CARBON SEQUESTRATION AS AGRICULTURE'S NEWEST MARKET: A PRIMER ON AGRICULTURE'S ROLE IN CARBON CAP-AND-TRADE

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I. INTRODUCTION

"I ask this Congress to send me legislation that places a market-based cap on carbon pollution . . . ."[1] President Obama spoke these words in a speech

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1. Barack Obama, U.S. President, Address to Joint Session of Congress (Feb. 24, 2009), http://www.whitehouse.gov/the_press_office/remarks-of-president-barack-obama-address-to-joint-session-of-congress/.

on Tuesday, February 24, 2009, in which he outlined energy policy as a main focus of his early administration. One year later, the American Clean Energy and Security Act ("ACES"), a bill that includes a national carbon cap-and-trade scheme, was passed by the House of Representatives.[2] While the Senate has yet to devote substantial attention to the bill, the House's response to President Obama's request may provide an answer to a growing question: Could climate change policy in the United States open the door to new revenue streams for our nation's farmers?

Much has been written in past months about the potential for implementing a carbon cap-and-trade program in the United States to minimize greenhouse gas emissions.[3] The advantages and disadvantages have been discussed, studies have been undertaken, and a debate worthy of an issue that combines law, science, and economics has raged. For many commentators the question had become when, not if, a carbon cap-and-trade program would be realized. Voluntary carbon markets exist in the United States already, and firms across the nation have been preparing for impending legislation of this sort.[4] More importantly, a general consensus has been reached that agriculture, through adoption of certain carbon sequestration practices, can play a large role in reducing carbon emissions, and therefore be a major player in the carbon market.[5]

President Obama's request, and the House's response, make clear that it is now likely a matter of when a carbon cap-and-trade program will be implemented. With the realization that a market-based cap will be placed on carbon emissions, the time is right for agriculture to ensure its role in the system. In doing so, farmers are likely to find themselves on the selling end of a new carbon offset market. Further, for some farmers, this new revenue stream may result

2. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 111(a) (2009).

3. *See, e.g.*, John M. Broder, *Obama's Greenhouse Gas Gamble*, N.Y. TIMES, Feb. 28, 2009, *available at* http://www.nytimes.com/2009/02/28/science/earth/28capntrade.html; Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293 (2008); Laurie A. Ristino, *It's Not Easy Being Green: Reflections on the American Carbon Offset Market*, 8 SUSTAINABLE DEV. L. & POL'Y 34 (2008).

4. *See* IDAHO SOIL CONSERVATION COMM'N, CARBON SEQUESTRATION ON IDAHO AGRICULTURE AND FOREST LANDS 7-2 to 7-5 (2003), *available at* http://www.scc.idaho.gov/PDF/Carbon%20Sequestration/IDAHOSEQUESTRATIONREPORT.pdf [hereinafter IDAHO COMM'N] (noting that many companies have already begun investing in greenhouse gas emissions trading systems and providing examples).

5. Nicholas Smallwood, Note, *The Role of U.S. Agriculture in a Comprehensive Greenhouse Gas Emissions Trading Scheme*, 17 N.Y.U. ENVTL. L.J. 936, 938 (2008) (discussing the Intergovernmental Panel on Climate Change's recognition of agriculture's potential role in carbon emission reductions through land management practices).

from farming processes that they have already begun or considered implementing.[6]

While legislation is on the horizon, there are a number of unanswered questions relating to the implementation of a new carbon cap-and-trade program. For the general public, and for farmers in particular, these are important questions. This Note is intended to introduce the reader to cap-and-trade programs, explain what a cap-and-trade program for carbon emissions might look like, discuss the crucial issues and elements that must be addressed by any legislation supporting a cap-and-trade system, and identify their importance to agriculture. This Article further discusses the likely resolution of those issues in upcoming legislation by considering their treatment in past and current legislative proposals for a carbon cap-and-trade program. Finally, the Article concludes with a practical example that demonstrates how a carbon cap-and-trade system will address these issues and involve a major role for agricultural producers.

II. CLIMATE CHANGE, CARBON SEQUESTRATION, AND CAP-AND-TRADE PROGRAMS

To better understand the advantages or disadvantages of a cap-and-trade program for carbon, it is necessary to provide a brief discussion of why we are concerned with reducing carbon emissions in the first place. It is also necessary to understand how carbon sequestration can address the problem of climate change, and what capacity it has to do so. Further, in order to understand the crucial issues that must be addressed by the legislation that creates a carbon cap-and-trade program, one should have an understanding of cap-and-trade programs generally.

A. *Climate Change*

Climate change has been characterized as one of the "most far-reaching and formidable environmental issue[s] facing the world."[7] Climate change results from the excess concentrations of greenhouse gases (GHG) trapping heat near the earth's surface and resulting in increases in average global temperature.[8] Those average temperature increases have the potential to create disastrous con-

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6. *See* Paulo Prada, *Farming Technique Developed in U.S. is Embraced Abroad*, N.Y. TIMES, Sept. 30, 2005, *available at* http://www.nytimes.com/2005/09/30/business/worldbusiness/30cnd-till.html.

7. JOHN A. ALIC ET AL., PEW CTR. ON GLOBAL CLIMATE CHANGE, U.S. TECHNOLOGY AND INNOVATION POLICIES: LESSONS FOR CLIMATE CHANGE 2 (2003), *available at* http://www.cleanenergystates.org/library/Reports/Pew_US-Technology_and_Innovation_Policies.pdf.

8. *Id.*

sequences.[9] Eleven of the last twelve years rank among the twelve warmest years in average global temperatures.[10] Continual average temperature rise of this magnitude could result in increases in the severity and frequency of weather events including floods and droughts, as well as the extinction of plant and animal species, fresh water shortages, and a decline in food production.[11]

The largest contributor to GHG emissions, and consequently a driving factor in the problem of climate change, is carbon dioxide emissions. Carbon dioxide (CO_2) makes up approximately eighty-four percent of total GHG emissions.[12] The increase in carbon dioxide emissions is a problem largely created by human activity, and predominantly results from the burning of fossil fuels.[13] According to estimates, human activity is responsible for a net 6.3 billion tons of CO_2 emissions annually.[14] Of all GHG emissions, sixty-five percent result from energy-related activities including production of electric power and transportation, of which CO_2 is the largest contributor.[15] The remaining portion is created by human land use, land use changes, and forestry.[16]

A key solution to the problem of climate change is thus the reduction of global GHG emissions, particularly CO_2 emissions. Technologies that provide reduced emissions from the burning of fossil fuels, those that displace the use of fossil fuels for energy production, and practices that sequester CO_2, are fundamental in combating the risks posed by climate change. The latter, specifically those sequestration (sucking up and storing) practices that can be provided by agriculture, are the subject of this Note.

