.[32] There is no single best management practice that could encompass 30,000 different possible soil types with different crops and different climate conditions.[33]

The "right source" of nutrients balances levels of all the essential plant nutrients, nitrogen, phosphorus, and potassium, considering those nutrients that are naturally present in the soil.[34] A farmer determines the "right rate" by considering soil nutrient supply and plant demand.[35] The "right time" considers natural cycles of both crop nutrient uptake and risk of nutrient loss.[36] For example, nutrients are more likely to run off of fields when the ground is frozen, militating against applying fertilizer in the late fall in

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27. Charles R. Hyatt et al., *Polymer-Coated Urea Maintains Potato Yields and Reduces Nitrous Oxide Emissions in Minnesota Loamy Sand*, 74 SOIL SCI. SOC'Y AM. J. 419, 419–28 (2010).

28. Jibiao Geng et al., *Long-Term Effects of Controlled Release Urea Application on Crop Yields and Soil Fertility Under Rice-Oilseed Rape Rotation System*, 184 FIELD CROPS RSCH. 65, 65–73 (2015).

29. R.L. Mikkelsen et al., *Addition of Gel-Forming Hydrophilic Polymers to Nitrogen Fertilizer Solutions*, 36 FERTILIZER RSCH. 55, 55–61 (1993).

30. *Reduce Nutrients in Surface and Ground Water*, U.S. DEPT. OF AGRIC. (Apr. 2012), https://www.nrcs.usda.gov/wps/portal/nrcs/detail/null/?cid=nrcs144p2_065179 [https://perma.cc/9VPU-FUB6].

31. *Id.*

32. *History of the "4Rs"*, IPNI CANADA (Oct. 3, 2012) http://www.ipni.net/ipniweb/portal/4r.nsf/article/4r-history [https://perma.cc/GT74-4PEY].

33. Gabriel Popkin, *Can 'Carbon Smart' Farming Play a Key Role in the Climate Fight*, YALE ENV'T 360 (Mar. 31, 2020), https://e360.yale.edu/features/can-carbon-smart-farming-play-a-key-role-in-the-climate-fight [https://perma.cc/JTK7-M8C4].

34. George Hochmuth et. al., *The Four Rs of Fertilizer Management*, U. OF FLA. IFAS EXTENSION (June 2014), https://edis.ifas.ufl.edu/publication/ss624 [https://perma.cc/C4VM-A67K].

35. *Id.*

36. *Id.*

Minnesota. The "right place" is about the spatial variability of a field due to hills or root-soil dynamics.[37]

Advocates of the 4 Rs want farmers to become "researchers on their own fields," experimenting "with various programs to determine which is best for them using their own management skills."[38] Industry members who champion the 4 Rs system recognize that a public perception of the fertilizer industry as "only interested in increased profits through unwarranted fertilizer sales" will drive "policymakers towards regulating nutrient management, water quality guidelines, total daily load limits and other policies or practices aimed at restricting or eliminating the use of fertilizer."[39] If farmers closely adhere to the 4 Rs, they produce less nutrient pollution and lessen the motivation to regulate. Unfortunately for both the fertilizer industry and the environment, the 4 Rs have not had a great impact on fertilizer pollution.[40] The failure of the 4 Rs is attributable to many factors, including a reluctance on the part of farmers to invest in research, and ineffective knowledge and technology transfer.[41] Another kind of approach is needed that does not rely on voluntary action.

Although there are still open questions about what types of EEFs are most effective in what climactic conditions, metanalyses of EEF research indicate that EEFs on average have multiple benefits over traditional fertilizers.[42] They tend to increase fertilizer nitrogen uptake in plants, increase yields, and decrease N_20 emissions.[43] While there are still unknowns about why some EEFs work better than others, a legal mechanism to increase their use is a promising alternative to the current voluntary 4 Rs approach.

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37. *Id.*

38. J.T. Thorup & J.W.B. Stewart, *Optimum Fertilizer Use with Differing Management Practices and Changing Government Policies, in* PROCEEDINGS OF THE 25TH ANNIVERSARY SYMPOSIUM OF DIVISION S-8, ADVANCES IN FERTILIZER TECHNOLOGY AND USE 86, 99 (Soil Sci. Soc. of Am. ed., 1988).

39. T.L. Roberts, *Right Product, Right Rate, Right Time, Right Place. . .the Foundation of Best Management Practices for Fertilizer*, *in* PROCEEDINGS OF THE IFA INTERNATIONAL WORKSHOP ON FERTILIZER BEST MANAGEMENT PRACTICES 29, 29 (2007), https://www.fertilizer.org/images/Library_Downloads/2007_IFA_FBMP%20Workshop_Brussels.pdf [https://perma.cc/6B3Q-QENA].

40. Thorup & Stewart, *supra* note 38.

41. *Id.*

42. Kanter, *supra* note 2; Jerry Hatfield & Timothy Parkin, *Enhanced Efficiency Fertilizers: Effect on Agronomic Performance of Corn in Iowa*, 106 Agronomy J. 771 (2014).

43. Kanter, *supra* note 2, at 544–52.

It is crucial that in ameliorating the nitrogen pollution problem, EEFs do not create a new problem. There are researchers who have concerns that nitrification inhibitors, one of the two types of EEFs, might be toxic.[44] Some, such as the products Piadin and Vizura, have been demonstrated to be toxic, harming some aquatic species as well as root development in plants.[45] Luckily, there are formulations of nitrification inhibitor that have been shown to be non-toxic in multiple tests.[46]

B. Minimum Sales Share Requirement for EEFs

A minimum sales share approach would be markedly different from the voluntary 4 Rs paradigm. It would require fertilizer manufacturers to increase their sales of EEFs over time as a percentage of their total sales of fertilizer. This approach is conceptually parallel to the CAFE standards.[47] The CAFE standards aim to enhance fuel efficiency by regulating a handful of motor vehicles manufacturers rather than by regulating hundreds of millions of drivers.[48] Similarly, a minimum EEF sales share program would regulate companies, rather than farmers, by requiring that EEFs comprise a moderate percentage of nitrogen fertilizer sales. The minimum sales share would start with a low requirement (e.g. 10%) and move towards a more stringent requirement with subsequent reassessments based on developing information and technological progress.

Fertilizer companies could drive larger sales through marketing and collaboration with USDA agencies like the Natural Resources Conservation Service (NRCS) or agricultural extension schools. [49] Ohio passed a novel rule in 2014 that all licensed fertilizer applicators on commercial farms must take a training course or pass

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44. Kanter, *supra* note 2.

45. JULIA E. KÖSLER ET AL, EVALUATING THE ECOTOXICITY OF NITRIFICATION INHIBITORS USING TERRESTRIAL AND AQUATIC TEST ORGANISMS (Env't Sci. Eur. ed., 2019), https://enveurope.springeropen.com/track/pdf/10.1186/s12302-019-0272-3.pdf [https://perma.cc/GXT6-TSV8].

46. *Id.*

47. Kanter, *supra* note 2.

48. *Corporate Average Fuel Economy*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., https://www.nhtsa.gov/laws-regulations/corporate-average-fuel-economy [https://perma.cc/7LLX-T6ZX] (last visited Nov. 17, 2021).

