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Legal Analysis and Pathway for Implementing State Agricultural Management Standards

I. Introduction

This memorandum addresses the role agricultural management standards can play in reducing nitrous oxide emissions and model legislation to provide a framework for implementing such standards at the state level.¹ The memorandum describes (1) the state level focus of the model standards; (2) how and why local considerations will be needed to supplement the general substantive principles and regulatory techniques embedded in the model legislation; and (3) context for inclusion of certain mechanisms in the model legislation.

Nitrous oxide emissions are a significant source of greenhouse gas (GHG) pollution in the United States, amounting to approximately 5 percent of total U.S. GHG emissions on an annual basis. One source category, agricultural soil management, accounts for nearly three quarters of those emissions. To date, there have been few or no significant legal controls applied to regulate nitrous oxide pollution resulting from agricultural soil management in the United States. Existing incentives administered by the U.S. Department of Agriculture (USDA) have attracted only limited participation and have had limited impact on cumulative annual emissions.

In *Legal Pathways to Deep Decarbonization in the United States*, Chapter 35 (2018), Jessica Wentz and David Kanter provide a robust analysis of this sector and potential legal options for realizing significant reductions of nitrous oxide emissions. Many of these options entail the introduction of management standards for nitrous oxide emissions in the agricultural and livestock sectors. The authors discuss how these standards could be central to many different policy instruments and could be adopted at either the federal, state, or local level. They also note how stakeholder compliance with management standards could avoid the challenges typically associated with monitoring and verifying nitrous oxide emissions reductions.

Implementing management standards requires two distinct steps: (1) articulating the substance of such standards, and (2) identifying effective regulatory techniques for putting the standards into action. Nitrous oxide emissions are particularly well-suited to sub-national management standards at the state level.² This model legislation establishes a framework for state-level implementation vs. local-level implementation, in light of the wide variety of approaches states

¹ A draft of this model legislation accompanies this memorandum.

² Other memoranda will explore at greater length potential federal strategies for the EPA's use of the CAA to establish binding nitrous oxide management standards.

take to home rule and municipal authority, and is derived primarily from provisions of New Mexico's Healthy Soil Act.³

The decision to focus the model legislation on state management standards is not meant to suggest that a state-level approach would prove most effective at reducing nitrous oxide emissions. In fact, both federal and local efforts to reduce nitrous oxide emissions through improved agricultural management practices would borrow heavily from the substantive principles and regulatory techniques described in the model legislation.

II. Substance of the Management Standards

The management standards are designed to encourage scientifically based strategies and best practices that promote sound environmental stewardship and efficient agricultural production. Scientists and conservationists already know the kinds of agricultural and livestock practices that are effective in reducing nitrous oxide emissions, which tend to focus on optimizing fertilizer use and manure consumption.

The 4-R nutrient stewardship practices are widely known as the benchmark standards for reducing nitrous oxide emissions. This framework instructs farmers to apply the right fertilizer source at the right rate, in the right place, and at right time.⁴ Importantly, local considerations determine what source, place, rate, and time are right. Site-specific factors like climate, soil mineralogy, crop choice, or labor constraints play a massive role in nitrogen use efficiency. This is why the 4-R framework, like many others soil conservation standards, stresses that local conditions must inform the choice of appropriate best practices for a given region, crop or field.

The need to account for local conditions means that the management principles embedded in the model legislation are necessarily broad. The substantive principles endorsed by the model legislation can be found in the definitions of “soil health principle” and “supported method.” These principles reflect the general themes common among the policies and research that were surveyed in preparation of the model legislation. However, minimizing nitrous oxide emissions will require states, program administrators, and farmers to supplement the generalized principles with local considerations and strategies. To assist in that effort, attached to this memorandum (as Appendix A) is a chart cataloguing the various best management practices that were researched.

