



**C-AGG Meeting Summary
Thursday-Friday, March 7-8, 2013
Hyatt Regency Sacramento**

Executive Summary of Meeting

C-AGG's March meeting in Sacramento offered an opportunity to continue a public dialogue with CA-based policymakers on AB32 and the role and future of agricultural offsets and other incentive-based agricultural GHG-based emissions reduction activities and opportunities. Speakers from the CA Air Resources Board (ARB) reviewed the status of CA's cap-and-trade GHG mitigation program, and the importance of land-based and agricultural emissions reductions and offsets in helping to meet CA's goals while maintaining the cost-effectiveness and rigor of the program. The agricultural sector is vitally important to CA's economy, and opportunities to incentivize engagement of the sector in GHG mitigation are high on the radar of policymakers and agricultural leaders, including within ARB and the CA Department of Food and Agriculture (CDFA).

C-AGG participants discussed relevant trends, challenges, and opportunities happening within the agricultural sector that have created difficulties as well as new possibilities for engaging producers in incentive-based GHG mitigation opportunities that provide a value for producers and for entities seeking or desiring GHG emissions reductions and related environmental and other co-benefits. A recurring thread observed by C-AGG participants is the increased need for data from farm operators and the sector as a whole; agriculture is increasingly being data-driven, and this trend is expected to increase over time. Producers are increasingly required to produce data for buyers, regulators, voluntary program participation, and supply chains. Technology and changing demographics within the sector are also evident, some of which are happening in parallel with data needs, and which may produce mutual benefits over time. The increased use of mobile technologies, include smart-phones and tablets, combined with APPS targeted to infield use for agricultural producers, promise to make some of the data collection, documentation, and even management decisions needs easier over time. But, effecting practice change is not easy with farmers unless there are demonstrations or data to back up the changes, and the right messengers are required to successfully encourage and effect change.

Most GHG mitigation programs and opportunities for agriculture are in the formative days, and data needs, data harmonization and standardization, data compatibility and data access are common challenges – not only across the entire spectrum of GHG mitigation opportunities and programs – but also across the spectrum of participants, from producers, project developers, registries, policymakers, through to the entire supply chain. The need for increased dialogue and collaboration in order to understand the challenges, the opportunities, and mutually-beneficial, value-based opportunities and solutions was also a key theme of the meeting. Some basic misunderstandings about agricultural operations and markets were identified within some sustainable supply chain initiatives targeting agriculture, and the need for more nuanced and collaborative dialogues to better articulate how agricultural systems might fit within market-based and supply-chain based initiatives were also explored, particularly given the complex nature of biological agro-ecosystems.

There also exist many hurdles to engaging agricultural producers to participate in voluntary GHG mitigation opportunities (a common thread of this and many past discussions within C-AGG), and this is a real and continued challenge for GHG CIG project developers and other project developers seeking to enlist producers in their projects. The lack of a clear market signal and approved protocols being utilized within GHG markets continues to reduce investor confidence and producer participation that might otherwise be surmountable by helping to elucidate a clear proof of concept. Additionally, given the market uncertainties, many project developers are finding it difficult to create a sound and salient value proposition for farmers. Some projects have managed to create solid, rigorous projects with offset credit buyers, but the trend for these has been more aligned with corporate social responsibility and less so about the potential to build valid agricultural protocols within carbon markets, though these transactions will certainly be beneficial to the latter, in the long run.

Semantics continues to be part of the problem, as well. For instance, producers are likely to engage in discussions about nutrient management or enhanced efficiencies, but far less likely to be interested in GHG emissions reductions conversations.

Additionally, as GHG protocols and methodologies for voluntary and mandatory GHG markets are developing, a host of logistical, technical, and socio-cultural challenges continue to be evident (some were mentioned above), including:

- high data needs, often including retrospective data collection and/or burdensome data collection that reduces participant engagement;
- lack of certainty regarding the value of participation, caused by uncertainty of credits to be awarded, offset price uncertainty, demand uncertainty, protocol uncertainty, etc.;
- program architecture variability and uncertainty has hampered development of agricultural offset protocols; for instance, the CA program is still in the early days of agricultural offset development, although lessons learned from the Alberta Offset Program and from other, similar programs requiring verification and or certification is contributing to understanding and program development;
- continued need to adapt non-biological offset approaches to highly variable, biological agro-ecosystems, while maintaining or developing comparable rigor to ensure program integrity (note that issues of verification, aggregation, and data management were well-discussed);
- real-time evolution of measurement, reporting, and verification technologies, tools, and capabilities for agricultural projects is highly promising, but also complicates the ability to capture or lock down some of these issues for protocol development and approval; and
- given the resource-intensive nature of much of this work, there is a continued need to include agricultural professionals in development of all aspects of these programs, protocols, and opportunities, to overcome some of the misunderstandings and to ensure realistic approaches are developed that capture the intended value propositions and outcomes of these programs and activities.

Significantly, the successes, challenges, learnings, and products developed to date by the GHG CIGs and the related GHG projects participating in C-AGG have created enormous benefits and critical, realistic outcomes that are helping to inform these developing programs, tools, and opportunities. C-AGG and its stakeholders clearly articulated the value of our close working relationships and of our continued interactions in helping to enhance these incentive-based GHG mitigation opportunities within the agricultural sector.

A view to the future of these activities and opportunities, and how to build support systems, programs, and tools that can support and benefit the agricultural sector into the future was also a thread of discussion. Within CA, co-benefits of agricultural GHG mitigation opportunities are increasingly being explored and considered, which is consistent with C-AGG's view that over time, these programs and tools need to be built in such a way that they continue to add value and to enhance the agricultural landscape even as it adapts to climate change and other market-driven and societally-driven forces, including sustainable supply chain initiatives and consumer or investor-driven desires for sustainable products, however sustainability is defined. The underlying need for the agricultural sector to continue to (and increasingly) collaboratively engage as these programs and systems further develop will be key to this future.

Finally, C-AGG engagement with relevant federal agencies to continue to pursue data-sharing opportunities and initiatives, for both research data and data sets (particularly useful for enhancing the rigor of models and other measurement technologies) as well as to further develop ecosystem and market-based opportunities for the sector was discussed, with widespread agreement of the value of these endeavors.

A C-AGG initiative to scope international engagement and collaboration within this same space was briefly summarized and discussed, with agreement that it is likely to include a sub-set of C-AGG participants operating under the C-AGG umbrella.

Detailed Meeting Summary Table of Contents

AGENDA ITEM	PAGE
Welcome and Introductions: C-AGG Overview and Background Debbie Reed, C-AGG Executive Director	5
Overview Perspective: GHG Mitigation Opportunities for Agriculture DeeDee D’Adamo, Board Member, California Air Resources Board (ARB)	5
Assessing the Landscape: A C-AGG (Plenary) Discussion of Critical Issues and Trends in Agriculture and Climate Change	10
Alberta Offsets Program: Lessons Learned and Overview of Alberta’s Verification Standards and Guidelines Karen Haugen-Kozyra, The Prasino Group	12
CA Air Resources Board (ARB) Program Updates: Research Activities, Scoping Plan, Agricultural Offsets Richard Corey, Deputy Executive Officer, CA Air Resources Board (ARB)	17
C-AGG Verification Recommendations for Agricultural Offsets: A Facilitated Plenary Discussion	22
DNDC Updates Bill Salas, Applied GeoSolutions, LLC, & DNDC Applications, Research and Training	31
COMET-Farm and DNDC: Bridging the Data Gaps Ryan Anderson, Delta Institute Steven DeGryze, Terra Global Capital, LLC	35
Sustainable Supply Chain Initiatives: What Do They Mean for Agriculture? Andrew Arnold, SureHarvest Allen Dusault, Dairy Management Inc. Gabriele Ludwig, Almond Board of California Daniel Sonke, Campbell Soup Company	37
Update from USDA on Relevant GHG and Environmental Services Activities Marlen Even, USDA Global Change Program Office	46
NRCS/USDA Update Adam Chambers, NRCS/USDA	49
Maine EarthSmart Program: Farming for the Future Susan Gammon, Androscoggin Valley Soil and Water Conservation District	52
Agricultural Data Needs: Framing the Discussion for Workshops with Federal Agencies: USDA, USGS, NOAA, USEPA Debbie Reed, C-AGG	56
C-AGG International Collaborative Efforts: Framing the Discussion for Workshops Debbie Reed, C-AGG	58

Thursday, March 7, 2013

Welcome and Introductions, C-AGG Overview and Background

Debbie Reed, C-AGG Executive Director

- Overview of C-AGG:
 - C-AGG aims for broad stakeholder representation, including the agricultural sector, environmental & NGO community, carbon trading / carbon markets, academia & government
 - C-AGG's focus is incentivizing greenhouse gas (GHG) emission reductions within the agricultural sector and at the farm scale, and exploring policies, programs and incentives to simultaneously engage and provide net benefit to the agricultural sector
 - We don't strive for absolute consensus, but agreement on recommendations and proper direction on GHG mitigation activities, policies, and needs
 - We have three in-person meetings per year, various activities in between
 - Please take a look at C-AGG's new website and let us know what would be helpful to you and your activities. There's also a portal for GHG Conservation Innovation Grant (CIG) projects, so those projects can interact and we can keep the community up to date on project successes, challenges, and progress
- Objectives/topics for this meeting:
 - California focus
 - We want to have a two-way dialogue about cap and trade, AB32, and the scoping plan with policymakers, and have CA policymakers hear first-hand from folks on the ground, developing GHG projects. Opportunity to dialogue on the challenges, opportunities, and successes that project developers are encountering, which can be helpful as ARB moves forward considering and developing protocols.
 - Agricultural Offset Protocol Opportunities – in various markets
 - Verification: discuss draft C-AGG recommendations, have dialogue to fill in gaps, clarify, perhaps develop into a white paper, if necessary/desirable.
 - Lessons learned from Agricultural Offset Program in Alberta, Canada
 - DNDC Update
 - USDA Updates
 - Maine Earth-Smart Carbon Program – a regional alternative to carbon markets
 - Sustainable Supply Chain Initiatives – need for agricultural sector engagement
 - Begin to scope new C-AGG activities for 2013-2014
- C-AGG has new office space in Washington, a new fiscal sponsor (New Venture Fund), and will be expanding to do some international work

Overview Perspective: GHG Mitigation Opportunities for Agriculture

DeeDee D'Adamo, Board Member, California Air Resources Board (ARB)

- I've been on ARB for 13 years, been involved in these issues for a long time, but things have been exciting lately with efforts on climate change and implementation of AB32
- We're very focused lately on agricultural offsets, trying to do a better job of getting a handle on some of the challenges and opportunities for the agricultural sector
- Overview of California's climate change program:

- 2006: Governor Schwarzenegger signed AB32, which set 2020 GHG emission reduction goals into law
 - Development of road map/scoping plan, outlines how we will achieve max tech feasibility/cost effective reductions in GHG, adopted in 2008
- Scoping plan now under scheduled (5-year) review, and ARB staff are busy interfacing with stakeholders and getting recommendations; scoping plan to be presented to the board in the fall
- AB32 also requires statewide quantification of emissions, using 1990 levels as a goal to be achieved by 2020, and requires reporting of GHG emissions
- We use a market-based tool for reductions, which is the cap and trade regulation we've adopted for refineries, power plants, transportation
- We have an enforceable emissions cap that declines over time, with tradable permits equal to emissions under the cap
- Sources that are regulated under the cap need to surrender allowances equal to their emissions at the end of the compliance period
- We just held second allowance auction, and things are going well. We're forging ahead
- There are remaining concerns, but our board is actively engaged in working with all stakeholders to get this right. It'll be awhile before we are operating at 100%, but the program so far is a success. Concerns continue to be voiced by naysayers about whether climate change exists, but overall the public is in support of our efforts.
- The AB32 statute was challenged on the November 2010 ballot via Proposition 33, which would have suspended our efforts until unemployment was under 5.5%. The intention was to kill our efforts, but the proposition was defeated by a margin of 23%, which sent a strong message.
- Governor Brown and his administration are committed to the success of our programs, and we're working closely with sister agencies (such as the waste board, state EPA).
- President Obama urged climate change action in his State of the Union address this year
- There's also a lot going on internationally to address these issues
- I have a background in agriculture, and climate change impacts on agriculture are extremely troubling to the whole state. My husband is a farmer on the west side where we've seen chronic water supply shortages. The greatest reservoir in CA is the Sierra snowpack, and losses to that hit close to home for me.
- Agricultural impacts of climate change include:
 - Decreased water supply
 - Lower milk production
 - Pest infestations
 - Reductions in crop yield
- There was a major heat wave in 2006 – we lost a lot of cows and milk production went down. We expect things to get worse as temperatures rise in the future
- *Agriculture in CA is a \$47 billion industry.* Agricultural exports are high, and important to the future of the sector. However, climate change will impact not just the agricultural sector but our entire economy if the agricultural sector is disrupted. For example, there are so many companies that support agriculture (fertilizer, etc.)
- Agricultural emissions are about 7% of statewide emissions in CA, so it's important for agriculture to be part of the solution. Some of the top issues to address include:
 - Manure
 - Land management
 - Fires

- Fertilizer management
 - Rice cultivation
- Agriculture is connected with the cap and trade program through food processors, who are a directly regulated sector. Moreover, all citizens including farmers are affected by cap and trade because of fuels and electricity use that are regulated under the cap.
- We want to identify voluntary emissions reduction strategies in the agricultural sector through offsets, as well as via California Environmental Quality Act (CEQA) mitigation opportunities
- Offsets
 - We have four compliance offset programs to date, including methane digesters
 - We also have a forestry protocol
 - Currently our staff is working to develop a rice cultivation offset protocol (topic of a public workshop to be held later this month)
 - CA is a partner in the Western Climate Initiative (WCI), which wants to create a regional cap and trade program. WCI's offset priority list in 2012 includes nutrient management, rice fermentation, livestock methane digester and forestry protocol. Quebec has implemented a livestock digester program similar to CA's. Credits from any of these protocols need to be fully fungible in a linked program.
 - Our staff is working with the California Department of Food and Agriculture (CDFA), USDA, C-AGG, carbon registries, agricultural groups, and NGOs to evaluate how offsets can best fit into the cap and trade program. This is where the real challenge begins, because we have clear standards in AB32. Compliance offsets need to be real, permanent, quantifiable, verifiable, enforceable. Any one of those areas could be the subject of a whole conference.
 - We want to dig down deep in this meeting on the issue of verification
 - We are moving forward with offsets, and they're a priority for our board and staff, but it's best not to stop there. We need creative approaches to move agriculture forward and give them the tools they need to reduce emissions, even if their activities don't fit nicely into an offset program.
- I also want to talk about some other ongoing efforts:
 - *California Air Pollution Control Officers Association (CAPCOA)* – represents 35 local air quality agencies throughout CA. They're actively engaged in developing a CAPCOA regional GHG exchange. They will issue credits based on CAPCOA-approved protocols or on a case-by-case basis. The credits will be used for mitigation to comply with CA's air quality act.
 - Funding opportunities
 - There are many incentive programs out there already, but we're also looking at proceeds from the cap and trade program as a source of funds: ARB and the California Department of Finance are working on the administration's draft concept paper investment plan for these funds
 - AB1532 says that the proceeds need to be used to further the goals of AB32
 - SB535 requires that 25% of the proceeds benefit disadvantaged communities, 10% of which must be spent *within* disadvantaged communities. Cal/EPA has identified these communities, which can be found on our website. There's a string of them right down the San Joaquin Valley. There's a tremendous opportunity for us in the valley to get an infusion of funds into that region.

- Governor Brown's priorities include:
 - Clean transportation
 - Sustainable communities
 - Energy efficiency improvements -- Including water investment plans; note that a concept paper on water investment plans was recently the subject of a series of workshops we had, and there's a public comment hearing coming up in May.
 - Leveraging NRCS conservation assistance in order to help support voluntary GHG reductions. The EQIP (Environmental Quality Incentives) program has been successful in retiring inefficient equipment, but it's also noteworthy that on the land conservation side, more than \$12 million was spent in CA in 2012.
 - The vast majority of NRCS's Conservation Innovation Grant money went to GHG reductions and sequestration.
- Farm Bill
 - A lot of programs are on the chopping block. I'm happy to hear about US Senate Agriculture Chairwoman Debbie Stabenow's interest in C-AGG's efforts.
- Research
 - One challenge is identifying critical research opportunities, particularly developing GHG quantification methodologies for agriculture;
 - Emissions are impacted by weather, soil dynamics, water supply, etc., all of which are uncertain by nature.
 - The academic community and NGOs have funded at least 20 projects to help with things like dairy methane emissions, emissions from crop operations and soils. This data may be used to help develop additional protocols.
 - USDA has taken a strong leadership role in identifying GHG mitigation opportunities for the agricultural sector
- Q&A
 - *QUESTION:* You mentioned two ARB allowance auctions have been held, and companies are planning compliance. The offset price at the last auction was \$16.62. I'm curious about your perspective: If the offset credit price increases, that might help with project development and bring additional revenue to ARB. But you must not want to see high/volatile prices, because ultimately we want this program to work at reasonable cost to CA residents. What do these prices mean, and what do you hope to see?
 - *ANSWER:* We don't want to send unintentional signals in the marketplace, so I can only speak in general terms about this issue. We want to keep the cost of the program reasonable. We are working closely with entities that have expressed a concern, and maybe some adjustments will be warranted. As far as the last two auctions, this is a good sign: there were no disasters, nothing major shut down. It looks like all systems go, and things are moving in the right direction.
 - *ADDITIONAL COMMENT* from ARB: We put a "price floor" in the design of the program, which sets a minimum for what allowances can sell for at auction. We set that to be low enough not to impact the economy, but high enough to ensure that investing in emission reduction technologies is the right thing to do. We also have a reserve which tries to contain prices in a reasonable range. So you have a floor and a ceiling, and together these keep prices in check and incentivize investments in clean technologies. The auctions are just a way for us to get information about what all entities believe the actual cost would need to be in order to meet AB32 mandates. I think we're in that range, which is encouraging. Participants were able to get in and bid.

