WRITTEN TESTIMONY
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TO THE

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON AGRICULTURE
CONCERNING THE COSTS AND BENEFITS OF AGRICULTURAL GREENHOUSE GAS OFFSETS

1. Introduction and Summary

Mr. Chairman and members of the committee, I am honored to appear before you to testify on the potential role of agricultural and forestry carbon offsets in a US greenhouse gas emissions trading market. Overall, I believe that offsets hold limited promise, both as a cost control mechanism and as a method for reducing emissions beyond the sectors covered by a cap-and-trade scheme. For U.S. farmers, this may translate into higher than anticipated costs for agricultural inputs and lower than anticipated benefits from the sale of offsets.

A superior alternative to the approach taken by the American Clean Energy and Security Act of 2009 (ACES)[1] would be to separate the cost containment function under a U.S. cap-and-trade program from policies aimed at reducing emissions from uncapped sources such as agriculture and forests. In essence, rather than trying to kill two birds with one stone, using two stones. The first would be a price collar for the cap-and-trade program. The second would be a conservation incentives program focused on GHG reductions and funded via allowance allocations and safety valve revenues. Such an approach would provide much greater certainty regarding minimum and maximum costs to be born by firms and consumers affected by the cap on fossil fuel emissions. It would also greatly simplify the implementation and operation of a program aimed at reducing emissions from U.S. farms and forests, thus insuring that farmers and forest land owners receive the expected benefits from reducing and sequestering carbon.

The changes necessary to reduce GHG emissions from U.S. farms and forests will almost certainly also provide substantial co-benefits in the form of reduced impacts to air, water, and ecosystem quality. A carbon offsets-based program for producing reductions has no straightforward way of taking these added benefits into account. In contrast, a more familiar conservation incentives program could easily factor in the extent to which certain practices provide benefits beyond GHG reductions.

[1] The American Clean Energy and Security Act, H.R. 2454, 111th Cong. (2009).

A conservation incentives program would also accomplish another important objective – insuring that as much of the revenue devoted to reducing emissions from U.S. farms and forests actually reaches the individuals who change farm and forest practices. Current compliance grade offset programs, such as the Clean Development Mechanism of the Kyoto Protocol, have struggled mightily to produce offsets of high environmental integrity. This struggle has necessarily created high transaction costs and substantial risks for offset developers. In practice, these risks reduce the fraction of offset revenue captured by the owner of a factory or landfill actually producing the GHG reductions. Instead, other elements of the offset value-chain, such as offset development companies, lawyers, consultants, and hedge funds, have captured much of the revenue. The same would likely be true of a U.S. carbon offset market under ACES. In contrast, a conservation incentives program, because of its simplicity, would insure a greater share of benefits for farm and forest owners.

In this testimony, I will address several key lessons learned from the experience to date under the Kyoto Protocol with compliance grade carbon offsets. I will then describe the relevance of these lessons to the agricultural and forestry offsets program contemplated by Title V of ACES. Finally, I will describe an alternative policy for reducing GHG emissions from U.S. farms and forests – a conservation incentive program. Lastly I will describe an alternative cost-containment mechanism for a U.S. cap-and-trade system, a symmetric safety valve or price collar. I conclude the following:

(1) **There has been and will continue to be substantial crediting of business-as-usual behavior within the CDM and other large offset programs.** This is particularly true for sectors such as electricity generation that are highly regulated or benefit from substantial public subsidy. This crediting of counterfeit emissions reductions is likely to be a hallmark of any real offset program. The crux of the problem is the inability in practice to tell which of the many applicants for carbon offsets are telling a genuine story regarding emissions reductions and which would have changed practices even in the absence of the carbon market.

(2) **The CDM has yet to perform as a reliable cost-containment strategy.** Actual issuance of offsets has been far lower than predicted because of concerns about environmental integrity. These concerns have led of necessity to an elaborate and time consuming regulatory process. The impact of this failure to produce offsets has been largely hidden by the reduction in demand for permits due to the global recession. A U.S. program that sought to have higher standards than the CDM while producing more credits would almost certainly face similar supply problems.

(3) **Real-world implementation of an offset market of the scale contemplated by ACES could not avoid the CDM's pitfalls.** ACES as passed requires an offset market and regulatory structure of between 10 and 50 times the size of the current CDM. While there are process efficiencies that a

US system could realize, the potential for crediting business-as-usual behavior, for uncertain offset supply, or both, is substantial. In practice, both effective cost control and certainty as to emissions levels are impossible to achieve under such a system.