B. *Sequestration in Agricultural Soils*

While cutting carbon dioxide emissions has always been one solution to climate change, another possibility has been the sequestration of carbon from the atmosphere. The term "sink" is used to describe a process or activity that se-

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9. *See id.* at 3.

10. CHARLES W. RICE & DEBBIE REED, SOIL CARBON SEQUESTRATION AND GREENHOUSE GAS MITIGATION: A ROLE FOR AMERICAN AGRICULTURE 7 (2007), *available at* http://bipartisanpolicy.org/sites/default/files/cwrice_report_30907_final.pdf.

11. Stephanie B. Ohshita, *The Scientific and International Context for Climate Change Initiatives*, 42 U.S.F. L. REV. 1, 7-11 (2007).

12. ENVTL. PROT. AGENCY, *Executive Summary* to INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2005, at ES-4 (2007), *available at* http://www.epa.gov/climatechange/emissions/downloads06/07ES.pdf.

13. *See* RICE & REED, *supra* note 10.

14. *See id.*

15. Ohshita, *supra* note 11, at 13.

16. *Id.*

questers carbon by removing it from the atmosphere.[17] The idea that sequestering carbon may be a short-term answer to global climate change was first recognized in 1983 when the Environmental Protection Agency (EPA) suggested planting trees to absorb carbon dioxide.[18] Trees, it was estimated, "could absorb an average of 750 tons of carbon annually for each square kilometer planted."[19] In 1988, the first carbon sequestration project between countries was born when an American energy firm agreed to plant 52 million trees in Guatemala to offset the carbon dioxide emissions that would be generated by a new power plant the firm was building in the U.S.[20]

By the early 1990's, the Intergovernmental Panel on Climate Change (IPCC) had concluded that improved land use management and activities "had the greatest potential for net carbon change in carbon stocks by 2010."[21] The Seventh Conference of the Parties to the Kyoto Protocol recognized that in addition to reforestation, agricultural land practices provided significant carbon sinks.[22] Today, "[c]arbon sequestration on agricultural land is . . . a recognized component of climate change strategies at the international level."[23]

Several agricultural practices reduce GHG emissions, such as soil management practices that decrease the amount of nitrogen-rich fertilizers used on cropland, manure management and storage projects that reduce methane emissions, and the production of bio-fuels to displace traditional fossil fuel usage.[24] However, this Note is focused on the number of recognized agricultural practices that expand biological carbon sinks by increasing the amount of carbon that can be sequestered by agricultural soils. While agriculture is responsible for a portion of the carbon dioxide emitted into the atmosphere each year, it contributes less than one percent of total CO_2 emissions.[25] As farmers have expanded and intensified cultivation, however, natural carbon sinks in the soil have been disrupted, and more carbon is emitted each year by agriculture as a result.[26] Cultivation has resulted in soils losing fifty percent of their original carbon content.[27]

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17. Alexander Gillespie, *Sinks and the Climate Change Regime: The State of Play*, 13 DUKE ENVTL. L. & POL'Y F. 279, 279 (2003).

18. *Id.* at 281.

19. *Id.* at 281-282.

20. *Id.* at 283.

21. *Id.* at 282 (citing Fred Pearce, *Growing Pains*, NEW SCIENTIST, Oct. 24, 1998, at 20).

22. Kelly Connelly Garry, Commentary, *Managing Carbon in a World Economy: The Role of American Agriculture*, 9 GREAT PLAINS NAT. RESOURCES J. 18, 22 (2005).

23. Steven A. Kennett et al., *Property Rights and the Legal Framework for Carbon Sequestration on Agricultural Land*, 37 OTTAWA L. REV. 171, 173 (2005-2006).

24. *See* Smallwood, *supra* note 5, at 939.

25. *Id.* at 938.

26. *See* Gillespie, *supra* note 17, at 298-300.

27. RICE & REED, *supra* note 10, at 10.

On the other hand, farm and grazing land soils sequester approximately 20 million metric tons of carbon each year according to the USDA,[28] thus presenting a potential net sink.

Agriculture's contribution to a carbon cap-and-trade program is found in the soil's power to sequester much more carbon each year than it currently does. The carbon sequestration capacity of soils exceeds that of plant biomass and the atmosphere combined.[29] According to USDA and EPA estimates, agricultural soils in the United States have the ability to absorb one-half ton of carbon emissions per acre, per year.[30] This means that cropland soils in the United States alone could sequester anywhere from 275 to 760 million metric tons of CO_2 annually.[31] An additional 66 to 330 million metric tons could be sequestered on U.S. grazing lands.[32] USDA and EPA scientists "estimate that agricultural soils have the potential to sequester enough carbon to offset 10-15 percent of annual U.S. GHG emissions."[33]

Many agricultural practices provide soil carbon sequestration, such as the use of high-residue crops and grasses, reducing fallow periods between crops, converting cropland to grasslands or hay pasture, improving burning management, altering the intensity and timing of grazing, and using low-till or no-till methods of farming and residue management.[34] This Note specifically focuses on land cover and low or no-till farming as methods of sequestering carbon, and providing an avenue for farmers to participate in the carbon market.

Land cover practices are an effective and low-cost method of providing carbon sequestration. The process involves allowing cropland to revert back to another land cover, usually a form of grass. The Conservation Reserve Program (CRP), which was not originally intended to be a carbon sequestration program, provides an example of a "set-aside" land cover program.[35] In such a practice, entire sections of land are set-aside and allowed to revert to natural cover. Grass cover tends to sequester more carbon than does the maintenance of field crops.[36] As such, set-aside practices are likely to be established on low-yield or unusable

28. Garry, *supra* note 22, at 24.

29. *Id.*

30. SEN. BOB DOLE & SEN. TOM DASCHLE, 21ST CENTURY AGRIC. POLICY PROJECT, THE ROLE OF AGRICULTURE IN REDUCING GREENHOUSE GAS EMISSIONS: RECOMMENDATIONS FOR A NATIONAL CAP-AND-TRADE PROGRAM 21 (2008), *available at* http://bipartisanpolicy.org/sites/default/files/21st_Century_Agriculture_Policy_Report2.pdf.

31. RICE & REED, *supra* note 10, at 12.

32. *Id.*

33. DOLE & DASCHLE, *supra* note 30.

34. *See* Kennett et al., *supra* note 23, at 175-176.

35. RICE & REED, *supra* note 10, at 13.

36. *Id.*

portions of land, though land cover soil sequestration can be adopted on high-yield croplands as well.[37] Other land cover carbon sequestration practices include the installation of grass waterways, buffer strips, or field margins.

