The Alliance to Advance Climate-Smart Agriculture:
Supporting Producers to Promote Productivity, Markets, and Environmental Benefits
("The Alliance")

I. Executive Summary

A. Contact information

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B. List of Alliance partners

1. State pilot leads: Arkansas Department of Agriculture Natural Resources Division, Minnesota Board of Water and Soil Resources, North Dakota Farmers Union, and Virginia Department of Conservation and Recreation.
2. Producer groups: Agricultural Council of Arkansas, Arkansas Rice Federation, Minnesota Farmers Union, Minnesota Soil Health Coalition, Minnesota State Cattlemen's Association, and the National Black Growers Council.
3. Technical experts and conveners: National Association of Conservation Districts, Supporters of Agricultural Research, Sustainable Food Lab, and the Environmental Initiative.

C. List of underserved/minority focused partners

The National Black Growers Council (NBGC) will serve on the Advisory Council along with four additional to-be-identified groups (one per state) representing underserved producers. The Alliance will also form a DEI Committee, including relevant Tribal representatives, NBGC, and invited members of at least one young farmer organization, an indigenous representative from a national livestock association, a female small dairy operator, a young, small-scale, LGBTQ producer, a national corn association leader, among others, to represent underserved producers. In addition to their expertise on program design to meet the needs of underserved producers, these groups and individuals either have a presence in the four states in which the pilot will take place or are able to connect pilot partners to relevant groups in those states. The project will allocate funds to ensure underserved producers can participate in project meetings.

D. Compelling need for the project

1. **Climate-smart agriculture and forestry (CSAF) programs must reward all environmental benefits to be economically viable for producers.** Currently, only 3% of producers are participating in voluntary carbon markets. This low number is due to the fact that payments for the greenhouse gas (GHG) benefits of CSAF practices typically do

not meet producers' implementation costs, resulting in a financial loss. Producers lack the up-front financial resources to shift technology and equipment required to adopt CSAF practices, or to take on subsequent yield risks, and they cannot pass costs on to consumers. Climate-smart agricultural practices can deliver public environmental benefits with an "ecosystem service" value 400% greater than the value of the GHG benefit alone, particularly from water quality benefits in crops and air quality benefits in livestock. Paying producers at a rate that reflects the combined environmental values of CSAF practices enables them to earn a reasonable return, which enables them to rapidly scale adoption and deliver climate-smart commodities. This pilot project uniquely compensates producers with a payment that surpasses costs and reflects the combined public value delivered by stacked environmental benefits.

2. **CSAF programs must promote sustainable agricultural productivity to achieve global goals.** Increasing agricultural productivity is critically important to achieving climate goals and global food security, yet a focus on productivity is absent from climate-smart agricultural programs. Productivity-enhancing practices may have adverse environmental impacts; however, including climate and environmental goals is achievable. This project will draw on insights from Virginia Tech's seminal Global Agricultural Productivity Reports© and a SoAR-led technical workstream to deliver recommendations on integrating productivity considerations within our climate-smart pilot program.
3. **CSAF programs typically fail to work for limited-resource and socially disadvantaged producers. This pilot creates a program that works for producers of all sizes and types.** Private market programs often require administrative burdens that prevent equitable access for small and limited resource producers, which includes the majority of socially disadvantaged producers.Our pilot demonstrates an equitable program by: a) easing the administrative burden on producers and the private sector; b) offering minimum payments and equity payments to address historic discrimination; c) tailoring outreach to underserved communities; and d) evaluating how to support limited resource producers in using the Carbon Management Evaluation Tool (COMET).
4. **The private sector lacks a climate-smart certificate that addresses supply chain barriers, works at scale, and leverages public and private investments to avoid penalizing early actors while demonstrating additional climate benefits.** Private carbon market qualifying criteria for demonstrating additional GHG benefits prevent early adopter participation. The Alliance pilot will test a program model to verify and measure total and net GHG benefits. This model will enable the private sector to purchase climate-smart commodity certificates and claim additional investments using average net GHG reductions. Early adopters would be fairly compensated by the program, both gross and net impacts would be reported, and private sector actors would claim only the net impacts to meet their reporting needs. This model also resolves supply chain barriers that commodities confront by disconnecting the certificate from the need for chain of custody tracking. High-end estimates of private-sector market carbon farming are only $5 billion[1], while the cost of national adoption of climate smart practices is approximately $50 billion[2]. Additionally, the pilot will conduct research on consumer willingness to pay for various climate-smart labels to help assess the size of the private market and label effectiveness.

5. **Guidance is needed on how to support producers to effectively use COMET-Planner.** Very few producers have experience with COMET-Planner and our pilot needs to identify what support producers need in order to use the tool effectively. This pilot will use several approaches to inform types of support needed, including outcome evaluation comparing COMET-Planner and COMET-Farm and interviews of participating producers.
6. **Livestock producers are not incentivized to adopt practices that reduce methane gas production and deliver other environmental benefits.** Economic incentivization of climate-smart livestock management requires specific consideration due to 1) the unique variability in investment associated with mitigation options (e.g., cost of feed supplements vs lagoon covers); 2) the technology-specific trade-offs among environmental impact, animal productivity, farm profitability, and other sustainability metrics such as consumer acceptance and animal wellbeing; and 3) the need for farm-specific planning and evaluation of effective, appropriate, affordable, and timely mitigation strategies. To account for these challenges, this project proposes to focus investigations on confined-animal farm operations in Minnesota and Virginia. The goal is to establish a payment system that provides incentives for reducing resource inputs and optimizing productivity, when both metrics are scaled by animal and land unit, and consider the need for reducing use of riparian areas by livestock.