49. Jason Johnson, *4Rs Right for Nutrient Management*, NAT. RES. CONSERVATION SERV. (Feb. 2011). https://www.nrcs.usda.gov/wps/portal/nrcs/ia/technical/ecoscience/nutrient/nrcs142p2_008196/ [https://perma.cc/4NG7-YLUP].

a test every three years.[50] Similarly, New Jersey and Maryland passed laws regulating turfgrass fertilizer application, which requires professional fertilizer applicators to obtain a fertilizer application certification.[51] The certification process might be an ideal opportunity to spread knowledge of EEFs. Many cities already require that fertilizer applicators train in a city certified program, so a city could design or contract out an applicator training addendum to the main training, solely about EEFs, with money provided by fertilizer companies.[52] This would increase company revenue while simultaneously raising EEF awareness among farmers and applicators.[53]

The benefit of a minimum sales requirement is its ease of administration.[54] States already require sellers to acquire licenses to sell fertilizer, and some cities further regulate fertilizer applications and fertilizer content through local ordinances in addition to state regulations. For example, Forest Lake City, Minnesota, forbids anyone from applying liquid fertilizer that contains more than a certain amount of phosphate within the city.[55] It also bans fertilizer applications within 10 feet of any wetland or water resource.[56] These bans are effective because they force companies to modify their products, positively affecting municipalities that do not themselves have bans.[57] However, a complete ban on non-EEF fertilizers would severely harm farmers. A better solution, and one more acceptable to communities, would be to create a legal framework of local ordinances where a city could condition fertilizer sales licenses on verification of satisfying minimum EEF sales requirements.

The most significant downside to a minimum sales share approach is that sales are not necessarily tied to fertilizer efficacy. Once a

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50. S.B. 150, 130th Gen. Assemb., 2013–2014 Sess. (Oh. 2014).

51. N.J. STAT. ANN. § 58:10A-63 (West 2021); *MD's Lawn Fertilizer Law*, MD. DEP'T OF AGRIC., https://mda.maryland.gov/Pages/fertilizer.aspx [https://perma.cc/F468-LRKN] (Nov. 29, 2021).

52. TALLAHASSEE, FLA., CODE OF ORDINANCES § 9-124 (2021).

53. PEGGY HALL & ELLEN ESSMAN, STATE LEGAL APPROACHES TO REDUCING WATER QUALITY IMPACTS FROM THE USE OF AGRICULTURAL NUTRIENTS ON FARMLAND (2019), https://nationalaglawcenter.org/wp-content/uploads//assets/articles/agnutrient_report.pdf [https://perma.cc/7PK4-JMND].

54. Kanter, *supra* note 2, at 548.

55. FOREST LAKE, MINN., CODE OF ORDINANCES § 100.05(C) (2021).

56. *Id.* § 100.05(E).

57. Seungyub Lee & Laura McCann, *Passage of Phosphorus-Free Lawn Fertilizer Laws by U.S. States*, 8 J. OF NAT. RES. POL'Y RSCH. 66, 66–88 (2008).

fertilizer qualifies as an EEF, a company will have little incentive to further improve the fertilizer.[58] However, a municipality could solve this problem by setting levels for more effective EEFs. For example, EEF products that are especially efficient could be rated as silver or gold.[59] A company would then be required to sell a smaller percentage of gold EEFs than silver EEFs to meet its minimum sales share requirement. No matter what details a municipality adds to its EEF ordinance, using a minimum sales share requirement would likely be the simplest way to make an ordinance work.

III. THE HISTORY OF MUNICIPAL PHOSPHORUS REGULATION

Litigation over municipal ordinances that banned phosphorus in detergents in the 1970s mirrors legal battles in the early 2000s over municipal ordinances regulating phosphorus in fertilizer. Both histories shed light on possible municipal regulation of nitrogen pollution today.

A. Litigation About Detergent Phosphate Ban Ordinances

By the mid-1960s, eutrophication had degraded approximately 10,000 lakes in the U.S.[60] Sewage systems do not filter out phosphorus in wastewater effluent, so the phosphorus from detergents were flowing into lakes and rivers.[61] Because of increasing phosphorus loads, smelly green algae covered shorelines and fish stocks plummeted due to anoxic zones.[62] There was a growing public outcry, pushing cities, states, the federal government, and companies to curb phosphates in detergents, which accounted for 50% of wastewater phosphorus nationwide.[63]

The three largest detergent manufacturers at the time, who accounted for 80% of detergent production, intended to find a

58. Kanter, *supra* note 2, at 547.

59. Rukesh Samarasekera, *Leed Credits, Prerequisites and Points: How Are They Different?*, U.S. GREEN BLDG. COUNCIL (Mar. 6, 2017), https://www.usgbc.org/articles/leed-credits-prerequisites-and-points-how-are-they-different [https://perma.cc/9JYX-NNTS].

60. CHRIS KNUD-HANSEN, HISTORIC PERSPECTIVE OF THE PHOSPHATE DETERGENT CONFLICT (1994), https://web.archive.org/web/20100528155811/http:/www.colorado.edu/conflict/full_text_search/AllCRCDocs/94-54.htm [https://perma.cc/M37F-VR56].

61. *Id.*

62. PENELOPE REVELLE & CHARLES REVELLE, THE ENVIRONMENT: ISSUES AND CHOICES FOR SOCIETY 749 (Jackie Estrada ed., Jones & Bartlett 3d ed., 1988).

63. Allan Hammond, *Phosphate Replacements: Problems with the Washday Miracle*, 172 SCI. 361, 361–63 (1971).

compound that could replace phosphorus's cleaning properties.[64] While they were still testing and seeking approval for a new detergent formulation, industry groups attempted to head off a patchwork of state and local regulations by agreeing to reduce phosphorus concentrations in detergent to 8.7% in 1970.[65] Despite industry efforts, municipalities in New York, Florida, Indiana, Michigan, Minnesota, Vermont, and Wisconsin passed ordinances banning phosphates from detergents altogether.[66] Industry groups sued to enjoin the municipal ordinances until they could find a suitable phosphate substitute. The result was a mass of caselaw in favor of municipalities' right to pass detergent regulation to prevent water pollution.

In *Soap & Detergent Association v. Clark*, a business association sued the board of Dade County, Florida, in 1971 for passing an ordinance that completely banned the sale of detergents with phosphates.[67] Plaintiffs argued the ordinance was an "unreasonable burden on interstate commerce" and violated the Commerce Clause, rendering it unconstitutional.[68] In holding for Dade County, the Court emphasized that "the question of safety and health is one for legislative determination, and mere economic injury to an affected industry will not counterbalance the avowed public intent of the local ordinance."[69] The Court also found it favorable to the county's argument that the Dade County Pollution Control Hearing Board had the power to "grant variances and extensions of time" for strict compliance in a situation where there is "no technically feasible, economically reasonable means of compliance."[70] The court observed that this "safety valve" made the ordinance more reasonable and more likely to be constitutional.[71]

In the same year, Colgate-Palmolive sued Erie County, New York, for its ordinance that limited and then later banned the sale of detergents with phosphates.[72] Plaintiffs' legal theory was that the ordinance was an unreasonable burden to interstate commerce and

64. *Id.* at 361.