- *QUESTION:* Regarding the Western Climate Initiative, I wonder about the driver behind partnering with Canadian provinces when 49 other states are ignoring cap and trade.
- *ANSWER:* I don't think they're ignoring it. I think they're watching us very closely - Western states in particular. Congress needs to act, but it doesn't look like that will happen right now. I was pleased to see President Obama prioritize climate change in the State of the Union address, and hope that US EPA will move forward soon with regulatory approaches to move in that direction within the bounds of current law. The Supreme Court has given them the authority to do so.
- *QUESTION:* We've been developing nutrient management protocols. I'm interested in your perspective: one challenge of agricultural offset projects is that they yield a small amount of tons or credits per acre, and aggregation is expensive. Are there ways to aggregate inexpensively? Also, we know all offset projects must be real, enforceable, etc., but protocols must be flexible enough to allow farmers to farm while also participating – how can we encourage farmers to participate and still allow them needed flexibility to make important management decisions?
- *ANSWER:* When we talk about the cost to implement and verify offset projects, I can see that there will be costs and expenses involved, and farmers won't have a lot of time to divert to this process – they are focused on water, planting schedules, etc. To get them involved in another program with more paperwork and hassles, yes I'm concerned about that. Groups like C-AGG can help us be creative about ways that we can aggregate cost-effectively. One other clear path is through strong participation from agricultural groups – like Cynthia Cory and the Farm Bureau, and Paul Buttner and the Rice Growers. I liken it to conservation management plans that farmers implement on the ground. There are plans that were developed for dust mitigation strategies, and the people who got farmers to participate were county Farm Bureau directors and Cynthia and Paul. They helped make it easy. We have another program to monitoring drainage, and the concept is the same – we get voluntary participation by agricultural organizations through organizations and coalitions that bring them to the table. But we need to start with creative ideas about how the program should be structured to begin with, to provide as much flexibility as possible.
- *QUESTION:* The US EPA's regulation of GHG is under the Clean Air Act, which is a different mechanism from what CA is embarking on. As things progress, what is the potential impact of a federal program that uses different regulatory processes than what is developed here?
- *ANSWER:* Mary Nichols has been deeply involved in this. Through the clean car program our staff had to negotiate with US EPA, and we were able to meld together a federal program that works for us in CA. I know we're looking at creative ways, but mainly the relationships are there so we can coordinate as much as possible.
- *QUESTION:* What are your thoughts on the Western Climate Initiative in terms of their next steps related to agricultural offsets?
- *ANSWER:* Other than the priority list, which included many agricultural project types, I haven't worked directly with them.
- *ADDITIONAL COMMENT* from ARB: The priority list is probably all that has really been discussed publicly. Lately the majority of work we've been trying to do is about harmonizing regulations to affect linkages. On March 28th we're holding an offsets workshop at ARB, which will be one of the first opportunities to see us developing protocols in earnest. It's very challenging to develop protocols - it takes a lot of time. Dave and Greg and I and others here (at ARB) are thinking about what we need to do to

get the work done that's already been promised. We're very encouraged by opportunities out there, but have to be realistic about what we can undertake. ARB is part of WCI, CA is part of WCI, and we're working in concert to get the best programs we can.

Assessing the Landscape: A C-AGG (Plenary) Discussion of Critical Issues and Trends in Agriculture and Climate Change

Two questions were posed to the group to stimulate an open exchange of ideas: What are you paying attention to? What are trends you're concerned about? Input and responses follow.

- Apps that farmers use on the farm. I see more and more of them in the field and being advertised in agricultural magazines and newsletters. We're seeing applications for apps in some of our own (GHG mitigation) work. Second, the White House Office of Science and Technology Policy has a chief technology information officer (Todd Park). His job is to make federal data available to people who paid for it, i.e., the public – to get the data into the hands of the people who can create benefits with the data. He has led multiple data-sharing initiatives, and his Deputy (Nick Sinai) is having what I think is the first ag data sharing workshop in late April, focused on agriculture and food security in Africa. We are trying to get them to help us in a similar manner, to support ag GHG mitigation efforts.
- Staff from the Climate Action Reserve (CAR) attended the Commodity Classic in Orlando recently, to share CAR's nitrogen protocol, and since we got back we've been brainstorming how to sell this to farmers, because they were not receptive at all at the meeting. We need to think about how we talk about these issues ("reducing nitrogen use" versus "improving nitrogen efficiency"?). It was an interesting experience to realize how hard a sell this was or can be.
 - *By raising their hands, most everyone in the room showed that they have also had to handle challenges related to marketing these concepts.*
- We have a Conservation Innovation Grant (CIG) on water quality trading, and we're using a tool that is an adaptation of (USDA's) Nutrient Tracking Tool (NTT). The data inputs are very similar. This brings up for us the notion of common data entry points, and the great potential for farmers if their data could be entered somewhere just once and then be used in other tools or programs, e.g., with DNDC, NTT, ag offset protocols, etc.
- Regarding data collection and communication with farmers, there are privacy issues that make this a sensitive conversation and topic. Farmers are very sensitive about what will be done with their data once collected. The Environmental Working Group has made this an even bigger problem for everyone by specifically revealing farmer information publicly in a manner that is problematic. We understand the need for data, but to communicate with farmers, you can't say, "I'm going to use this for the nutrient management protocol." Our basic approach has been never to talk about GHG, but instead talk about NRCS funds, and managing nitrogen. E.g., "here's what we need to do with nitrogen: we need to manage it differently and cap it at a certain limit." Farmers understand that and will buy into it. Another example is water management. Farmers get that too. For example, say: "alternate your water rather than using continuous flooding." Tell them to reduce nitrogen or put it on at a different time. You need to make it understandable. Lastly, questions that come up in real world: According to the first page of the handout for this conference, offsets need to be real, additional, quantifiable, permanent, verifiable, and enforceable. When I read this, I think, "Real? Yes. Additional? Yes, but you need to know what the boundaries are. Quantifiable? Yes. Permanent? **No**. Verifiable? Yes. Enforceable? **Scary!**" If you can answer those questions so you don't come out with a threat, we can make this work.

- *So talk to farmers about what they're actually going to do, not about GHGs. Permanence and enforceability are red flag words. Also, remember that it only takes one or two organizations (like the Environmental Working Group example) to really set things back for the whole sector.*
- One thing DeeDee D'Adamo of ARB has helped the ag community in CA with is the diesel risk reduction plan. We have such a plan in California, and over the years we've gone down the list until every diesel engine in the state had to be replaced. It started with low hanging fruit like waste haulers, then went on to construction equipment. I knew agricultural equipment was at the end of the list, but we eventually got there. When diesel trucks were the target, we were able to put a rule in place that gives some flexibility for farmers if they drive a certain mileage. But they all have to report to ARB. The last rule, the agricultural equipment rule, was just announced in the last couple of weeks, and in the first phase will apply only to 8 counties in the San Joaquin Valley (but the next phase won't stop there). Ag probably won't be faced with mandatory GHG reductions, but it's something I want everyone to be aware of when we talk about farmers not being ready to jump in right away. What they care about is things affecting them now -- like burn permits - in the Bay Area, the cost is going up hundreds of dollars. Lots of issues like this are not being experienced outside of CA. It's different here. We have some of the most progressive folks in the world, but we're also already highly impacted by many issues, including water quality, nitrates, lowered ozone standards, etc.
- What we're seeing (and hearing) here is that ARB has been working very hard with agriculture over last few years, finding an appropriate spot for trucks, and tractors. I want to tip my hat to ARB for that. The linkage with NRCS also has a lot of helpful programs. NRCS links in with ARB programs on the conservation management plan side to lessen command and control regulatory impacts that would have happened had NRCS not stepped up with support and funding. Want to recognize those organizations for their good work.
- I wanted to bring up PG&E's role, especially with regards to agricultural energy efficiency and its role as a purchaser of offsets. We're concerned about protocol development and offset supply in the future. We have extensive energy efficiency programs, not only with agriculture but also with food processors and other capped industries. As a purchaser of offsets, we've been active in supporting protocol development, and we are trying to buy offsets. We're working cooperatively with ARB to develop a program that is affordable and feasible for CA residents. We had a program called AG-ICE in 2005-7 that worked on electrifying diesel pumps and resulted in a lot of emissions reductions. We ran through the incentive funding very quickly, but if programs like that could be used again, it could be a win/win.
- I'm looking at this from the investment side, and wondering how you stimulate investment in agricultural GHG offsets. At the end of the day, what will the business plan be for these offsets? Who will buy them? It's similar to what PG&E is thinking about supply and demand. We had an investor who was interested in GHG reductions from agriculture, but we couldn't invest their funds, and had to tell them to take their money back because we didn't think we'd be able to invest their money and make money in a reasonable time horizon, partly because we saw ARB focusing on nitrogen and rice, and we worried how many credits could be developed in the short term, and whether they could be sold at a decent price. And we thought "not yet." Another issue is that investors are looking not just at CA but at carbon markets worldwide. The European carbon market has essentially crashed, so that's a disincentive for potential investors. How do you tell people, "OK, the carbon markets crashed in Europe, but it will be different here?" What are some other outlets for this information and "credits" (which are not really credits). Can they be linked to supply chains? What will companies like Wal-Mart do in this game, and what impact will they have if they buy credits? So we need to think not just about

how to engage farmers but also wonder where the capital will come from to invest in these projects. I see high transaction costs associated with aggregation, and ag projects produce small quantities of GHG credits per acre per year. This requires working with lots of people, which adds transaction cost. How can you minimize costs and facilitate aggregation? That is of great interest to us.

- In Marin County here in CA I'm looking at emerging innovation at the local level. Counties and cities are also getting engaged in GHG mitigation projects. I'm having conversations at local levels where we may be able to jumpstart projects using local revenues. There are interesting innovations and discussions happening at that level. 60% of the land in Marin county is in agriculture, which seems like an asset that's not being deployed enough to help mitigate GHG emissions.
- I'm looking at the architecture of programs. Two things: first, the interplay between CA Public Utilities Commission and ARB. ARB's rules require offset buyers to bear liability of offsets they buy. So if you're PG&E, you're responsible if the offset is later invalidated. The CA Public Utilities Commission changed that rule, converting buyer liability to seller liability. That's a complicated scheme and adds transaction costs. Second: utilities can't buy directly from offset sellers. This is prohibited by the state. You have to do it through a public process or exchange, but offsets aren't purchased through those. Another thing to keep in mind is RGGI (Regional Greenhouse Gas Initiative), nine states who have cap and trade in the Northeast, just dropped their cap 45% because of low activity due to the state of the economy. Since RGGI is going forward with a much tighter cap, you might see more room for offsets activity there.
- I'm looking at engaging agriculture and the interface with GHGs for farmland conservation purposes. It doesn't fit very well with markets, protocols, etc., but in the context of other types of incentives for reducing GHGs, especially in the context of smart growth policies, etc., and also incentives for the agricultural sector to be interested in, it's another important opportunity and potentially has bigger impacts on GHGs than per-acre changes in practices. It's critical for a state where agriculture is such an important part of the economy to have that be a critical part of the overall policy. I know there are coalitions developing trying to do that. I see this not as part of the offset market, but about communities trying to meet their goals under legislation. [Submitted a study to be referenced in the notes: *Triple Harvest: Farmland Conservation for Climate Protection, Smart Growth and Food Security in California*. Produced by California Climate & Agriculture Network – (CalCAN). Available at <http://calclimateag.org/triple-harvest/>]

Alberta Offset Program: Lessons Learned and Overview of Alberta's Verification Standards and Guidelines

Karen Haugen-Kozyra, The Prasino Group

- I want to give a snapshot overview of carbon pricing in Alberta, a look at how we've evolved over time (adaptive management), where our biggest learning has been, and the evolving science of verification. We're in our sixth compliance cycle, and we have a pricing policy based on reduction of GHG output from facilities. We have a baseline credit system – no allowances. Everything being traded in the system is a credit. If facilities install beyond business as usual, they must buy credits or purchase offsets from other players in the economy or put a \$15/ton compliance purchase into the technology fund. Some people call that \$15/ton a tax.
- We have 34 approved offset protocols, which go through four levels of review and approval. We've used about 17 million tons of offsets to date. The tillage management system protocol has been most widely used and also the most controversial. There's a growing interest in offsets, and the issue of compliance has been scrutinized. The Auditor General does a value-for-

money audit. Anything that takes money away from the technology fund is seen as something that needs to be closely scrutinized.

- Core elements of the Alberta System:
 - Demand for credits created through regulation
 - Supply of credits
 - Rules to govern the system
 - Infrastructure
 - Consequences for noncompliance
- The government has a \$2 million annual budget to audit compliance. Compliance is important to us because we want to know where the system is working, and where it is or was not. The Auditor General began in 2009 to join Alberta Environment's audit teams to learn/observe and understand how the process was working.
- The Alberta system operates under an adaptive management framework:
 - Projects implemented on ground are verified and audited;
 - Learnings go back into the guidance documents, which set up rules for the system;
 - This leads to improvements and changes to protocols, and it keeps circling every year.
- At the start of the offsets program, we were focused mainly on getting the science right, how to put the science through policy filters. It is only in the last few years that we have begun to focus more on verification. Our first compliance period every year is in March. Reports are submitted in December, so everyone has about three months to true up.
- One issue in our system is that it's *ex post*. There's no immediate validation process. Audits don't occur until almost 8-9 months after everything is said and done. If an issue is found, the verifiers have to go back to the facility, and the project may then need to be reverified by a government auditor.
- What we found is that verifiers and project developers were asking for more explicit guidance – the general guidance document wasn't enough. Government audits on verification couldn't always come up with consistent findings or a consistent statement. The regulatory department set out to define what "reasonable assurance" meant; they set up a joint task force of chartered accountants and engineers, and found that these two sectors look at issues of assurance differently. Accountants are more interested in a controls approach, while engineers are more interested in a substantive approach. That helps explain the conflicting information we'd been seeing. Both groups also assess errors differently. That culminated in a verification guidance document with some sample procedures, and both types of approaches must be used.
- We're also now doing a number of pilot studies on protocol validation. When our program began, we required a limited level of assurance, which basically meant that verifiers could state simply that: "nothing problematic has come to our attention." Now, we have a requirement for reasonable assurance, which is far more quantitative.
- From 2002-2011, before moving to reasonable assurance, we learned that offsets can be mobilized quickly, but this really depends on the type of protocol. Alberta's audits revealed that we needed better documentation for specific data points, and that data management needed to be more directly addressed. The Farmer's Advocate took an intense interest in this process, and surveyed companies to ask them what a reasonable level of assurance meant to them. The results showed that third party documentation given by the third party to the verifier was viewed as the strongest level of assurance, and that affirmation from the farmer was viewed as the weakest.
- The Conservation Cropping Protocol is the newest protocol in our system. It has a number of key data points for each acre. It also has details about different sources of verified evidence that

may be used, the roles and responsibilities for data collection – farm operator, project developer, professional agrologist, etc. In the first few years of verification in our system, the procedures weren't clear – now, as you'll see with this protocol, we've tried to be very explicit.

- The joint task force recently released their verification guidance document.
 - Key changes in the document:
 - All verifications must be done to ISO 14064-3, which will help with consistency. We never had accreditation in our system, as the regulator didn't want to increase costs
 - Mandatory roles
 - Mandatory verification acceptance phase
 - Verifier may decline work
 - Site visits now mandatory
 - The guidance document lists verification procedures that the verifier may choose to use. One problem in our system is that from verifier's point of view they're *also* collecting data. We now realize that everything needs to be documented – we need pieces of paper signed by the farmer, for example. This can be frustrating, because verifiers use a number of different procedures.
 - The guidance document also lays out sampling types based on a preliminary risk assessment.
- Protocol Best Practice Guides: Conservation Cropping
 - Expectations (e.g. due diligence on farm/field eligibility; quality of data) are clarified, and roles and responsibilities are outlined
 - Quality evidence requirements – we can still run into trouble with a verifying firm or auditor (see example below), but requirements for what evidence is viewed as sufficient and appropriate is better defined. For example – evidence for “existence of an annual crop” is approached by requiring at least one piece of evidence from a provided list.
 - Reliability of evidence: We experienced particular to agriculture and the reliability of evidence. As an example: One farmer had a verifier come in and do a GHG verification on their offset project. The buyer came in, brought in their team of verifiers and did double due diligence. The deal was completed, credits sold. Then a government auditor no agricultural background or experience came in, looked at the evidence for certain data points, and saw conflicting evidence for seeded acreage in different pieces of evidence, calculated a 10% error multiplied up through the levels of compliance, and the project was suddenly noncompliant. That happened because the auditor didn't understand what the most reliable piece of evidence was for seeded acres.
 - Now we have incorporated scales of assurance. We have farm-supplied sources of evidence, third party documentation (GPS files, crop insurance records, etc.), and then a professional agrologist can be utilized to assess the data and provide a professional opinion. So now we're being more explicit about what evidence is important to the verification process (and community), and we are rating according to sufficiency.
- We hope this will add clarity and consistency, so as not to have people caught in between different verification systems and procedures.
- Q&A
 - *QUESTION:* I didn't get a true sense of what your accreditation or certification process is in the Alberta system.

- *ANSWER:* We don't have one.
- *QUESTION:* To back up, that would explain a lot of the issues you've had, as I see it. Can you also speak to things like conflict of interest?
- *ANSWER:* We've had since day one a conflict of interest checklist -- a series of forms that must be signed by the verification firm. That's submitted annually with compliance reports. If the regulator were here, he'd say "we feel audits are essential because you need to know how people are interpreting things and how the system is performing." I've argued with him about accreditation, but he's just not convinced – he's trying to handle it another way.
- *COMMENT:* It can be very onerous and costly to go through a certification program, but here we're seeing the problems with everyone coming up with their own approach. With a certification program you'd hopefully resolve a lot of these issues before they occur.
- *QUESTION:* What kinds of payments are we talking about here?
- *ANSWER:* Not much. For a good-sized farm it could be about \$10,000/year. But a lot of farmers don't want to participate anymore.
- *QUESTION:* How are project developers who are currently working in this system reacting to the changes to protocols and increases in verification costs?
- *ANSWER:* That remains to be seen. Compliance reports are due at the end of this month (March). The regulator and the company I used to work for have a portal with all the protocols and reviews, and the regulator comes out every October and reviews the whole system. Potential changes are discussed publicly, usually beginning a year or two in advance of implementation. Notices are widely circulated during the review period, and all comments and responses are published. Verification on the conservation cropping protocol with 800 farms would run about \$15,000, and that has doubled now.
- *QUESTION:* How many acres would that be?
- *ANSWER:* Quite a few. We're seeing about 125,000 tons as a large project.
- *QUESTION:* As for site visits, let's say you have 800 farms, does the auditor have to visit all of them in a given year?
- *ANSWER:* No. There are many approaches to statistical sampling. We're talking about a risk-based sampling approach. You lay out the assessment you'd do, take an initial sample of farms, go through the data. Given what we understand about larger farms/sources that might have a bigger impact, you do a contributational analysis on all those emissions. Once you understand the risk and take the sample and look at the control, then the verifier will determine how large a sample to do. Then you go out and do sample and site visits, and if they find anomalies they may expand that. They need to feel comfortable that they can proceed with verification.
- *QUESTION:* Is the guide available online?
- *ANSWER:* Yes (see guide posted at: <http://environment.gov.ab.ca/info/library/8802.pdf>)
- *QUESTION:* So you do statistical sampling, and I assume the sample changes every year. After a period of time, does every one of those 800 farms eventually get visited?
- *ANSWER:* That's not dictated, but it's a good idea.
- *QUESTION:* What if one farm fails? Doesn't that invalidate the whole 800 farm set?
- *ANSWER:* We have to live with what's found in the sample and applied to the whole population.
- *QUESTION:* Does the verifier have to adjust the sampling plan?
- *ANSWER:* No.
- *QUESTION:* Do they have to record it?