(4) **Dedication of a significant fraction of allowances to permanently fund a Conservation Incentive Program for farms and forests is a superior policy for reducing uncapped emissions.** A Conservation Incentive Program could accomplish many of the emission reduction objectives of an offset program and do so more cost-effectively. By allowing for increased flexibility and by reducing and risks of creating GHG emission reductions a Conservation Incentive Program would likely produce greater reductions from uncapped sources than would be possible under a carbon offset system.

(5) **A symmetric safety valve or price collar that includes both a price floor and a price ceiling for emissions allowances is preferable to offsets as a cost-control option.** A price collar would be simple to administer, would not require an elaborate regulatory system, and would produce certainty ex-post as to the actual level of emissions under the cap. Offsets will deliver none of these benefits. A price-collar would keep costs within the ACES emissions trading market commensurate with expectations. By doing so it would help to ensure the ongoing support of constituencies essential for an enduring and stable climate policy. Finally and most importantly, a price collar would provide a guaranteed minimum return for clean-tech innovators seeking to displace older fossil generation. This guaranteed return would increase the provision of new and innovative technologies to the US economy. By doing so, it would also increase the number of green jobs created by a US climate program, and help to position the US as a leader in the global energy revolution.

2. Crediting of Business-as-Usual Activities in the Clean Development Mechanism

The environmental integrity and cost-effectiveness of a carbon offset system depend on the ability to rapidly, reliably, and cheaply determine how entities seeking carbon offsets would have behaved in the absence of emissions trading. This “business-as-usual” or baseline scenario can then be compared to the proposed offset activity. Any reduction in emissions from the baseline can then be credited with offsets. Offsets must, if they are to be effective, must result in changed behavior. If not, then the result is that emissions do not fall either under the cap (where the offset is used as an alternative compliance tool) or outside the cap (where emissions remain unchanged relative to the baseline scenario). If an offset system performs perfectly, the net of uncapped and capped emissions remain unchanged. For every ton reduced outside the cap, one ton is emitted by a covered entity inside the cap. Of course, no offsets market is likely to work perfectly; in practice, a balance must be struck between the over-crediting of business-as-usual behavior and the under-crediting of real reductions. But even evaluating this type-1 versus type-2 error requires some ability to objectively determine the counterfactual baseline scenario. In practice, this has proven impossible to do for real offset systems.

The Clean Development Mechanism of the Kyoto Protocol (CDM) is the largest carbon offset market in the world, both in terms of volume of credits and value transacted. The CDM is also the world's first compliance grade carbon offset market. Firms covered by cap-and-trade regimes, most notably the European Union Emissions Trading Scheme (EU ETS), can use CDM offsets in lieu of allowances for compliance. The CDM was conceived with the twin goals of lowering compliance costs for parties to the Kyoto Protocol and assisting in the financing of sustainable development. The performance of the CDM holds important lessons for an analogous compliance grade carbon offset system proposed for the US agriculture and forestry.

The CDM has evolved through time as it has both grown in size, from just a few emission reduction projects to more than four thousand, and in complexity, from just a few project types to over one hundred. During this growth process, the regulators of the CDM have learned by doing and have improved practices. These improvements have been made mainly with the intention of insuring greater environmental integrity. **Nevertheless, both anecdotal and systematic evidence suggests that substantial crediting of business-as-usual projects continues to occur. The root cause of the problem appears to be an inability to reliably determine the baseline scenario for a particular project or class of projects.**

The problems in the CDM have been greatest in sectors and countries where government regulation or subsidy plays an important role in economic activity. In China where more than half of all CDM credits originate, this is most evident in the energy sector. The Chinese energy sector, because of its strategic importance, remains largely state controlled and in many cases, state owned. The basic problem for the CDM is that state mandates and subsidy programs, along with a complicated and non-transparent interaction between state owned banks, state owned utilities, and financial and energy regulators, already strongly favor the construction of renewable and natural-gas fired energy production. Some small fraction of the new capacity added is no doubt caused by the additional finance provided by CDM. However, in practice, almost all new plants in the wind, hydro, and natural gas sectors apply for and receive credit under the CDM for emissions reductions (see Figure 1)[2].