III. Regulatory Techniques to Implement the Management Standards

Both state-level and local-level considerations will influence the choice of regulatory techniques used to implement the substantive agricultural management standards. Site-specific factors like climate or crop choice will help dictate the substantive practices best-suited to reduce nitrous oxide emissions. These factors will also inform which policy tool is appropriate for implementing

³ In preparation of the model legislation, approximately ten different states' healthy soil bills were surveyed. New Mexico's bill met the following criteria: (a) includes goal of promoting healthy soil to reduce greenhouse gas emissions, (b) provides initial list of best management practices to achieve such goal, (c) provides sufficient description of an advisory body, and (d) provides sufficient description of an incentive program. In addition, most of the content in New Mexico's bill was general enough to be adopted by other states, and all of the content was in one place rather than spread across various state laws. This basic structure allows for adding more details around best practices and incentive programs as desired, for example, adding a certification program set forth in Vermont's bill.

⁴ See *4R Principles*, THE FERTILIZER INST.: NUTRIENT STEWARDSHIP, <https://www.nutrientstewardship.org/4rs/4r-principles/>.

the best practice. For example, public extension programs encouraging the adoption of drip-irrigation are a potent way to increase fertilizer efficiency in arid and diverse farming environments like California's central valley.⁵ In the US Corn Belt, however, it may be more effective for farmers to plant cover crops that prevent nutrient runoff.⁶

Accordingly, the model legislation does not treat any one type of implementation technique as the preferred tool for reducing nitrous oxide. Instead, it takes a comprehensive approach by describing a variety of techniques individual states can choose from. These techniques can be implemented alone or in concert; they can also be ratcheted up-or-down in stringency and specificity. As noted within the model legislation, some agricultural management practices that are effective at reducing nitrous oxide emissions associated with agricultural production in a locality can increase other forms of nitrogen pollution. The model legislation encourages an integrated approach to state nitrogen management implementation efforts that would help ensure that farmers do not implement practices under the auspices of this initiative that would cause them to fall out of compliance with other state or federal nitrogen management rules and regulations.

The model legislation's incentives for voluntary adoption of nitrogen management standards generally take one of two forms: educational support or adoption incentives. In addition, states may wish to incorporate mandatory elements into the Healthy Soil Act by either requiring landowners to implement one or more management actions appropriate for their local conditions or requiring landowners to demonstrate that they have achieved certain outcomes annually. Each of these methods is described further in the section below.

A. Educational Support

Regulators evaluating different implementation techniques must ensure that they are farmer-focused, as it is successful implementation by farmers that will drive the success any program. Historically, familiarity with conservation information and exposure to affiliative networks are positive predictors of adoption, irrespective of any initial skepticism towards adoption and implementation of management standards.⁷ Proactively educating stakeholders about how to implement best practices, and why they are beneficial to adopt, is key to successful implementation.

The model legislation encourages education in two ways. First, Section 6 creates an assessment and education program. The program's approach to technical assistance and extension services is inspired by leading research on best practices adoption. Consistent with that research, the

⁵ The adoption of drip-irrigation is effective in California's arid and diverse agricultural fields. See Suduan Gao et al., *Subsurface Drip Irrigation Reduced Nitrous Oxide Emissions in a Pomegranate Orchard*, 10 INT'L J. OF ENVTL. SCI. AND DEV. 79, 83 (2019). Furthermore, public extension programs are an effective way to encourage the adoption of drip-irrigation techniques. See Rebecca Taylor and David Zilberman, *Diffusion of Drip Irrigation: The Case of California*, 39 APPLIED ECON. PERSPECTIVES AND POL'Y 16 (2017).

⁶ The use of cover crops is effective in reducing nitrous oxide emissions in cornfields. See Matthew J. Helmers, *Strategies for nitrate reduction: The Cedar River Case Study*, Proceedings of the Integrated Crop Management Conference 195, 196 (2010). Financial incentives are well-suited to encouraging farmers to plant cover crops. See Dan Charles, *How To Make Farmers Love Cover Crops? Pay Them*, NPR (March 16, 2017 4:55 PM), <https://www.npr.org/sections/thesalt/2017/03/16/520281317/how-to-make-farmers-love-cover-crops-pay-them>.

⁷ L.S. Prokopy et al., *Adoption of agricultural conservation practices in the United States: Evidence from 35 years of quantitative literature*, 74 J. OF SOIL AND WATER CONSERVATION 521, 531 (2019).

program prioritizes the creation of broad social networks and local coordination to aid information dissemination.⁸ It prioritizes in-person education involving conservation agencies, technical assistance providers, and farmers.⁹

Second, Section 5 creates a Healthy Soil Advisory Group. Using advisory groups to improve access to quality agricultural information is one of the most effective ways to encourage the adoption of best management practices among farmers.¹⁰ These groups are typically comprised of public sector specialists, private producers, and representatives from stakeholder organizations. They conduct outreach, provide educational services, and enable networking opportunities for local agricultural sectors. They also leverage real-world experience to inform states in setting technical standards and best practices.