- *ANSWER:* For a first-time verifier, they need to develop a verification strategy, sampling plan, and verification plan, in sequence.
- *QUESTION:* In terms of risk-based sampling and offering flexibility, I'm curious about whether the system essentially relies on verifiers' level of comfort in order to reach the specified level of assurance? You tell them, "Here are the steps you have to go through," and they develop their own sampling plans? Or is it built into the rules that they must sample X percentage?
- *ANSWER:* It's not built into the rules; there is flexibility. But we're seeing a better balance between quantitative and qualitative methods.
- *COMMENT:* Seems as though more prescriptions might have caused fewer problems with differences in methodologies.
- *ANSWER:* The government was careful. They didn't want to prescribe too many things. There's a lot of discretion still.
- *COMMENT:* During C-AGGs discussion of verification in November, Rainforest Action Network talked about their risk-based statistical sampling procedures, and they seem to have fairly prescriptive sampling requirements. It would be interesting to do a comparison.
- *ANSWER:* We compared ours with CCX, which mandated a 10% sample.
- *QUESTION:* A lot of what you said was about learning what was going on, but it leaves me wondering: you started out talking about how options for compliance and offsets were done, and I wonder about your own view given your challenges. Do you think we're getting the ton-for-ton offset that the program is designed to (and that we hope it will eventually deliver)?
- *ANSWER:* Going forward I am confident. Looking backward, the system allowed people to dabble in offsets. They could always come back into compliance. I don't want you to think that in every sample 9 out of 10 were bad. It was one here and there under the government audits. But going forward, I think a lot of players have been weeded out of system on the project development side, and I think with these new tools it will be a new world. I think with offsets a ton will be a ton.
- *QUESTION:* I'm wondering how Alberta's experience with offsets could shed light on offset invalidation in California's program?
- *ANSWER:* In CA there will be government auditing too. I hope what I've shown you today will help. Having one standard, making sure you've got great guidance is key. In my perfect world, we'd have one protocol and everyone would be trained on it. But even getting as prescriptive as we are, I think because we allowed multiple entities to come in, we needed to move that way. Consider who you want to be active in the space on verification. If the lady who wrote the standard said "I couldn't have written that 2 years ago" (which she did), then that means there was a lot to learn, and we've learned a lot.
- *QUESTION:* What percentage of offsets has been invalidated in the Alberta system? Is there a window or designated invalidation timeframe?
ANSWER: There are correction procedures in place. I don't have that number off the top of my head, but I can get it. If the government finds there's a material error, the project developer has time to correct it. Usually after about six months, the project developer has to pay for the next government audit, and the facility may have to be idle during that time.
- *QUESTION:* Could you go back and invalidate ten or twenty years from now?
- *ANSWER:* Yes, the regulation talks about revocable license. It's an open-ended revocable license.
- *QUESTION:* What's been the response of regulating entities? Are the cost savings sufficient?

- *ANSWER:* What's happening is we're getting two tiers. The government only has so much money for auditing. They usually do about 7-10 auditing projects per year. Those that pass government audit become a sort of gold standard, almost like certification. So now it's "show me your government audit." That said, I don't know what regulators will do, because they can't afford to do it all.

CA Air Resources Board (ARB) Program Updates: Research Activities, Scoping Plan, Agricultural Offsets
Richard Corey, Deputy Executive Officer, CA Air Resources Board (ARB)

- First, I wanted to explain how I fit into the organization. The portfolio I have is climate, fuels, toxics, and elements of the diesel program (such as ships). I've been spending progressively more time on agricultural issues.
- I wanted to discuss our overall AB32 activities, where are we with the program, then dive into the scoping plan - specifically what the requirements are for the update, the game plan for the update, and what the impacts will be.
- From a broad perspective, going back to adoption of AB32, there's been a range of activities starting chiefly with the establishment of a robust inventory. Solid emission factors was one of the key drivers, ultimately developing into a range of strategies intended to get us to 1990 emission levels by 2020. Having an independently verified and regularly updated inventory has been critical to the effectiveness of the program.
- The scoping plan in 2008 was a road map – telling the story of how can we get to 1990 emissions by 2020. A number of measures and strategies were discussed at a fairly high level, but did serve as an overall framework for how, over the next several years, staff analysis and stakeholder work would play out and translate into a range of measures already leading to emission reductions.
- As for ongoing stakeholder engagement, we work with the Western Climate Initiative and a range of other stakeholders. We've identified specific concerns and opportunities, and spent time cultivating those relationships and understanding what those relationships are. Understanding and good data leads to good decision making.
- The 1990 emissions target is 427 million metric tons CO₂e, for an emission reduction target of 80 million metric tons CO₂e. A figure in the presentation showed where those reductions can come from.
- 2013 update to the Scoping Plan
 - The primary objective is to answer some basic questions, such as:
 - Where are we with respect to meeting our 2020 target?
 - What measures and strategies have been implemented, and are in place?
 - Are we on track to meet our goals?
 - Are there issues that have emerged that need to be addressed?
 - We also want to look at the longer-term portion, for instance:
 - What are the co-benefits we are seeing?
 - Are there other toxins/criteria pollutants that have been reduced as a result of these efforts?
 - What are the job opportunities out there in renewable (energy)?
 - What about local efforts – what is happening there? We have a range of initiatives at the local level. What activities are taking place, and how can we better represent them in the document?

- Another element is an update on climate science. There's been a lot of work done since the last IPCC report. We've also been looking at black carbon and other species outside of what's included in the Kyoto Protocol (the 6 gases).
 - The second module of the scoping plan is about what happens post-2020:
 - Where are the opportunities for emissions reductions going forward?
 - What are the benefits and co-benefits associated with these potential opportunities? (e.g., economic benefits, jobs, environmental co-benefits, etc.)
 - Where are greatest opportunities for reductions?
 - What kind of analysis/research needs to be done?

We really want to tee up a pathway for moving toward additional reductions.
 - There's a range of other related documents to consider – the Governor's environmental goals and policies, Vision 2050, etc.
 - Broadly, these documents are about energy, fuels, and adaptation at the state and local levels.
 - We want to integrate the work going on in these other documents, think about the impact on criteria pollutants/toxics, co-benefits, etc., and coordinate with other stakeholders more effectively.
 - Five critical focus areas will be addressed in the Scoping Plan:
 - Transportation fuels and infrastructure
 - Energy generation, transmission, and efficiency
 - Waste
 - A question we are asking here is where are the greatest opportunities? How can we interface with current efforts and stakeholders? Are there opportunities for incentives? What role might they play?
 - Water
 - Agriculture
 - Regional overlay
 - This time with the stakeholder process we want to better represent the range of local activities with respect to climate leadership. What's already been done and what efforts are being planned for the future? We're interested in working with air districts, nonprofits, etc., to have this dialogue, translate it into the scoping plan in terms of actions taken and opportunities going forward.
 - Schedule
 - We're having initial public workshops next month
 - We hope to have a draft report in the summer
 - We're targeting a board-proposed update to scoping plan toward the fall/end of this year
 - Effort with respect to the investment plan
 - In my mind, there's a clear linkage between the update to the scoping plan and future investment plans. I see the update to the scoping plan as identifying where there are opportunities going forward. Structurally, what do those signals look like? If there are incentives, how are they directed? Ultimately investment will be subject to legislative appropriation, but we are looking for opportunities, how to prioritize where funds ultimately go. I think this scoping plan update has an important role to play in that discussion.
- Quick summary of where we are in cap and trade
 - Key objectives
 - Reduce GHG emissions

- Price emissions to incentivize change
 - In designing the regulation, a key element is providing some price certainty. Also minimizing leakage concerns, and leading to a cost-effective program. We took steps to take those factors into consideration. There's more work to do, but we take very seriously the directives in AB32 about meeting the 2020 target in a cost effective way, and we've developed a platform that has launched and is moving forward effectively. We have two auctions under our belt, and reporting is underway.
 - Offsets
 - In our mind, offsets play a key role in the program from a compliance and a cost-effectiveness standpoint. As I said, the system as a whole only works when it is robust, when people have confidence in you, and when there's certainty about what's required/expected of you.
 - As we moved regulations through for adoption, there was considerable pushback about whether offsets should be part of the program at all. In our view it's part of the overall response, in terms of opportunities to get important reductions. We want to see more offsets in the program, more agriculture protocols. That's important to us.
 - New offset protocol development
 - On March 28th there will be a public meeting about two new protocols (four have already been adopted):
 - Rice cultivation
 - Coal mine methane
 - Auction proceeds
 - These go into a state fund for GHG reduction projects. The California Department of Finance (DOF), ARB, and others develop the administration's investment plan to inform legislative appropriations for use of those proceeds in a manner that advances the purpose of AB32. Recently we had a series of workshops to discuss a concept paper, which was posted on our website a few weeks ago. Remaining consistent with the priorities in the governor's budget, we identified some high-level categories for the initial investment plan. This will be good for three years and will be updated every three years. It will be presented to our board in April and ultimately to the DOF as part of our May revision. We've received substantial input, and will work with the DOF to develop the investment plan over next few months.
- Research: ARB-funded agricultural emissions research to date (California context) includes:
 - Quantifying GHG emissions from typical livestock and crop operations
 - Evaluating GHG emission reduction potential of various management practices
 - Dairy and livestock activities
 - N₂O emissions from fertilizer
- Part of the challenge we have had is making sure we understand what's been done already - the results and constraints. This can help direct how priorities are set.
- In sum, significant activities will occur over this next year, such as the update to the scoping plan. That document will inform policy. We look forward to our public workshops, as well as opportunities to met with you and understand from your perspective what issues and concerns you have, and where the opportunities are.
- Q&A

- *QUESTION:* You mentioned sustainable agricultural practices in the budget proposal. Is that tied only to quantifiable emission reductions, or does it go beyond that in order to fund things we know are directionally correct but don't have exact science to quantify?
- *ANSWER:* That document is still evolving, but there's clear recognition that the level of quantification runs on a continuum. Some strategies have an absolute number attached (such as how much fuel is consumed), but along that continuum are those where you know there's a benefit, but the uncertainty bounds are broader. There's room for those opportunities, and we need to identify and characterize them as best we can. Better quantification of those strategies is really a benefit as well. So those efforts under way to narrow in on a number will be helpful, but other strategies aren't off the table. We just want to accurately portray what's understood with regard to specific strategies.
- *QUESTION:* I was surprised to see that agriculture is one of five main categories for action in the scoping plan. A number of us here have been working closely together figuring out where agriculture will go. If you've already identified that it's one of the big picture topics, you must have some general sense of where agriculture will go – is that correct?
- *ANSWER:* In thinking about it, what we want to do in that document is frame where we are, emissions-wise, and where there are opportunities for further reductions. And clearly you could structure things within those categories in different ways. But we see, let's say, a red flag within a given sector that needs more research and analysis. So I'd characterize the agricultural sector as one where from a GHG standpoint there's broad uncertainty in terms of emissions. I want to go to core of your question: I don't see individual categories as being all about measures. I think it's about what we understand about different sectors and their emissions, figuring out how to move forward. From some sectors there may be more uncertainty than others. Some may present certain opportunities for reduction, and the question is what instrument helps you achieve those emissions reductions. For agriculture, I think it's about identifying the magnitude of opportunity, understanding it better, and identifying what kind of research needs to be done going forward. There is a contrast here between these five categories and the original scoping plan. Now the central question is about opportunity and how to frame research questions going forward.
- *QUESTION:* When you say "opportunity," I can view that in a lot of different ways. Currently agriculture isn't directly regulated under the 2020 rule for cap and trade. I'm trying to understand: when you say "opportunities," do you mean opportunities for reductions of some kind? Does that mean a regulatory process, a (voluntary) offset process, cap and trade? That's my first question.
- *ANSWER:* It's important to think about where we are today, and you touched on it. Agriculture has a role, and I think the role that has been demonstrated (and I think there's greater opportunity) is with respect to offset protocols. I want to see more offset protocols. How do you prioritize those? Where do you get the most reductions? What's most cost effective? It's also about the role that incentives play. In terms of challenges, if there's an opportunity for reductions, the next question is what does that yield – for instance, in terms of co-benefits. The analysis and discussion leads you to the right instruments to secure the desired levels (of reductions). And from a policy standpoint, we've talked about protocols and incentives, and as I think about this update this year those are the tools I think about.
- *QUESTION:* So if you have an offset program now and a protocol that's been accepted, let's say 10-15 years from now it becomes a regulatory program. How does the offset program that was/is there interact with a future regulatory program?
- *ANSWER:* I see the need for more protocols. I see a need for them remaining under the program. Our view is offsets should continue to play an important role, and for them to do

- that, if I think about the protocols we've already adopted, and projects that have come through, those offsets will run us through at least the first compliance period and begin to move us through the second. We need more offsets to get through the second and ultimately the third compliance period. This is something we'll put an emphasis on.
- *QUESTION:* You'll get no disagreement from me on the need for more offset protocols for agriculture. In the 2013 scoping plan update section, you said co-benefits could play a more dominant role. One thing about agricultural emission reductions is that there are many co-benefits. If you can look at offsets and not just reductions, if you include co-benefits, there's a much greater reason to invest in agricultural offsets. Will co-benefits be a future criterion for agricultural offset protocols in particular? Again, if you look at things like water quality, farmland preservation...could those co-benefits somehow be incorporated?
 - *ANSWER:* The overall criterion I briefly talked about is the need to be more robust – that's critical. Otherwise we lose the ability to defend offsets. But to the extent that you have additional reliable GHG reduction offsets, I think it's an interesting question. How is that additional benefits are captured? It's something to think about. Some supplemental incentive? Offsets are an important instrument. If there's a range of co-benefits, the answer might not be an offset protocol, but how proceeds are directed (going back to earlier points) and CEQA mitigation projects in recognizing co-benefits. The question could become decisive if you have two projects, both yielding GHG reductions, but one with (more) co-benefits... How do you capture that and encourage it? I think that's an important question.
 - *COMMENT:* I was also thinking about an investor's perspective, looking for the biggest bang for the buck. If you could stack and monetize the co-benefits, this might be the answer for your future approaches.
 - *QUESTION:* PG&E is very concerned about cost-effectiveness. Will you be using a framework of dollar per metric ton to help you prioritize?
 - *ANSWER:* The story for 2020 is about activities, measures, and how they're coming along. Those are already in play. So your question is really about post-2020 and looking forward. Since the scoping plan is a planning document, the information within it is at a pretty high level, and not really robust enough to get at those decisions. Ultimately all those measures require you to drill down. We'll go as far as we can in the document from a cost standpoint, but thinking about it as a planning document, I think that detailed economic analysis will come more in the fall. Individual strategies can be evaluated in terms of dollar per ton and also co-benefits.
 - *QUESTION:* Regarding the issue of cost, part of it will also be dealing with the transaction costs of getting offset systems through. (The cost of verification, aggregation, etc.) Is there some way to include thinking on that (in terms of how you get offsets through) in a scoping paper? You might want to look at how well those offsets can be facilitated, particularly with aggregation since I think that will be a key issue in agriculture.
 - *ANSWER:* I'm thinking of that not so much as a scoping plan question as much as programmatic implementation issue. You have project developers who need certainty, confidence that reductions are real. There's a balance between those activities. Even in discussions we're having, folks say you can retain confidence/rigor, but it doesn't take many bad projects to cast a pall over the entire program. Rigor is critical. We should be asking that question, but we'll see certain efficiencies play themselves out.
 - *QUESTION:* What can this group do here?
 - *ANSWER:* There's a big interest in more agricultural offset protocols being approved. What ultimately informs those are robust existing protocols. Some might be close but need additional work. Also, are the parties (i.e., agricultural producers) willing to participate in

- these protocols? The perfect protocol that nobody's interested in is a waste of time and resources. Viable opportunities and meaningful reductions is the challenge.
- *QUESTION:* I'm curious about the relationship between the investment of auction proceeds and potential offset credits in the future. Does the identification of something in the agricultural sector (being included in the auction proceeds investment plan) signal that ARB feels it's not ready for offsets as a way to invest its auction proceeds? Or maybe not ready right now? Or maybe proceeds shouldn't be used to make practices happen, but build research so that they're robust enough to be auction credits. If we see something in the investment plan as a target for auction proceeds, what does that mean ARB is thinking?
 - *ANSWER:* Interesting points. In terms of the auction proceeds investment plan, I think one element will play out in terms of thinking about the plan as a portfolio approach. I think there will be opportunities called out for near-term emission reductions (something is good to go), but I think there will also be an element that is investment in an opportunity that may not yield reductions today, but is positioning either infrastructure or other opportunities than can ultimately pay off big. I think your point that something might not be ready for an offset but yields reductions is a good question, and something we need to further discuss.
 - *QUESTION:* When you say offset protocols that are "good to go," there are Conservation Innovation Grants as you know throughout the country on projects to reduce GHGs, and many have substantial co-benefits. So does "good to go" in CA mean projects within CA? Or are projects in other regions of the country that are providing co-benefits to those other regions possibly "good to go"?
 - *ANSWER:* Offset protocols now are applicable to all of North America, and I don't see that changing. I'm interested in real opportunities in CA, I'll say it directly.
 - *QUESTION:* Following up about geographic applicability: Since existing protocols may apply to other geographies, is that going to be part of the scoping plan?
 - *ANSWER:* I haven't really talked about that in any detail. But as we think about the overall cap and trade program and other protocols, as you look post 2020, I think it's a fair question. For certain protocols, do you think about the impact of a broader geography? As you explore that, to me that maps back to what would the impact be, what's your confidence in enforcing the program and retaining the rigor necessary for offsets? I don't have a direct answer, and think we should discuss it.

C-AGG Verification Recommendations for Agricultural Offsets: A Facilitated Plenary Discussion

Debbie: We at C-AGG have been discussing verification most recently with an eye toward what's happening in CA. We have provided and to some extent publicly discussed some verification recommendations for consideration, but given that many project developers and aggregators and investors and others with real expertise in these issues are gathered here in this room, we thought this would be a good opportunity to continue the discussion. We've identified a lot of successes and challenges since the USDA NRCS GHG Conservation Innovation Grants (CIGs) kicked off, including with regards to verification issues. Given this opportunity, we thought it would be good to delve further into the issue of verification, and discuss what we have learned, clarify the recommendations if there are specific questions that need to be answered or discussed.

- ARB: When we talk about these issues, we need to be very specific about what we're talking about. "Aggregation," for example, means different things to different groups of people. We need specifics that we can implement in a protocol. And one thing that's hard for a lot of people to understand about verification is that verification is not a hurdle just to make life difficult, it's

there to protect the integrity of the program. Everyone in this room should be as in favor of verification as we are. Once the system loses its integrity, you lose the value of your credits. We want to protect your value and our system at the same time.

- Debbie: This tees up the issue of aggregation, which is something we as a group identified as one of the most important issues relative to verification as well as to the cost-effectiveness of projects. Let's discuss this further. The question is how to define aggregation? What does that look like in the context of agricultural protocols?

(Note that the discussion led to multiple additional terms identified as requiring further definition; in some cases, the following notes have been rearranged to incorporate discussion points relative to terms and terminology that did not necessarily occur in the same sequence).