E. Approach to minimize transaction costs associated with project activities

This project will minimize transaction costs in multiple ways:

1. Administrative costs will be reduced by eliminating applicant ranking. All producers willing to adopt climate-smart practices will qualify and a stratified randomized selection process will be applied to ensure statistically representative and equitable enrollment.
2. By using existing measurement tools, the pilot will minimize training and development costs. GHG impact will be quantified using tools such as USDA's COMET and Field to Market's Fieldprint Calculator (for rice), which do not require extensive on-farm sampling. To inform a large-scale program design that can rely on COMET Planner, the pilot will simultaneously evaluate COMET-Planner and COMET-Farm outputs for up to 10% of producers. Additional carbon capture MMRV methods will be employed for comparison with COMET results. Producers will be compensated for extra time needed to use COMET-Farm. Soil Conditioning Index—Revised Universal Soil Loss Equation 2 (RUSLE2) and/or other state-based tools will be used to quantify other environmental benefits.
3. Unlike current carbon market programs, this pilot project will use the USDA best practice of producer self-verification and select audits, which the Congressional Budget Office found effective in current programs. To support private market investments at a dramatically reduced verification and administration cost, program partners will work with corporate stakeholders to propose parameters for a program based on verification of the net and total GHG reductions and reporting of the averages for the private market to use in the purchase of certificates. Process refinements will be suggested based on extensive dialogue with technical experts and private market actors.
4. To improve program design, producer groups, including equity-oriented groups, will host producer meetings in pilot states. Meetings will cover topics such as suggestions to refine

participation processes to minimize transaction costs and barriers to entry. Listening to producer suggestions, questions, and concerns will be an important feature of all producer meetings.

5. Livestock pilots will include recommendations on verifying methane reductions using practical, scientific, and cost-effective methods. Methods will be considered including drones for spot-checking and feedback from producers will be gathered to inform a practical approach for a voluntary program that delivers scientifically valid results.

F. Approach to reduce barriers to implementing Climate-Smart Agriculture and Forestry (CSAF) practices for the purpose of marketing climate-smart commodities

This project will reduce barriers to implementing climate-smart practices by:

1. Designing a program that will dramatically increase the supply of climate-smart commodities by compensating producers at a payment level that offers a reasonable return to overcome the risks inherent in adopting new production practices.
2. Designing and deploying a prototype Climate-Smart Certificate through discussions and one in-person workshop with producers and multinational corporations, hosted by the Sustainable Food Lab, focused on overcoming supply-chain barriers in the commodity sector and not penalizing early adopters.
3. Distributing a prototype certificate to enrolled Alliance pilot producers to facilitate market access for selling CSC goods or the associated captured carbon.
4. Testing consumer willingness to pay for climate-smart labels through a Virginia Tech study of supermarket consumers using different labels and price points.
5. Supporting the participation of small producers by setting a minimum payment value and progressive payment structure.
6. Ensuring meaningful participation by underserved producers through mechanisms such as funding allocations, travel stipends, minimum payments, and equity payment terms.
7. Piloting a simple application and enrollment process to encourage greater interest in and access to the program.
8. Improving the verification process to be more practical for producers while remaining effective and useful for purchasers.
9. Providing TA to support practice adoption through existing networks of expertise in soil and water conservation districts within pilot states.
10. Developing a tool to model climate-smart livestock practices' environmental benefits by region and practice to enable payment terms that reflect public benefits and economic context.

G. Geographic focus

The Alliance pilot project will be implemented in Arkansas, Minnesota, North Dakota, and Virginia to test the concept in a diverse array of geographies, ecologies, and economic contexts. Within each state, conservation districts will be selected to reach a diversity of operations and ecologies. Technical workstreams and conferences, tools, reports, producer meetings, and stakeholder dialogues will inform our climate-smart program design.

H. Project management capacity of partners, including description of existing relationship with and/or prior experience working with producers or landowners, promoting climate-smart commodities

Virginia Tech is a "Research-1" Land Grant University with an annual research portfolio of more than $500 million; the College of Agriculture and Life Sciences (CALS) has an annual portfolio of $50 million in external grants and contracts. Virginia Tech's influence reaches into every county and city in Virginia through Virginia Cooperative Extension, which it leads in collaboration with Virginia State University, Virginia's 1890 Land Grant University. The project management and financial capabilities of Virginia Tech and CALS will be leveraged to ensure the success of this project. A project management unit with management, financial, and communication responsibilities for the entire project will be located at Virginia Tech.

Our partners were selected based on their experience and expertise. Our implementer partners include the Arkansas Department of Agriculture, the Minnesota Board of Water and Soil Resources, the North Dakota Farmers Union, and the Virginia Department of Conservation and Recreation. Our producer partners include Arkansas Rice Federation, Agricultural Council of Arkansas, Minnesota Soil Health Coalition, Minnesota Farmers Union, Minnesota State Cattlemen's Association, NACD, and National Black Growers Council. Additional partners include Sustainable Food Lab, Environmental Initiative, and SoAR.