Additionally, in recent years, technologies in weed control and farming equipment have advanced, allowing many crops to be grown with reduced or no-tillage.[38] Less tillage results in fewer disturbances to natural soil carbon sinks, which in turn results in increased sequestration of carbon in the soil. In addition, because crop residue becomes soil organic matter, retaining crop residue in fields also increases soil carbon sequestration. Moreover, no-till or low-till systems often result in higher net returns because operating costs are decreased.[39] For example, fewer trips across the field results in lower fuel costs, which results in higher returns. One Kansas study demonstrated that emissions from direct energy use "were nearly 40% lower for no-till compared to tilled systems."[40]

Aside from its high capacity as a carbon sink, agricultural soil sequestration represents the most viable option for combating climate change for several other reasons. The first reason relates to timing and cost. It is generally conceded that combating climate change ultimately depends upon the technological advancements science can make to significantly reduce the use of fossil fuels. Agriculture's role in providing soil carbon sequestration presents the short-term, low-cost solution that will result in carbon emissions reductions while science catches up. Because the processes are rather "low-tech," we need not wait for technological advances nor expend a great deal of resources to implement sequestration practices. In fact, with respect to land cover, millions of acres are already enrolled in the CRP.[41]

Similarly, many farmers already engage in low or no-till farming because of the other soil quality and erosion mitigation benefits it provides.[42] Such soil carbon sequestration offsets have been praised as "charismatic carbon credits" because of their ancillary environmental benefits.[43] Soil carbon sequestration results in increased levels of carbon in the soil, which improves soil quality, fer-

37. *See id.*

38. *Id.*

39. *Id.* at 15.

40. *Id*.

41. TADLOCK COWAN, CONG. RESEARCH SERV., CONSERVATION RESERVE PROGRAM: STATUS AND CURRENT ISSUES 4 (2010), *available at* http://www.nationalaglawcenter.org /assets/crs/RS21613.pdf.

42. *See* SJOERD W. DUIKER & JOEL C. MYERS, BETTER SOILS WITH THE NO-TILL SYSTEM 6 (2005), *available at* http://panutrientmgmt.cas.psu.edu/pdf/rp_better_soils_with_noTill.pdf (noting the steady increase in no-till systems over the last fifteen years).

43. Soil Carbon Ctr., Kan. State Univ., *"Charismatic Carbon" Credits: Carbon Credits from the Agricultural Sector Could be Highly Valuable in U.S. Carbon Markets*, http://soilcarboncenter.k-state.edu/originals/CASMGS_Charismatic_C_doc(4-2).htm.

tility, and productivity. It further reduces soil erosion and nutrient runoff. All of these bi-products lead to better air and water quality, in addition to the reduction in CO_2 emissions. Thus, soil carbon sequestration further presents an excellent low-cost, short-term solution to climate change because "[n]o other GHG reduction option offers so many ancillary benefits to society and to agriculture."[44]

C. *Cap-and-Trade Programs Generally*

A cap-and-trade program is created by capping the aggregate amount of a particular pollutant that may be emitted from regulated sources. A limited number of tradable allowances are then distributed, which represent the right to emit certain amounts of that particular pollutant and are surrendered according to a polluter's output. The allowances are made tradable, so that an entity that is going to exceed its number of allowances may purchase allowances from another entity that has excess allowances. Initially, the allowances are either auctioned off or given away, and the market price of an allowance is largely determined by how much alternative investment in an emissions reduction system would cost. In simple terms, a firm will purchase allowances until doing so becomes less cost-effective than taking steps to reduce carbon emissions at the source. Cap-and-trade programs are praised for being more cost effective than traditional regulatory systems that set emissions caps, and then attempt to directly regulate the sources to ensure compliance with the restrictions.[45]

Most commentators agree that a United States cap-and-trade system for carbon would be an upstream point of regulation system.[46] This means that the system will not attempt to regulate the carbon emissions of every possible emitter, but will focus on regulating the major emitters at the beginning of the fossil fuel chain. In the case of carbon, the regulated sources will be energy producers. As a result of targeting upstream players, the cost of the emissions cap will be distributed throughout the American economy. In short, regulated firms will pass the cost of complying with the cap on to consumers. As firms are forced to either invest in emissions reduction technology, or buy offsets or allowances, the cost will be passed on to the end users, thus trickling through the national economy.

Cap-and-trade programs have previously been used for other pollutants. The best domestic example is the cap-and-trade system used in regulating sulfur dioxide (SO_2) emissions following the Clean Air Act Amendments of 1990.[47] Following the implementation of that regulatory regime, "[a] robust market of

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44. *Id.*
45. Stavins, *supra* note 3, at 295-97.
46. *See, e.g.*, *id.* at 309-11; DOLE & DASCHLE, *supra* note 30, at 3.
47. *See* Stavins, *supra* note 3, at 300.

SO_2 allowance trading emerged."[48] Estimates of that cap-and-trade program demonstrate that it was successful in bringing SO_2 emissions down 5.5 million tons in fifteen years, and resulted in cost savings of $1 billion per year over other traditional enforcement schemes.[49]

While no mandatory U.S. cap-and-trade program exists yet, the EU's Emissions Trading Scheme for carbon is the world's largest cap-and-trade program.[50] That program has resulted in a CO_2 market with weekly trading volumes between 5 and 15 million tons.[51] Voluntary carbon trading markets are also springing up in the United States. The Regional Greenhouse Gas Initiative (RGGI) is a carbon-trading scheme among ten northeastern states that seeks to incrementally decrease carbon emissions beginning in 2015.[52] Also, the Chicago Climate Exchange represents a voluntary United States carbon trading market that already incorporates agricultural practices into the system.[53] A more in-depth look at agriculture's role in the Chicago Climate Exchange appears in Section IV *infra*.

What is agriculture's role in a mandatory U.S. cap-and-trade program? Under typical cap-and-trade programs, allowance trading occurs between one regulated firm and another. A firm that is going to exceed its allowances purchases allowances from a regulated firm that pollutes less, and thus has allowances to spare. In a carbon cap-and-trade program that involves agriculture, regulated firms would be able to purchase carbon allowances or "offsets" from farmers as non-regulated sources that provide carbon sequestration services. Farmers who adopted soil carbon sequestration techniques would be awarded allowances or, in the parlance of the Chicago Climate Exchange, exchange soil "offsets," which could be sold to regulated firms.[54] For agriculture, this could create new revenue streams potentially in the billions of dollars per year.[55] While a carbon cap-and-trade program may open new doors for agriculture, there are many issues that must be addressed in any cap-and-trade system, and particularly in one that involves agriculture as a provider of tradable offsets.