65. J.R. Duthie, *Detergents: Nutrient Considerations and Total Assessment, in* NUTRIENTS AND EUTROPHICATION: THE LIMITING-NUTRIENT CONTROVERSY 205–16 (G.E. Likens ed., 1971).

66. REVELLE & REVELLE, *supra* note 62, at 749.

67. Soap & Detergent Ass'n v. Clark, 330 F. Supp. 1218 (S.D. Fla. 1971).

68. *Id*. at 1221.

69. *Id*. at 1222.

70. *Id*.

71. *Id*. at 1223.

72. Colgate-Palmolive Co. v. Erie Cnty., 327 N.Y.S.2d 488, 490 (N.Y. Sup. Ct. 1971).

a violation of the Commerce Clause.[73] The Court rejected that argument for the same reason the court in *Soap & Detergent* did, and held for the defendant county, noting also that the ordinance allowed "a reasonable time for the change-over by the detergent industry and gave Colgate as well as the other suppliers of detergents over nine months' time to put their affairs in order in Erie County."[74] This extra time added to the reasonableness of the ordinance and was another reason that the Court found for the county.[75]

In *Procter & Gamble Co. v. City of Chicago*, industry plaintiffs sued Chicago in 1975 for violating the Commerce Clause with its phosphate detergent ban, claiming that "the burden imposed on such commerce is clearly excessive in relation to the putative local benefits."[76] The Court held that in order to find a commerce clause violation, plaintiffs had to show "convincingly that limiting the quantity of phosphorus can never be the key to the problem," and despite some evidence showing that eliminating phosphates from detergent would not completely solve the eutrophication problem, plaintiffs did not meet that evidentiary burden.[77] A second important holding from the case was that "Chicago has a legitimate interest in banning phosphate detergents as an example for other communities," meaning that even if the ordinance did not have any effect on eutrophication in the lake, setting an example for neighboring municipalities would still be a constitutionally justifiable goal.[78]

Due in large part to municipal, and later state phosphate detergent laws, phosphorus content in sewage quickly declined. Phosphorus concentrations in wastewater treatment plant effluent were about 3 mg/L of phosphorus in the 1940s, climbed to 11 mg/L at the apex of phosphate detergent use in the 1970s, and, largely due to state and local restrictions, dropped to 5 mg/L by 1999.[79] But phosphorus from other sources was still harming the health of lakes and rivers.

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73. *Id.* at 491.
74. *Id*.
75. *Id.*
76. Procter & Gamble Co. v. City of Chicago, 509 F.2d 69, 75 (7th Cir. 1975).
77. *Id.* at 80.
78. *Id.* at 81.
79. DAVID W. LITKE, U.S. GEOLOGICAL SURV., REVIEW OF PHOSPHOROUS CONTROL MEASURES IN THE UNITED STATES AND THEIR EFFECTS ON WATER QUALITY 31 (1999), https://pubs.usgs.gov/wri/wri994007/pdf/wri99-4007.pdf [https://perma.cc/3L6Q-A9KF].

B. Litigation About Phosphorus Fertilizer Ban Ordinances

Once phosphorus from detergents in sewage effluent declined, fertilizers made up most of the remaining phosphorus pollution in lakes and rivers. Legal battles over phosphorus-free fertilizers also hint at a framework for how to use municipal ordinances to motivate the industry to increase EEF market share.

In 2004, Dane County and the city of Madison, Wisconsin passed ordinances banning phosphorus in lawn and turf fertilizers with few exceptions.[80] Excess phosphorus use had caused toxic algal blooms for decades in the region, harming human and environmental health.[81] Fertilizer industry plaintiffs attempted to strike down the ordinance by filing a complaint in federal court in Wisconsin alleging state law preemption, federal law preemption, and violations of the commerce clause, equal protection clause, and due process.[82] *Croplife America, Inc. v. City of Madison* resulted in defendant municipalities winning the case on summary judgement. On appeal to the Seventh Circuit of the state law preemption claim, an opinion written by Judge Richard Posner affirmed the lower court's decision.[83] The court's response to each cause of action hints at how the draft ordinance below might fare against legal challenges from the fertilizer industry.

After the court upheld Madison's ordinance in *Croplife*, fertilizer companies required phosphorus-free fertilizers in order to compete in the greater Madison market. The industry has adapted well since 2004. Minnesota counties and cities began passing similar ordinances between 2002 and 2005.[84] A state-sponsored report on the effectiveness of the phosphorus restrictions found in a sampling of stores that 97% stocked phosphorus-free fertilizers, and 82% of all fertilizers used for gardening and lawns were phosphorus-free by 2006, without increasing consumer cost.[85] The county and city ordinances succeeded without harming gardeners or the fertilizer

80. Croplife Am., Inc. v. City of Madison, 373 F. Supp. 2d 905, 908 (W.D. Wis. 2005).

81. *Id.* at 910

82. *Id.* at 908.

83. Croplife Am., Inc. v. City of Madison, 432 F.3d 732, 735 (7th Cir. 2005).

84. *See, e.g., Phosphorus Lawn Fertilizer Law*, MINN. DEP'T OF AGRIC., https://www.mda.state.mn.us/phosphorus-lawn-fertilizer-law [https://perma.cc/H8V3-AEFB] (last visited Dec. 3, 2021).

85. MINN. DEP'T OF AGRIC., REPORT TO THE MINNESOTA STATE LEGISLATURE: EFFECTIVENESS OF THE MINNESOTA PHOSPHORUS LAWN FERTILIZER LAW 25 (2007), https://www.mda.state.mn.us/sites/default/files/inline-files/07phoslawreport.pdf [https://perma.cc/5KE3-YG3J].

industry, so Minnesota adopted a statewide bill restricting phosphorus in fertilizers.[86]

Today, twelve states now have phosphorus bans or restrictions in place for non-agricultural fertilizers. It appears that more states have not passed similar bills because the industry shifted its practices even in areas without phosphorus restrictions.[87] A leading fertilizer company, Scotts Miracle-Gro, removed phosphorus altogether from one of its flagship fertilizer products, and other companies have followed suit.[88]

IV. DEFENDING AN EEF MUNICIPAL ORDINANCE

Lessons from past phosphate litigation were at the forefront when drafting the municipal EEF ordinance below. Any plaintiff that seeks to limit or strike down the ordinance through litigation will likely attack it with state preemption claims, federal preemption claims, commerce clause claims, equal protection claims, and due process claims. This section will analyze probable challenges to the EEF ordinance below using the *Croplife* litigation as a guide, and will describe how the ordinance stands up to each of those claims in turn.