Our partners have a rich history of working with producers and landowners as well as promoting climate-smart commodities. Relevant to this project, their experience and expertise in working with producers and landowners includes contributing insights at producer meetings; providing guidance to landowners on climate-smart practices; and sharing information on watershed improvement opportunities. Our partners have been working with producers and landowners for a combined 150 years.

Our partners' histories include promoting climate-smart commodities through means such as supplying information on greenhouse gas benefits to producers; distributing information to landowners on ways to produce climate-smart commodities; collaborating with corporations to expand programs that engage producers in their supply chains to increase the supply of climate-smart commodities, and giving incentives to landowners who produce climate-smart commodities. Our partners have been doing this work for a combined 70 years.

In addition, this project will be informed by former USDA senior leaders Kevin Norton and Brad Karmen. Norton served as Associate Chief for the USDA National Resources Conservation Service (NCRS) and Karmen served as USDA Assistant Deputy Administrator for Farm Programs. They will advise on the pilot and program design recommendations based on USDA best practices for creating an economical, efficient, and environmentally impactful pilot program, based on their combined 80 years of expertise.

II. Plan to pilot climate-smart agriculture on a large scale

A. Description of climate-smart practices to be deployed

Qualifying practices will be selected from the USDA NOFO-identified list of practices as well as conservation crop rotation. Each implementing partner will assess the list for relevance to the selected state, county, and commodities. Environmental and cultural resources review will be conducted when required by USDA-NRCS guidelines. Each practice must meet the NRCS specifications for the respective state. Some NRCS livestock protocols allow for a wide set of

practices that may not deliver GHG benefits, so the livestock sub-pilot will develop a tool to incentivize reduced inputs and improved productivity, informing the refinement of NRCS protocols to be more climate-friendly. Qualifying practices will include, with NRCS codes:

- **Crop practices:** Cover crops (340); no-till (329); reduced till (345); nutrient management, including precision nutrient management (590); conservation crop rotation (328); silvopasture (381); riparian forest buffer (391); riparian herbaceous cover (390), tree/shrub establishment (612), pasture and hay planting (512).
- **Rice practices:** Residue management, no-till (329); residue management, reduced till (345); irrigation water management–alternate wetting and drying for water conservation in rice (449); conservation crop rotation (328); nutrient management, including precision application and/or advanced formulations (590).
- **Livestock practices:** Comprehensive nutrient and manure management plan and implementation (102); roofs and covers (367); waste separation facility (632); feed management to reduce enteric emissions (592); prescribed grazing (528); nutrient management (590); silvopasture (381)

B. Plan to recruit producers, including estimated scale of the project (e.g., number of landowners, acres targeted, head of livestock)

Recruitment. We target enrolling more than 4,500 producers across four states in our pilot program. To do so, we assume that we will need to reach some multiple of this number of producers to yield enough interest. A priori, we have no idea what this multiple is. Therefore, we propose to use multiple communication channels to reach producers, including 1) website and social media, 2) existing channels of communication such as Conservation District and Cooperative Extension listservs and equity partner networks, and 3) face-to-face engagement. Based upon the extensive experience of our partners, we believe face-to-face engagement will be crucial for success in attracting applications and enrollment. Among agricultural audiences, person-to-person engagement events such as county extension meetings, conservation district meetings, and field days at research centers play a major role in attracting and informing producers. Furthermore, 40% of our enrolled producers are to be from underrepresented and limited resource populations. Such producers may not be connected to traditional agricultural communication channels such as county extension. The implementing conservation districts will be the primary, but not only, recruiters based on their extensive reach to thousands of producers. Each state will also have an equity partner focused on outreach to underserved producers, such as the 1890 land-grant university and the National Black Growers Council. The state agencies and producer group partners will also advertise in their communication channels reaching tens of thousands of producers. We have proposed 75 producer-focused meetings and field days across the four pilot states and three years, with an estimated 4,100 attendees.

County/district selection. State pilot leads, in consultation with the Advisory Council, which includes the NACD, will identify a combination of conservation districts to a) reach all major commodities including grazing and animal feeding operations plus specialty crops; b) reach underserved producers; c) have capacity for providing technical assistance; and d) meet any additional state-specific criteria such as watershed priorities and environmental justice co-benefits.

Statistically representative selection. Virginia Tech researchers will develop an applicant selection model that statistically represents state demographics and does not set any restrictions on producer participation to inform program design. The model will include criteria such as diversity of commodities, operation size, underrepresented producers, and previous adoption of climate-smart practices.

Project Scale. This project is designed to yield information that could inform future program design, while also making a significant impact in the pilot stage. The pilot will reach an estimated 4,400 - 4,800 operations representing a total of 475,300 acres or animal units. This estimate assumes a project budget of $80 million with $57.3 million going directly to producer payments, including a $4 million allocation for high-cost livestock practices, and a cap of paying for the adoption of practices on 160 acres or animal units per operation. Additionally, participating farm sizes will reflect state farm sizes, socially disadvantaged and limited resource producers will earn 25% equity payments, and new producers will be selected for participation in the second year in three of the four states, Minnesota the exception. The pilot scale may differ slightly from the above goals depending on the districts and counties selected. The estimated scale of the pilot per state is as follows:

State	Cropland Acres	Pasture/Range Acres	Animal Units
Arkansas	76,672	31,242	23,405
Minnesota	57,865	2,852	12,782
North Dakota	95,616	33,768	1,936
Virginia	72,923	48,791	17,447
Total Pilot Units	303,076 (64% of pilot units)	116,654 (24% of pilot units)	55,570 (12% of pilot units)

C. Plan to provide technical assistance, outreach, and training, including who will be conducting these activities, qualifications, and project timeline

State pilot implementation. In all four pilot states, state pilot leads will implement the pilot by sub-granting or contracting with selected conservation districts and other experts to conduct outreach and enrollment and provide technical assistance (TA). The supporting team of partners is tailored to each state's context.