Defining Aggregation and the Role of Aggregation:

- **COMMENTS:**
 - Aggregation means you have multiple land owners coming together under a single body or with a single coordinating entity that manages the project. In this scenario, aggregation creates cost savings as part of the verification process. Perhaps not every single farm needs a site visit every year, but rather statistical and risk-based sampling methods are used to identify where site visits are needed, and to come to reasonable levels of assurance with regard to verification.
 - If someone does a lot of market transactions, what the buyer is looking for is someone who can assume or take on delivery risk. The aggregator has to take on a certain amount of delivery risk.
 - Aggregation is about lowering transaction costs without reducing the integrity of program. I could see investors aggregating multiple projects to get cost savings. Verification is an important transaction cost but not the only one. Writing the PDD, for example, or lowering inventories are also important transaction costs.
 - CAR has addressed aggregation in its forest protocol; what can be learned from that?
 - CAR: The process actually isn't streamlined. To us, aggregation means one point of contact, one report. Instead of sampling 800 farms, you're sampling a group that reflects a subgroup of owners that are uniformly applying the same management practices. There are efficiencies to be gained there.
 - CAR: We handle agricultural aggregation differently. Project participants might be landowners, or they might be lessees. You don't need permission from landowners for a lessee to reduce their N rates. It's really about the project manager. It's nice to try to lump aggregation types together, but the project type will be important regarding what efficiencies can be achieved. In forestry you don't get to cut as many corners. Every forest landowner has to prove permanence is not going to be a concern for the project. Reversibility of the project will affect the protocol you can use (with regard to forestry versus agriculture).
 - Aggregation structure (and sampling methodologies) will necessarily vary by project type.
 - **QUESTION:** PG&E is concerned about invalidation risks. If multiple projects are aggregated, there's the prospect of one failed project bringing down others. How would a compliance buyer then go after that project to rectify the situation?
 - **ANSWER:** Aggregation actually helps you reduce risk, because you can have multiple parties, and risk is spread across the pool.
 - **RESPONSE:** Although that makes it harder for us to assess the risk, because we'd have to assess every project.

- *COMMENT:* Looking at biological systems, with small potential emissions reductions contributions, the only way to make it work with agricultural systems is to build a structure so that aggregation spreads the risk rather than magnifies the risk. This seems to be the way it will have to work.
- We don't require a project report and verification on every farm in an aggregated project. So the larger the project, the more the risk is spread. We strive to engage as many farms as we can for this purpose. Also, regarding the right to transact: ARB's regulations address this. The way we do it is the project developer engages with the large final emitter (LFE) but doesn't interact with the regulator, ultimately. When the regulator engages with farmers, the contractual arrangement must make sure the legal right to transact with farmers is part of the framework.
- I'm a little confused about the issue of due diligence on each individual project.
- I guess it would depend on how the offer was structured. We'd have to look at the price of each one and assess the risk against the value. If it were aggregated under a protocol that allowed aggregation and we didn't know where the assets came from within a pool of projects, we'd have to assess risk on an aggregated scale. We'd default to looking at the riskiest participant and characterize the whole offer based on that riskiest participant.
- But that assumes you have different selling different prices for different projects. If it's listed as one project, you don't have the price risk of different projects. This goes back to the project developer that may need to bear that risk, so maybe you're valuing the risk of potential failure of all these projects or a percentage of them versus the failure of one. So it's going to be one single listing on a registry.
- Thinking about the nitrogen management protocol, there's been a lot of discussion about the number of fields that needed to be included (because of the use of models). But is it the number of fields per project? Does that help to address this at all?
- CAR: We went through this thought process. With DNDC we looked at having a minimum number of fields in the aggregate, but then we moved away from DNDC. To manage risk we have a couple of pieces to restrict the amount of impact one field could have on the rest of the aggregate. For 5 or 10 fields or less there are percentages. If you have 5 fields, one field can't make up more than 70% of the total, for example. We also try to lay out prescriptive minimal sampling requirements. Small aggregates are defined as 10-20 fields or less, then we have large aggregates for single participants. Or we have large aggregates with multiple participants.
- (Note: the subject briefly turned to uncertainty and use of process models for GHG measurement and aggregation in protocols. For a more robust discussion on this topic, see also the following C-AGG products:
 - http://c-agg.org/cm_vault/files/docs/temp_file_C-AGG_Uncertainty_Executive_Summary_V_1_FINAL_May_9_20122.pdf
 - http://c-agg.org/cm_vault/files/docs/temp_file_C-AGG_Uncertainty_White_Paper_7-5-121.pdf
 - http://c-agg.org/cm_vault/files/docs/temp_file_C-AGG_Uncertainty_Recommendations_for_Policy_Makers_2012_V.11.pdf)
- If you have one landowner with multiple fields are you talking non-contiguous fields?
- Yes, the same owner might have a large amount of land, might manage fields in different ways. One might be a corn/soy rotation and another might just be soy, cover crops on one field, etc. We have a section of our protocol looking at defining field

boundaries. It needs to be managed homogeneously, because if it is not, it is treated as a different field.

- From an investment / investor point of view, I would focus on transaction costs, so I wonder if someone should go look at a carbon project and look at the steps – the costs of identifying, acquiring, getting the info for the PDD, writing the PDD, submission costs, verification costs, etc. Put all those costs up there and see which are amenable to aggregation and what it would take to deliver aggregation without diminishing the quality of credits you're getting. I just want efficiency. With other things we've seen when we break it down what aggregation will get you. So in this room we might focus on verification. How do you lower that cost – bring landowners together in a single project? What or how do the rules allow for verification?
- Some aspects of aggregation (defining what the project is, who the authorized project designee is, etc.) come into play in terms of what you can and can't do with aggregation. But we need to define aggregation models that work within ARB's regulations – there is no prohibition against aggregation, cost-effectiveness, efficiency, and robustness. Let's look at transaction costs, risks, and which aggregation methods are either permitted or not permitted by ARB.
- The goals of aggregation are reduced transaction costs and reduced risk (for farmers, for investors). Project aggregators must take on some risk.
- *QUESTION*: Can someone from ARB give us an understanding of the definitions (of aggregation) within the existing regulation?
- *ANSWER* (ARB): I don't think we need to worry about revising the regulation, since it'll be open this summer. Right now there are 2 opportunities for aggregation that exist:
 - Forestry:
 - Co-op approach. Multiple forest owners within adjacent assessment areas form a cooperative and can become one project with one report, one verification, one (bank of) credit(s). You'll save money in terms of data management, but it is one project with one baseline. If any owners pull out or don't abide by the standards, the whole project is terminated or reversed. The success of the entire project rests with the collective, and one potential bad actor can lead to termination of the entire project.
 - Multiple projects, one project designee. Multiple offset project operators hire one authorized project designee (third party authorized to represent the projects before ARB, including handling project monitoring and verification). In this case you're only responsible for your own project.

What we are hearing is that there is a desire for a hybrid of both of these, with one report, but where one bad apple doesn't sink the whole project. The issue is how to maintain integrity with that kind of a hybrid approach?

Issues of agricultural protocol development, risks, and “doing by learning”

- *COMMENTS*:
 - We seem to have a dilemma. In the law, offsets must be real, verifiable, etc., but we know from this discussion and the experience of C-AGG that, with agriculture, offset development is still largely in the learning stage. How can we make this work in the real world? Let's go back to first principles, and look at what is needed to make agricultural offsets work in CA. What actually is needed in CA for AB32 to allow more offsets from agriculture? We know we need aggregation, but what does that mean? And what else is needed?

- I agree that you just have to get it going and nothing will be perfect the first time. You need to be prescriptive enough in order to avoid areas of disagreement in professional judgment. If it's not prescriptive enough one verifier will disagree with another and credits will be invalidated.
- Some of the protocols that we are working with haven't even been used yet. Would it make sense to have them assessed by multiple organizations at the outset so we can identify problems early on? We could even begin to implement the protocols and invite assessment during the initial verification process that can then be integrated back into the methodology to inform verification for future projects. We just don't know what problems we'll encounter the first time out. We can use the guidance of the law and what's in the protocol, but maybe for the first verification process multiple people from different backgrounds can participate and evaluate in order to improve the protocol and alleviate some of this uncertainty.
- Can we categorize risks (presented as "costs") into two main categories? Project development costs vs. verification costs? These seem to be the two biggest issues. From a regulatory standpoint verification costs are more problematic than project development costs. There's considerable effort required to engage project participants, write the OPDR, etc., that project developers may be able to streamline – particularly with experience. But it seems harder to streamline on the verification side, and it's likely that verification costs will be higher and less flexible.
- Friendly amendment – there are three major issues relative to costs: monitoring and reporting costs, verification costs, and aggregation costs. There could be cost savings in monitoring and reporting. If other data, like water conservation, fuels, and nutrient management is already being collected for other reasons, can we leverage that and just collect additional necessary data as a means of reducing monitoring costs? Some of this other data is being captured and stored on third party servers. We want to understand what can be done not only to streamline and improve verification, but we also want to look at other (external) verification resources like remote sensing. Can these be combined to reduce verification costs?
- I'm reminded of all the partners we have here and elsewhere that are interested in seeing us move forward to get additional offsets. Are we locking ourselves into a box by trying to keep costs down? Or could we look at partners like NRCS, the NGO community, private foundations, etc., that might help with certain aspects of protocols in order to bring costs down system-wide, or programmatically?
- As we get more experience with different projects, we'll get better at verification. But regulations are hard to change. I would like to be more proactive and find ways to reduce costs that can be built into protocol development. If you exclude something from a protocol then it is excluded, and it's difficult to circle back. So we want to design protocols that are more flexible without being completely open-ended. We face legal and regulatory challenges when we are not prescriptive. So we'd like to include technologies for verification that might possibly be utilized.
- ARB: The general verification guidance document is going through our management review, which takes a long time. We're thinking about doing a FAQ, hopefully it will be on our website in a few weeks. What we're really worried about is getting same the information out to everyone simultaneously. We'll post this on our verification website.

Data Sharing: Critical Issues

- *COMMENTS:*

- In CA we have a sustainability program that's practice-based. Getting growers to write something down is radical change, but making their data publicly available is a non-starter. In our sustainability program, individual data remains confidential. So there's a sense of disconnect for me in this discussion. Given the way the law is written and the data-sharing and transparency requirements, I struggle to see how to get growers to participate. The transaction costs and the problem of individual farm-based data available to the government or to the public are both significant problems. I do think incentives can be found in other places. NRCS is good at starting things up, but we need to think about the long-term viability and sustainability of the programs we are trying to build.
- ARB: We've heard this issue before, and we're working with the farming community on it. We need to keep the level of information we collect (and hold) to a minimum. However, we have to have the ability to monitor emissions reductions so we can issue credits. We're looking at what other minimal data we can collect, on a protocol by protocol basis. The information does not need to be in our hands, but must be seen by a verifier (who has a confidentiality agreement). We can request some information for audits but we have practices in place to make sure that info doesn't become public. Attorneys work with us to protect confidential business information.
- CAR: You won't find the legal land locations of farmers who participated in projects or individual tonnage on our reports. That information is kept private. The registry is not for profit, it's not the government. There are ways to be accountable with confidentiality while maintaining necessary transparency. With new technologies, we want to be careful not to do the project manager's job for them. If price signals are good and evidence is gathered, they will do it. It doesn't matter what the aggregation model is -- if it is clear in the protocol it will happen. From the point of view of lowering transaction costs, verification will be significant. In ARB's (verification) training they focus on planning, risk, and sampling strategies to minimize risk with really good preliminary risk assessment.
- *COMMENT*: So for you it's not about aggregation models but about having a very clear protocol, and allowing project developers to do what they do best.
- *RESPONSE*: It is also about the importance of transparency and being clear about how data will be handled. It's important to tell farmers how their data will be handled, which of it is confidential, which of it is not. This is key to moving forward.
- Data use, potential misuse, and trust:
 - some producers have expressed anxiety regarding the use and/or development of systems that will or can track relevant information, including management practices and other field-based activities, that would help with these efforts;
 - we need to build trust, and we need to use trusted partners to build these projects and systems;
 - Partnerships will be critical: We need to establish partnerships with parties that have some of this data – e.g., Google or NASA or others. Cisco and NASA had a partnership trying to figure out humanitarian applications for satellite imagery data.
- *NRCS COMMENT*: One reason producers work with us is the strong privacy protections within our programs, codified in the Farm Bill. Our typical approach, even if it's beneficial to the landowner to have their information go to another source, is to not divulge information, but to send the person asking directly to the farmer. Aso, as far as conservation & planning information goes, our practices are structured to be fairly

open-ended, so they can be used in concert with the landowner's other objectives and management practices on any given piece of land. When it comes to digital data that is rigorous enough for verification protocols, our standards are built from the opposite approach – not from how rigorous we need to be, but from the perspective of what it is we are trying to accomplish with and on behalf of the landowner. There are obviously parallels, but all this impacts the level of detail that is available if you are looking at NRCS data or information or practices.

Data Issue: The Value of Data, Prioritizing Data Collection, Alternative or Existing Sources of Data

- **COMMENTS:**
 - some data sources need to be ground-truthed by qualified third parties, but there is a potential liability for these third parties, in some cases;
 - we need to have an understanding of the accuracy and applicability of each type of data source and/or tool or technology;
 - some of these technologies are costly, and depending on who bears the costs, may not lower transaction costs for offset projects;
 - some data sources are not always available (e.g. cloud cover can impede satellite-based imagery at the time or place that it is needed)
 - where data is already being collected, we need to access this data without recreating systems or requesting it “again” from farmers;
 - In CA, for instance, farmers already record and report pesticide use to county agriculture commissioners.
 - It would be good to systematically evaluate what tools are already in the marketplace to help growers keep track of what they're doing, and how can they be used in ways that benefit market-based opportunities (but won't increase producer anxiety about how data will be used).
 - quite often, data exists but the farmer or crop advisor or party that owns or holds the data needs to be convinced of the value of sharing the data for offset projects;
 - with producers, we have to show them the value of data for enhanced decision-making that improves their profitability;
 - we need to comparatively assess the value of data, and ensure that we are collecting only what is necessary and valuable to these efforts; more might not always be better - there is a need to balance burden and value;
- C-AGG is still seeking workshops with USDA and other federal agencies to discuss access to relevant public data that can be useful to these efforts in any number of ways previously discussed and identified by C-AGG, including research data and data sets for model calibration and validation; and other data to help establish baselines, etc.

Defining Projects

- **COMMENTS:**
 - To define aggregation we must also define “project.” Are multiple “projects” being aggregated, or are multiple farms being aggregated into a single “project”?
 - Multiple project owners and multiple projects can be aggregated under a single protocol, but verification is based on a stratified, risk-based assessment of the aggregate, such that not every individual project will receive a site visit every year.
 - Distinctions about multiple participants versus multiple land managers must also be made. The number of land managers may not be indicative of the number of land units.

Defining Project Managers

- **COMMENTS:**
 - Project managers have legal capacity to interact with ARB on behalf of the offset project(s) they're presenting. Multiple projects or multiple farms or ranches can be aggregated by project managers.

Technologies for Use in Verification:

ARB: We should also bring up verifications of models vs. verifications of practices. Once a model is approved for use in a protocol, we consider it to be accurate for that use. What we need to figure out is how we determine practices used to inform the model were actually done (e.g., mid-season drainage, pumping records, fuel use records, etc.). For remote sensing, we know it comes up a lot that you can't see whether there's water there or not. Are there other spectral imaging technologies that can tell you whether there's water? It needs to be more technologically advanced than sending someone out to the field and taking Polaroids.

- Laundry list of remote sensing technologies, or other technologies (that could, for example, verify that a rice field has been drained, or that X amount of N has been applied to a field?)
 - **Satellite imaging**
 - **Spectral imaging / LIDAR**
 - **Aerial photography**
 - **Geotagged / date stamped pictures**
 - **Logs of variable rate technology**
 - **GPS trace logs**
 - **Soil moisture**
 - **APPS that are increasingly being used by producers in the field, for decision-making**
- Other sources
 - **Pesticide use reporting, receipts**
 - **Sustainability reporting data**
 - **Farm GPS/GIS precision management information and data**
 - **Insurance information**
 - **Financial info (receipts, etc.)**
 - **Soil tests (including, for instance, soil nitrate tests)**
- **COMMENTS:**
 - We're anticipating seeing more nitrogen reporting requirements, and are seeing technological development with soil tests, etc. Any "technology" list should include whatever testing technologies have been or will be developed along those lines.
 - Smartphone APPS – there are many new smart-phone APPS that farmers can use to help them in the field; an example discussed was an APP that allows a farmer to 'measure' the N content in corn stalk leaves by taking a picture of it against a pink cardboard background on their smart-phone.
 - ARB needs evidence that a certain thing took place. This laundry list is a reminder of a next step we have to do. We have to think about verification technologies applicable to specific protocols, and then address whether there is evidence that the technology can be used for verification purposes, and if so, how accurate is it, etc. The issue of integrity must be addressed.

Other Cost-Saving Approaches for Verification

- **COMMENTS:**

- ARB: Regarding verification and cost savings, we have talked briefly with some stakeholders about other methods that would allow cost savings. Like spreading out verification so you only have to do it every few years for certain projects. But that would require that the project will have to go back and verify, for instance, 3 years worth of data. Currently, the forestry protocol allows verification as long as every 6 years. Is that palatable?
- In Alberta, part of the problem is that when the government auditor comes in, he/she can't do site data and visual inspections into the past. If you think it can work and your audit process can support it, it would perhaps be acceptable.
- ARB: It's easier for us because we are the auditors.
- Another point: Cost for verification is not cost per ton but cost per hour. Costs can be wildly different depending on the level of organization at facility. The more organized and accessible everything the verifier needs is, the quicker & easier verification will be. The best will have a binder of information ready, or even send it to us in advance.
- In Alberta, many aggregators are uploading all their data so the auditor can see that data back in their office.
- *QUESTION:* Are project information management systems now a requirement in Alberta?
- *ANSWER:* They are not required, but they are recommended in our best practice document.
- The cost of verification tends to go down in subsequent verifier visits.
- We talked earlier about using public or nonprofit funds to make it easier for farmers to adopt practices. Is there a public interest in making project developers as efficient as possible?
- Absolutely. If your data is easy and transparent to understand, it will reduce cost and risk.
- Regarding delayed verification, I imagine it's an added risk if you wait three years to get verified the first time. If you are doing something wrong in year one, it's hard to go back and get that data and fix things so you're getting the credits you should. While delayed verification might seem like a good idea, I think it's a risky concept.
- One option is to do a verification in the first year and then wait three years for the next.
- A lot of these practices we're talking about are annual management decisions for farmers. If you go multiple reporting periods, you take on additional risk that something did or did not happen in the cycle they're getting a credit for.
- Don't underestimate putting something on the ground and testing it. On our four protocol validation studies, we're also going to get offset project reports, calculation templates, and data collection templates. We want to reduce risk and transaction costs, help them get it done.
- NRCS: For clarification: NRCS checks whether or not a practice has been installed to NRCS standards and whatever was specified on site. Engineering projects are different from agricultural practices, though. We've never had the manpower to do long-term verification and monitoring practices. We've always wanted to do this, but it hasn't been a reality of how we can function with the manpower we have. I don't want to give the impression that once something is installed we can go out there every year and verify it.
- ARB: We want to end up with a workable protocol, not something that can't get adopted. We're having the first workshop at the end of this month on March 28th, and after that we will be forming technical working groups. The workshop will be fairly high

level, but major decisions about protocols will be made in the working groups. Make yourselves available, because the more effort you put in, the better the protocol(s) will be.