> (a) It shall be unlawful for any person, firm or corporation to sell, offer or expose for sale, give or furnish any nitrogen fertilizer, whether in the form of anhydrous ammonia, ammonium nitrate, ammonium sulphate, calcium nitrate, or any other form, in the City of _____ from and after February 1, 2022, unless at least 10% of the seller's revenue from within the municipality's limits was derived from the sale of EEFs in the prior year.
>
> (1) An EEF is either a controlled release fertilizer or nitrification/urease inhibitor as defined by Cornell University Cooperative Extension:[89]
>
> (A) *Controlled-release fertilizer*: A fertilizer containing a plant nutrient in a form which delays its availability for plant uptake and use after application, or which extends its availability to the plant significantly longer than a reference 'rapidly available nutrient fertilizer' such as ammonium

86. *Phosphorus Lawn Fertilizer Law*, MINN. DEP'T OF AGRIC., https://www.mda.state.mn.us/phosphorus-lawn-fertilizer-law [https://perma.cc/H8V3-AEFB] (last visited Dec. 3, 2021).

87. Lee & McCann, *supra* note 57, at 67–68.

88. *Id.* at 68.

89. CORNELL UNIV. COOP. EXTENSION, ENHANCED-EFFICIENCY NITROGEN SOURCES (2009), http://nmsp.cals.cornell.edu/publications/factsheets/factsheet45.pdf [https://perma.cc/6PT9-ACFE].

> nitrate or urea, ammonium phosphate or potassium chloride.
> (B) *Nitrification inhibitor*: A substance that inhibits the biological oxidation of ammoniacal-N to nitrate-N.
> (C) *Urease inhibitor*: A substance that inhibits hydrolytic action on urea by the enzyme urease.
> (b) The _____ City Department of Natural Resources shall have the power and authority to grant variances and extensions of time for compliance with the requirements of this ordinance. The Department may grant such variances or extensions only if it is affirmatively established by competent factual data and information that strict compliance with the requirements of this chapter is impossible or inappropriate because of conditions beyond the control of the person, firm, or corporation involved.
> (c) A person, firm, or corporation that did not meet the minimum sales share in the prior year may apply to the _____City Department of Natural Resources with a feasible plan to sell a greater share of EEF fertilizer in the upcoming year in order to begin or continue selling fertilizer within municipality limits.

A. Fighting State Law Preemption Challenges in Wisconsin, Illinois, Michigan, Minnesota, Nebraska, and Ohio

State preemption will likely be the most significant legal hurdle in passing an EEF ordinance. Municipal legislation is preempted if it "expressly contradicts state law or if it runs counter to the legislative intent underlying a statutory scheme."[90] Since the explosion of municipal phosphate fertilizer ordinances in the early 2000s, many states have passed legislation to expressly "occupy the field" of fertilizer regulation and prevent more municipal action.[91] State statutes in Wisconsin, Illinois, Michigan, Minnesota, Nebraska, and Ohio are analyzed below.

1. Wisconsin

In the *Croplife* litigation concerning the Dane County phosphorus ordinance, Plaintiffs/appellants argued that a Wisconsin statute that forbade a city or county to "prohibit the use of or otherwise regulate

90. 56 AM. JUR. 2D *Municipal Corporations, Counties, and Other Political Subdivisions* § 306, Westlaw (database updated Nov. 2021).

91. MINN. STAT. ANN. § 18C.110 (LexisNexis 2021). Minnesota law specifically exempts from preemption any local ordinance restricting phosphorus in fertilizer "that was in effect on August 1, 2002."

pesticides" preempted municipal action on mixed fertilizers.[92] Because many "mixed fertilizers" on the market combine both fertilizers and pesticides into one product, plaintiffs argued that an ordinance regulating the fertilizer in a mixed fertilizer also regulated the pesticides. If this were the case, the state statute would preempt the local ordinance. The Seventh Circuit, through a plain reading of the Wisconsin statutory definition of fertilizer, held that "the definition of both 'pesticide' and 'fertilizer' as including a mixture of the two preserves both state regulation of pesticides and local regulation of fertilizers."[93] This holding was in line with the conventional understanding of Wisconsin fertilizer management up to that point, leaving it to "local regulation of phosphorus because the effects differ from county to county depending on the number and importance of a county's lakes."[94]

2. Illinois

Illinois law does not explicitly preempt municipalities from regulating fertilizers. "The Department has the power to execute and administer the Acts and rules regulating the manufacture, sale, and distribution of fertilizers."[95] Although the state law seems to occupy the same field as the EEF ordinance, if the two do not clash there may not be state preemption.[96] In *City of Davenport*, a city ordinance permitted the use of an automated traffic enforcement system, which plaintiff claimed conflicted with the comprehensive state scheme for traffic enforcement. The Court held for defendant city because "the state statute and the municipal action must be *irreconcilable*," and that was not case.[97] Here, the state's authority over sale of fertilizers and a municipal EEF ordinance are not necessarily irreconcilable if, for example, "the Acts and rules"[98] only speak to regulation of phosphorus fertilizers.

92. Croplife Am., Inc. v. City of Madison 432 F.3d 732, 733 (7th Cir. 2005).
93. *Id.* at 734.
94. *Id.* at 735.
95. 20 ILL. COMP. STAT. ANN. 205/205-345 (West 2000).
96. 56 AM. JUR. 2D *Municipal Corporations, Counties, and Other Political Subdivisions* § 306, Westlaw (database updated Nov. 2021).
97. City of Davenport v. Seymour, 755 N.W.2d 533, 544 (Iowa 2008).
98. 20 ILL. COMP. STAT. ANN. 205/205-345 (West 2000).

3. Michigan

Michigan expressly "preempts any local ordinance, regulation, or resolution that would duplicate, extend, or revise in any manner" state law having to do with fertilizer regulation.[99] However, Michigan also reserves a specific preemption exception. "A local unit of government may adopt an ordinance prescribing standards different from those contained in this part and rules promulgated under this part and that regulates the manufacturing, storage, distribution, sale, or agricultural use of a product regulated by this part only under . . . the following circumstance:

> (a) Unreasonable adverse effects on the environment or public health will otherwise exist within the local unit of government, taking into consideration specific populations whose health may be adversely affected within that local unit of government.[100]

Section 324.8517(a) is Michigan's recognition that a municipality should play a role in managing the harmful effects of fertilizers within its borders. In those municipalities with dangerously high nitrate levels in drinking water, there is arguably an "unreasonable adverse effect" on the public health, and an EEF ordinance would solve the problem by regulating the sale of fertilizers.[101] An ordinance adopted through section 324.8517(a) by a municipality may not be enforced "until approved by the commission of agriculture." Instead of a municipality defending its EEF ordinance in court, the Michigan commission of agriculture would make the final decision and in case of denial would have to "provide a detailed explanation of the basis of a denial within 60 days."[102] Even if the Michigan commission denied an EEF ordinance, the explanation would still provide a useful lesson in how a similar ordinance could be drafted to survive.