State leads will: a) receive all state pilot funds and sub-grant or contract to all partners doing TA, outreach and training; b) under Virginia Tech's leadership, coordinate training of TA providers on COMET tools and the pilot program overall; c) help identify the best-suited region for pilot implementation after the grant is received; and d) help refine the pilot program design. State leads will also establish parameters for the conservation districts to conduct local outreach, facilitate the application process, aggregate performance data, and conduct oversight of TA providers and COMET/ Fieldprint. Finally, state leads will provide overall administrative leadership for state pilots. In Minnesota and Virginia, the state leads will supplement federal

PCSC grant funding with state-based funds to enroll more units and/or additional practices for pilot participants.

Technical assistance will be provided by local conservation districts and contracted TA providers with demonstrated, successful experience working with agriculture producers and equity groups for planning and implementing qualifying practices. Please see state lead scopes of work for a list of these providers. Outreach and enrollment of producers will be conducted by the conservation districts as well as contractors with expertise in targeted outreach to underserved communities.

Project Timeline. The timeline is approximate and assumes project initiation on or near 1 July 2023. Additional details are given in the accompanying milestones document.

D. Plan to provide financial assistance for producers/landowners to implement climate-smart practices

Defining Qualifying Operators. This project will allow one application per Farm Service Agency (FSA) farm number, with the payment going to the FSA designated operator or to be divided as designated on the enrollment form and contract. The participant selection model will allow up to two FSA farm numbers per designated operator.

This project will pay producers $100 per acre or animal unit per year for voluntary adoption of climate-smart practices that deliver more than that amount in public environmental benefits. This payment level reflects the combined public value delivered to climate, water, and other environmental benefits, while covering the cost of the practice and de-risking adoption with an additional financial incentive. Producers will receive 50% of the payment upfront, 25% after implementation and verification, 25% after final reporting is completed. Limited resource producers may be eligible for a 100% upfront payment. If a participant is unable to implement the approved practice in year one due to conditions outside of their control, such as weather, they will be given an extension to install the practice in the second year. If a farmer does not adopt the practice after two years, they must return the funds or apply for an extension due to extenuating circumstances. The budget in this application assumes a 160-acre or animal unit cap per FSA farm number, except for the MN and VA livestock sub-pilots which may set a different cap. Equity payments are explained below.

All payments to producers will be issued by Virginia Tech. Once a producer is enrolled in the program, they will receive a debit card in the mail that will be used to load disbursements. Along with the card, farmers will receive a card holder agreement document containing the terms and conditions of the card. This document will list information on how to use the card and includes a disclosure of any applicable fees, including card replacement, foreign currency conversion, and ATM fees. Information on how to check balances and contact customer service is also included. Participants will be registered and the card mailed to the participant prior to any money being loaded into the account. Upon receipt, the participant will be directed to call, confirm their identity/enrollment and then Alliance project staff will transfer the funds to the card program. This will ensure the card is in the hands of the participant and no funds are “lost in the mail”. There are procedures included in the terms of the card regarding replacement options for lost cards, etc. We have a vendor and are finalizing the contract now. The vendor was selected through an RFP process to select university wide solution(s) for research participants and other payments.

Refining Payments for High-Cost, High-Value Livestock Practices. Because climate-smart livestock practices have significant variability and can be broken down into incremental practices (i.e., those incentivized under the per animal model) and high-cost, high-value practices (i.e., digesters, etc.), the incentivization of these practices requires a different structure. To address the regional variety of grazing and rangeland ecologies and economics, Virginia Tech will create a livestock tool that establishes a payment per head, which could be more or less than $100/AU, to achieve ideal reductions in input use and increases in productivity, based on five-year goals of moving toward warming neutrality. The ultimate goal of the data collection in these pilot investigations would be to establish market-informed incentives that are regionally sensible and can be generated uniformly across operation locations, types, and sizes.

Additionally, the pilot will provide $2 million to both Minnesota and Virginia to pilot the implementation of high-value and high-cost climate-smart practices in Animal Feeding Operations (AFOs). Targeting a small number of swine, dairy, poultry, and beef operations, this project will test and evaluate the payment terms and program design for the practices necessary to effectively reduce methane and nitrous oxide emissions from these operations. The conservation practices selected will be tailored to each operation and will include such items as basic lagoon covers, collectors and converters, separators, and composting systems. By paying for the full cost of an integrated waste management systems approach, the project will yield information with respect to the costs, technology, and management requirements to effect voluntary adoption of these practices across the United States.

Compensation for COMET-Farm. Producers using COMET-Farm will be compensated $1,000 each for the estimated 35 hours to collect and input historical farm data. These payments are included in the $57.3 million request for producer payments.