DNDC Update

Bill Salas, Applied GeoSolutions, LLC & DNDC Applications, Research and Training

- Covered three main topics:
 - Validation of DNDC for CA and US cropping systems
 - Need to understand the performance of the model. Will use data collected from ARB, CDFA, CEC
 - GRAMP: Global Research Alliance Modeling Platform
 - Vietnam Rice GHG MRV system
 - Starting project with USDA funding
- **Validation of DNDC**
 - Why do we need to go through this validation work? We need extensive data to be able to quantify how well these models are working.
 - Through validation we can talk about how the aggregation of multiple fields influences the performance of the model
 - We want to evaluate a wide range of crops and cropping systems
 - For the last 6 months we have focused on 3 efforts:
 - N₂O data sets collected by UC Davis colleagues for a range of crops in CA. These were collected over/for 34 site-years (a site-year represents a growing season or growing year in which continuous measurements were performed)
 - Methane from rice CIG in CA, TX, LA (61 site-years of data)
 - Midwest corn (87 site-years of data)
 - **N₂O**
 - For each data set, we look at spatial variability (for example, in a vineyard you have different models for alleyways versus vines) and do a model validation.
 - We also looked at vegetable systems, looking at spatial variability of emissions. Furrow beds versus drip beds use different nutrient inputs.
 - Tillage – experiments with reduced till over several years
 - We also looked at how interannual variability in weather affects model performance
 - Lastly, we looked at fertilizer rate experiments to understand the model's sensitivity to different N rates.
 - For each field measurement, there's a mean value and a standard deviation of those measurements. There's fairly good correspondence. Sometimes the model underestimates, sometimes it overestimates. 65% of the measurements were within one standard deviation of the mean. 82% were within 2 standard deviations.
 - Using this data, we can figure out how to compensate for uncertainties
 - **Rice methane validation**
 - We mined peer reviewed publications for data
 - For the first period, there's no methane since it's a dry seeded crop, but then the level rises. Once the crop reaches maturity, it's no longer investing in root biomass, pumps carbon to the grain, and the methane emissions come down.

- One practice we're looking at in the mid-South is intermittent draining. A study in Texas in the mid-90s looked at single draining, and methane came down with the draining, then went back up. You can reduce methane emissions by 80-90% using alternative drainage strategies.
- It's important to note that the model is trying to simulate the mechanisms of production and consumption of GHGs across very different regions – CA and the US Gulf Coast. All in all, though, the model performs well across all these regions.
- **Midwest corn validation**
 - Very little work was done on this in the past. We did a literature review, compiled 99 studies. We then evaluated these studies for usefulness in terms of model validation.
 - From those, we identified 20 that were useful. There was a lot of published data, but only 20 were available. These represented 87 site-years of data.
 - There's another process that affects N₂O emissions in the Midwest: freeze-thaw cycles, which can cause large pulses of N₂O emissions.
 - In one study, modeled versus measured values seemed to be fairly consistent. In a couple of studies we're seeing something that we're looking at in more detail. As you get to higher N rates, the model overestimates N₂O emissions fairly significantly. We're trying to figure out why that is. Reviewing these studies helps us figure out how to capture uncertainty in different management systems, look for bias, and figure out where the model is incorrectly predicting.
- **DNDC model validation summary**
 - More data sets are coming in over next 3-4 months
 - We'll keep collecting data on an ongoing basis
 - We're in the process of extending this work globally
- **GRAMPS (Global Research Alliance Modeling Platform System)**
 - This came out of series of discussions in the UK. UK DEFRA decided that the modeling community needed efforts to be centralized so people could build on one another's experiences, improve models together. It's led by Pete Smith at University of Aberdeen
 - They're hoping to have a prototype system by the summer
 - They're seeking additional funding support beyond initial funding from UK DEFRA
 - Looking to add more models to the system
 - Objectives:
 - DNDC has been around 20+ years, been through various versions. People are confused by differences between versions. We're developing a catalogue to document specific differences between the versions.
 - We're also going to be doing analysis, compiling data sets for model development and testing. The committee will assess criteria for model data sets to be imported into platform.
 - Grassroots effort first - the initial project is providing support for some data sets to be imported into the system, and we're hoping that additional funding opportunities will lead to more data sets being incorporated.
 - We want to tap into other efforts like the GRACE-net database
 - We will also develop indicators on how to evaluate model performance
 - We're developing cyber infrastructure to house FAQs and educational materials

- This will have a web user authentication system. Everyone will be able to view and download data. Whenever there's an update to the model, it will update the global database of users.
 - The CMS and data management system will enable users to perform searches by geography, crops, etc.
 - We will also develop case studies, demos, FAQs on how to use the model and evaluate it
- **Relevance to C-AGG**
 - We want to coalesce the global modeling community
 - The real value is building this large database for global model development and testing
 - This is a platform to ask questions and discuss model improvements
- **Vietnam Rice GHG MRV**
 - The government in Vietnam has made a commitment to reduce GHG from agriculture by 20% by 2020 while at same time increasing productivity.
 - Developed a strategy to evaluate baseline emissions
 - They're looking at opportunities for pro-poor development
 - Assessing mitigation potentials. The highest efficacy potential is AWD – intermittent flooding of fields. There's high potential in the North, less in others. In the South, large monsoon systems come in.
 - We did a quick estimate of the mitigation potential for this opportunity and came up with 63 million metric tons CO₂e. We predict this change in AWD will increase yields substantially as well.
 - We've been asked to build MRV system to support this
 - We're working with a USAID contractor and the Ministry of Agriculture & Rural Development in Vietnam, as well as EDF. We're doing a quick one-year pilot project assessment to set baseline emissions, understand how to track changes in emissions over time.
 - This consists of remote sensing, and we've done lots of work on rice monitoring. We have to use synthetic aperture radar imagery since it's so cloudy in Vietnam.
 - For each field from radar you can tell when it was planted and harvested. We turn around and use that data to drive DNDC for the regional analysis
 - Eventually we hope to do QA/QC on mapping the presence or absence of water under the canopy. With radar you can penetrate the canopy and see whether there's water underneath.
 - The MRV components will include remote sensing products, field studies to calibrate the model, and estimates of GHG emissions, among other components.
 - There's a major IT component as well
 - We're working through the process of figuring out what the Vietnamese government wants and assessing information needs
 - We're also working with development agencies to figure out how to take this from pilot to broader implementation
- **Q&A**
 - *QUESTION:* You talked about methane and N₂O, but a lot of us are also interested in the soil carbon. How does model account for perennial crops on the carbon side? We've been looking at sequestration in the soil. Where are you on that?

- *ANSWER:* DNDC is a soil biogeochemical model and tracks what happens in the soil. To do that, we need to model crop growth, because crops take up and deposit nutrients. The model looks at annual increments. The difficulty is that very few data sets have measurements of soil carbon dynamics over time. You can look at long-term studies where you have a 100-year study, and you can look at changes in organic matter over time. No perennial studies I know of.
- *QUESTION:* How about the ARB study about DNDC and comparing it with other models?
- *ANSWER:* The comparison work is going to be done on the first data set I showed for CA N₂O. The results will be ready by June/July.
- *QUESTION:* Are there plans to present that publicly?
- *ANSWER:* Not that I know of.
- *QUESTION:* On the first regression slide: how does your R² change if you take out the point on the end?
- *ANSWER:* We look at residuals to estimate structural uncertainty and develop uncertainty metrics from that. The R² is not the method we want to use to estimate uncertainty. The key is to look at residuals to estimate model performance.
- *QUESTION:* When we talk about validating DNDC or any other model, we don't have a common understanding of how much data is available. Is there some sort of intermediate way we could have some common repository – even a list of sources, citations of things like N₂O data for CA? What would it take to come up with something less grand than GRAMPS, but maybe faster?
- *ANSWER:* I have seen some work done at the national level. For corn we looked at data sets for the US. The pieces are out there, but we need to talk about how to bring them together, create a standard platform or information system. We did a comparison with Johan's group (Johan Six, formerly of UC Davis) and they were fairly complementary.
- *QUESTION:* Our company used your model a few years ago to look at soybeans. One limitation I saw in the model was that it didn't seem to be crediting legume nitrogen contribution to the subsequent crop. It had some upper limits, and seemed to be knocking our corn yields down. When we tried to put alfalfa in the mix (big producer of nitrogen), it seemed to blow up the model. The model also seemed limited in options for manure management, and types of tillage practices.
- *ANSWER:* As for tillage: from DNDC's perspective, it wants to know how tillage affects the volume of soil. If you're working on a tillage system that only impacts one portion of the landscape, from DNDC's perspective there need to be two different units. We're building tools to do that automatically for vineyards (as mentioned earlier, alleyways versus vines). You have to specify the characteristics of effluents or solids when you apply it, such as the carbon to nitrogen ratio. We have a system for tracking carbon and nitrogen in a newer model for a lagoon system. We're continuing to test this through a CIG project with DMI. As for the legume question: you have to characterize the crop. For legumes, you have to specify what fraction of nitrogen demand it fixes, which is very tricky to get empirically.
- *QUESTION:* It looked like there was quite a bit of variability in your first few slides.
- *ANSWER:* We're querying the data still. We're trying to understand under what circumstances the model is missing the target. We're looking at mechanistic processes. We have other information on crop growth dynamics, soil moisture, soil nitrate and ammonium. I can't give you an explanation about why we might have over or underestimated in some areas. It's part of the evaluation process.
- *COMMENT:* The N₂O flux due to weather conditions was pretty astounding to me.

- *ANSWER:* The huge difference was driven by precipitation and management. We need to use our understanding of the mechanistic nature of these processes to avoid these hotspots. So for Arkansas, you don't want to drain when there's a lot of nitrate in the soil, which can add big pulse of N₂O into the atmosphere. It's bad for emissions, and you also lose nitrogen that the crops would have used.

COMET-Farm and DNDC: Bridging the Data Gaps

Ryan Anderson, Delta Institute

Steven DeGryze, Terra Global Capital, LLC

- We met with the Packard Foundation about a year ago, and agreed that agriculture is becoming a data-intensive business. Agriculture ten years ago was very different, and it'll be even more different in another decade. All sorts of APPS and tools are becoming available to farmers. With this tool we're trying to find some convergence between two major GHG tools and GHG emissions reduction strategies – DNDC and COMET-Farm. We're trying to bridge that gap and make this a useful tool for farmers.
- The context: as GHG CIG project developers, we became frustrated by all the different interfaces and models out there, and needed to figure out how we could actually present something to a farmer, and get their buy-in and participation, and build a protocol for carbon markets.
- When Adam Chambers presented on COMET-Farm two years ago at a C-AGG meeting, it wasn't ready for primetime, but it seemed farmer-friendly. The basic idea we came away with at that time was that DNDC and ACR methodologies and other protocols require lots of data inputs, but it was entirely unclear how many of those inputs corresponded or overlapped, so we developed a spreadsheet to find out. Initially, we used that to develop an interface to allow farmers to enter necessary data that was just fed into DNDC, and we directly entered or downloaded data that we could collect from someone other than the farmer (e.g. soil or weather data).
- Eventually, we decided that we needed to combine the ease of COMET-Farm and the rigor of DNDC.
- We developed a tool designed to explain COMET-Farm to a farmer. (Steven and Ryan demonstrated their web-based tool). We have helper text in red to guide people throughout the process. We also added a search function so you can use and download anything in Google Maps (address, latitude/longitude, etc.) and select multiple parcels.
- We need data from 2000-2012 to figure out historical and current management practices. Most farmers say it is hard to go back even 3 or 4 years, so we need to deal with those data gaps. The (USDA) COMET team is looking at simplifying things.
- We recently added liming and cover crops, as well as residue burns to the management practices.
- Also, data can be copied across years, making it more user friendly (if certain practices or inputs remain the same).
- It takes about two minutes for the model to run, then you can export data to CSV. Farmers can choose whether or not to send the runs to us.
- If you choose to run multiple scenarios it'll give you a baseline for 1980-2012 and 2013 forward. You can click the graph button and see how changes in certain input parameters cause output changes from year to year.
- One problem with this tool is that although it is targeted for use by farmers, the outputs only display CO₂, N₂O and methane emissions and changes in emissions, which are abstract concepts

for farmers, not linked to specific outcomes or impacts, such as water quality or agronomic impacts or yield, etc.

- The tool itself is open source, and we want it to be shared with everyone. Anyone can contribute; It's fully transparent.
- The technical report generated at the end of the process is anonymous, but shows documentation like the date it was generated, info downloaded from the NRCS soil survey, (which has lots of data that can be utilized in a biogeochemical model like DNDC). The spreadsheet is pretty long because it has two fields and multiple years (a 17-year simulation).
- A major input that DNDC needs is weather information. Bill Salas created an interface for us so that the farmer can enter information on their location and all nearby weather stations pop up, such as Weather Underground, DAYMET, local airports, etc., all of which can be directly downloaded into DNDC.
- *Comment from Bill Salas:* We're trying to provide the user with more options. Weather Underground is great, but we don't know much about quality control. Airport data tends to be better. DAYMET is available up through 2011, but what do you do for 2012 and 2013? Other products may be more current, but the data is often coarser. There are tradeoffs for using different products, so the user needs to decide what's best for their use. For CA we'd like to link this to CIMIS, but CIMIS doesn't have an API. We can at least get up through 2012 in the tool and then update the data annually beyond that. Since the architecture is open we can provide better data where available, although we need an API to link to.
- You can run COMET-Farm without anything else installed.
- Bill: We're also developing and testing a Linux version that will run faster. Right now we're at version 0.4 and we're looking for alpha and beta testers. Email us and we'll send you the code repository. You can play around with it.
- Q&A
 - *QUESTION:* Can you draw from multiple weather data sets to smooth over missing data?
 - *ANSWER:* That's part of the reason Bill added DAYMET. If there are gaps in the Weather Underground station, you can use other data sources, but you may not have the same amount or the same quality of data from other sources.
 - *COMMENT* from Bill Salas: We also want to make sure to flag missing data.

Friday, March 8, 2013

Open Announcements

Nick Martin, ACR: With Packard Foundation support, we've written a grazing management and livestock methodology. It's pretty broad and modular, so it can be applied to a number of different activities. It addresses enteric fermentation, manure, fertilizer, fossil fuels, and soil carbon changes and grazing and livestock activities that can affect each of those. It's designed to be graduated in level of complexity of accounting methods according to how big an impact that has on soil. I wanted to mention this because we've extended public comment through next Friday, March 15th. You can read more on our website.

Teresa Lang, Climate Action Reserve: Climate Action Reserve's annual conference is coming up, and it's the largest carbon offset conference in North America. CAR also held a scoping meeting on grasslands and peatlands earlier this week. If you're interested in that topic, we have information on our website. Anyone interested in sharing thoughts about whether we should move forward with protocol development on those topics, please get in touch with us.

Noel Gurwick, Smithsonian Environmental Research Center: The World Bank and UC Davis are having a 3-day conference on Climate Smart Agriculture at Davis, coming up. The focus is more international, and it's from the perspective of resilience rather than mitigation, but it looks like it will be good meeting.

Thoughts and Reactions to Thursday's Session

- **COMMENTS:**
 - I'm a relative newcomer to C-AGG, but between the last meeting and this one I think we've made tremendous progress on the issues of verification and aggregation. There are lots of thorny issues to think through, but we've made progress and have had a good and open dialogue with ARB. Thanks to ARB for their openness and feedback and thoughtful dialogue in working through these issues.
 - Yesterday I was reeling between "yes we can do this" and "no that won't work," but I really believe we can make this work. We've made progress teasing out data needs and some issues related to data access. I can see how we can make an agricultural (rice) protocol work. I think the progress with software and models is also incredibly helpful, particularly in order to reduce the burden on farmers. I can see next steps we can take working with data and making sure the transition is smooth. At the end of the day, we're a go.
 - A system is and can come together. I got a real sense of optimism yesterday that the pieces are starting to come together.
 - I was glad ARB was here and was very interactive. That in-depth group discussion had to happen and I feel it was very useful, if maybe a little painful since we've gone over that ground before. But it feels as if we are moving forward on all fronts, simultaneously, now.
 - If you can't think well together, you can't imagine the right action to take. When you have the right relationship, it builds a positive loop of success.

Sustainable Supply Chain Initiatives

Andrew Arnold, SureHarvest

Allen Dusault, Dairy Management Inc.

Gabriele Ludwig, Almond Board of California

Daniel Sonke, Campbell Soup Company

Debbie: The issue of sustainable supply chain initiatives (SSCI) is something we've followed and discussed but have not delved into too much, as a group, but there is so much happening around this issue that is relevant to agriculture, that it is important we continue to engage. After our November C-AGG meeting with federal agencies representatives, we began discussing ways to increase demand for agricultural offsets, which was a central theme of our joint C-AGG / USDA workshop with other agencies. However, the message we are hearing from the White House is that they are considering the supply chain as a means of impacting GHG emissions reductions rather than carbon markets and offsets. This is potentially problematic for agriculture, as agriculture to date does not receive a premium or a price difference for emissions reductions achieved at the farm-gate within sustainable supply chain initiatives. But the changes that are required of the sector can be both expensive and risky. So it's not just in the private sector that SSCIs are taking on a level of import. The Obama administration seems to be in the early stages of thinking about things they might do to push policies not only for GHGs but also energy initiatives and other measures. It appears to be early-stage, high-level thinking, but I urged the folks I talked with to consider how to incentivize the agricultural sector within such approaches, rather than just having agriculture continue to be a price-taker. But for our discussions, it is imperative that the agricultural sector be thinking about SSCI and how we can participate in and benefit from them. Through

conversations we've had, some multinational corporations have said that it should be incentive enough that they will not purchase from farmers if they don't meet the corporation's established supply chain standards. Standards are related to efficiency, and if you set standards that small producers can't meet, there's an impact there. We've had previous conversations with Jason Clay of WWF where he talked about bundling carbon into the supply chain so there's a value to the farmer, but what we hear from corporations is that the price of carbon is not something they can just absorb into their bottom line; they will pass it on to others. Agricultural producers who change practices are taking on risk, and we have to figure out, if sustainable supply chain initiatives are going to promote or require practice changes, how do we provide tools to ensure that there's a beneficial aspect for agriculture? I've asked our panelists to talk about (from their organizations' and their own perspectives) what supply chain initiatives mean to them and what they're doing. The questions posed to them are:

- Are there any unintended consequences of SSCI standards? Who should lead SSCIs, and who else needs to be involved, and at the table. We've talked to a lot of agricultural representative groups about SSCIs and there's not a lot of familiarity with them.
- Standardization and harmonization of tools and metrics is an issue. Along with the proliferation of SSCIs, there's been a concurrent proliferation of tools and metrics. How do we know which are the most accurate, and/or the most cost efficient? When talking to the White House I suggested that this is the area where they could perhaps be most helpful.
- Issues of audit fatigue and added burden on behalf of producers – this can add to burden of what farmers are already doing, particularly if SSCIs continue to proliferate, and there is a lack of harmonization and standardization.
- Finally, how can we incentivize producer participation and benefits to producers who participate?

Andrew Arnold, SureHarvest:

- All of us on this panel have worked together in some way. Dan and I were officemates in Modesto. Gabriele has put in place an almond industry sustainability program. Allen came from a CA NGO and now leads a complex dairy initiative.
- I thought I'd start from a SureHarvest perspective. We're involved in lots of things. Most of it is around sustainable agriculture and its place in the supply chain.
- I think there are 3 dimensions to this when we look at buyers and suppliers as supply chain players. At any point in the supply chain, with exception of growers, everyone else can be both a buyer and supplier at the same time. The ultimate buyer is the consumer. Part of the dynamic in sustainable supply chains has to do with the greening of consumers over time. There have been activities starting to cater to that. The buyers we're referring to most though are retailers and food service companies.
- I want to discuss buyer programs and farm-focused programs and product labels around sustainability and footprinting. When these programs started, the supply chain perspective of products became very important. This may not be solely focused on GHG or metrics, but I think we're looking at that and how that would work within the supply chain perspective.
- In terms of buyer programs, there have been some leaders over years that put programs in place.
 - SYSCO had a program called SYSCO Sustainable, which evolved from an integrated pest management practice survey. It looked at issues around food safety and pesticide use.
 - Unilever declared that "sustainable is who we are," and they have built their entire brand identity around sustainability. They believe it provides market access to their products for people looking for "sustainability" characteristics in products.