B. Adoption Incentives

Research shows that financial incentives prompt farmers to adopt best practices. Loans, subsidies, and credits incentivizing certain practices are all positively correlated with the adoption of such practices. Yet research also indicates that the effect of financial incentives on farmer behavior is uneven and circumstantial. Specifically, financial incentives are more motivating for early practice adopters and for poorer farmers.¹¹ This reinforces the need to carefully tailor regulatory techniques to meet local needs; the incentive program best-suited to reduce nitrous oxide emissions in a specific region will depend on regional wealth, existing use of best practices, capital costs, opportunity costs, and other factors.

Sections 7 and 8 of the model legislation expressly authorize financial incentives in the form of grant and loan payments, respectively. Consistent with the research, they orient these incentives around localized needs. Grants are awarded to decentralized districts and eligible entities that are more closely aligned with local issues, and loans are given directly to stakeholders.

Section 9 provides for a different kind of incentive—a certification program that enables farmers to market and sell their goods as products of healthy soil. This kind of incentive addresses farmers’ attitudinal considerations. Indeed, research shows that farmers’ perceptions on issues like their own environmental stewardship ethic, their identification with conservationist cohorts, and their understanding of consumer preferences for sustainable goods play a larger role in best practices adoption than traditionally acknowledged.¹² Certification and consumer labeling strategies (which are understudied in academic research) are designed to incentivize the use of best practices by appealing to farmers’ attitudinal identities.¹³ Some research does suggest that farmers

⁸ *Id.* at 532.

⁹ Tingting Liu et al., *Factors Influencing Farmers’ Adoption of Best Management Practices: A Review and Synthesis*, 10 SUSTAINABILITY 1, 12 (2018).

¹⁰ Adam Baumgart-Getz et al., *Why farmers adopt best management practice in the United States: A meta-analysis of the adoption literature*, 96 J. OF ENVTL. MGMT. 17, 23 (2012). *See also* Julie Ingram and Jane Mills, *Are advisory services “fit for purpose” to support sustainable soil management? An assessment of advice in Europe*, 35 SOIL USE AND MGMT. 21, 22-23 (2019) (describing value of advisory committees in changing agricultural landscape).

¹¹ Tingting Liu et al., *supra* note 10, at 13.

¹² L.S. Prokopy et al., *supra* note 8, at 521.

¹³ Tingting Liu et al., *supra* note 10, at 20.

will perceive the costs and benefits of adopting best practices more favorably if they believe consumers are more aware of, and are more likely to reward, environmentally-minded farmers.¹⁴

C. Mandating Healthy Soil Strategies

In addition to developing educational programs and financial incentives to encourage the adoption of agricultural management techniques, states may also choose to mandate the adoption of certain agricultural practices to manage nitrous oxide emissions.¹⁵ An optional Section 12 is provided in the model legislation, which would require landowners and operators to either demonstrate that they have implemented supported methods for promoting healthy soil or obtain and maintain a certification from the state agency. As described in Section 9, to earn a certification from the state, an applicant must demonstrate that (1) topsoil increased on the land year over year, (2) the soil management efforts have reduced GHG emissions in each successive year, or (3) the soil contains an increasing percentage of organic matter each year.

IV. Conclusion

The model legislation includes other provisions not discussed here. This memorandum primarily addresses the state-level focus of the model legislation, the role of local considerations, and the rationales and contexts for inclusion of certain key regulatory techniques. As noted, the framework contained in the model legislation is designed to be educational and incentive-based, but could be expanded to include mandatory elements, such as the optional Section 12 framework, if desired.

¹⁴ François J. Dessart et al., *Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review*, 46 Eur. Rev. Review of Agric. Econ. 417, 444 (2019).

¹⁵ Conversion of these voluntary standards into mandatory measures, however, would preclude generation of offset credits for such reductions.