E. Plan to enroll underserved and small producers, including estimated number of underserved and small producers participating, and associated dollar amounts anticipated to go directly to producers, in the form of financial and technical assistance

Definitions. Underserved producers include beginning producers, socially disadvantaged producers, veteran producers, limited resource producers, women producers, small producers, and producers growing specialty crops. Socially disadvantaged producers include those belonging to groups that have been subject to racial or ethnic prejudice, such as farmers who are Black or African American, American Indian or Alaska Native, Hispanic or Latino, and Asian or Pacific Islander. We will use the USDA definition of a limited resource producer, which means a participant "with direct or indirect gross farm sales not more than the current indexed value in each of the previous two years, and who has a total household income at or below the national poverty level for a family of four, or less than 50 percent of county median household income in each of the previous two years."

Outreach & Inclusion. The National Black Growers Council and the Alliance DEI Committee will support outreach to inform their members about the opportunity, including hosting producer meetings focused on outreach, encouraging their members and constituents to apply, and informing program design. We also propose to engage four additional partner organizations, one per state ("Equity partners") to receive subawards. These organizations will be selected based upon their existing connections with and demonstrated ability to reach

underserved and underrepresented producers, to help our Alliance reach our goal of 40% enrollment of producers in these categories. These organizations will support this project by helping to encourage application and enrollment by underserved and underrepresented producers. Equity partners will submit their draft outreach plan for guidance by the Advisory Council and DEI Committee.

Equitable Participation. Virginia Tech researchers will create a model that selects participants to ensure program diversity. This model will prioritize selecting a statistically representative sample of participants while ensuring sufficient allocation for underserved producers. In keeping with the spirit of the Justice40 initiative, at least 40% of participants will be underserved producers.

Equitable Funding Allocation. The pilot will allocate 5% of funds for socially disadvantaged producers and 5% for limited resource producers in each state. If the funds are not used during the first year, they will be rolled into the second year allocation for underserved producers. Additional efforts will then be made to achieve the goals, including potentially adjusting the selection of conservation districts to reach more socially disadvantaged producers.

Equity Payments. Limited resource producers, socially disadvantaged producers, and producers from female-only operations automatically qualify for an equity payment valued at 25% of the baseline $100/unit. A minimum payment of $500 will be provided to operations with fewer than five acres. Operations with fewer than five acres and operated by a participant eligible for equity payments will receive a minimum total payment of $625.

Estimates of producer reach and direct payments. To achieve the Justice40 goals to include underserved (including small) producers, at least 40% of participants will be underserved reaching at least 1,800 operations. Additionally, a minimum of 550 operations with socially disadvantaged or limited resource producers will participate in the pilot project. Socially disadvantaged and limited resource producers will receive $125 per acre on a maximum of 160 acres. Direct payments will total as much as $20,000 per operation. Assuming an average practice cost of $36 per acre, net profit per operation could reach $14,240 per year.

Producer Category	Number of Operations	Percent of Operations	Number of Acres/Animal Units	Percent of Acres/Animal Units
Underserved, total	1,843	40%	142,590	30
Socially Disadvantaged	276	6%	19,012	4
Limited Resource	276	6%	19,012	4

III. Measurement/quantification, monitoring, reporting, and verification plan

A. Approach to GHG benefit quantification, including methodology approach consistent with the section titled “Quantification Requirements” below

Quantifying GHG Benefits. Participants will quantify and report total GHG benefits through the use of COMET-Planner. COMET Planner does not include feed management, manure management, or rice, so operations implementing those practices will use alternative tools including COMET-Farm and Field to Market’s Fieldprint Calculator. Virginia Tech will

aggregate the data from all participants to report total and additional GHG impact. To enhance the robustness of GHG quantification, up to 10% of participants will use both COMET-Planner and COMET-Farm. Virginia Tech will extrapolate the difference in findings from the two COMET tools regarding additional GHG and long-term GHG impact projections. The results will inform how a COMET-Planner-based program can be augmented by COMET-Farm to obtain finer-scale estimates of farm-level GHG benefits. COMET-Farm will also allow the assessment of GHG benefits associated with changes in practices over a longer period of time. These results can be extrapolated from the COMET-Farm subset to provide a range of aggregate impact around the baseline impact estimated using COMET-Planner.

The above data-driven results will be complemented by a literature-review approach that estimates gross and net GHG impacts using studies of GHG impact for each climate-smart practice, rather than operation-level data. Using national data on rates of early adoption of climate-smart practices, the early adopters' GHG benefits will be subtracted and the additional GHG impacts will be reported. This model allows early adopters to be compensated for their contributions and allows the reporting process to track gross and additional GHG benefits.

Virginia Tech researcher Dr. Mark Reiter will work with state pilot leads and SWCDs to collect and analyze soil samples on a limited number of operations to evaluate efficacy of cover cropping, grazing management, and other CSAF on GHG sequestration potential. Dr. Robin White will direct measurements and modeling of on-farm verification of greenhouse gas emissions and various metrics of broader ecosystem services, to be focused on locations in Virginia and Minnesota where high-cost livestock practices have been implemented as part of the Alliance pilot. For each farm, she will collect comprehensive manure samples from the manure storage and handling systems to be evaluated for composition of volatile organic solids, as well as N and P fractions. We have also requested budget for three additional contracts, $25,000 each, for measurement/quantification, monitoring, reporting, and verification (MMRV) to supplement COMET and other measurements. This might include soil analysis, remotely sensed data, or other relevant measurements.

To design a pilot program that does not penalize early adoption, Virginia Tech will develop a model and guidance for refining the methodology over time to inform how our pilot can include early adopters and quantify the total and additional GHG in a manner that is scientific and practical, such as by subtracting the average rate of early adoption. The Advisory Council will use those model insights along with the Alliance proposal to develop recommendations on how to account for total and additional GHG benefits while fairly compensating early adopters.