4. Minnesota

Minnesota law expressly occupies the field of phosphorus fertilizer regulation. A municipality "may not adopt or enforce any ordinance that prohibits or regulates, and may not in any other way prohibit or regulate, the distribution, sale, handling, use, or application of *phosphorus* fertilizers and *phosphorus* fertilizer products that are

99. MICH. COMP. LAWS ANN. § 324.8517 (West 2021).
100. *Id.*
101. *Id.*
102. *Id.*

applied or will be applied to land used for growing crops or any other agricultural use."[103] It is an open question whether Minnesota occupies the field for nitrogen fertilizer regulation as well.

A party defending the EEF ordinance in court might interpret the state statute using the *expressio unius est exclusion alterius* canon of construction, arguing that because Minnesota exclusively names phosphorus fertilizer legislation, nitrogen fertilizer legislation is purposely left out and legal for municipal ordinances to regulate.[104] Additionally, the *City of Davenport* argument, which states that phosphorus law and a municipal nitrogen ordinance are not irreconcilable, might be persuasive.[105] A party opposing the EEF ordinance would counter that the Minnesota law has revealed the state's intent to occupy the whole field of fertilizer regulation, precluding a municipal ordinance concerning nitrogen fertilizer.[106] Although the final result is uncertain, a court would likely take into account Minnesota's earlier history with municipal phosphorus ordinances and conclude that the state legislature passed this statute to specifically preempt municipal phosphorus fertilizer ordinances, leaving nitrogen fertilizer to municipal regulation.

5. Nebraska

Nebraska preempts a municipal EEF ordinance, but explicitly carves out a role for local control of water pollution. "The Nebraska Commercial Fertilizer and Soil Conditioner Act and any rules and regulations adopted and promulgated thereunder shall supersede and preempt any ordinance, rule, regulation, or resolution enacted by any political subdivision of the state regarding the regulation of fertilizer and soil conditioners."[107] However, there is a clause that reserves a role for local regulation.[108] Nebraska has endowed twenty-three Natural Resource Districts that cover the entire state with the responsibility for "Pollution Control" and "Development, Management, Utilization, and Conservation of Groundwater and

103. MINN. STAT. ANN. § 18C.110 (West 2021) (emphasis added).

104. VALERIE C. BRANNON, CONG. RSCH. SERV., R45153, STATUTORY INTERPRETATION, THEORIES, TOOLS, AND TRENDS (2018).

105. City of Davenport v. Seymour, 755 N.W.2d 533, 544 (Iowa 2008).

106. 56 AM. JUR. 2D *Municipal Corporations, Counties, and Other Political Subdivisions* § 306, Westlaw (database updated Nov. 2021).

107. NEB. REV. STAT. ANN. § 81-2,162.28 (West 2021).

108. *Id.* ("Nothing in this section shall be construed to preempt or otherwise limit the authority of . . . any natural resources district to enforce the Nebraska Ground Water Management and Protection Act.")

Surface Water."[109] The districts are made up of locally elected directors that make environmental decisions within the district boundaries.[110] Although a city or county in Nebraska would be preempted from passing an EEF ordinance, it is within the power of any one of the twenty-three Natural Resource Districts to do so.

6. Ohio

Ohio law expressly occupies the field and preempts a municipal EEF ordinance. "No political subdivision shall regulate the registration, packaging, labeling, sale, storage, distribution, use, or application of fertilizer."[111] Nor shall any "political subdivision . . . enact, adopt, or continue in effect local legislation relating to the registration, packaging, labeling, sale, storage, distribution, use, or application of fertilizers."[112] Because the proposed EEF ordinance regulates the sale of fertilizer, Ohio law would preempt the ordinance.

Each state has its own unique fertilizer law regime, producing different results with a state preemption challenge to a municipal EEF ordinance. With the exception of Ohio, there are strong arguments in each state that the ordinance could overcome a preemption challenge. In Illinois, a municipality could argue that the state and municipal laws are not irreconcilable. A Michigan municipality could argue that nitrogen pollution is a "unique adverse effect," that merits municipal regulation. A Minnesota municipality could argue that the state's fertilizer regime only covers phosphorus, meaning there is no conflict with municipal nitrogen regulation. In Nebraska, a municipality would pursue a different strategy, encouraging the ordinance to be passed by one of Nebraska's unique natural resource districts.

B. Fighting a Federal Law Preemption Challenge

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) prohibits states from imposing on pesticides "any requirements for labeling or packaging in addition to or different from those required

109. NEB. ASS'N OF RES. DISTS., *Programs*, https://www.nrdnet.org/programs [https://perma.cc/9YJ8-A32T] (last visited Dec. 1, 2021).

110. NEMAHA NAT. RES. DISTS., *About*, https://www.nemahanrd.org/about [https://perma.cc/ED5C-97SN] (last visited Dec. 1, 2021).

111. OHIO REV. CODE ANN. § 905.503 (LexisNexis 2021).

112. *Id.*

under [FIFRA]."[113] The *Croplife* Plaintiffs argued that the ordinance conflicted with FIFRA because it added a requirement for application of mixed fertilizers (thereby regulating the pesticide portion) that users must "water such lawn and turf fertilizer into the soil where it is immobilized and generally protected from loss by runoff."[114] But the Court held that additional language in the ordinance[115] meant FIFRA did not preempt the municipal ordinance.[116]

Because an EEF ordinance will focus on the behavior of fertilizer sellers rather than the behavior of fertilizer applicators, this particular preemption question will not arise. Furthermore, the proposed municipal ordinance only affects the sale of the fertilizer portion of mixed fertilizers, so sale of pesticides is unaffected and a FIFRA challenge would not succeed.

C. Fighting a Commerce Clause/Equal Protection Clause Challenge

A state or local law violates the federal government's right to regulate commerce between the states if it mandates "differential treatment of in-state and out-of-state economic interests that benefits the former and burdens the latter."[117] A law violates the equal protection clause if it irrationally discriminates against a party.[118] The *Croplife* plaintiffs argued that the Dane County ordinance mandated differential treatment between states and irrationally discriminated against the Plaintiffs because it exempted the Milwaukee Metropolitan Sewerage District's biosolid fertilizer, Milorganite. The Sewerage District repurposed sewage sludge into a phosphorus fertilizer called Milorganite, which was indeed exempted from the county ordinance.[119] The court held that there was no discriminatory purpose or differential treatment because the ordinance exempted "all biosolids, not just those produced within the state."[120] Because there was a rational basis for the ordinance (in this case, encouraging the "beneficial use of municipal sewerage

113. 7 U.S.C. § 136v(b).

114. Croplife Am., Inc. v. City of Madison, 373 F.Supp. 2d 905, 912 (W.D. Wis. 2005).

115. *Id.* at 916 (referring to the ordinance's language that "the person applying the product is to water the fertilizer only when doing so is consistent with the product's label instructions").

116. *Id.*

117. Or. Waste Sys. v. Dep't of Env't Quality, 511 U.S. 93, 99 (1994).

118. Croplife Am., Inc. v. City of Madison, 373 F.Supp. 2d 905, 916 (W.D. Wis. 2005).

119. *Id.* at 910.