- Others have their own programs, now, including Marks & Spencer, Tesco, Wal-Mart, Costco, McDonald's, PepsiCo. Their programs are evolving, but have been largely practice-based. That's the easiest approach, in terms of audits. "Do you do this? Do you *not* do this?" It's pretty straightforward.
- Some of those programs have also collected quantitative data, e.g., SYSCO has asked their suppliers about amounts of fertilizer and pesticides used. Their intent is to create a baseline or benchmark against which to measure future use or reductions in use, to be reported in their annual sustainability reports.
- So buyers have been working with their suppliers, some of those suppliers have to work with *their* suppliers, and it ultimately comes down to the farm.
- Looking at farms, there are growers and groups of growers looking at sustainability, and it's still a bit controversial in some parts of the sector. Many of the programs producers have been engaged in largely developed to respond to environmental and resource issues within certain crop production areas. There are some social elements, more so in developing countries than here in US. But those were the pillars of those programs. The organizers of these programs were industry groups, trade associations like almonds, wine grapes, pears, dairy. These have been popping up, and CA has been a leader in those sorts of programs.
- Another element is certification labels like the Rainforest Alliance, Fair Trade, and protected harvest, which Dan (Sonke) has been involved with. Those address specific issues.
- So these programs and these trends have growers thinking about their practices, and the threats of regulatory pressures and commercial requests have become a real issue for some growers already. Some of the sustainability programs have reached out and talked to growers, and folks like Gabriele talk about buyers asking questions – so as a sector we need to get ready for what is already happening.
- While the flavor of these programs has been largely practice-based, it is quickly moving more toward metrics and outcomes. Supply chain initiatives need metrics to measure, to benchmark, to assess change, and to determine how we can improve over time.
- Unfortunately, many different metrics and calculator tools have popped up. For instance, Field-to-Market -- which is aimed at commodity crops like soy, corn, cotton, rice – has their own tool, as does the Stewardship Index for Specialty Crops, which SureHarvest is heavily involved in. So buyers are asking for this information already. What we need to do is to come up with a suite of metrics or tools or calculators that we can all agree on and utilize so we are not faced with the spectacle of every buyer coming up with their own metrics and measurement systems.
- Another key calculation is to determine how these can be used to benefit producers -- to help growers on the farm be more efficient, save money, reduce environmental impacts, etc. If these programs are going to impact farming, they need to be farm-focused and they need to benefit growers and the environment they operate in, not just meet (a disconnected) demand from buyers. It's just good business. Dairy Management Inc is working on a dairy-oriented suite of tools and metrics to do this.
- Regarding product labels: this is where programs like *GoodGuide* (www.goodguide.com) come in, to provide consumers some sort of product rating based on select criteria. Consumers may begin to use the guide to select products as they shop – based on sustainability criteria. We're a long way away from that, but it's been a driver for corporate communications and for data.
- Buyers are becoming or already involved in these sustainability initiatives, but to date there's been a lot of conflict in trying to get buyers and suppliers to talk about the initiatives, their impacts, or the future. For farmers, we want to know what is in it for us if we collect this data for you? Without that common understanding and common benefit, these initiatives become a

form of commercial compliance, the “stick” approach rather than the “carrot” approach – which is inconsistent with the C-AGG approach, which is to talk about these programs and opportunities in terms of incentives to growers.

- Regarding footprinting efforts, the most visible one is The Sustainability Consortium (TSC). They’re rolling out things that buyers are using. Wal-Mart is using their key performance indicators as a way to get their suppliers starting to talk about sustainability. TSC has a food, beverage, and agriculture sector initiative. There’s also a Sustainable Apparel Coalition, which involves cotton production. Those initiatives try to come up with standard crop production elements that are hotspots in terms of environmental challenges for their product categories.

Gabriele Ludwig, Almond Board of California:

- I want to start by giving you a little background about the Almond Board, which was established as a federal marketing order under USDA jurisdiction. All growers pay into the Board, and most of the funds go to the generic marketing of almonds around the world, but some goes into research and other programs.
- The US almond industry exists only in CA. CA produces 80% of the world’s almonds. It’s the top value export crop and top specialty crop for export in the US. We’re a very internationally focused crop.
- SureHarvest is the consultant we work with on our sustainability program, and Dan (Sonke) did most of the initial work (when he was with SureHarvest).
- One thing we struggled with in the beginning was that there isn’t a direct link - like with a wine label - between growers and consumers, so labeling is somewhat irrelevant to our initiative. We won’t see a direct benefit from saying we grew something more sustainably in order to seek a premium price or market niche.
- The almond industry itself created a definition of sustainability for the Almond Board, based on grower participation, input, and level of comfort, with great guidance and support from SureHarvest. We also worked on the marketing side to do positioning – it was important to know who our audience is, and their values and viewpoints. That’s a world I don’t know much about. But the process helped us understand who we were creating a sustainability initiative for. For us, ingredient buyers and regulators were the main audience, and fortunately, we had 35 years of research backing up continuous improvements made by the industry to increase performance.
- Eventually we settled on the use of a practices-based self-assessment program. “Here are practices you could be using in irrigation management,” for example. It goes from baseline practices to practices viewed as more sustainable. “Are you doing this practice or not?” The assessment tools asks for responses like, “I’ve heard of it but I’m not using it,” “I’ve heard of it and I’ve tried it,” etc. These qualitative responses help us decide whether we need to do demonstrations or education around certain beneficial practices. Or maybe, if growers have tried a practice but discontinued it, it’s too complicated or too expensive.
- We are now starting our fourth (sustainability) workshop season. We have five modules that cover irrigation, nutrient management, energy, air quality, and pest management. We have 2 or 3 more in the works.
- The real struggle has been getting growers to write things down – that’s a radical change of behavior for them. That’s all I’m looking for right now. That’s the reality we deal with. It takes close to 2 hours to do all 5 assessments for one orchard. Of course once you’ve done one it does become easier.

- The bottom line is that when most Central Valley growers hear “sustainability,” they think it’s liberals in the Bay Area wanting to dictate how they grow on their farms. We’ve tried to address that fear by working with them, on their terms.
- When growers participate, they get a report back that compares their responses relative to others in their area, hoping to trigger some thinking there, and perhaps even improved management changes. We ask specifics like how much water and NPK did you apply. There are a few numeric questions, but most are practices-based. We’ve contemplated a certification program, but it’s too expensive. There’s no way you’d get the cost of a certification program back in the marketplace.
- When Debbie said that the White House is interested in supply chains, that scares me. Growers are generally price takers. We’re competing in a global marketplace. There’s no option to raise our price by 5 cents to cover the cost of paperwork or auditors or practice changes. The longer I’ve worked with this, the more I understand what retailers want – typically, nice simple metrics. We’re trying to fit complex biological, weather-impacted agro-ecosystems into nice tidy boxes with nice tidy metrics. It just doesn’t work very well, or at all, in some cases. We know we need water to grow crops, and fertilizer, but there’s only so much reducing we can do. How do we deal with sporadic pest outbreaks? In one year there were 80 applications of one particular pesticide, in the next year 800 just because of an outbreak. How does that fit into tidy little metrics? With pesticides it’s easy to look at toxicity, but you also have to look at how growers are applying it and why.
- We also did a life cycle assessment. There were a lot of questions about water footprint, NPK footprint, etc., and data collection has fallen to me. I have a hard time with just trying to do the necessary measurements and trying to find some consistent trend.
- Another issue with metrics and life cycle assessments is the issue of units. Almonds are very dense, particularly compared on a gram weight basis to something like pomegranates, for instance. Yet the metrics don’t take nutritional value into account. The inputs required to produce one kg of almonds compared with that of producing one kg of pomegranates says nothing about what you actually *get* from that food. I’m not keen on some of these ideas that we can measure this and come up with nice tidy numbers that retailers can use to compare products or suppliers.
- On the issue of labels, I’ve gone to international meetings where consumers do not understand these labels. They don’t see the difference between The Rainforest Alliance and Fair Trade. The level of ignorance among consumers is astonishing, but these labels and these certification programs are promoted and carry some weight.
- Also, we’ve received questionnaires from corporate buyers asking questions like what percentage of the nut supply has been grown in water scarce regions. We’re in CA! What more do you need to know? And they give you multiple choice questions that don’t allow us to address the complexity of some of these issues.

Allen Dusault, Dairy Management Inc.:

- I work for Dairy Management Inc, which is much like the Almond Board. The industry funds and pays for marketing. I work with the sustainability of dairy products.
- Two years ago, I was in much the same place as Gabriele about asking producers to embrace the concept of sustainability.
- The tool we have developed is called Farm Smart. It’s an outcome-based tool, not a practice-based tool, and we’ve been testing it in the field. It’s designed to allow dairy producers to assess their footprints, and to improve performance.

- We're also looking to save producers money and find additional revenue opportunities. We're focused mostly on energy, water use and quality, and GHG. We want to optimize the use of these resources. We provide objective measures of performance across the industry regardless of location and differences in production practices. This is important because retailers are asking the industry how we measure and document sustainability. It leads to objective outcomes versus practice-based outcomes.
- We're trying to link up farm footprints for GHG and other measures with Plant Smart, which is our processing facility tool, and Fleet Smart, our transportation tool. The goal is to be able to say things like, "this pound of cheese has this footprint."
- The drivers for us are coming from retailers and the global marketplace, particularly as more products are going overseas. We can't rely on milk sales in the US since that has been declining.
- We're focusing on empowering better decision making. We also have a life cycle assessment-based tool derived from 540 producers, and we are just releasing a new version, which provides a producer footprint and allows communications to the retail sector.
- The next tool to come out will be decision support for producers, to provide the necessary tools to make management decisions that help to mitigate your impact, now that we have a better idea of what that is. It will give producers a bottom line benefit.
- Dairies across the US will be able to compare themselves. The data is confidential. Hopefully we can focus on the "milk-shed," where dairy facilities sending milk to same processing facility can compare how they're doing against each other.
- The key takeaway is we've been struggling to respond to demands coming from brands. How do we have objective, defensible measures to avoid "greenwashing" labels? We have to have a value proposition, or a reason for producer to use the tools we develop – they won't use them if there's no economic benefit or bottom-line incentive.
- We think that with an objective set of measures we'll have a robust system to respond to varying demands of the marketplace and retailers. But with commodity crops and the Specialty Crop Stewardship Index, everybody's developing their own tools. We have to have some agreement about the science because we can't have 50 different systems.

QUESTION You described a difference being where Gabriele was 2 years ago to where you are today. What was the shift in mindset that allowed that to happen?

ANSWER: DMI made a public commitment to reduce GHG 25% across the industry by 2020. It's very ambitious, and the commitment was made a few years ago. I previously worked with CA's dairy quality assurance program and helped to pioneer that. It's was a very useful program and moved dairy in CA to the head of the pack in terms of practices. The thing is, practices that work here are different from practices that work best in other parts of the country. I discovered that I couldn't realistically use a practice-based approach. You *can*, and some like Unilever are doing that, but for us it doesn't work very well. So we had to go for an outcomes focus and we had funding to do it. I wanted to have the ability to capture objective measurements so we can fit our approach in wherever the marketplace goes with it.

Daniel Sonke, Campbell Soup Company:

- I used to work on farmer-based programs and switched almost two years ago to the processor/brand side. I've had to switch my mindset a bit in different ways from what Allen just talked about.
- Campbell's started a corporate social responsibility (CSR) reporting process back in 2008/2009. The focus of the company takes more of a CSR approach. There are four categories for

reporting: nutrition of products, investing in communities where we have facilities, treating our employees right, and finally, cutting the environmental impact of our products in half in terms of GHG and water. Although that's not the entire supply chain, just within our factories. That's a 2020 goal we made back in 2008. Directionally we're on track to hit that goal, including through investments in solar and wind power, and reductions in water use.

- Most recently we were the only US food company to be named one of the 100 most sustainable corporations in the world. It's not just about the planet for us, and we do have a broader CSR focus.
- When I came on board in 2011, Campbell's did not have an agricultural sustainability program, but knew they wanted to be working in agriculture. We source tomatoes here in CA, which is Campbell's number one agricultural product.
- We've looked at water, energy, GHGs, and solid waste in factories. My job has been to translate this into agriculture, although not necessarily to tackle every issue.
- We're focused now on vegetables, as opposed to some other things like sugar, wheat, and grains that we could focus on. Our main areas of focus within agriculture are water use, GHGs, fertilizer use, soil quality, and pesticide use.
- Our more specific goals in agriculture are to reduce water use per unit of ingredient by 20%, nitrogen per lb of ingredient by 10%, and GHGs per unit of ingredient by 20%. We're also exploring methods of responsible pesticide use. We're struggling with soil quality, taking a basic approach of gathering information, asking if farmers have tested soil quality and whether they're adding organic matter.
- We've been gathering data from our tomato growers over the last season, and are in the final stages of running the numbers. We can see average water use by grower, and can compare it to industry-wide information that is available. Our growers seem to be applying less water than the universities think they need to, which is consistent with a pilot study we did the year before last. In CA we have one of the lowest levels of adoption of drip irrigation, with lots of furrow irrigation still in use.
- With nitrogen we're still around the industry average.
- Campbell's is a supplier too, so we get lots of audits and questionnaires from our customers. A lot of them surprisingly get handled by sales staff, and my office never sees them.
- It's safe to say we're all still trying to figure this stuff out – that's a key thing I've learned from working for a big company. We're getting a little more organized about how we approach these things, but it is all still new.
- Wal-Mart launched their sustainability index based on The Sustainability Consortium this year. It's very much an academic approach. They ask the right questions in terms of hotspots – academics know where those are. Like fertilizer. But what they suggest farmers do about it is puzzling. The number one question we're supposed to answer for potatoes, for example, is whether the fertilizer manufacturer discloses energy management goals and plans. I've asked this question to tomato growers and they laugh at me. "I go to the store and buy fertilizer!" There is, as has been pointed out, a disconnect, and I'm not sure how approaches like this move us in the right direction.
- Q&A
 - *QUESTION:* Gabriele, I completely understand your thoughts that CA producers are on the defense and have had lots of regulations piled on them, fairly quickly. But I always think, where are we going? When you say that almond growers don't see the benefit of figuring out how to tell their story, when we have a label like Blue Diamond in CA, that

surprised me. Our producers know their products have to be sold, and they're going all over the world, and that's wonderful. But instead of saying in exasperation, "it's another thing we have to do," I think we need to grab the bull by the horns and say, "We're going to tell you why that question about fertilizer is stupid." Something like this happened with PepsiCo's Tropicana brand and orange growers.

- *GABRIELE*: Growers are frustrated by how they're being portrayed, and they appreciate the opportunity to tell their story. By having a sustainability program and numbers behind that program, we are seeing increased acceptance by growers on why they should participate.
- What I think we need to address, which came up yesterday, is this fundamental cultural shift occurring in the agricultural community. Most growers are independent operators, managing their operations as best they can, in the best interests of the common good, producing food. I can't tell you how many growers loved the farmer truck commercial that ran during the Super Bowl, because it spoke to them. That image of a rugged individualist taking care of things is what they feel, and people but increasingly, people are telling them "you're doing it wrong." That fundamental disconnect between the agricultural sector and those trying to impact it is what this is about. I wouldn't be advocating for sustainability if I didn't see the benefits. We're trying to improve where growers are and their profitability and impacts. But I get frustrated by the simplicity of some of these questions given the complexity of the ecosystem farmers are working within. As a community we want to be more proactive and dialogue with Nestle and others about our own program, but there has to be a shared and common value proposition – it can't just be one-sided.
- *DANIEL*: Try to find a nitrogen data set from a university with data from about 500 growers. Writing down and collecting this data is a new area for agriculture. I'm proud of the data set I've gathered in the last year, simply because now we have an understanding of where we are, and now we can start making intelligent recommendations about how to do this better. I feel like some supply chain initiatives are rushing to the solution without assessing where we are first. And it really is revolutionary to collect this kind of data from farmers, who are independent business operators scattered across large areas.
- *QUESTION*: Some of you mentioned absurd questions from your buyers. I wonder what the dialogue between your companies and your buyers has been like. Have you been engaging with buyers to explain this, and to get them to ask you more reasonable questions?
- *DANIEL*: Like I said, many of those questions never reach me, and when they do it's mostly about ticking boxes. A big driver behind Campbell's programs is not the buyers but the investors. We sit down with socially responsible investing groups that are stockholders, and they ask smart questions about agricultural water use, etc. We sit down with them and show them where we're going. In that forum we have more opportunity to influence the supply chain than the survey/check-the-box approach. We also participate in The Sustainability Consortium, so we have a voice there, but we're one voice among many.
- *ALLEN*: You diplomatically communicated that dumb questions are being asked. Mostly it is because the people writing these questions have no background in agriculture. We're talking about complex biological systems. Most of these companies have a model of manufacturing and production that's based on a factory, not on a farm. It's hard for them to understand this isn't the same model.

- *QUESTION for Allen:* What buy-in have you received from some of your bigger co-ops like Land O'Lakes?
- *ALLEN:* We talk with our co-ops a lot. It's a collaborative working relationship. They tell us what market pressures they are up against, and we tell them what we're doing to address them. We're trying to address all the issues, but it's tough. I think our best defense is to develop tools that work for producers that we can take back to retailers and say this is something that works – use this instead of something that doesn't.
- *QUESTION:* I'm a veterinarian, and sometimes people ask me things like, "What are the most sustainable eggs?" My short answer is that it depends. The long answer has to do with, are you thinking about feed conversion ratios, or something different, like GHG emissions, animal welfare, or food safety? Often, these things are almost like whack-a-mole. Solve one problem and you might cause another. Do buyers understand that reality?
- *GABRIELE:* No.
- *ANDREW:* Some buyers are trying to understand that question and the relationships. The Sustainability Consortium and the Specialty Crop Stewardship Index get into tricky areas like social issues and biodiversity. There are a lot of perspectives on those issues. I think they acknowledge that metrics for quantifying them are still very much "on the to-do list".
- *DANIEL:* Different buyers have different priorities. Some ask me about farm labor, or about biodiversity. I have an answer, but it's not one of our top five priorities.
- *QUESTION:* I think we all appreciate reporting requirements. Gabriele, I'm curious about how the associated costs get passed on in a global marketplace. I'm also curious about the panel's perspective on the whole range of requirements that impact growers. How much impact does an additional three hours used in reporting have on growers? How big a deal is that in the grand scheme?
- *GABRIELE:* We did a tour with a father/son team. The son looked at water data every morning on the computer, and the father would walk in from the fields and tell him where the water *actually* is. Traditional growers are not sitting in front of computers and writing things down. iPhones, tablets, and other mobile devices are making this a better and a more worthwhile proposition, but sitting in an office with a computer is *not* what they signed up for, not why they became farmers. For the younger growers it's changing, but the average grower in the US is still a 57-year-old male.
- *DANIEL:* It's not about the three hours, but rather about the costs of installing water meters on different lines throughout the fields, daily monitoring, managing the data. A lot of growers still use a shovel to figure out where the water is. Longer term, they'll have to install systems that will cost thousands of dollars per acre. Another thing I've learned from big companies is that procurement people want the cheapest product no matter what. They're trained in clever ways to negotiate lower prices, but they don't understand agriculture, and these issues certainly are not on their radar. It'll take time. Eventually corporate culture will add this to the list of things buyers need to think about, but this is not their specialty, and it is largely off-radar. Currently, procurement departments are rewarded for outsourcing in order to negotiate the lowest possible prices for product. Most of the time it (literally) comes down to pennies!
- *QUESTION:* You mentioned working with investors. Are investors asking these questions because they're worried about Campbell's, or is it more about CSR? Also, to the extent that issues are driven by suppliers, are they asking what your baseline is and how you're improving over time? Or are they just asking about what you're doing now? If they're

trying to meet established goals, it seems like they'd want to see the reductions, and how they are being achieved.