Quantifying Additional Environmental Benefits. To capture and demonstrate the additional environmental benefits from the implementation of the selected practice, the state pilot lead will provide data derived from the conservation planning process as appropriate for the enrolled acres, such as soil condition index, tons of soil erosion reduced, reduced application of nutrients, water quality benefits, etc. The state pilot lead will utilize RUSLE2 and provide the data to Virginia Tech, which will aggregate, report, and quantify the dollar value of soil and water quality benefits. Fieldprint also provides data on additional environmental benefits, including biodiversity, water quality, soil conservation, irrigation water use, energy use, and soil carbon.

For several of the climate-smart practices included in the pilot, the SoAR technical session on payment terms will include a comprehensive literature review to assess and quantify

the stacked ecosystem service value delivered, including GHG benefits, using national and regional studies to provide estimates of public value. This work will draw on existing analysis conducted by the Rural Investment to Protect our Environment (RIPE) organization of the stacked ecosystem service value of the practices included in the pilot, each of which exceeds the threshold of delivering $100/acre or AU in total environmental benefit. This report will inform the level of public value generated by our climate-smart program and contribute to streamlining the approach to incentivizing the adoption of climate-smart practices.

B. Approach to monitoring of practice implementation, including the anticipated number of farms and acres reached through project activities

Pilot participants will self-report implementation of the practices adopted under the pilot. The conservation districts and other contracted TA providers will conduct spot checks of at least 10% of self-reporting farms to provide third-party verification. The spot checks will be structured to ensure that a subset of all adopted practices is sampled. The state pilot lead will report the number of operations, acres of each practice, and findings from the monitoring and compliance spot checks to the pilot lead. The reach of the project scope is addressed under II.B.

C. Approach to reporting and tracking of greenhouse gas benefits including the anticipated GHG benefits per operation, per project, per commodity produced, per dollar expended, and the anticipated longevity of GHG benefits

Reporting of GHG Benefits. Producers will report their GHG benefits using COMET and/or Fieldprint tools with or without TA support, as described above. Virginia Tech researchers will aggregate and report the GHG and environmental benefits by operation, project, commodity, dollar expended, and anticipated longevity of GHG benefits. This analysis will include a review of data provided by producers without COMET tool TA support compared to those receiving TA support, the use of COMET-Farm versus Planner outcomes, and the ability of smaller producers to use the tools. Results of this analysis will inform recommendations on the levels and types of support needed by producers enrolling in a program using the COMET tools. This data-driven reporting will be augmented by a literature review of climate-smart practices' GHG and ecosystem service values, leveraging RIPE's existing compilation of research. Virginia Tech will also assess how the transaction costs of reporting GHG benefits may vary across operations and with various production and socioeconomic dimensions.

Tracking and Marketing of GHG Benefits. Virginia Tech will report the GHG benefits accrued by each producer as well as across the pilot program using the tools identified above as well as other TBD partner-provided MMRV tools. Participating producers will be eligible for a prototype certificate that "certifies" either the value of environmental benefit of their product (e.g. "climate smart" rice) or the GHG benefits as a stand-alone product divorced from the commodity. Alliance partners will develop relationships with potential purchasers of these climate-smart commodities and/or GHG benefits and will promote the certificates to these organizations. In addition, Virginia Tech and partners will seek to establish pilot-specific relationships with companies and organizations that pay for either carbon or climate-smart commodities and with which enrolled producers may already have a relationship, thus capitalizing on existing channels through which to augment producer value. For example, if a producer is already paying for a tool or dashboard to manage his or her farm, and that tool has a

channel through which they can begin to sell their environmental benefits, the Alliance will seek to establish a relationship with said company to easily support our producer's access to that marketplace.

Simultaneously, the Sustainable Food Lab (SFL) conduct interviews with corporate commodity purchasers, technical experts, producers, and Alliance partners and host a design workshop to develop at least two models for a climate-smart certificate that can be used with private sector purchasers to overcome commodity market supply chain challenges and that utilize the learnings from the certificate prototype process described above. These workshops will engage the members of and leverage the insights from the Sustainable Food Lab, the Midwest Row Crop Collaborative, and others.

There will be four main outputs from this SFL-led dialogue:

1. White Paper on a Model for Climate Smart Public-Private Market Integration, which will describe the context and design elements needed for a certificate system that includes chain of custody. This model will be crafted through a process of interviews with, discussions among and reviews by at least 6 food companies with science-based targets (SBTs). After the draft is developed, SFL will share it with key stakeholders to solicit their feedback, input, and recommendations which will then be used to refine the model. Taking account of difficulties with permanence, additionality, and the ability of participants in collaborative landscape initiatives to claim credit for their contributions to net emissions reduction and other environmental benefits, this white paper will propose solutions that enable private market purchasers to participate in the CSAF market while also meeting internal and external reporting requirements that dictate whether they can claim credit for environmental impacts.
2. White Paper on a Model for Climate-Smart Public-Private Market Integration without Chain of Custody that proposes a draft model for using certificates in commodity supply chains. This would be relevant to actors, including feed and biofuels, which do not have visibility to chain of custody and use an average figure, such as is done in the mass balance model in commodity grain purchases. Utilizing insights gained through interviews, SFL will develop a draft model for feedback and produce a white paper that describes the certificate model in which a certificate might help support both farmers and supply chain actors. In dialogue with key stakeholders, SFL will propose a system to assign the participating acres or animal feeding operations with a climate-smart certificate that has a tracking number captured in a centralized system, overcoming the need for chain-of-custody tracking. In this model, the producer may choose to market their products as climate-smart and/or engage the private sector to purchase applicable certificates. Private sector buyers would be able to report their investments in GHG benefits using an average value assigned to each unit within the program.
3. A Certificate Program open to all enrolled producers, to be launched early in project year 3. The certificate should be synergistic with producer needs, livestock and ethanol supply chains, corporate supply chains with SBTs, and other collaborations.