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48. *Id.*
49. *Id.*
50. *Id*. at 301.
51. *Id.* at 302.
52. *Id.*
53. RICE & REED, *supra* note 10, at 20.
54. *See id.*
55. DOLE & DASCHLE, *supra* note 30, at 3.

III. Issues Presented by a Carbon Cap-and-Trade Program Involving Agriculture

A paper published by the Idaho Soil Conservation Commission listed three missing elements impeding the development of a carbon cap-and-trade program in the United States: regulation capping emissions, public acceptance of carbon markets, and rules for carbon markets and trading.[56] It appears that the first two impediments are diminishing, as Congress has introduced legislation involving an emissions cap for carbon,[57] and public acceptance of this type of scheme is on the rise. However, the most unresolved and difficult factor remains—the rules of the game. While the economics of any cap-and-trade program present a significant number of issues that must be resolved to ensure the efficient and cost-effective operation of the program, a cap-and-trade program for carbon, particularly one that provides a role for agriculture, draws out even more issues that must be resolved by the regulatory framework supporting the program.

This section addresses the major elements of a cap-and-trade program that any impending regulation will have to address, and discusses how those elements have been addressed in past proposed legislation. The American Clean Energy and Security Act (ACES), a carbon cap-and-trade bill introduced in May 2009,[58] will serve as a reference point for predicting the way that upcoming legislation will likely address the issues. While some of the elements and issues are simply informative, in the sense that their final resolution will be a facet of the system, others present questions that should be of particular interest to farmers that intend to be players in the cap-and-trade market.

A. *Baseline, Additionality, and Leakage*

Baseline refers to the idea that in order to determine the success of a project, there must be something to compare it to.[59] In the context of soil carbon sequestration, this means that there must be a starting point to determine how much carbon has been sequestered over a given amount of time. Because soils already have carbon content, there must be an estimate of what current soil carbon content is in order to measure additional sequestration. A common method of defining a baseline is to determine the carbon content of soil over a certain

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56. Idaho Comm'n, *supra* note 4, at 7-1.

57. *See* American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (2009).

58. *Id*.

59. Smallwood, *supra* note 5, at 949.

region of land.[60] Comparing any increase in carbon content of land on which a sequestration project takes place to that of similar land on which a project does not take place can test that baseline.[61]

Additionality is related to baseline, and refers to the notion that a project must create a benefit additional to what would have happened without the project.[62] For example, soil may sequester some carbon in the absence of a particular soil carbon sequestration technique. In a carbon cap-and-trade program, agriculture should only be rewarded for the amount of carbon sequestered over and above the amount that would have been sequestered without adopting a new sequestration practice. A common method for determining additionality again is simply to compare the carbon content of soils on which a sequestration project takes place to similar land on which a project does not take place.[63]

It should also be noted that in the context of particular practices, such as no-till farming, additionality takes on other dimensions. For example, while no-till presents a viable soil carbon sequestration process, it is criticized as requiring more than average chemical treatment to combat weed growth.[64] On the other hand, in addition to the soil carbon sequestration provided by no-till systems, such systems tend to produce other benefits in terms of soil, air, and water quality. If the use of this type of practice is to be rewarded, it must be done in a manner that reflects its net benefit, taking into account its positive and negative impacts.

Leakage occurs when a project that reduces CO_2 is undertaken, only to move the prior practice to a place outside the project.[65] For example, when cropland is converted to grassland as a sequestration project and other non-cropland into cropland is converted on another site, the net benefit is reduced. One study concluded that "for every one hundred acres of cropland retired under the Conservation Reserve Program, twenty acres of previously non-crop land were converted into crop-land."[66] If farmers are to be rewarded for the service of carbon sequestration, that reward must reflect only the net benefit realized. In short, benefits created by a carbon sequestration practice must be discounted to account for any leakage that occurs.

These three concepts must, and will, be addressed by whatever regulatory framework supports a carbon cap-and-trade system. The ACES bill includes

60. *Id.*
61. *Id.*
62. *See id.*
63. *Id.*
64. DUIKER & MYERS, *supra* note 42, at 17.
65. Smallwood, *supra* note 5, at 952.
66. *Id.* at 953 (citing JunJie Wu, *Slippage Effects of the Conservation Reserve Program*, 82 Am. J. Agric. Econ. 979, 979 (2000)).

language directed at addressing baseline, additionality, and leakage issues.[67] With respect to baseline, the bill requires the Administrator of the EPA to develop "[a] standardized methodology for establishing activity baselines for offset projects."[68] The bill specifically requires the baseline "to reflect a conservative estimate of business-as-usual performance or practices for the relevant type of activity," such that it will "ensure the environmental integrity of offsets calculated in reference to such baseline."[69]

The ACES bill further requires the Administrator to develop regulations "for determining the additionality of . . . greenhouse gas sequestration," which requires, at a minimum, that sequestration is only considered additional to the extent it exceeds the baseline, and the practice is not required under other law.[70] In addition, the Administrator is directed to develop a "standardized methodology for accounting for and mitigating potential leakage."[71]

It is likely that regulation supporting a carbon cap-and-trade program will involve language similar to that found in the ACES bill. Specific methods and regulations will be promulgated following the law's passage, but general guidance from the regulatory body will certainly address these three issues to ensure that farmers who undertake sequestration projects are rewarded for the net benefit created. While the exact science necessary to estimate and determine the amount of carbon sequestered on a particular project land is outside the scope of this Note, most commentators agree that these issues can be accounted for in a simple and cost-effective manner.[72] For agriculture it is enough to understand that regulation will include accounting for issues of baseline, additionality, and leakage, and that these considerations will structure the rules of the game in a manner that impacts the value of a particular practice.

B. *Measurement & Verification*

If a carbon cap-and-trade program is going to reward farmers with offsets based on the carbon they sequester in their soils, there must be a way to measure the amount of carbon sequestered on those lands. To date, no uniform

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67. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 734(a) (2009).

68. *Id*. § 734(a)(2).

69. *Id*.

70. *Id*. § 734(a)(1). Under a prior cap-and-trade bill, America's Climate Security Act of 2007 ("Lieberman-Warner bill"), the Administrator was specifically required to determine baseline and additionally by comparison to similarly situated land. America's Climate Security Act of 2007, S. 2191, 110th Cong. § 2404(g)(2)(A) (2007).