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[2] *See*, Michael Wara and David Victor, A Realistic Policy on International Carbon Offsets, Stanford Program on Energy and Sustainable Development Working Paper #74 (2008), *at* http://pesd.stanford.edu/people/michaelwara

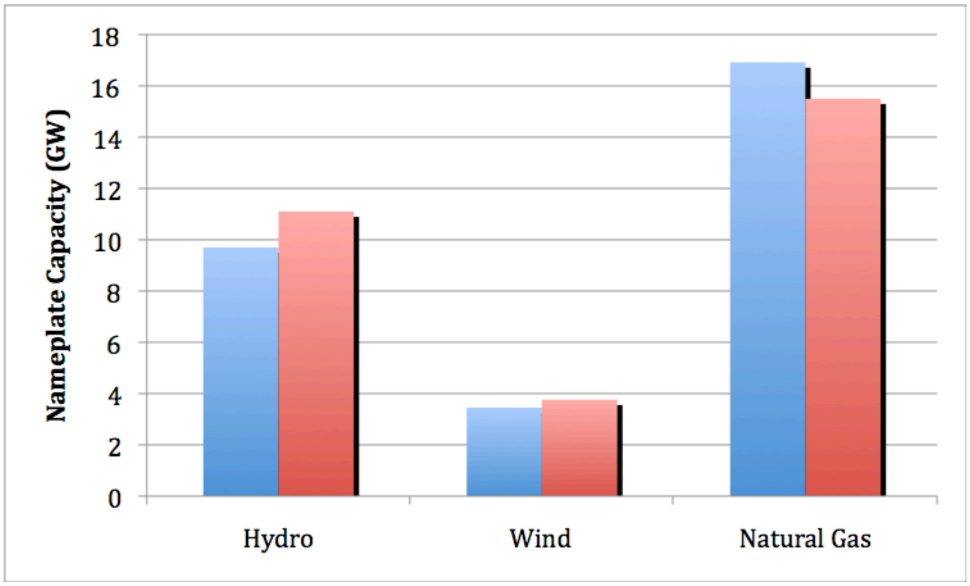

Figure 1: Hydro, wind, and natural gas fired power plants built or under construction in China compared to applications for CDM crediting for these projects. Essentially all new capacity (blue bars) is applying for CDM offset credit (red bars). Issued credits are based on the difference between these new energy sources and the Chinese grid GHG emission intensity. Shown are new capacity and CDM applications for Chinese hydro and wind power in 2007, and for natural gas-fired power in 2005-2008.[3]

The problem for the CDM has been that in practice, there is no straightforward way to determine whose behavior has been altered because of offsets and therefore who should receive them. CDM regulators have been forced to add layers of bureaucracy in an ultimately futile effort to determine which of the many applicants are telling a genuine story regarding emissions reductions and which would have installed cleaner technology even in the absence of the carbon market. As a result, there are lingering uncertainties as to the quality of credits that have been and are being issued by the CDM.

CDM offsets are most often bought for use as alternative compliance in a cap-and-trade system. The impact of their uncertain quality translates into uncertainty as to the quantity of emission reductions produced by the overall program of cap, trade, and offset. The same fate would likely befall a U.S. system. In the EU ETS, this uncertainty has turned out to be less than anticipated because of the global recession. The recession has caused a fall in demand for electric power and hence for allowances and offsets. The fall in demand, combined with free allocation of allowances to emitters has resulted in relatively little use of offsets.[4] Even so,

[3] Hydro and wind CDM applications exceed new capacity additions in part because some plants applying for credit in 2007 were built earlier and in part because some plants that applying for credit experienced construction delays. Data Sources: National Development and Reform Council; International Gas Union; International Energy Agency; Jørgen Fenhann, UNEP-Risø Centre, CDM-JI Pipeline Database.

[4] In 2008, the first year during which covered entities could use CDM offsets as alternative compliance in the EU ETS, just 82 million offsets were surrendered, compared to a maximum allowed usage of 8% of the cap or approximately 150 million offsets. Data obtained from the European Commission

approximately one third of the reduction between the cap in 2007 and the cap in 2008 was covered by CDM offsets. To the extent that these offsets are of doubtful quality, we will never know whether a third of the reductions within covered sectors for the first year of the Kyoto Protocol were real or mere paper reductions. Unless ACES can somehow resolve the lingering uncertainty and criticism that has surrounded determination of baselines and consequent emissions reductions in offset programs, it will suffer the same fate. And ACES if enacted, would rely on offsets to a far greater extent than does the current EU ETS.