120. *Id.* at 915.

waste" rather than incineration), and because neither the intent nor the effect was to favor any one state or party over another, it was constitutional.[121] If a municipality has some *conceivable* basis for the ordinance then it is rational, regardless of whether it is the best way to achieve the goal.[122]

Opponents of an EEF ordinance will likely argue that a law favoring EEFs over normal fertilizers is unconstitutional because it benefits companies that produce EEFs and hurts those that do not. Like the *Croplife* plaintiffs, they may also argue that the ordinance favors states that produce more EEFs over states that do not. But the *Croplife* holding suggests that any incidental advantage that an ordinance would give a company or state over others would not defeat the ordinance. Companies or states with a higher capacity to produce and sell EEFs will benefit more from an EEF ordinance, however this secondary result does not detract from the rational basis of reducing nitrate pollution in drinking water.

The fact that the Court used rational basis review is crucial for any future EEF ordinance. There are uncertainties about how effective an EEF ordinance passed in a single small city will be.[123] Undoubtedly some level of nitrogen pollution will persist even if many EEF ordinances pass.[124] Opponents of an EEF ordinance will point to these failings to suggest that the ordinances are irrational and benefit some companies over others, violating the equal protection clause. But the *Croplife* court held that despite plaintiffs' considerable evidence that phosphorus fertilizer bans were unwise and ineffectual, an ordinance need not "resolve the entire problem it is designed to attack" or "attack the problem in the most effective way" in order to survive rational basis review.[125]

D. Fighting a Due Process Challenge

The *Croplife* plaintiffs also argued that the ordinance was too vague to be constitutional, but the Court held that, because the

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121. *Id.* at 916.

122. *Id.* at 914.

123. Tingyu Li et. al. *Enhanced Efficiency Fertilizers Are Not Panacea For Resolving the Nitrogen Problem*, 24 GLOB. CHANGE BIOLOGY e511 (2018).

124. T. Williams et al., *Enhanced Efficiency Nitrogen Fertilizer: Potential Impacts on Crop Yield and Groundwater in Tall Fescue Fields of the Southern Willamette Groundwater Management Area, Oregon, USA*, U.S. EPA (Dec. 13, 2019), https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CPHEA&dirEntryId=347986 [https://perma.cc/RY3B-ZQFX].

125. Croplife Am., Inc. v. City of Madison, 373 F. Supp. 2d 905, 914 (W.D. Wis. 2005).

ordinance requirements for fertilizer labelling, sale, and application were sufficiently clear, there was no due process issue.

Vagueness is a difficult flaw to contend with in writing an EEF ordinance because it is not governed by clear judicial rules. The guideline is that the ordinance should be clear enough that "regulated parties should know what is required of them so they may act accordingly; and precision and guidance are necessary so that those enforcing the law do not act in an arbitrary or discriminatory way."[126]

An EEF ordinance would have to avoid the due process pitfall that the city of Toledo, Ohio met, when the 6th Circuit struck down its Lake Erie bill of rights ordinance. The Court held in that case that an ordinance granting Lake Erie the right not to be polluted violated the due process clause because it was not clear how residents could comply or officials could enforce it.[127] In invalidating Toledo's ordinance, the Court held up Madison's phosphorus-free fertilizer ordinance as a constitutional approach to protecting a municipality's waters.[128] An EEF ordinance must hew closer to the Madison bill than the Toledo bill in terms of specificity to survive a challenge.

While the *Croplife* holding will only be persuasive authority in most jurisdictions, it still provides valuable insight into how judges may think about these kinds of local environmental questions. Preparing to defend an EEF ordinance from state preemption claims, federal preemption claims, commerce clause claims, equal protection claims, and due process claims will be crucial for any municipality interested in pursuing this solution.

E. Home-Rule Municipalities Have Uniquely Strong Legal Abilities to Defend an EEF Ordinance

Home-rule municipalities, also known as charter municipalities, would have the best chance to defeat state preemption challenges of municipal fertilizer ordinances. A home-rule municipality has the power to preempt states from regulating "municipal affairs," although they still may not regulate issues of "statewide concern."[129] Even if state law preempts an EEF ordinance in a municipality created the standard way through state legislation, there are

126. *Fox*, 567 U.S. at 253.

127. Drewes Farms P'ship v. City of Toledo, 441 F. Supp. 3d 551 (N.D. Ohio 2020).

128. *Id.* at 557.

129. Pamela Corrie, *An Assessment of the Role of Local Government in Environmental Regulation*, 5 *UCLA J. ENV'T L. & POL'Y* 145 (1986).

hundreds of home-rule municipalities that would have a better chance of defending an EEF ordinance in court. Illinois has 34 home-rule communities, Ohio has 236, Minnesota has 108, Nebraska has two, and Michigan has 325.[130]

There is no precise test that courts use to determine what is a "municipal affair," but many courts grant a presumption of validity to a municipal ordinance when there is "a significant local interest to be served which differs from one locality to another."[131] Nitrate pollution rates widely vary between municipalities, as does the effectiveness of EEFs, so any home-rule municipality that passed an EEF ordinance could argue in response to a state preemption challenge that it is regulating a municipal affair.[132] State courts are inclined to "harmonize the provisions of the charter with the provisions of the statute relating to the same matter" if there is any resolvable conflict.[133]

A Seventh Circuit case from 1995 illustrates the power of home-rule municipalities. In *National Paint & Coatings Association v. City of Chicago*, 45 F.3d 1124 (7th Cir. 1995), a business association sued Chicago for passing an anti-graffiti ordinance that banned the sale of spray paint and jumbo indelible markers within city limits, arguing that Chicago had violated "the dormant commerce clause and principles of substantive due process, and that it also exceeds Chicago's home-rule powers."[134] The Court held that Illinois provides that "home-rule units be given the broadest powers possible" to "regulate for the protection of the public health, safety, morals and welfare."[135] After determining that this ordinance did not exceed home-rule powers, the Court held that in spite of spray paint being easily accessible outside of Chicago borders, the ordinance was still rational and therefore constitutional.[136]

National Paint suggests that a home-rule community has more power to pass an EEF ordinance and avoid preemption than a

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130. *Chartered Local Government*, BALLOTPEDIA, https://ballotpedia.org/Chartered_local_government#Total_charter_cities_by_state [https://perma.cc/TJ9H-4CR7] (last visited Dec. 6, 2021).

131. Pamela Corrie, *An Assessment of the Role of Local Government in Environmental Regulation*, 5 *UCLA J. ENV'T L. & POL'Y* 145 (1986).

132. OHIO ENV'T PROT. AGENCY, *Chemcial Integrity: Nitrogen*, http://wwwapp.epa.ohio.gov/dsw/nps/NPSMP/ET/nitrogenwq.html [https://perma.cc/JPE8-4RVN] (last visited November 13, 2021).

133. State *ex rel.* Robinson v. City of Dayton, 984 N.E.2d 353, 361 (Ohio Ct. App. 2012).

134. Nat'l Paint & Coatings Ass'n v. City of Chicago, 45 F.3d 1124, 1126 (7th Cir. 1995).

135. *Id.*

136. *Id.* at 1127.

normal municipality. This is especially important for Ohio, which explicitly preempts agricultural fertilizer regulation from municipalities. The holding also undermines a likely argument from opponents of an EEF ordinance, that because non-EEF fertilizers can be bought outside of municipality limits and used within, the ordinance irrational and therefore unconstitutional. The Seventh Circuit rejected that argument in *National Paint* and courts would likely reject it here.