71. H.R. 2454 § 734(a)(4).

72. *See, e.g.*, Smallwood, *supra* note 5, at 949; DOLE & DASCHLE, *supra* note 30, at 41.

method of measurement and verification exists. It is likely that a carbon cap-and-trade regulatory framework will adopt a hybrid approach to measurement that involves both estimates and random soil samplings.[73] Verification of those measurements is likely to be required of project managers or aggregators.

While technologies that measure carbon content in soils do exist, they are rather expensive.[74] Conversely, while scientific models can estimate sequestration benefits, they involve room for error. Estimates based on models alone could thus jeopardize the market for offsets if public confidence in their value cannot be ensured. Senators Dole and Daschle's report on agriculture's role in a carbon cap-and-trade system notes these difficulties. It suggests, therefore, a hybrid approach that would allow measurement and verification through a process of estimating benefits using the scientific models and performing random soil samplings for comparison.[75]

The ACES bill provides only general guidance regarding measurement. It simply directs the Administrator to develop a "standardized methodology for determining the extent to which . . . greenhouse gas sequestration achieved by an offset project . . . exceed[s] a relevant activity baseline, including protocols for monitoring and accounting for uncertainty."[76] A hybrid approach will likely be the result in any final cap-and-trade legislation. The Lieberman-Warner bill included a hybrid approach which required the Administrator of the EPA and the Secretary of Agriculture to develop tools that included applicable field and remote sensing sampling methods or techniques, models, factors, equations or tables, and other processes or tools acceptable to the Secretary or Administrator.[77]

With respect to verification, the ACES bill adopted a third-party verifier approach to ensure the integrity of offsets. Under the bill, the Administrator is directed to establish regulations that require each offset project participant to submit a report prepared by an accredited third-party verifier, which certifies that the projects meets all requirements and confirms the quantity of carbon sequestered by the project.[78] The bill accordingly directs the Administrator to develop regulations and processes for the accreditation of third-party verifiers.[79]

For farmers participating in the carbon market, it is important to take note of whatever process for measurement and verification will be adopted. The regulations are sure to require that sequestration benefits be measured, and will

73. DOLE & DASCHLE, *supra* note 30, at 41.
74. *Id.* at 40-41.
75. *Id.* at 41.
76. H.R. 2454 § 734(a)(3).
77. America's Climate Security Act of 2007, S. 2191, 110th Cong. § 2404(f) (2007).
78. H.R. 2454 § 736(a)-(c).
79. *Id*. § 736(d).

likely proscribe with some specificity how those benefits are to be measured in a reliable manner. Verifiers will become familiar entities to a farmer engaged in a carbon sequestration project, and he or she should be prepared to deal closely with verifiers as they inspect project lands.

C. *Necessity of Aggregators*

Given the potential size of the carbon-market and the large amount of allowances that regulated firms will want to purchase, it is unlikely that these firms will deal directly with farmers. While a single plot can sequester a significant amount of carbon (about 0.5 tons per acre per year), firms may be looking to acquire somewhere in the millions of tons of emissions offsets. As such, aggregators are likely a must in a carbon cap-and-trade program.

Aggregators are facilitators of transactions between the farmers who own offset projects and the firms that seek to acquire offsets. An aggregator will collect emissions offsets from multiple farms, and package them for sale on the carbon market.[80] In addition to providing ease in the selling of offsets, aggregators will create pools of carbon sequestration projects.[81] This enhances the statistical certainty that certain levels of sequestration are being achieved. Certainty in determining sequestration levels across a single plot may be difficult or cumbersome to ensure, but when projects are pooled, a statistical mean helps to ensure a level of certainty.[82]

The Iowa Farm Bureau currently works as an aggregator for soil carbon sequestration projects that seek to market offsets on the Chicago Climate Exchange.[83] Iowa Farm Bureau requires its projects to certify compliance annually, and random selection of projects for verification has illustrated a compliance rate of 99%.[84] For farmers, it is important to know that aggregators are most likely to be their direct contacts for undertaking soil carbon sequestration projects, and potentially the source of verification and measurement. While the Warner-Lieberman bill did not specifically mention aggregators, aggregators probably would have been necessary under the proposed program given the size of projects and the demand for offsets. Thus, aggregators will likely play an important role in the cap-and-trade system. Farmers should be aware that aggregators represent the entities with whom they will most likely sign direct contracts, and those contract provisions will address a variety of issues particular to carbon trading.

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80. Smallwood, *supra* note 5, at 958.
81. *Id.*
82. *Id*.
83. *Id.* at 958-59.
84. *Id.*

D. *Permanence*

Carbon sequestration in soils differs in a rather significant manner from other activities that result in the realization of marketable emissions credits. In many other contexts, a given emissions-mitigating practice actually reduces or eliminates the emissions. Carbon sequestration is different in that it captures emissions and stores them. The disadvantage of this practice, of course, is that something stored can be released. This problem is referred to as "permanence."

The regulatory system must address the issue of permanence, and assign responsibility for reversals. For example, if Farmer A agrees to implement no-till practices on his lands, and is rewarded with marketable offsets for doing so, the system works properly as long as Farmer A continues to follow those practices. If, however, Farmer A abandons the practice after a number of years, the carbon sequestered during the years of no-till is likely to be released when cultivation begins anew. The program will not operate properly if Farmer A is rewarded for an initial sequestration practice that does not result in a net benefit over the long term. Note also that occurrences outside the control of Farmer A could cause reversal, for example, weather, fire, or pests.[85]

Permanence can initially be addressed by the system through measurement and verification practices that include safeguards to ensure permanence.[86] From there, regulations may define who is liable in the event of a reversal. If a reversal occurs, liability could be placed on the farmer, who would have to surrender the value of the offset earned, or on the purchaser, who must then seek other offsets from another party. Further, the danger of permanence may be mitigated by requiring that a certain practice go on for a lengthy period of time before being rewarded.