4. SFL will contribute to the Alliance project final report with summaries of interviews, meetings, and research on outcomes of the certificate program resulting from our three-year, four-state pilot.

Based on recommendations and feedback that emerge during the prototype certificate process as well as our partnerships with purchasers and marketplace providers, the proposal will be refined to meet private sector reporting and tracking needs, including the evolving Securities and Exchange Commission (SEC) disclosure of GHG rules. The aim is not to replicate the carbon offset model, but rather to design new models that rely on measurement and verification processes that are similar to existing USDA processes. Alongside developing a prototype for a chain-of-custody model, the goal is to test the feasibility of projecting impact based on statistical models rather than monitoring every field, allowing for a more practical program, with adjustments made to certificate values based on the determined accuracy of producers' self-verified GHG claims and level of additionality. The dialogue will explore options, such as a tracking system that publishes the total and average GHG impact by acre or animal unit, and potentially by commodity.

Anticipated GHG and Environmental Benefits. The project's impact is best described in the context that it is shaping a program that will have significant impacts in the pilot stage, and could inform larger-scale programs. We estimate that 80% of operations in the United States would be enrolled in a national program that provides payments at rates that surpass policy costs. This would reduce the agriculture sector's emissions by 55% and total U.S. emissions by 8% after ten years using existing practical climate-smart measures. Agricultural methane emissions would be reduced by 32%, and total U.S. methane emissions would be reduced by 8% compared to 'business as usual' estimates. Such a national program would have a benefit:cost ratio of 9:1, for a total environmental benefit of $415 billion, assuming multiple climate-smart practices are implemented on the same cropland acres and animal units after ten years of the program[4]. SoAR and Virginia Tech will update the environmental impact projection based on the pilot results, technical session findings, research, and stakeholder feedback.

The pilot's near-term impacts will be an estimated GHG benefit of 215,000 metric tons carbon dioxide equivalent (CO2e) and a total environmental value of $170 million[5]. Per operation, this equates to a GHG benefit of 47 metric tons, assuming 160 acres or animal units per operation. Pilot practices provide a yearly GHG benefit, thus, a scaled-up program could incentivize longevity by offering yearly payments. Per dollar expended in direct payments, the GHG benefit is 0.004 metric tons CO2e[6]. This is in addition to the 3:1 benefit:cost ratio that pilot practices will provide in stacked environmental benefits, such as water quality and conservation, air quality, and soil health. While existing carbon market models may spend less per ton of GHG reduced, only 3% of producers participate in these programs due to low payment rates. Increased funding for GHG benefits beyond cost-share is necessary for incentivizing widespread adoption, significantly reducing agricultural emissions, and generating stacked environmental benefits beyond carbon.

Using model results from the COMET-Planner tool, the pilot's cropland practices will provide an estimated average per-acre GHG benefit of 0.4 metric tons. Grazing practices will provide an average per-acre GHG benefit of 0.1 metric tons[7]. Using existing regional and national studies, feeding operation practices will provide an average estimated per-animal unit GHG benefit of 0.8 metric tons[8].

D. Approach to verification of GHG benefits

- To verify the GHG benefits reported by COMET-Planner and provide added accuracy, up to 10% of participants will also use COMET-Farm.
- To verify the quality of TA provided, pilot leads in collaboration with Virginia Tech will establish internal quality assurance for the climate data entries supported or assisted by their TA provider (Virginia Tech or otherwise) by ensuring that each TA provider is knowledgeable in the use of COMET tools.
- To verify that practices were adopted, local conservation districts will conduct oversight with on-site spot-checks on at least 10% of participating farms per year and by reviewing the tailored conservation plans compared to the COMET run outcomes.
- Virginia Tech researchers will 1) evaluate efficacy of cover cropping, grazing management, and other CSAF practices on GHG sequestration potential, and 2) measure and model on-farm GHG emissions and various metrics of broader ecosystem services, at locations in Virginia and Minnesota where high-cost livestock practices have been implemented.

These verification methods will assess the accuracy and validity of the data provided for the project acres. Soil and livestock practice samples and data to be collected by Virginia Tech researchers will provide further insight into the validity of modeled data. State pilot leads will correct the COMET data that is submitted to Virginia Tech and will report on the types and scale of errors. State pilot leads will also make recommendations for verification process improvements for potential scalability. The project will also look to other USDA Partnership Network pilots for refined verification approaches.

E. Agreement to participate in the Partnerships Network

The Alliance pilot partners agree to participate in the Partnerships Network.