3. The Clean Development Mechanism Struggles to Produce a Large Offset Supply

Another surprise of the first 5 years of CDM operation has been the difficulty the system has had in producing large numbers of issued credits. Reliable supply of large volumes of offsets is a necessity for a cost-containment mechanism. The problem for CDM offsets has been that in order to maintain environmental integrity, a complex and time consuming regulatory process is required. The CDM system works by first requiring that a project apply for registration, after which it operates, producing emission reductions. Reductions claimed by a project are then audited by an accredited third-party verifier. Only after this verification can an offset project owner apply for issuance of credits that can be used for compliance purposes. The ACES offset program is designed to operate in a similar fashion.[5]

In the CDM, this process has proven fraught with delay. The number of issued credits is far lower than had been expected or promised in offset project application documents or by early analyses of the market. Estimates vary depending on methodologies used to assess project and country risk, but expected deliveries of CDM credits were on the order of several billion tons. Over the past 5 years, the program has produced just over 300 million offsets (See Figure 2). Further, the rate of issuance, which increased through the early phases of the program, has recently stabilized at about 12 million offsets per month (See Figure 3). At this rate, the CDM will issue just 800 million offsets by the end of the Kyoto Protocol compliance period in 2012. This slow rate of issuance has been caused largely by the need to carefully check registration and issuance requests because of concerns about environmental integrity. Because each request and audit trail must be checked individually before approval, this is not an area where significant economies of scale have been found. Instead, issuance has emerged as perhaps the most significant bottleneck in the CDM process, followed closely by project registration.

Community Independent Transaction Log.

[5] ACES *supra* note 1, §§ 735, 736.

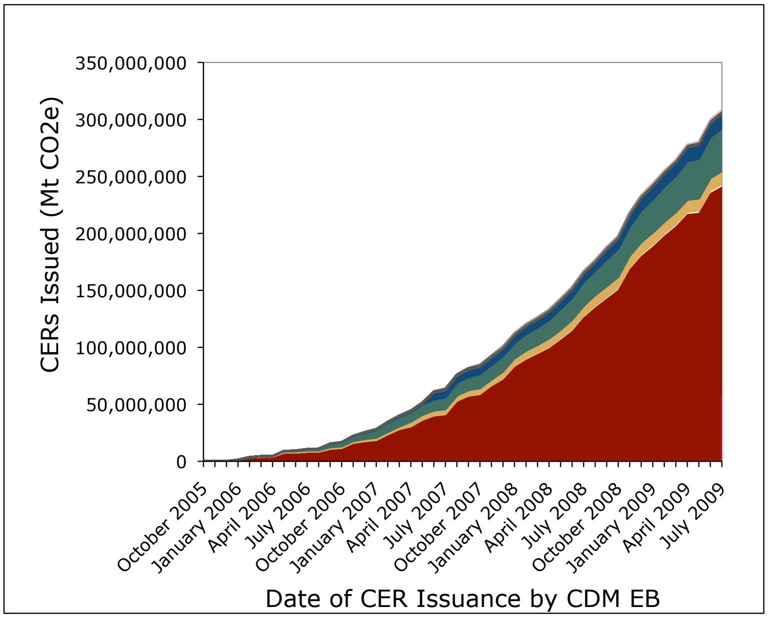

Figure 2: Cumulative issuance of carbon offsets, known in the CDM as Certified Emission Reductions (CERs) by the CDM to July 31, 2009. Total issuance is just over 300 million CERs over almost 5 years. 70% of issued CERs come from large industrial gas projects (Red). The remainder come from a mix of methane capture (Tan), renewable energy (Green), industrial energy efficiency (Blue) and natural gas power plants (Grey).[6]

Furthermore, the composition of the projects generating credits is strongly biased towards those that generate large numbers of credits. This dramatically reduces the number of requests for issuance that must be reviewed by the CDM. Thus the current rate of issuance is unrealistically high relative to the entire universe of offset projects, or a U.S. domestic offset program focused on farms and forests. Shown in red in Figure 2 are the industrial gas capture projects, which have generated more than 70% of the issued credits to date. These offset projects capture high global warming potential gases at industrial facilities. Because each ton of high GWP gas is worth between 310 and 11,700 times a ton of carbon dioxide, these projects generate enormous volumes of credits. Industrial gas projects greatly simplify the workload for the CDM, since a few large issuances from these projects make up most of the flow of credits. Unfortunately, these are unlikely to be representative of either the future of the CDM or of a U.S. domestic offset system. The remainder of projects in the CDM portfolio or in any other potential offset portfolio will be significantly smaller in scale and so require proportionately more work on the part of regulators to process and approve. Thus because of the project mix in the CDM, the market may be operating more quickly than is likely for a U.S. offset system.

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[6] Data compiled by the author from the CDM issuance database, *at* http://cdm.unfccc.int/issuance/index.html.