The ACES bill includes a section specifically addressing reversals for sequestration projects.[87] Under the bill, the Administrator is required to "establish requirements to account for and address reversals."[88] Specifically, the Administrator must "prescribe mechanisms to ensure that any sequestration with respect to which an offset credit is issued under this part results in a permanent net increase in sequestration, and that full account is taken of any actual or potential reversal of such sequestration, with an adequate margin of safety."[89] The bill specifically directs that the mechanisms adopted must include one of the two

85. DOLE & DASCHLE, *supra* note 30, at 31.
86. *See id.*
87. American Clean Energy Act of 2009, H.R. 2454, 111th Cong. § 734(b) (2009).
88. *Id*. § 734(b)(1).
89. *Id*. § 734(b)(2).

most recognized methods for dealing with reversals: (1) an offsets reserve, or (2) insurance.[90]

An offsets reserve would allow the Administrator, before issuing offset credits, to retain a certain percentage of offsets in an offsets reserve account.[91] If a reversal occurs, the Administrator may then retire offsets in the reserve pool to account for the amount of CO_2 released due to the reversal.[92] If no reversal occurs, the percentage retained in the offsets reserve would then be distributed to the project from which the offsets were retained. With respect to the insurance option, the Administrator could purchase insurance adequate to cover the cost of purchasing and retiring offsets equivalent to the CO_2 reversal.[93]

The bill also speaks to liability for reversals. In the event of an intentional reversal, the project owner is required to place into the offsets reserve an amount of offsets equal to the number of reserve offset credits that were canceled due to the reversal.[94] In the event of an unintentional reversal, the project owner is required to place into the reserve an amount of offsets equal to half of the number of reserve offset credits that were cancelled due to the reversal.[95]

Thus, it is important to recognize the problem of permanence in soil carbon sequestration. Regulation is certain to speak to the problem of permanence, and include measures to guard against it. Offsets will not be earned, or will be forfeited for projects that experience reversals. Farmers should be aware that the issue of liability for reversals is an important one. While a sequestration project may result in revenue streams, a farmer could find himself financially responsible for reversals. Further, while liability for reversals may be addressed by the regulations, it may also be addressed in contracts that farmers enter into with aggregators.

E. *Double Benefits*

Another important issue to be addressed by the regulations supporting the cap-and-trade program is whether, or to what extent, farmers will be able to receive "double benefits" for a practice. Federal subsidies programs already exist that compensate farmers financially for certain practices that will likely become recognized carbon sequestration practices under the cap-and-trade program. Conservation programs like the CRP already cover more than 34 million acres of

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90. *Id.* § 734(b)(2)(A)-(B).
91. *Id*. § 734(b)(3)(A).
92. *Id*. § 734(b)(3)(B)(i).
93. *Id*. § 734(b)(2)(B).
94. *Id*. § 734(b)(3)(B)(ii).
95. *Id*. § 734(b)(3)(B)(iii).

farmland, resulting in government payments of $1.8 billion.[96] Regulation must address whether a farmer who already has acres enrolled in the CRP (or similar incentive programs), or a farmer who chooses to enroll acres in the CRP after the implementation of a carbon cap-and-trade program, will be able to receive the government subsidy payment and earn offsets that can be sold on the carbon market for the same practice.

Some commentators have suggested that double payments should not be allowed because farmers who already receive subsidy payments for certain actions will be willing to sell offsets for cheaper prices, thus distorting the market for carbon offsets.[97] On the other hand, farmers who have not already enrolled in the CRP program, for example, may be incentivized to enroll by the added benefit of doubly earning marketable offsets simply for allowing low-yield lands to grow over.

It is unclear whether the ACES bill speaks to the issue of double benefits. The bill states that the Administrator must promulgate regulations which ensure, at a minimum, that any sequestration "is considered additional only to the extent that it results from activities that . . . are not required by or undertaken to comply with any law, including any regulation or consent order."[98] It is possible that this clause is intended to address the issue of double benefits. While a program like the CRP does not require participation, a sequestration project may be considered to have been undertaken in order to comply with CRP regulations upon commitment to the program. As such, the sequestration project could not be considered additional, and would not receive offsets in addition to CRP payments.

If the language at issue does not prevent double benefits, the likely outcome is a middle-of-the-road approach. The payment or amount of value for taking a certain action that simultaneously qualifies for offsets and a subsidy program will be discounted to reflect the double benefit.

For agriculture, this is an important issue. Getting double benefits could encourage many farmers to enroll acres in the CRP, or convince many farmers to initiate other sequestration practices. On the other hand, it is necessary to balance that interest in economic benefit to agricultural producers with the fact that a strong, healthy market for carbon offsets may depend on disallowing double benefits.

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96. Press Release, USDA, USDA Issues $1.8 Billion in Conservation Reserve Program Rental Payments (Oct. 1, 2008), *available at* http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2008/10/0251.xml.

97. Smallwood, *supra* note 5, at 959-60.

98. H.R. 2454 § 734(a)(1)(A).

F. *Property Law Issues*

A remaining issue that is not likely to be addressed by legislation is the notion that a carbon cap-and-trade program will add some additional complexity to land contracts. Commentators have pointed out that any cap-and-trade system should allow significant flexibility with respect to contracting for carbon offsets.[99] Flexibility is necessary primarily for two reasons. First, the carbon sequestration potential of land, and the land itself are two different assets. Second, many of those who own agricultural land are not the same people who farm it. As such, it will be necessary to allow landlord-tenant agreements to incorporate elements regarding carbon sequestration. For example, a tenant may wish to undertake no-till practices to earn marketable offsets on agricultural land he rents. The lease agreement will need to define whom those offsets belong to; thus, the impacts of marketable credits for soil carbon sequestration must be discussed in the contracting stages.

On a similar note, it has already been mentioned that sequestration is reversible. Because sequestration is a service that a given farmer will produce over time, it may be necessary to address this time limitation when considering the sale or purchase of agricultural land. A contract solely between a farmer and the aggregator or purchaser of offsets is binding only upon those parties. If the farmer sells or leases the land on which the sequestration practice was taking place, it will be necessary to ensure that the practice continues in the hands of the third party buyer or lessee. Accordingly, it is likely that sequestration obligations under contracts will run with the land to bind subsequent users of the land through the period for which the sequestration practice was contracted.

To better understand the practical implications of a carbon cap-and-trade program and the elements and issues it must incorporate and address, an example will be useful. A voluntary, legally binding carbon offset market exists in the United States already, and is likely indicative of how carbon trading and carbon sequestration contracts will work under future legislation. The following section thus discusses, from a practical standpoint, how contracts for carbon sequestration typically operate by examining carbon offset trading and carbon sequestration contracts in the context of the existing Chicago Climate Exchange system. The discussion will introduce the Chicago Climate Exchange and provide a discussion and example of an aggregator contract offered by the AgraGate Climate Credits Corporation.

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99. *E.g.*, Kennett et al., *supra* note 23, at 189.