Home-rule municipalities, with their broad powers to regulate "municipal affairs," could provide a stronger legal defense for a municipal EEF ordinance. Although states construe home-rule powers differently, the extra power that a home-rule municipality holds can only benefit the ordinance and, in some cases, may be the differences between a legal and an illegal ordinance.

V. ADOPTING AN EEF ORDINANCE?

A. What Factors Would Motivate a Municipality to Pass an EEF Ordinance

The EPA regulates more than 150,000 public and private drinking water systems through the Safe Drinking Water Act (SDWA).[137] So long as a water system has at least fifteen connections or serves at least twenty-five people, it must adhere to the drinking water standards set by the EPA.[138] The agency has set maximum nitrate level standards at 10 ppm.[139] If a municipality's drinking water nitrate levels exceed the EPA standards, it could lead to either state or EPA enforcement measures and penalties.[140] So, along with responding to constituents who demand clean water, a municipality might pass an EEF ordinance to avoid state and EPA penalties.

Benefits of EEF use are most pronounced in areas that exceed the "criterion rate" for Nitrogen Uptake Efficiency. The criterion rate is

137. MARY TIEMANN, CONG. RSCH. SERV., RL31243, SAFE DRINKING WATER ACT (SDWA): A SUMMARY OF THE ACT AND ITS MAJOR REQUIREMENTS (2017).

138. *Id.*

139. *National Primary Drinking Water Regulations,* U.S. ENV'T PROT. AGENCY, https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations [https://perma.cc/8TTR-F5T4] (last visited Dec. 6, 2021.

140. Memorandum from Mark Pollins, Dir., Water Enf't Div., EPA, and Karin Koslow, Acting Dir., Compliance Assistance and Sector Progs. Div., EPA, on Proposed Revision to Enforcement Response Policy for the Public Water System Supervision (Dec. 8, 2009), https://www.epa.gov/sites/default/files/documents/drinking_water_erp_2009.pdf [https://perma.cc/4ZFL-ADRK].

reached when nitrogen fertilizer input is 40% higher than the nitrogen that leaves fields in the form of grain, suggesting highly inefficient fertilizer use.[141] Approximately 11.5 million acres of corn cropland exceed the criterion rate and are located largely in Nebraska, Illinois, Minnesota, Michigan, and Ohio. Including city, township, and county governments, these states contain about 9,000 municipalities that could realize the most benefits in the form of lowered costs for farmers and higher profits for fertilizer companies due to passing an EEF ordinance.[142]

The threshold question in assessing what municipality might pass a technology-forcing ordinance is asking which local governments would have the most incentive to do so. Recent litigation suggests that municipalities in Iowa are searching for novel solutions to the fertilizer pollution issue, motivated by increasing filtration costs being shouldered by public utilities and taxpayers. As nitrogen pollution increased, the Des Moines public water utility, the Board of Water Works (BWW), had to steadily filter more nitrates out of drinking water.[143] The BWW estimated it would need to spend between $76 million and $183 million to construct and operate a new nitrate-removal facility and keep up with the pollution.[144] Unable and unwilling to sue individual farmers, the BWW instead sued drainage districts responsible for draining the water from swamps and flooded farmland into waterbodies.[145] Although the suit failed for a variety of reasons, it revealed the enormous costs associated with nitrate pollution and the willingness of municipal officials to search for novel legal solutions.

Those cities or counties that are considering costly upgrades to their water filtration systems would have an incentive pass an EEF ordinance. This calculus will occur wherever nitrates levels in drinking water sources are near the 10 ppm limit set by the EPA in 2012.[146] Communities throughout Nebraska are particularly vulnerable. A citizen science water monitoring campaign in central and eastern Nebraska found that about forty percent of the 197

141. David Kanter & Timothy Searchinger, *A Technology-Forcing Approach to Reduce Nitrogen Pollution,* 1 NAT. SUSTAINABILITY 544, 544–52 (2018).

142. *Cities in Illinois,* BALLOTPEDIA, https://ballotpedia.org/Cities_in_Illinois [https://perma.cc/FD7F-H9AN] (last visited Nov. 13, 2021).

143. Bd. of Water Works Trs. of City of Des Moines v. Sac Cty. Bd. of Supervisors, 890 N.W.2d 50 (Iowa 2017).

144. *Id.* at 54.

145. *Bd. of Water Works Trs.*, 890 N.W.2d 50.

146. *Id.* at 53.

surface water sites tested had nitrate levels exceeding the 10 ppm nitrate limit.[147] Faced with the exorbitant costs of upgrading its public utility's water filtration systems, a municipality will be more likely to consider an EEF ordinance. Importantly, a community will be far more likely to consider an EEF ordinance if its drinking water source is within its jurisdiction. In Nebraska, twenty percent of drinking water comes from private wells which are within the municipality.[148] But if a municipality imports water from outside its borders, an EEF ordinance is less appealing because it would have no effect on the drinking water supply.

Municipalities far smaller and less wealthy than Des Moines are grappling with nitrogen fertilizer pollution. Water filtration is more effective when scaled up, so smaller cities that consume less water pay more per gallon of water filtered.[149] The EPA recommends either an ion exchange or reverse osmosis treatment system to filter nitrates from drinking water. Depending on the choice of system and the concentration of nitrates in the water, filtration costs can rise to exorbitant heights.[150] Nitrate levels in Hiawatha, Kansas, reached 11ppm in 2017.[151] After issuing multiple public drinking water warnings, the town of 3,300 decided to build an ion exchange plant at the cost of $3.5 million.[152] Although federal and state funding is often available for these projects, cities frequently balk at the cost of installing water meters to secure funding, and instead finance filtration systems on their own.[153] And once the systems are

147. Brandon McDermott, *Testing Nitrate and Phosphate Levels in Nebraska Water*, NEB. PUB. MEDIA (Sept. 3, 2019), https://nebraskapublicmedia.org/en/news/news-articles/testing-nitrate-and-phosphate-levels-in-nebraska-water/ [https://perma.cc/Z4BD-Y6VK].

148. NEB. DEP'T OF HEALTH AND HUMAN SERVS., NEBRASKA'S PUBLIC WATER SYSTEM PROGRAM 8 (2017), http://dhhs.ne.gov/Reports/Public%20Water%20System%20Annual%20Report%202017.pdf [https://perma.cc/NX4E-STNB].

149. *See* VIVIAN B. JENSEN ET. AL., CTR. FOR WATERSHED SCI., U.C. DAVIS, ADDRESSING NITRATE IN CALIFORNIA'S DRINKING WATER (2012), http://groundwaternitrate.ucdavis.edu/files/139107.pdf [https://perma.cc/PCS4-X9FH].

150. Anne W. Schechinger & Craig Cox, *America's Nitrate Habit is Costly and Dangerous*, EWG (Oct. 2, 2018), https://www.ewg.org/research/nitratecost/ [https://perma.cc/WU3E-AZ5Q].