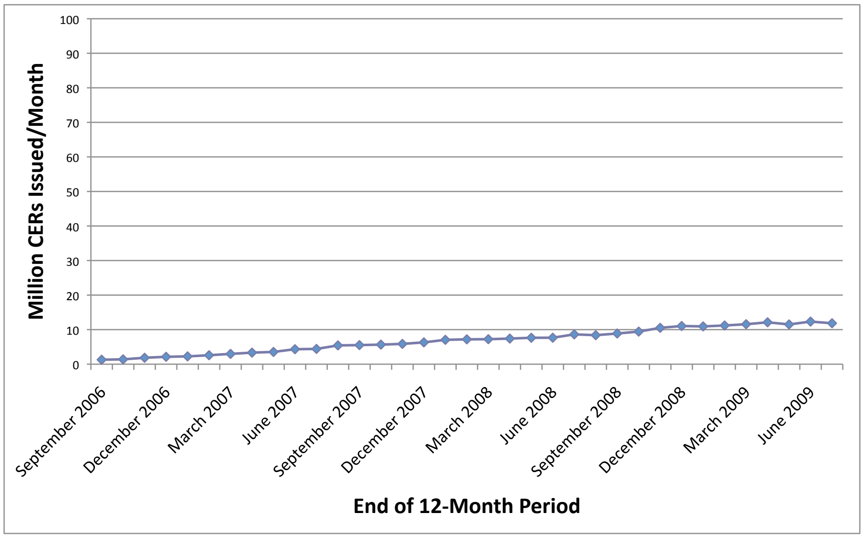

Figure 3: The 12-month running average of CDM offset issuance scaled to reflect the approximate monthly requirement to meet ACES demand for domestic offsets, 100 million tons per month. CDM issuance rates appear to have stabilized at 12 million CERs per month.[7]

Whatever the ultimate issuance rate achieved by the CDM, one thing the system has made clear is that actually producing compliance grade offsets is a complex and time consuming regulatory undertaking. Building the regulatory apparatus for the CDM has proven quite challenging, especially as concerns about quality have caused greater scrutiny to be applied to each project registration and request for issuance. This scrutiny takes time and leads to delays and hence a slower than anticipated production rate of offsets. Luckily for those nations and firms otherwise dependent on the CDM for cost containment, the global recession, by reducing economic activity, has substantially lowered emissions.[8] This in turn has greatly reduced the need for offsets and the costs of not having them, averting what could have been a compliance crisis.

4. Implications of the CDM example for ACES

The CDM is the carbon offset system about which we know the most. But how relevant is experience gained under the Kyoto Protocol to the ACES offset program? I believe that the lessons presented above, of difficulty telling good from bad credits, and of the challenges of producing adequate supplies of credits, are likely to be highly relevant to an offset program of the scale contemplated by ACES.

No offsets system, including the CDM or ACES, can avoid the problem of establishing emissions baselines against which actual emissions are judged.

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[7] Ibid.

[8] The United States is a useful point of reference in this regard since it did not ratify the Kyoto Protocol and so is not trying to reduce emissions in order to comply. During 2008 and 2009, the EIA estimates that US emissions have fallen by between 8 and 9 percent.

The CDM has illustrated the difficulty of this task. By 2020, the ACES offset program would likely be approximately 20 times the size of the current CDM, if measured in terms of issuance rate (See figure 3).[9] Extrapolating from the relatively small size of the CDM to the much larger ACES program is necessarily uncertain. This is especially the case because ACES contains provisions for both a large international forestry offsets program[10] as well as a large domestic agricultural and forestry offsets program.[11] Also, ACES incorporates numerous provisions aimed at improving the quality of its offsets program compared to the CDM.[12] Nevertheless, the fundamental conceptual and administrative challenges that have confronted the CDM are unlikely to be absent from an ACES offsets program. Such a program will struggle to create offsets of undisputed high quality because of difficult baseline determination problems, both in domestic agricultural and forestry settings and in the international regime. It will have to confront the reality that its rulemakings are potentially subject to challenge in court under the Clean Air Act and/or the Administrative Procedure Act. The CDM Executive Board faces no such scrutiny of its decisions, or potential source of delay, in its implementation.

In addition, the ACES cap-and-trade program is, far more than the EU ETS, dependent on offsets both for cost-control and for environmental effectiveness. Most analyses of the bill indicate that allowance prices will approximately double in the absence of a ready supply of offsets.[13] In its analyses of the bill, EPA estimates that less than 50% of emission reductions that occur due to its enactment will be in capped sectors prior to 2030 (See Figure 4). The majority of the bill's environmental impact hinges on the offsets program having superb environmental quality. If not, then emissions will occur under the cap and be covered by offset credits that due not represent real world reductions. In order to accomplish this objective, the ACES offset program, both international and domestic, will have to accomplish a far higher level of environmental oversight than has proven possible, even with the best intentions, within the CDM.