IV. Practical Models for Carbon Trading: The Chicago Climate Exchange and Aggregator Contracts

A. *The Chicago Climate Exchange*

The Chicago Climate Exchange (CCX) is an active voluntary trading market for carbon offsets.[100] CCX members make legally binding commitments to reduce their annual GHG emissions, and are allocated annual emissions allowances according to the CCX baseline and schedule.[101] While the CCX is not a regulated exchange pursuant to federal law, it is regulated by the Financial Industry Regulatory Authority (formerly the National Association of Securities Dealers (NASD)), an independent regulator that verifies all of CCX's members' baseline and annual emissions data, monitors CCX trading activity, and reviews all verifier reports for offset projects.[102] Both public and private entities are members of the CCX, including Ford, DuPont, American Electric Power, Sony, Bank of America, IBM, and the cities of Aspen, Boulder, Chicago, and Fargo.[103]

The current phase of the CCX requires its members to reduce emissions by 2010 to a level six percent below the baseline established in 2003.[104] Members that exceed their reduction goal have allowances to spare and may either sell or bank those surplus allowances.[105] Those who do not meet their emissions reduction obligation must purchase "Carbon Financial Instrument" (CFI) contracts.[106] These instruments are comprised of Exchange Allowances, representing surplus allowances held by other members, and Exchange Offsets, which are offsets generated by qualifying projects.[107] Agriculture's place in the CCX is thus as a provider of such offset projects, which generate offset CFI's to be traded on the CCX market. A qualifying offset project specifically includes rangeland soil carbon management.[108]

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100. *See* Chicago Climate Exchange, Overview Brochure (2008), http://www.chicagoclimatex.com/about/pdf/CCX_Overview_Brochure.pdf [hereinafter Overview Brochure].

101. *Id.*

102. Chicago Climate Exchange, Emissions Verification and Compliance, http://www.chicagoclimatex.com/content.jsf?id=524 (last visited Sept. 15, 2010).

103. *See* Chicago Climate Exchange, Members of CCX, http://www.chicagoclimatex.com/content.jsf?id=64 (last visited Sept. 15, 2010).

104. *See* Overview Brochure, *supra* note 100.

105. *Id.*

106. *Id.*

107. *Id.*

108. *Id.*

To compare the CCX program to a regulatory, mandatory cap-and-trade program, the "members" of the CCX that are required to reduce carbon emissions would be the equivalent of the "regulated entities" under a mandatory carbon cap-and-trade program. Those entities would be required to meet emissions targets, and like the members of the CCX, regulated entities with surplus allowances could bank or sell them. Regulated entities that exceeded emissions caps would likewise be forced to purchase offsets or allowances. Like the CCX program, agriculture would participate in a mandatory cap-and-trade program by providing sequestration services that generate offsets, which could be sold on the open carbon market.

The CCX provides specific protocol for implementing and registering each type of offset generating project, including an agricultural soil carbon project. For purposes of illustrating the process and examining aggregator contracts, I will use a conservation tillage soil sequestration project as an example. The CCX requires the following protocol for conservation tillage soil sequestration practices. First, the land on which the project is located must be within a qualifying county pursuant to maps adopted by the CCX.[109] For most Midwestern farmers, this requirement is of little concern because the majority of counties in the Midwest are qualifying areas. For example, the entire states of Iowa and Illinois are included.[110] Further, a farmer must commit to a minimum five-year contract requiring the use of continuous no-till or strip-till on the enrolled acres.[111] The CCX defines conservation tillage to require that at least two-thirds of the soil surface remain undisturbed, and at least twenty percent of the residue remain on the fields.[112] Defining the practice with specificity allows for a standardized basis on which to evaluate projects.

Carbon sequestration projects on agricultural soils will likely need to be aggregated and registered with the CCX by an aggregator, such as the AgraGate Climate Credits Corporation, due to the small number of offsets each farmer can offer.[113] The role of the aggregator is to represent multiple offset-generating projects on behalf of the various project owners, and to package these projects in a manner that allows the sale of the CFI's earned by the projects. Offsets are dis-

109. *See* CHICAGO CLIMATE EXCHANGE, SOIL CARBON MANAGEMENT OFFSETS (2008), *available at* http://www.chicagoclimatex.com/docs/offsets/CCX_Soil_Carbon_Offsets.pdf.

110. *Id.*

111. CHICAGO CLIMATE EXCHANGE, SOIL CARBON SEQUESTRATION OFFSET PROJECT PROTOCOL 7, 11 (2009), *available at* http://www.chicagoclimatex.com/docs/offsets/CCX_Conservation_Tillage_and_Grassland_Conversion_Protocol_Final.pdf [hereinafter CCX PROJECT PROTOCOL].

112. *See id.* at 26-27.

113. Any project involving less than 10,000 metric tons of sequestered carbon per year must be registered through an aggregator. *See id.* at 8, 10-11.

tributed at year-end for sequestration performed during the year. Further, just as the Warner-Lieberman bill required, projects must undergo third party verification by a CCX-approved verifier annually before an offset will be issued.[114] The verification process involves the verifier conducting an in-field inspection on at least a portion of the enrolled acres.[115] In order to address the issue of permanence, each year twenty percent of the CFI contracts generated by soil carbon sequestration is placed into a set-aside pool.[116] In the event of a reversal, the CCX cancels CFI contracts in the set-aside pool proportionately.[117]

The rate at which offsets are issued is determined by reference to maps adopted by the CCX. Depending on the location of the project lands on the map, the rate that offsets are issued differs.[118] For example, projects in Iowa earn offsets at a rate of 0.6 metric tons of sequestered carbon per acre, per year for conservation tillage practices.[119] Projects in Northern Minnesota, by contrast, earn offsets at a rate of 0.4 metric tons of sequestered carbon per acre, per year.[120] In this way, the measurement of sequestered carbon is based on models (maps and tables), while the verification of those practices is made in person on the land. This process is similar to what Warner-Lieberman suggested as using applicable models, tables, or maps, and sampling methods, along with third-party verifiers.

B. *Aggregator Contracts*

Because CCX requires aggregated soil carbon sequestration projects to be registered by an approved Aggregator, the contract a farmer enters into to provide soil carbon sequestration in exchange for offsets will be between farmer and aggregator. For purposes of discussing what these contracts entail, and how they incorporate CCX rules, the standard Contract for Exchange Soil Offsets of AgraGate will be examined. AgraGate's contract, as a subsidiary of the Iowa Farm Bureau, is a useful representative of typical aggregator contracts.[121]

In general, the Iowa Farm Bureau contract requires, in addition to the signed contract itself, an "enrollment worksheet," FSA maps of the enrolled land, and an FSA crop certification summary. The "enrollment worksheet" is filled

114. *See id.* at 19-21.
115. *See id.* at 21.
116. *Id.* at 18.
117. *Id.* at 19.
118. *See id.* at 35-41.
119. *Id.* at 35, 42.
120. *Id.* at 36, 50.
121. AgraGate Climate Credits Corp., Carbon Credit Program Exchange Soil Offset Contract, *available at* http://www.agragate.com/docs/XSO_Rangeland_Offset_Contract_2006-2010_AgraGate_v071107.pdf (last visited Sept. 15, 2010) [hereinafter AgraGate Contract].

out to provide Iowa Farm Bureau with an FSA Farm Number, FSA Tract Number, the number of acres on which the practice will be adopted, and an indication of the practice the farmer intends to enroll for each parcel of land (e.g., no-till, strip-till, or new grass plantings). The combination of these documents, and the information in the enrollment worksheet, provides Iowa Farm Bureau sufficient information to document and record the location and size of the lands on which the soil carbon sequestration project will take place. This information is necessary for allowing examiners to verify practices on lands, and for purposes of determining the rate at which offsets are earned pursuant to the CCX-adopted maps.