- *DANIEL*: As for your first question, a lot of socially responsible investors are asking these questions, but not exclusively. Broader investors like awards and recognition. Socially responsible investors ask more specific questions. I'd say it's currently less about numbers and more about the activities.
- *ALLEN*: Some companies just want to say they bought products from sustainable places, but in other cases they want metrics and ask us to show them what we've done. It really varies.
- *GABRIELE*: Almonds are lower on the rung for retailers, but they're starting to worry about us. In the European market, retailers have said "here are some pesticides you can use and here are some you can't use," but they haven't thought through what that might mean to the growers. They haven't asked "where are you now, and how can we improve?" It's not a collaborative relationship or a dialogue. Retailers and grower groups are doing individual thinking, and I don't see a lot of dialogue.
- *ANDREW*: I do think the Stewardship Index is about measurement to manage – getting to that mindset about looking at data over time and seeing how you're doing. We're not there yet, in the marketplace -- the mentality is not there. The Stewardship Index is trying to create a suite of metrics that can hopefully be tracked over time, and work for growers and retailers.

Debbie: It's instructive to see the two sides to this coin, that both retailers and growers are thinking about what can be done, but it is obvious that collaboration and dialogue are needed to develop this in a manner that benefits growers and retailers (suppliers and buyers) – the value proposition for both sides needs to be teased out and is critical to making this work. And we have to figure out the issue of metrics – what is appropriate, what is necessary, and what matters.

Update from USDA on Relevant GHG and Environmental Services Activities

Marlen Eve, USDA Global Change Program Office

- I wanted to two updates: one on our GHG methods development work; and a second, more general update about relevant USDA activities.
- I work in USDA's Climate Change Program Office (CCPO), which is housed in the Office of the Chief Economist. CCPO has responsibility of coordinating climate change mitigation and adaptation responsibilities across USDA. When climate change legislation is being considered, we collect comments and coordinate USDA's position. I am an Environmental Scientist at CCPO, where I was hired about three years ago to come in and lead the GHG methods project.
- The project is developing science-based methods for estimated GHG stocks and flows at the local entity scale. We don't say farm scale, because the methods need to be inclusive of forest management and all different aspects of management that take place on a land unit. I'm also working on GHG estimation tools. There's another group in our Office of Environmental Markets that's working on water quality tools and ways to estimate some other benefits.
- The GHG Methods project has two main objectives:
 - Develop GHG estimation methods; and
 - Turn our set of methods into a user-friendly tool.
- USDA has a long history of doing national GHG inventories that provide regular snapshot across the US. We've worked with NRCS alongside the EPA on their annual inventory, and assisted in developing the agriculture and forestry sector inventories there. Our office led an effort in the

early 2000s to develop the agriculture and forestry portion of reporting for the Department of Energy 1605B voluntary GHG emissions reduction program.

- One critical issue is our ability to move from and connect national inventories to the local scale and actual land management operations. Because these operations are so incredibly diverse, our tools need to be diverse too. Questions about uncertainty and data availability also which affect our ability to understand what's going on.
- In developing these methods, we started by thinking about key considerations, like transparency, consistency, comparability, ease of use, accuracy, cost effectiveness, etc. These issues guided our development of these methods and the web-based GHG estimation tool. We had to balance how to maximize accuracy while maintaining ease of use -- there are tradeoffs. How do you make a standalone tool that is also consistent and comparable with other tools? It's important that any local tool is not reporting anything different from what our national tool is reporting. Also, it has to be transparent but scientifically rigorous and user friendly.
- We brought together about 45 individuals that have been working in three author teams over the last two years: forestry, crops, and livestock. They have been tasked with evaluating the state of the science and methods development. The tool that comes out of this will be used hopefully by land owners and land managers to assess options for GHG management. One thing I've observed is that registries, markets, aggregation commonly go to landowners and assess their GHG potential using a particular practice. We want to provide tools to landowners about what the impacts of their overall activities might be – their entire management systems.
- The tool will also be used to assess the performance of different conservation initiatives, so that we can determine the impact of specific EQIP or conservation practices at a specific location. We're also hopeful that different pieces of the methodology and the tool will be useful to a number of people in this room in support of different registries, protocols, and projects. When you get a chance to look at the report, you'll see that a considerable bit of science has gone into the report.
- Because we want this to be transparent, we've gone through several levels of review. We're currently doing an expert scientific review, and I would like to thank C-AGG for providing a large number of our expert reviewers. At 533 pages, committing to this review is no small task!
- Following the expert review, the authors will make adjustments, and the next version of the document will be available for public comment for a 60-day period before the final version is published, hopefully in August this year.
- Highlights of what to expect in the report:
 - Much of it is about methods you'll be familiar with, but the authors have developed a new approach to estimating N₂O emissions on crop land that is a blend of previous approaches, and uses both a dynamic process model and field data. Bill Salas and the DNDC team have been involved in that and cross-compared models. I'm anxious to hear what our science experts currently reviewing the document think of the methodology we're proposing.
 - There's also the forestry method: the authors are recommending that in this tool USDA begin to integrate FVS and some of the dynamic modeling environment that foresters use, much as COMET has integrated DAYCENT.
- Uncertainty: everyone here has talked about the difficulty of putting error bounds around GHG estimations. When you're looking at the whole landscape, that's incredibly challenging. We're still trying to assemble data to support this.

- The author teams have been fairly specific about pointing out where research and data gaps are. One value of this report will be laying out our priorities for the next decade in order to fill those gaps.
- The report is a blueprint for the tool that will follow, and that tool (previously called *TRACCR*, currently being called *Quantifier*) has begun to be built, but we need our methods to be fully vetted through review process. Ultimately it may be called COMET Quantifier or something under the COMET brand.
- Our goal for the tools is that they will become the USDA standard framework for farm or forest scale GHG estimation. We get asked a lot how these tools will or will not interact with COMET. Our tool is aligned closely with COMET-Farm and I work closely with Adam on the development of both these tools. COMET has been developing and growing in its scope. We see our tool as more of a snapshot that shows what we know at this time and becomes the lockdown USDA standard for estimation and reporting of GHG, while COMET may continue to develop and improve. We may update our tool in the future with another consideration of the science. The many layers of review in our process are what give it the credibility to be used by USDA.
- The tool also needs to be consistent with the work that EPA does. We've worked closely with EPA, they've looked at our methods and assessed inconsistencies. We also begun to coordinate work with other USDA tools, including water quality, NTT, and others.
- The first version of the tool will be released sometime this fall, and it may or may not include the fully implemented forest method. That may come out in a second version of tool. Timeline:
 - Late summer / early fall, report will be in final version, published on the shelf;
 - This fall the tool will have its first complete version, although it won't be very elegant at that point;
 - I need to talk to Debbie about getting time on the C-AGG Detroit meeting agenda to talk about the livestock and croplands portion of the tool, which should be ready to be unveiled then. It's hard to promise, but that's what my timeline says.
- A few developments at USDA:
 - Last month Secretary Vilsack published a results portion of the usda.gov website, which contains a number of fact sheets on USDA accomplishments in conservation, etc. A number of things we talk about are listed here as USDA accomplishments, such as GHG CIG grants and the project I'm managing with developing GHG estimation methods. The Secretary has increasingly been ramping up awareness and the level of dialogue around GHG initiatives.
 - The CCPO has a new website in which we have tried to focused exclusively on what our office does and what it's involved in.
 - Two USDA reports were released in early February, as supporting documents for the US National Climate Assessment. The Forest Service was the lead on the Forestry report. These reports provide a snapshot of where agriculture and forestry are in the current climate, and some of the anticipated challenges due to current and projected climate change impacts.
 - USDA also released its first ever climate change adaptation plan, which was part of CEQs (The White House Council on Environmental Quality) government sustainability report, now out for public comment. USDA's plan assesses the vulnerabilities of our forests and our agricultural lands, and what USDA needs to do to be prepared to deal with these vulnerabilities. All agencies that manage facilities, lands, and resources added to this sustainability report, which is intended to be updated annually.

- There's also a new report called "GHG Mitigation Options and Costs for Agricultural Land and Animal Production within the United States" (from ICF International) looking at adoption, implementation costs, and what price of carbon it would take to achieve broad adoption of practices. This report will be posted on the web, but as of Tuesday it hadn't been yet. The goal is to take each of these practices and turn it into a spreadsheet and put that up on the web. It will be nice to present all of this info in one place.
- Secretary Vilsack gave the keynote address at the Agricultural Outlook Forum in DC a week ago, and he spent quite a bit of time talking about climate change as a priority for USDA to help farmers, ranchers, and land managers adjust to increasing climatic variability. The Secretary emphasized the need to get resources out to land managers, and to deploy portals so they can find the information they need. You can read the transcript on usda.gov's newsroom. This is something Secretary Vilsack has been growing more vocal about – how do we address climate change, how do we move forward.
- Q&A
 - QUESTION: Do any of those documents talk about markets and credits?
 - ANSWER: I don't think so, not specifically.

NRCS/USDA Update

Adam Chambers, NRCS/USDA

Greg Johnson, NRCS: Our team has been charged with a couple of things: leadership of the COMET project, primarily via Colorado State University (CSU), and leadership of the GHG Conservation Innovation Grant (CIG) projects. I want to publicly acknowledge Adam Chambers because he's done a superb job in both of those arenas, particularly with the GHG CIGs. We have had a lot of discussions and issues about access to data, but I'll let Adam address that.

Adam:

- *(Showed a graph from the US EPA inventory of GHG emissions and sinks.)* I've heard people inside the beltway (the Washington, DC metro area) talk about the land use / land use change / forestry sink going away due to changes to the climate, commodity pressures, urbanization, etc. From NRCS's perspective, losing this sink would be a very big deal, and scary.
- California factoids:
 - CA Receives the largest amount of NRCS funds each year; TX is second.
 - Last year, EQIP funds helped producers implement conservation practices on more than 3.4 million acres of CA farmland.
- We had 2,000+ contracts in CA, almost \$100 million in EQIP. Total assistance to CA was \$112.5 million out of a total budget of \$1.3 billion.
- Quick COMET-Farm update:
 - This is a tool that NRCS has been investing in for more than a decade. It's had a lineage – there was COMET-VR and COMET- 2.0. Now we're in COMET-Farm, and we have added field operations and a livestock module. We're working on a fossil fuels module that, coupled with these other modules, will allow for full farm GHG accounting with one tool.
 - Our team at CSU does a nice job of putting together user-friendly interfaces. The COMET-Farm interface is even more user friendly than COMET-VR and COMET 2.0, and we hope people are actually using it.

- We track the number of users, but that's all we track.
- To use COMET-Farm, you have to log in and register, select which sector you want to work in. Users have the ability to define a parcel of acreage, go into the historical management of that acreage, and look at tillage going forward. We recognize that not all farms will have all this data, but we're trying to create a friendly environment for farmers to play with the data.
- COMET-Farm doesn't currently contain every specialty crop. It comes down to where there is data available and how much time it would take to implement those crops, versus our user audience. We're trying to serve the whole US, so it's a balancing act. The beta version is out for use right now, and we went through an alpha testing phase that included lots of input from C-AGG.
- We hoped we'd have full version of COMET-Farm out a year ago, so we're a bit behind schedule, but part of that delay is that we've been getting a lot of added value by working with the GHG CIGs, which has definitely improved the quality of the tool.
- I wanted to highlight the data export tool that Ryan and Steven reviewed yesterday. The CSU team worked on this, and Steven and Ryan told us what we needed to export and what format to use so we could take the data and move it into DNDC. And while that export functionality is great there is info you can use right on the COMET-Farm results page.
- The team also did nice work with graphics, and we will continue to further develop these capabilities. We're trying to match up with the Quantifier tool that Marlen described and have outputs that look and feel the same.
- Many of you here have been working in COMET-Farm, and testing it out with your projects. Beth and Marilyn of the Chesapeake Bay GHG CIG have mapped Maryland. The green portion of the map has soil data, and the red is where gaps in 2009 data exist. We're redoing all the soil data in the country and gap-filling all the "red" areas of the country. This isn't visible to anyone, but our soils layer will be consistent with data that will come out in May of this year.
- GHG CIGs – USDA Update
 - Prior to announcing the GHG CIGs, we knew that a lot of conventional practices were reducing soil carbon or degrading the landscape in some way. We also knew we could improve agriculture through the implementation of conservation practices, while maintaining or increasing yield. We had previously ranked conservation practices using a GHG index based on whether they sequester more carbon or reduce GHG emissions.
 - Then we invested \$7.4M in nine GHG CIG projects across the country. Former NRCS Chief Dave White came up with the idea of putting \$10 million of EQIP assistance into these projects as a means to help them recruit producers. Unfortunately, it was far more complicated than we anticipated it would be to direct these funds. NRCS and the GHG CIGs will have to figure out ways to work cooperatively to recruit producers. We've learn a lot along the way, in terms of challenges to getting agricultural carbon credits into the market. We're at a point now where we've figured out how to do that and it's taken a lot of work. Thanks to people in this room for your patience! Some of the challenges and lessons we have learned along the way:
 - NRCS had never done this before, and we didn't quite know how to deliver on all aspects of these projects;
 - Marrying the projects with NRCS state and local offices has itself taken a lot of coordination, but the willingness to participate has been phenomenal;

- We thought we could roll out EQIP funds back in October, but with budget uncertainty and the budget sequestration, funds didn't actually get out the door until December.
 - We're receiving applications but we don't yet have any signed projects. We need to get past the threat of the sequester and get into the delivery of funds.
 - *QUESTION:* Could you give examples of any EQIP funds associated with one of the GHG CIG grants?
 - *ANSWER:* I want to let someone else answer this, since it's all over the board.
 - *COMMENT* from Beth McGee, Chesapeake Bay Foundation: We're working in two counties in Virginia trying to promote the use of variable rate nutrient applications. It's under NRCS Section 590, but that particular practice is what we're interested in. We want to run that information through DNDC to see where the N2O benefits are. Part of our grant was to explore which options seem promising in terms of generating carbon credit opportunities.
 - *COMMENT* from Randall: We're working in North Dakota on expired CRP. We're working on livestock and infrastructure development so that land stays in grass cover. We're developing fencing, infrastructure, and making land more viable for grazing and forage.
 - *QUESTION:* Is this a model that could be applied to other non-GHG CIG projects?
 - *ANSWER:* Not really, because the \$10 million was a set-aside. The GHG CIGs were intended to explore new space, and perhaps develop models for further development.
 - *COMMENT* from Marlen Eve, USDA: Having A focused CIG solicitation on GHGs was new for us. Tying specific EQIP dollars to this call for proposals has been a trick to implement. Regular CIG partners would be eligible for EQIP and might apply, but here the projects are actually facilitating that process to some extent.
 - *COMMENT* from Tom Hedt, NRCS: The point of CIG grants is to bridge the gap between research and work on the ground. If a CIG grant succeeds in that sense, the state should be able to take that info and replicate this work in the future. These CIGs were trial balloons, which might not be readily replicable at the end of this phase of the projects. *ANSWER:* This has been a challenge for us specifically because of the EQIP piece.
 - *Adam:* We put an info-sharing website together; as these GHG CIGs come up with outreach and information, I'd like to put that up there. It has links to EQIP contacts in different states. C-AGG has also done that for the GHG CIGs.
 - Regarding information and data sharing, I'd encourage everyone to look at Section 1619 of the farm bill, which limits our ability to share producer information with anybody. We spent a lot of time with our attorneys, and there are limits to data going out of NRCS. There are good reasons why this is in place, and reading up on this will help everyone understand it better. Still, we need to figure out better ways to share information. We can't force producers to participate with a CIG because of section 1619. There's a release going out to all the states that producers can sign, and it doesn't affect the EQIP dollars they receive. If they sign the release, NRCS can convey info about the projects to producers that we otherwise cannot convey.
- Information as of March 5 on how much interest we've had in EQIP:
 - We were at about \$11 million in applications, but we only have *up to* \$10 million.
 - We've seen \$14 million worth of interest in participating.
 - We're not sure what to do with this. We're collecting this data through March 31 and we'll evaluate the level of interest.
 - This tells me that you're all doing a great job of outreach. Some projects we didn't even expect. In Oklahoma we'd budgeted \$50,000 and we're up to \$2 million. In Illinois and

Iowa there's a lot of effort going on. CIGs have had to build relationships with state NRCS offices. This demonstrates the work ethic of the group here.

- I'd like to ask Tom Hedt of CA NRCS in Davis to talk about the next piece of the project, which is delivery of the funds. Signups are open right now, and we'll begin batching sometime after March 15.

Tom Hedt, NRCS: This will vary from state to state, but we have a cutoff date after which all applications within the system will be screened and ranked. Applications are ranked from high to low and dollar amounts assigned to each application. We don't fund partial applications, so if your next one is \$80,000 and you have \$20,000 left, you've got a cutoff there. The ones that make the ranking cutoff, our offices go out to work with those producers. Interaction with the CIG entity that has the grant is separate. We go out and work one-on-one with them to make sure they understand practice requirements. The plan is nailed down and the contract has to be signed and obligated by July 31. After that, the producer can move ahead to implement specific practices.

Adam: If producers sign a 1619 release, we can pass their info to the GHG CIGs and begin the process. Then you can have project implementation and development and delivery of credits.

Tom: Right. We can't force producers to share information as a criterion of program participation.

Maine EarthSmart Program: Farming for the Future Susan Gammon, Androscoggin Valley Soil and Water Conservation District

- Maine and New England agriculture represent a different situation than the rest of the country.
 - First, the average farm size in Maine is 160 acres. We're closer to the average farm size in Vermont as far as other states in New England go.
 - We're very diversified, with lots of small crop farms, dairy, potatoes, etc. It's hard to make a living in farming anywhere, but it's *really* hard in New England.
 - We're significantly higher in national direct sales than the rest of the country.
 - We have more organic farms than the national average, and a higher percentage of on-farm electricity generation than the national average.
 - We also do more Community Supported Agriculture (CSA) than anywhere else.
 - Potatoes are a big part of our production. Blueberries and dairy are also significant. We're also a big chicken egg producer, especially in my part of Central Maine.
- Our District started in 2007 collaborating on on-farm energy audits.
- We did some soils modeling with a CIG grant and some matching funds.
- We started doing outreach to farmers to let them know that they might want to start thinking about GHG emission reductions because of RGGI [the Regional Greenhouse Gas Initiative]. Everything was coming down nationally and regionally. We did a few workshops here and there as part of the CIG program.
- In 2009, we decided to develop a survey to find out what farmers need to reduce GHG emissions, and potentially participate in market-based opportunities.
- They mostly wanted personal, non-biased assistance to assess the business case and the financial paybacks that might be possible on their operations; they didn't want this information from someone who was trying to sell them something. They did express an interest in a GHG offset market if there was one available.