[9] *See,* Environmental Protection Agency, EPA Analysis of the American Clean Energy and Security Act of 2009: HR 2454 in the 111th Congress (Jun 23, 2009);
[10] ACES *supra* note 1, §§751-756.
[11] ACES *supra* note 1, §§501-511.
[12] ACES *supra* note 1, §§731, 739, 509, 531.
[13] EPA *supra* note 9; Congressional Budget Office, Economic and Budget Issue Brief: The Use of Offsets to Reduce Greenhouse Gases (August 3, 2009); Energy Information Administration, Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009 (Aug. 4, 2009).

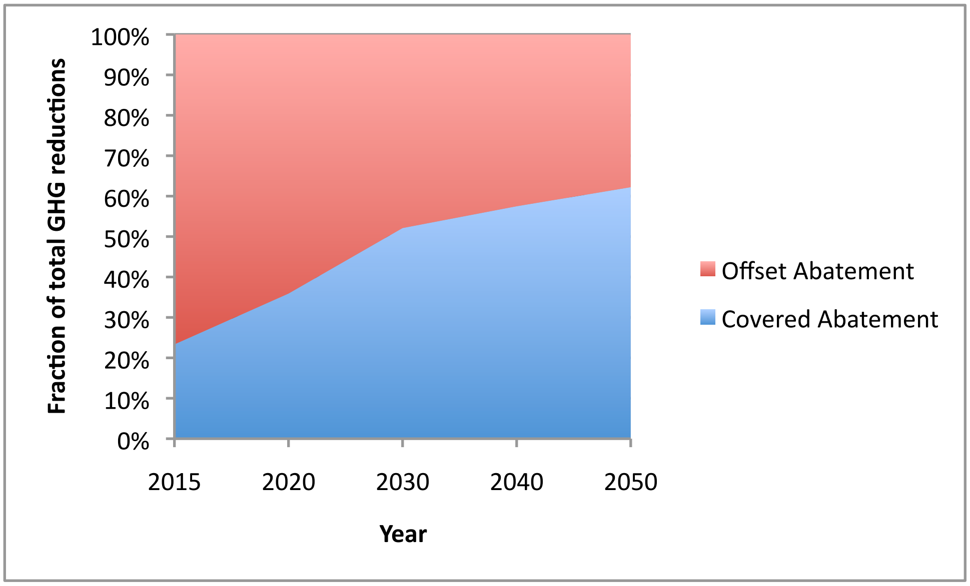

Figure 3. An EPA projection of the relative proportion of emissions reductions that occur at sources covered by the ACESA cap and at offset projects occurring at sources that are not covered by the cap.

In order to avoid chronic shortages of credits, and consequently very high allowance prices for covered entities, USDA and EPA will have to accomplish more stringent environmental review of offsets at a much faster rate than the CDM – at least 20 times the speed of the current CDM. All economic analyses of the bill suggest that its costs will nearly double if offset supply is significantly constrained or delayed.[14] Failure to produce the expected offset supply might both cause undue harm to the US economy and undermine long-term support for the ACES program. In the event that offset supply proves lower than expected under ACES, the EPA and USDA will come under tremendous pressure to lower standards in order to increase the rate of supply of new offsets into the US emissions trading market. The dependence of ACES on offsets thus exposes it to significant environmental and political risks. Insufficient offset supply may drive a reduction in standards thus undermining the basic rationale for a carbon market. Alternatively, if USDA and EPA are unable or unwilling to increase supply by lowering standards, political support for the program might be severely undermined.

6. A Conservation Incentive Program would provide greater benefits to the environment and to farmers and forest land owners

Allocation of a substantial block of the allowance pool to a Conservation Incentive Program could be used to accomplish many of the benefits promised by agricultural and forestry offsets. One of the key benefits of offsets is that they extend incentives to reduce emissions beyond the scope of sectors covered by the cap. Offsets create a potential financial benefit for reductions in uncapped sectors,

[14] Ibid.

such as agriculture, or uncapped jurisdictions, such as Brazil, to reduce GHG pollution even though they are not required to do so. This benefit need not be sacrificed just because offsets are not relied upon for cost-containment. The simple solution is to dedicate revenues raised by the auction of allowances towards reductions outside of the cap.

Revenue produced by the auction of a dedicated fraction of the allowance pool could be channeled towards GHG emission projects on farms and forests via a Conservation Incentives Program (CIP). Such a program could assist the agricultural and forestry sectors in reducing their emissions. This could be accomplished via payment for the cost of particular activities that are known to result in lowered emissions or via open requests for proposal for emission reduction activities.