The contract itself requires the farmer to "agree that ____ acres shall participate in a rangeland management program" for the applicable period.[122] The contract is for Exchange Soil Offsets, and as such, AgraGate Climate Credits Corporation ("Purchaser") agrees to buy and the farmer ("Seller") agrees to sell, free from encumbrance, "the rights to the Exchange Soil Offsets (XSOs) created by this contract" during the period.[123] The farmer specifically warrants in the agreement that the Exchange Soil Offsets (XSOs) covered by the contract comply with all rules of the CCX, specifically "that the land from which the XSOs covered by [the agreement] arise shall participate in a rangeland management program for a minimum of five years."[124] The AgraGate contract adopts the CCX definition of degraded rangeland, which is adopted from the definition in the Natural Resources Conservation Service National Handbook of Conservation Practices.[125] That handbook also defines both no-till and strip-till and provides examples of approved and non-approved equipment that may be used in qualifying under the definitions.[126] In addition, in order to receive credit for conservation tillage practices, residue may not be removed or burned.[127]

The contract incorporates other specific requirements pursuant to CCX rules. The agreement identifies where an eligible project must be located to earn offsets by reference to the CCX-adopted maps. Further, pursuant to CCX rules addressing the problem of permanence, the agreement states that twenty percent of the Exchange Soil Offsets earned by the project will be retained by AgraGate in a reserve pool until the end of the agreement period.[128] If a project owner con-

122. *Id.*
123. *Id.*
124. *Id.*
125. *Id.*
126. NATURAL RES. CONSERVATION SERV., CONSERVATION PRACTICE STANDARD: RESIDUE AND TILLAGE MANAGEMENT NO TILL/STRIP TILL/DIRECT SEED 329-1 (2010), *available at* http://www.nrcs.usda.gov/technical/standards/nhcp.html (scroll down to "Residue and Tillage Management, No-Till/Strip Till/Direct Seed (Ac.) (329) (410)").
127. *Id*.
128. AgraGate Contract, *supra* note 121.

forms to the performance requirements, the XSOs held in reserve will be disbursed to the owners of the projects.[129]

The agreement also defines the payment price for XSOs. Under the contract, "[t]he transfer price of the XSOs covered by [the agreement] shall be the sales price as determined by sale through the Chicago Climate Exchange less a 10% service fee."[130] Further, the trading fees and the costs of registration and verification are deducted from the pool of projects before payments are made.[131] Moreover, AgraGate has the sole discretion over sale of the offsets earned by pool projects, and makes no warranty with respect to the market value of offsets earned.[132] In short, AgraGate sells the offsets on the CCX market, deducts fees related to trading, registration, and verification, and deducts their ten percent servicing fee before remitting the remainder to the farmer based on his earned offset rate. The agreement further states that payments will be made to farmers from IFB twice a year.[133] While the agreement does not disallow double benefits in the form of subsidy and offset benefits, it does prohibit selling carbon offsets earned for the practice on other carbon markets.[134] That is, it prevents farmers from generating and selling credits on the CCX, and generating and selling other credits on another market for the exact same practice.

For purposes of measuring, and thus valuing carbon sequestration, the agreement adopts the CCX maps by reference.[135] These maps define specific areas, and impart a rate of estimated soil sequestration in each area. For purposes of measurement and verification, two mechanisms are primarily used, and the agreement provides for each. First, the agreement provides that farmers are required to periodically submit a signed project report of compliance with the requirements of the agreement to AgraGate.[136] Second, the farmer agrees that CCX officials and verifiers "may conduct on-site inspection of registered projects and related documents."[137] The project operator agrees "to provide access in such cases in a prompt and cooperative manner."[138]

The agreement further addresses non-compliance, and lists the applicable penalties for such non-compliance. As an initial matter, XSOs will not be issued

129. *Id.*
130. *Id.*
131. *Id.*
132. *Id.*
133. *Id.*
134. *Id.*
135. *Id.*
136. *Id.*
137. *Id.*
138. *Id.*

to projects that fail to comply.[139] If XSOs have already been distributed to a project that is found to have been non-compliant, the project is required to return offsets equal to the XSOs found to be in non-compliance, and the owner loses any claims to credits held by the reserve pool.[140] In addition, project owners who file false certification reports must pay CCX a penalty of twenty percent of the value of the offsets, interest on that penalty from the date of non-compliance, and the costs of enforcing the non-compliance provision, including reasonable attorney's fees.[141] The project owner may also be prohibited from participation in the CCX.[142] Importantly, liability for non-compliance rests with the project owner that signs the agreement. For tenants then, it is important to ensure that they will be in possession of the land for the length of the period required in the agreement. If, for example, a new tenant refuses to continue the practice, the penalties will be assessed against the original project owner that signed the agreement, regardless of whether it was the previous tenant or the landlord. Similar caution should be taken with respect to the landlord-tenant agreements to ensure that the landlord allows such practices, and that a reasonable level of confidence in the ownership over the next five years can be achieved.

V. CONCLUSION

A national cap-and-trade program for carbon is on the horizon. The program will likely include a role for agriculture, allowing it to tap into new revenue streams by providing sequestration services that generate marketable carbon offsets. The legislation is likely to incorporate and address some or all of the elements and issues discussed herein, including baseline, additionality, leakage, measurement and verification, permanence, double benefits, and landlord-tenant and land sale contracts. Because the CCX is a functioning carbon market that incorporates several of the elements included in previously proposed legislation, such as the Warner-Lieberman bill, it is likely that a new regulatory carbon cap-and-trade program will resemble its operation. As such, farmers should be prepared to take advantage of the new market by contracting with aggregators to adopt soil carbon sequestration practices. In so doing, it is important for farmers to recognize how regulations, and the contracts they enter into, address the typical issues in a carbon cap-and-trade program, in addition to how those provisions impact their practices and the potential revenue they may generate.

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139. *Id.*
140. *Id.*
141. *Id.*
142. *Id.*