- Farmers in general are really independent and stubborn, or they wouldn't be farming. But they're also optimistic. "Next season will be better" is a common refrain. For some of them, practice change is hard. If something worked before, they don't want to change it, and if it doesn't bring an economic benefit, they just can't do it, *period*.
- In the dairy industry alone, we're getting maybe \$21/hundredweight cost of production, whereas in Maine and New England it's \$30. So they're under huge cost pressure. We can't go to that farm and ask them do something that will cost them money.
- So, we had to figure out something practical for on-farm implementation in our area. We had to reduce on-farm expenses or provide an increase in income. Currently we aren't even offering them anything novel – we're working with NRCS practices that they could do but aren't doing. NRCS has been a big supporter, and can provide funding for many of the practices we suggest.
- We found that there had been no focus before on actual practices that would work in New England – there just wasn't a lot of data available.
- We got USDA together with the local cooperative extension, agronomists, etc., back in 2009 to look at what we felt would work. Initially we thought we wanted to work on GHG offset market protocols and maybe even develop a regional offsets market. Then the CIG grants came in and we didn't have to do that ourselves.
- Still, our farms are small and there's no ability to aggregate, so the opportunities to participate in offset markets are slim. Most aggregators want 1,000 acres minimum, and most farms don't have that many acres, since we average 167 acres. So our best chance for offset markets is in forestry.
- We still wanted to help New England farms become more sustainable, and enhance environmental impacts. We decided we needed to have not only an economic benefit but also give farmers recognition for what they were doing, through an activity-based rewards program. We first establish what a farmer is doing – that's the baseline – and then help them assess what they can do to improve performance.
- We developed energy management, crop management, fertilizer, nutrient management, manure management, pasture, and forestry modules, using expert opinions to help develop each one. Each module has specific standards and requirements that a farmer must meet. They're pretty fluid. We're learning what will work and what won't in terms of implementation.
- Participation and rewards are based on a point system – 100 points to make it easily understandable. We also look at co-benefits – that's a big way to sell this to farmers, since GHG reductions just won't do it. We have to be able to say, these practices are good, these are the benefits, and "Oh, by the way, you'll be able to reduce GHG emissions." Farmers care about production and cost and getting the work done, and not necessarily about GHG emissions.
- We want farmers to have a choice of low-tech practices and higher-tech things like methane digesters. Every farmer gets to choose the practices he wants to implement on his farm. This is practice-based and farmer-driven. Whole-farm assessments can be too cumbersome and take much too long, so we developed this in a modular approach. It's about developing a (modular) management plan for farmers that take environmental benefits into account.
- Participants have to complete one module and then can pick and choose from other modules. If they want to do just crop rotation, they can do that. They have to get 70 points to qualify for our certification program. Frankly, the certification program itself isn't important, but rather the practices that are implemented. So if they can't get certified (or don't want to) after the assessment, if instead they decide maybe to give no till with cover crops a whirl, we still feel we've succeeded.

- We don't have any designated quantification system for these modules (beyond practices and changes in practices), since it is not an offset program. The practices are known to reduce emissions. We don't require a certain amount of emissions reductions -- except in the energy module, which has a minimum 10% floor for reductions. But we know that if you use cover crops, etc., you'll reduce GHG, and that's enough. But we do try to prioritize what will give farmers the biggest bang for their buck, so that most likely professionals doing this will have to use some kind of quantifying tool. We tell them to use what they're comfortable with, be it COMET-Farm or DNDC, or just tables. We have forestry tables we're using since forestry models are so complicated.
 - Our system of verification differs with each module right now, since we are still in a pilot phase. After we've gained some experience, we'll gather together collaborators to help us tweak our approaches. We have nothing in place right now to fund verification, so that's an issue and will continue to be.
 - For each module we might have planned site visits. For electricity, they can send in their electricity data. So for now it's reporting on their part and some on-site visits.
- Energy management data:
 - Our state has lots of economic problems right now, and a lot of previously available money has gone away, especially for new programs. Ideally this program would be housed within the state in the end.
 - We can easily get quantified data from energy audits.
 - Two years of records of fossil fuel use are required for energy module participation.
 - Fuel switching: we don't want to damage engines.
 - Energy reduction: As part of the certification program, we may develop a pioneer status because we need examples of people who are doing good work. I'm a farmer myself and I didn't even realize what a sore point it is among them. There's a sticking point between organic and conventional, which is also something we have to contend with.
- Soil tests are other methods where we can quantify if needed.
- The next problem we're having is not just quantification, but delivery of assessments after the pilots are completed. This is just a funding issue, and we'll either get there (i.e., get funding) or we won't. We might have to change our certification program to an education program with guidelines. If Wal-Mart, for example, sent out a questionnaire about reducing GHG, there would have been no guidelines out there for the state, so no one would have had a clue how to answer it.
- We're doing landscape audits through NRCS, homestead audits through NRCS or a local partner.
- *QUESTION:* If you award pioneer status to a farmer, are you thinking of an enhanced incentive other than a blue star?
- *ANSWER:* We don't know. It's something we're looking at when I get back to Maine. There's no money attached to this other than reductions in expenses, increases in cost effectiveness. We had been thinking of doing a certification program, but there are a lot out there now, and there's been some pushback about that.
- Requirements of the fertilizer management module:
 - Current soil tests, manure tests, pre-plant tests;
 - Performance standards: all crop acreage has to be enrolled;
 - Can't have any reduction in yield related to fertilizer reduction;
 - Must synchronized applications;
 - You only need 15 points for this, but we weighted the system;

- With this module, we've actually tried to get farms ready for offsets, in case some aggregators would take on small farms, so that's why we're asking them to do some of this, like a five-year verification.
- Injection into root zone is worth the most points. It's also one of the most expensive things, so we want to reward them for spending money.
- **QUESTION:** Is there a reason you don't have using legumes as a fertilizer on there?
ANSWER: We're using cover crops as scavenger potential, but no, not as a nitrogen source, and I don't know why that was decided. A lot of things could be done differently with this and other programs that are performance based. By the way, one grower in particular has been pushing back about this needing to be performance based. In an ideal world it would be standards based, but we don't have the money to develop the standards.
- **Ongoing Challenges:**
 - Funding beyond the pilot
 - We don't know how to prove to the farmers that this is good for them to do. These are not generally high-tech practices, with the possible exception of methane digesters.
 - We've made a lot of progress, but we don't know how this will be accepted by farmers. If NRCS can help them with some things like cover cropping, that's great, but we'll see. It's so diverse in Maine – blueberries are so different from potatoes, etc...
- **Pasture module requirements:**
 - We look at production losses in milk going from confined to pasture-based operations;
 - If there's a production loss to milk, we're saying that's got to be offset by a reduction in expenses. That's a requirement. Somehow we need to figure that out.
 - The number of animals grazed must be keyed to the seasonal productivity.
 - No-till reseeding is allowed when necessary;
 - Pasture productivity must be maintained or enhanced;
 - Each item may have a standard attached to it;
 - Conversion of marginal cropland to pasture
 - Conversion of full confinement to partial confinement
 - Conversion of unmanaged pasture to managed
 - The research is very sketchy on pasture management.
- We have a couple of great videos that we haven't (yet) been able to upload to our website.
 - One video is of a 500-acre dairy farm and one is of a small diverse crop farm typical of what we work with. We asked them to talk about their operations and used them as training videos in developing management plans. The dairy farmers really spoke from the heart.
 - If you want them, let me know.
- You have to remember: There are lots of small family farms out there, and labor is performed by the family, so when you put these practices on top of everything else they are doing, we are adding to the family workload. When we ask these people to fill out questionnaires, and they're tired, are they going to cooperate? They have to see the benefit.

Susan: I wanted to clarify that our certification program doesn't preclude participation in offset programs. The whole idea is to get farmers ready for offset programs (record keeping, data collection) if that day comes.

Debbie: you showed that this could be a stepwise, regional-specific approach. Once people start collecting data they enter a whole new realm, and we've seen that again and again.

Agricultural Data Needs: Framing the Discussion for Workshops

Debbie Reed, C-AGG

Debbie:

- Included in your packets is a letter sent to USDA Deputy Under Secretary for Research, Education and Economics Ann Bartuska, who led a meeting with us. She brought together the chairman of the National Agricultural Statistics Board, people from ERS, the National Agricultural Library, the Secretary's office ARS, etc., to have a preliminary discussion and follow-up to our data needs discussion in November.
- We began a two-way dialogue about data needed for projects, and USDA responded in kind by describing some of the data they collected. We talked about how they might be able in some instances to change the delivery method of data to something more useful to us for project development and model development.
- I crafted the letter to have a trail to share around the department, but in such a way that we could also be aware of the trail and how this could proceed.
- A couple of things came out of that meeting: the chairman of agricultural board said we have lots of data you could use. We talked about confidential business information. We wrapped it up by saying, it's good for us to be thinking about your future data needs and how we might change data collection, and also according to constraints federal agencies are facing.
- One thing I included in the 2013-2014 grant for C-AGG was funding for workshops to follow up on this. I envision they will happen in DC. US EPA is also very interested.
- What we want to know from you is how you handle the data confidentiality issue, because it's very important to us.
- We're working to set this up and don't have dates pegged yet. We hope for one in the spring and one in the fall. We will transmit the info to C-AGG as it becomes available.
- We hope to explore what data is collected by agencies, how they store it, what they're doing with it, how we can access it. For us, what data would be helpful? Research data sets, data on farms... Not only opportunities, but also challenges and how we overcome them. Think about where we will be in five years' time, what data USDA could collect to support market-based incentives for GHG emissions reductions.

QUESTION: Is NRCS not included in this list because of 1619?

ANSWER: No, this list is not meant to be exclusive or exhaustive – we want to invite others with data and with data needs into the conversation.

Debbie:

- There's also the data sharing initiative at the OSTP of the White House. Could we ask them to kick it off? They haven't significantly tapped into agricultural data and how that could be useful, so getting them engaged will be important. Before we had this meeting, Nick Martin brainstormed with a lot of folks here and sent me notes on that. I've mined data from his notes to kick off this discussion.
- [Debbie showed a PowerPoint with a lot of initial suggestions.]
- We want people to start thinking about this. If we have a one- or two-day workshop, I want to accomplish as much as possible in the time we have.
- Our goal: come up with ideas on how USDA can collect additional data, and/or make existing data more accessible

- Can we think up an outline of what to say to USDA about what we hope to accomplish?
- Can we have a discussion and begin to build on this, so when we have these workshops with the government and others, we can make specific asks?
- Maybe we can have a discussion and then form a working group?

Discussion:

- I think you could add a fourth category here. Call it “data relevant to qualitative assessment of under-researched practices.” There’s data that wouldn’t be helpful now to develop a protocol, but could be suggestive of something that might happen down the road. It might inform our thinking about how policies might develop. Something cutting edge. Like a management practice that incorporates three different management practices.
- Data sets that indicate future research needs/opportunities
- More information on specialty crops
- Is it possible to consider paying for data?
 - *Debbie:* For privately held data, I think this is a conversation to be had. It’s often held in some proprietary form.
- Hybrid situation? Sometimes private parties are holding data collected for federal or state purposes. How do they fit in?
 - *Debbie:* I think that leads into the confidential business information issue as well, an issue we should be sensitive to. We need to look at what the regulations are and what legislation says. It could be worth having a conversation with legislature maybe about what our needs are. Also a conversation with regulators about making data accessible that does not include farmers’ name & GPS coordinates and confidential info.
- The question isn’t just about access to data but who holds it and how is that confidentiality ensured? There needs to be confidentiality.
 - *Debbie:* Agreed. There are legitimate process/logistical issues here.
- Who holds and manages data to protect from FOIA?
 - *Debbie:* My main interest is that we’ve had conversations with USDA but need a strategic discussion about how we actually begin to tap the data. We have needs now, but we have to start the process if we’re going to tap some of this data and start figuring it out. With two workshops this year we could accomplish a lot. Perhaps we can take the notes Nick put together in an outline format, sharing it with interested participants, and add to it. If this takes the form of preliminary workgroups, that’s OK, but I’d like us to do some work on this and tee this up for the federal workshops.
- Is there a timeline for this? The Fertilizer Institute is having a data meeting in Memphis. With results from that we may be able to select one or two to be part of this group.
 - *Debbie:* No timeline has been discussed; I was originally pushing for April, but that’s not going to happen. Maybe May.
- That could work out well with our schedule. We might be meeting in Memphis in April.
 - *Debbie:* I think we can do a lot of this collectively electronically, starting with a document like this, and once we get the timeline, take it from there.
- Re: 1619, there’s a good reason not to change it. It’s working!
 - *Debbie:* I agree. I’m not suggesting we have to change it, but we should discuss access and privacy issues.
- All of the programs we are discussing here are voluntary incentive programs, and that is critical to the success of these programs. Sometimes there is a perception that NRCS holds a lot of information that could be useful, but we’re not a research institution, and a lot of the time our

information is just handwritten notes in a case file. So comparing information that we have with the rigorous nature of some of the protocols is like mixing apples and oranges. Even if someone went through and systematized what we have in our case files, I would question the value of it in the context of these discussions.

- *Debbie*: We know we have a high ask. We started in December in DC saying tell us what you have, and we'll tell you what we need. I think we'd spend a lot of time just talking about what information agencies collect at the first session. It'll have to be an iterative dialogue, and we'll learn a lot from the first workshop.
- Another note of caution: we went after the ARMS database of a published paper by folks at ARS. They publish papers that nobody could get access to the data for either. So that does happen. We learned there's no way we could get a hold of the ARMS data for Illinois, for example.
 - *Debbie*: We're aware of this. We know this, and USDA knows we have this issue, and there are not only access issues, but compatibility problems and problems with how the data is stored. I think this is where OSTP could be helpful, making it clear that information sharing is a high priority for the administration. There may be no actual reasons not to share. Logistical problems like different formats, maybe. There's valuable data out there at ARS, sometimes 120 years worth.
- So you're exploring how to open to floodgate to historical data, and then talking about how to change business for the future
 - *Debbie*: That was an important part of the December meeting. USDA was open to it. There's a lot of data we could tap if we worked with the right entities. Someone pointed out a new entity under the National Agricultural Library, which might be a portal through which we can get some of this information. They're trying to store data in compatible formats to make it more accessible to anyone who wants it.
- *Workgroup Volunteers*
 - Noel Gurwick
 - Steven DeGryze
 - Bill Salas
 - Andrew Arnold
 - Terry Anthony
- For some CAR work we did, we were looking at nitrogen efficiencies versus application rates. I wonder if we could ask people to run a specific analysis. We don't need exact values but would like to see an average across areas. It would have to be someone behind the firewall.
 - *Debbie*: This is another category, I think. Running analysis on data that can't be shared, but analysis would be very helpful. As for the workgroup, it seems like we're talking about a few emails and maybe a phone call. We'll share this all publicly as we pull it together, and others can jump into the conversation anytime as it proceeds. It just seems like such a great opportunity for more data sharing here.

C-AGG International Collaborative Efforts: Framing the Discussion for Workshops **Debbie Reed, C-AGG**

Debbie:

- Another thing that came up at our November meeting: various countries who have different means of trying to reduce GHG emissions from the agricultural sector are trying to figure out some of the same things that we've been working on and discussing.

- CLUA (Climate and Land Use Alliance) has been having a lot of international discussions, for instance.
- The Brazilian government has established GHG emission reduction metrics for their agricultural sector by 2020. They put up \$500 million in no-cost loans to the sector in order to help them get there. They're developing a program of options and opportunities for the sector, and have asked about the types of incentive-based opportunities we've discussed at C-AGG (e.g., carbon markets, etc.) and some other opportunities. We have started a dialogue, and there are some clear collaborative opportunities there, to talk about tools we're using and share what we have learned. Bill Salas has been having meetings in Brazil about opportunities to use DNDC and other tools and methodologies.
- The same thing is happening in China – at the provincial and city level they're setting up cap and trade programs, encouraging agricultural mitigation activities through cap and trade. Lots of activities are under way, and there are lots of opportunities. They again are looking at the same types of tools and models and metrics, but are perhaps not as far along.
- Over the next year, we want to start a scoping activity within C-AGG -- not to reinvent the wheel anywhere -- but to look at how we might add value to international opportunities where C-AGG has some experience to share. We envision this as a subset of C-AGG since maybe everyone here will be interested in the international component. We want to start a discussion about this. I will be going to China in April to do some scoping. I wanted to share this with C-AGG before it gets too far along.

Discussion:

- This touches on two of the CIG projects. ARS Beltsville is working with Brazil and our collaborators on the Chesapeake Bay project. They have approached us regarding DNDC model collaboration. In addition, under the rice CIG project, Arkansas collaborators also have a post-doc up from Brazil learning how to use the model, and he will take it back to Brazil. There's a nice tie-in for the GHG CIG projects as well as C-AGG activities.
- Debbie: Embrapa in Brazil is the agency tasked with creating the agricultural mitigation program. I think they identified five specific opportunities, like manure management, pasture/rangeland management, etc. Before they get too far or share it publicly, they want to have more discussions, add context of what a collaboration opportunity would bring to the table. As you indicated relative to Embrapa working with ARS, they're interested in tools they can bring back to Brazil. ARS seemed to have some concerns relative to competitiveness.
- Is sugar cane production part of what the Brazilians are pursuing?
 - *Debbie:* It's not listed in the initial five activities, but that doesn't mean it won't be merged with bioenergy opportunities.
- It would be interesting to get lessons from the program in Australia.
 - *Debbie:* We could find out how that's going – that would be great.
- Will this take away from C-AGG's efforts in the US?
 - *Debbie:* I don't think so, but 2 or 3 years ago when we first talked about expanding internationally, some folks directly pushed back about that. So I think of this as a subcategory or subset of participants under the C-AGG umbrella. There's so much to do in the US that I think it's a subcomponent. I don't know yet how to work this into C-AGG meetings, maybe an hour session reporting progress. But there's so much overlap here and a way to share what we're doing with others that it is a great opportunity.
- Are you going to work with foreign agricultural services as well as ARS?

- *Debbie*: I think we want to. I've been talking to people at GRAMPS, folks at the Meridian Institute who have international agriculture programs underway. We're looking at who are the right people to tap as collaborators, either for info sharing or participation. But again, we don't want to reinvent any wheels or programs. Some work others are doing is not quite appropriate to our mission, but there might still be components we want to tap into. I don't know a lot of folks at the Foreign Agricultural Service, but it seems like a likely choice.
- Is there an opportunity to partner with IETA?
 - *Debbie*: I have talked to Dirk; I think that would be great. Also, the woman from CLUA in Brazil who is my contact there will be in DC at end of March, I'll let people know if they want to join in a meeting with her. She's been driving the movement on this issue in Brazil, anyway.
- Has C-AGG done any active advocacy on parts of conservation programs in the farm bill?
 - *Debbie*: No. C-AGG is 100% funded by the Packard Foundation, and we cannot engage in any lobbying. We can only educate.

Final Wrap-up -- Debbie: Thanks to everyone for two incredibly productive days. Thanks to ARB and CDFA for a productive dialogue on the CA situation. We have a lot of work to do, so I appreciate the clarity in communications.