Administration of an agricultural and forestry Conservation Incentive Program would be far simpler than an offsets program. The two great challenges of administering an agricultural offset program are measurement and permanence. A CIP, because it is not linked to an emissions trading market greatly simplifies both. Measurement of carbon emissions of similar accuracy and precision to covered sources is difficult and costly to accomplish on farms and in forests. This is the case both because baselines are difficult to determine in heavily regulated sectors and because site-specific quantification is expensive. At the same time, permanence looms large for sequestration based offsets because reversals threaten the integrity of the cap. In contrast, a CIP could handle these issues more flexibly and could more realistically shape an emissions reduction program to fit the needs and capabilities of both US farms and forests. A CIP would enable society to capture greater benefits from the contributions that farms and forests have to make towards reducing emissions while also simplifying the process of farmers and foresters gaining credit for their actions.

A Conservation Incentives Program could take better account of the co-benefits provided by practices that reduce GHG emissions from U.S. farms and forests. Linkage to a carbon market narrows the factors that can be considered in paying farms and forests to a single dimension – tons of carbon dioxide reduced or sequestered. In reality, the changes that lead to reductions in GHGs will also have tremendous co-benefits in terms of water and air quality as well as biodiversity. Farms and forests deserve credit for the additional benefits that a GHG oriented program will provide but will be unlikely to receive it from a carbon market. Furthermore, despite a desire to do so, USDA and EPA will have a hard time favoring projects that produce substantial co-benefits in addition to GHG reductions over those that solely produce tons of carbon. A CIP, because it is not tied directly to the carbon market, would allow USDA and EPA to be more flexible in taking these other benefits into account when determining payments to land owners.

By paying for practices rather than allowing farms and forests to sell tons of carbon, a CIP might produce more stable streams of revenue for farmers, thus

increasing participation. Pricing of carbon offsets is ultimately determined by the supply of offsets and allowances in the carbon market relative to demand from covered entities. Just as with other commodities, swings in price can be quite dramatic. Farmers and forest managers are familiar with the key commodity markets with which they interact and are used to managing the risks associated with price volatility. That being said, changing farm or forest practice in order to generate an uncertain quantity of offsets of uncertain price will in practice reduce participation. Managing these risks requires forward selling the offset stream at a substantial discount to an offset aggregator that is willing to bear both the quantity and price risks. While this will reduce the volatility of this novel income stream, it will also reduce its benefits to agriculture and forestry, since the carbon offset middlemen will demand (and deserve) to be compensated for holding this risk. Because a CIP would not create these risks for land managers, they would both capture more of the financial gains from the program and could participate without incurring increased risks to their operations.

Finally and not unimportantly, a CIP, rather than requiring the creation from whole cloth of a new set of capabilities at USDA and EPA, can take advantage of preexisting programs to get moving quickly and with little controversy. Regulation of a large offsets market requires a unique set of skills and capacities. These take time to develop. In addition, an offset system under ACES would require the promulgation of numerous regulations. Many of these rulemakings, however carefully managed, are likely to be challenged in court because of the importance of the offsets program to the environmental integrity of ACES and to the economic well being of farmers. Rather than spend 8 to 10 years developing and then litigating a complex regulatory apparatus for offsets, it makes far more sense to grow the currently existing programs via enhanced revenue streams from the cap-and-trade system, while shifting their focus towards a new emphasis on GHG emission reduction and sequestration.

5. The Advantages of a Price Collar over Offsets for Cost-Control

A price collar or symmetric safety valve sets a reliable and simple upper and lower bound on allowance prices in a cap and trade system. A price collar places a hard and certain limit beyond which US permit prices would not fluctuate. These trigger points would increase each year at a predetermined rate in excess of inflation over the life of the program. Operating such a system would be relatively straightforward compared to the complexity of a high quality offsets system. If allowance prices exceeded the price ceiling, the government would sell allowances into the market until the price fell below the ceiling. All allowance auctions would be held with a reserve price such that no allowances would enter the market at a price below the floor. If an exogenous shock caused prices in the secondary market for allowances to fall below the floor, the government could respond by reducing the number of allowances released for auction at regularly scheduled intervals until the price stabilized at the desired level.