151. *City of Hiawatha Issues High Nitrate Warning*, HIAWATHA WORLD (Jul. 11, 2017), https://www.hiawathaworldonline.com/news/city-of-hiawatha-issues-high-nitrate-warning/article_71208a3a-b98e-54a4-bc20-1c4b9bdd7a10.html [https://perma.cc/RN2N-R8MC].

152. Anne W. Schechinger & Craig Cox, *America's Nitrate Habit is Costly and Dangerous*, EWG (Oct. 2, 2018), https://www.ewg.org/research/nitratecost/ [https://perma.cc/WU3E-AZ5Q].

153. Jessica Fargen Walsh, *Nebraska Towns Pay Millions to Fight Nitrates as Water Bills Go Up*, OMAHA WORLD-HERALD (May 1, 2020), https://omaha.com/news/nebraska-towns-pay-

built, local taxes rise to pay for their operation. A UC-Davis study estimated that, for cities with populations between 500 and 3,300 people, the cost of building and operating an ion exchange plant would be between $47 and $378 per person per year.[154] While this estimate does not take federal grant money into account, taxpayers are ultimately footing the bill and local residents bear the costs of operation.

Hundreds of municipalities in corn farming regions could benefit from increased use of EEFs as an alternative to investment in water filtration. An EEF ordinance might be an especially attractive strategy for those cities, towns, or counties that have been forced to issue water quality alerts due to nitrogen pollution or are considering expensive upgrades to their water filtration systems.

B. Solutions

As outlined above, a minimum sales share municipal EEF ordinance will face multiple legal challenges, so a municipality pursuing this strategy should pass the ordinance from the strongest possible position. Ideally, a home-rule municipality will pass the ordinance. With the power to regulate "municipal affairs," the municipality will be able to better defend its EEF ordinance against a state preemption claim. While home-rule powers would be important in any state, in Ohio in particular the state preemption challenge will gravely threaten any ordinance regulating fertilizer. Passing it in one of Ohio's 236 home-rule municipalities might be the only way for an EEF ordinance to survive in the state.

Reasonableness will be a critical factor in defending the ordinance, so when drafting it, a municipality should add qualifications that make the ordinance easier for a company to obey. One of the simplest ways to add to the ordinance's reasonableness is to phase in the rules slowly. In *Colgate-Palmolive Co. v. Erie County*, 327 N.Y.S.2d 488, 490 (N.Y. Sup. Ct. 1971), the Court observed that the phosphate ordinance gave a "reasonable time for the change-over by the detergent industry and gave Colgate as well as the other suppliers of detergents over nine months' time to put their affairs in order in Erie

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millions-to-fight-nitrates-as-water-bills-go-up/article_5a810bb0-1437-5538-aab9-e50546672f60.html.

154. Anne W. Schechinger & Craig Cox, *America's Nitrate Habit is Costly and Dangerous*, ENV'T WORKING GRP. (Oct. 2, 2018), https://www.ewg.org/research/nitratecost/ [https://perma.cc/J3FG-RWVF].

County."[155] It would be wise for a municipality to delay implementation of the ordinance for a year to allow sellers within its borders to adjust to the new regulations. A possible provision is drafted below:

(a) It shall be unlawful for any person, firm or corporation to sell, offer or expose for sale, give or furnish any nitrogen fertilizer, whether in the form of anhydrous ammonia, ammonium nitrate, ammonium sulphate, calcium nitrate, or any other form, in the City of _____ from and after February 1, 2022, unless at least 10% of the seller's revenue from within the municipality's limits was derived from the sale of EEFs in the prior year.

Another way to enhance the reasonableness and therefore the defensibility of an EEF ordinance is through a provision for granting exceptions. In *Soap & Detergent Association v. Clark,* 330 F. Supp. 1218 (S.D. Fla. 1971), the court rejected the industry plaintiffs' argument that the phosphate detergent ban was an "unreasonable burden on interstate commerce."[156] In assessing the ordinance's reasonableness, the Court emphasized that it provided for "variances and extensions of time" for strict compliance in a situation where there is "no technically feasible, economically reasonable means of compliance."[157] An EEF ordinance should have its own "safety valve" that will strengthen it against any attacks of unreasonableness. A municipality could grant its town council, department of natural resources, or some other body the power to give variances or extensions to those companies struggling to comply with the ordinance. The risk of the law being struck down altogether is more severe than the risk of a noncompliant business evading regulation. A possible provision is drafted below:

(a) The _____ City Department of Natural Resources shall have the power and authority to grant variances and extensions of time for compliance with the requirements of this ordinance. The Department may grant such variances or extensions only if it is affirmatively established by competent factual data and information that strict compliance with the requirements of this chapter is impossible or inappropriate because of conditions beyond the control of the person, firm, or corporation involved.

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155. Colgate-Palmolive Co. v. Erie Cnty., 327 N.Y.S.2d 488, 490 (N.Y. Sup. Ct. 1971).
156. *Soap & Detergent Ass'n.* v. Clark, 330 F. Supp. 1218, 1221 (S.D. Fla. 1971).
157. *Id.* at 1223.

There is a complication with an EEF ordinance that was not present in simple bans of phosphate detergent products. This ordinance will function by banning the products of those businesses that do not sell a baseline amount EEFs, rather than just banning a certain product across the board. The ban will operate on the basis of the number of EEFs sold in the previous year. This means that if a business fails to sell enough EEFs one year, with no other provisions added to the ordinance, the seller will be locked out of the municipality's fertilizer market with no means to sell products and achieve compliance with the ordinance. To enhance the reasonableness of the ordinance and ensure that all sellers have the same opportunity to enter the market, the ordinance should contain a provision that allows a seller to show how it will meet the EEF sales threshold in the future in order to continue selling within municipal boundaries. A possible provision is drafted below:

> (b) A person, firm, or corporation that did not meet the minimum sales share in the prior year may apply to the _____City Department of Natural Resources with a feasible plan to sell a greater share of EEF fertilizer in the upcoming year in order to begin or continue selling fertilizer within municipality limits.

VI. CONCLUSION

American mayors today assert themselves on the national stage, cooperating on issues of global importance like Covid-19, energy, and climate change.[158] Municipalities are laboratories of innovation, and local governments could have a vital role to play in tackling the serious global issue of nitrogen pollution. Although a municipal EEF ordinance will likely face opposition from industry groups, cities, towns, and counties have in the past fought for the right to fix their environmental problems and won. Litigation in the 1970s over phosphate detergents, and phosphorus fertilizer litigation in the early 2000s, suggests that municipalities have vital roles in handling their own public health and environmental problems. In Illinois, Michigan, Minnesota, Nebraska, and Ohio, where farmers use nitrogen fertilizer most inefficiently, an EEF ordinance could deliver financial, health, and environmental benefits that today's voluntary 4 Rs regime cannot.

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158. *See Environment*, U.S. CONF. OF MAYORS (Aug. 26, 2021), https://www.usmayors.org/category/committees/environment/ [https://perma.cc/G5FR-5ZEB].