The history of emissions trading schemes indicates that ex ante predictions of permit prices are generally inaccurate and biased toward overestimation of cost. Experience with cap-and-trade programs to date indicates that a lower bound on prices is as important as an upper bound. The US Acid Rain Trading Program (ARTP), the Regional Clean Air Incentives Market (RECLAIM), and the EU ETS have, more often than not, exhibited prices far below marginal abatement costs predicted prior to their enactment. In the ARTP case, this was because abatement costs were in fact far lower than predicted. For RECLAIM, the problem was early over-allocation of allowances. In the EU ETS case, this was because of over-allocation in the first phase of trading (2005-2007) and due to recession in the second (2008-present). All three emissions trading markets have also experienced relatively brief periods of very high prices. The truth is that because we don't know with much certainty what marginal abatement costs will be under cap and trade, what fuel prices will be, and the future trajectory of GDP, it is impossible to predict with any accuracy or precision what allowance prices will be. Pretending otherwise is a misuse of the models used to estimate differences between policy outcomes.[15]

A symmetric safety valve provides reliable cost-containment for covered entities planning for compliance with a cap-and-trade system. In theory, offsets provide a solution for firms worried about the costs of compliance with cap-and-trade. In practice as described above, the biggest carbon offset market has been unable to provide either cost-containment or the environmental integrity required to ensure quantity certainty. Further, there is little reason to believe that the causes of this failure can be avoided under ACES. In contrast, a safety valve, because it responds directly to the price of allowances, provides far greater certainty that costs will not exceed a particular level during any given compliance period. Especially under a program like ACES that provides emissions targets until the mid-twenty-first century, such cost certainty allows for sound long-term investment planning on the part of vertically integrated utilities and merchant generators. In Europe under the EU ETS, it has proven very difficult for utilities to plan for new generation when there is tremendous uncertainty as to the carbon price. Such planning certainty is an important policy objective of any US climate program and a key prerequisite to charting a secure, clean, and low-carbon US energy future.

A symmetric safety valve will also provide a reliable minimum price for allowances that will enable firms to confidently make investments in new pollution reduction technologies. The history of cap-and-trade programs is as much a story of prices that fell below expectation as above. This result has led the clean-tech start-ups that create and venture capital firms that fund new energy technologies to ignore carbon prices when planning and investing. A price collar that provides long-term certainty as to the minimum price of allowances in a US

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[15] The computed general equilibrium and energy system models used to estimate future allowance price and program costs are likely far more reliable at estimating differences between policies than absolute costs. For example, estimates of the difference between a case with offsets and without offsets is likely more informative than an estimate of the absolute cost of either.

cap-and-trade would allow the innovative firms to count on a certain level of advantage relative to traditional fossil generation technologies. Providing this minimum certainty would allow startups to more fully capitalize on the societal benefits that their new low-carbon technologies will provide. As a consequence, a price floor would increase the provision of these technologies to the US economy, increase the number of green jobs created by a US climate program, and help to position the US as a leader in the global energy revolution.

While a price collar does not provide absolute certainty of emissions limits, neither would a real-world carbon offset system. It's important to emphasize what is not given up in the choice of cost-containment strategy. The main criticism of symmetric safety-valve proposals is that they do not provide quantity certainty for climate policy. [16] That is, they do not pretend to provide certainty as to the level of pollution that will be allowed in any given year. As has been shown above, offset systems promise to provide this certainty, but in practice fail to do so. Thus the choice between quantity certainty under a cap, trade, and offset system like ACES and quantity uncertainty under cap-and-trade with a price collar is in reality, a false choice – neither approach can provide both cost containment and certainty as to the maximum pollution level. In fact, given the low allowance price history of emissions trading programs, it is at least likely that a price collar would provide superior environmental results due to its ability to reduce the supply of allowances when prices fall too far.

7. Conclusions

Experience with the CDM has shown that large compliance grade offset markets fail to provide either adequate environmental integrity or a sufficient supply of offsets. The former results in substantial doubt as to the reality of reductions promised by the cap on emissions; the latter in significant cost uncertainty for the program.

Revenues raised from the auction of a dedicated block of allowances could be used to create a domestic agricultural and forest GHG pollution reduction program that better matches the needs and capabilities of these sectors. By doing so, farms and forests could dramatically reduce their GHG emissions while avoiding the costs and uncertainties associated with the implementation of a large offsets program. In addition, they could do so today, rather than after the administrative rulemakings necessary to implement the program have occurred. Finally, because such a program would not be tied to carbon markets, it could take better account of the many co-benefits provided by improved GHG management on farms and in forests.

A symmetric safety valve creates certainty as to the range of possible allowance prices. This allows firms to plan for a worst-case and allows new technologies to fully capitalize on a minimum guaranteed return from the carbon market. It also

[16] A lack of quantity certainty is also the major criticism of carbon taxes.

insures that the political calculus of costs and benefits central to the enactment of the cap-and-trade program is in fact realized in practice.