IV. A plan to develop and expand markets for climate-smart commodities generated as a result of project activities

A. Any partnerships designed to market resulting climate-smart commodities

As described above, our Alliance will develop and distribute a prototype certificate that captures the environmental benefits delivered by enrolled producers and allows them to transfer ownership of either their climate-smart certified commodity or the GHG benefits delivered. Virginia Tech and other partners will build a marketplace of purchasers and actively connect the enrolled producers to this network, with the goal of linking every producer who wants to sell into this marketplace with a buyer. Additionally, the Alliance will seek partnerships with companies that may already be working with our producers to enable ease-of-use of any existing marketplace.

Additionally, the Sustainable Food Lab will host interviews, workshops, and a design workshop to gather and provide guidance on one or more models for a climate-smart certificate that would de-risk private-sector investment in climate-smart commodities by overcoming existing supply chain challenges. This climate-smart certificate model - developed and refined in

partnership with major food and beverage manufacturers and processors that include but are not limited to Pepsi, Cargill, Mars, and Unilever - would be designed to enable a new marketplace for both the climate-smart commodities and their associated environmental benefits.

In addition to the project-specific generation of private market opportunities, this project also enables producers to market their climate-smart commodities to the American public as a worthwhile investment of the public dollars of the Climate Smart Commodities grant. Public support of government investments in farmers to improve soil health and water is over 93%, while public opinion of government spending on "climate" in general is as low as 39% with rural Republicans (Robert Bonnie, Duke University). The project's assessment of other stacked environmental benefits is designed to support producers in marketing their climate-smart commodities in a popular manner.

To help determine how to develop and promote a potential climate-smart commodity market, Virginia Tech researchers will study consumers' preferences and estimate their willingness to pay for climate-smart labeled goods using incentive-compatible field experiments, which are a standard research approach on consumer preference. Study details can be found in the Virginia Tech scope of work. The research will identify customer concerns, understandable terms and messaging, and acceptable premiums with the goal of determining consumer demand for climate-smart products. These analyses on climate-smart market dynamics will help inform the potential to scale the activities associated with the Climate-Smart Commodity concept, estimate the additional possible benefits to participating producers, and assess the long-term viability of these activities beyond the project period.

Finally, we propose to select three additional "marketing partners", with subawards of $39,919 each, to access or develop additional marketing channels for enrolled producers. Activities under these awards are to be determined, and could include connecting corn producers with low-C ethanol feedstock markets, allowing enrolled producers to take advantage of existing "premium" markets for agricultural product (e.g. "Virginia Grown"), and connecting enrolled producers with local and regional markets for climate-smart products. None of our current partners have the necessary expertise nor connections to create such opportunities for enrolled producers. Virginia Tech will initiate and lead the dialogue to engage these additional partners to help our enrolled producers access other markets that will reward the production of climate-smart commodities.

B. A plan to track climate-smart commodities through the supply chain, if appropriate

Through the aforementioned prototype certificate, we will "pilot" a model that would incorporate the following design elements:

- Producers enrolled in the program will be assigned a climate-smart certificate, per acre or animal unit, that has a tracking number.
- Climate-smart certificates will be registered with a project-specific tracking system.
- Informed by feedback that emerges from producer and buyer experience of marketing or purchasing the certificates as well as during the meetings, the tracking system will include information that is needed by commodity purchasers to meet their sustainability goals. Information may be provided as a program-wide average or it may be tailored to include: facility location, climate-smart practices, owner, size, crops, the start date of climate-smart practices, emissions reduced due to climate-smart practices, and a fuller set of environmental benefits.

The model(s) will include a process by which GHG benefits from participating farms, ranches, and animal feeding operations will be calculated and projected. Private sector buyers of the commodities and/or certificates will thus be enabled to report their supply chain GHG emissions reductions using these calculated values. Those purchasing the commodities will also be able to label their products as containing "climate smart" ingredients. The certificate protocol will align with the emerging SEC guidance on GHG emissions and climate-related risk disclosure.

In consultation with workshop participants (producers, companies from across the agriculture supply chain, and those corporations that would be interested in purchasing the climate-smart commodities), project partners will refine the certificate model(s) to ensure that climate-smart commodities can be easily tracked through the supply chain in a manner that reflects accurate climate benefits while not creating administrative burdens for either producers or purchasers. The model will also enable climate-smart commodities to be clearly marketed and their benefits measured and claimed by producers and/or purchasers.

C. Estimated economic benefits for participating producers including market returns

Each participating producer will receive $100 per acre or animal unit enrolled, with additional payments being made available to some underserved producers and those implementing high-cost livestock practices. According to NRCS data, the cost of implementing many climate-smart practices ranges from $3 per acre to $70 per acre, so the engineering estimated return is $63 per acre, with a range of $97 to $30 per acre. Assuming 160-acres or animal units, each participant will receive an average gross payment of $16,000 (split into three tranches in most cases) and an average net return of $12,600 per year. For underserved producers eligible for equity payments, the payment rate of $125 per acre will result in an average net return of $10,080 per year. Pilot-wide, participants will receive an aggregate net return of approximately $30 million, after practice costs. Commodity, equity, and other producer groups and additional partner organizations will host producer meetings to solicit feedback on the scale of economic impact on participating farms and the level of producer interest in the program.

Virginia Tech will also track the economic return to producers who participate in a climate-smart commodity marketing program (i.e. the certificate program), based on consumer and intermediary buyer demand for the climate-smart commodities and/or GHG benefits and the climate-smart certified food results obtained from the supermarket experiment described above.

D. Post-project potential, including anticipated ability to scale project activities, likelihood of long-term viability beyond project period, and ability to inform future USDA actions to encourage climate-smart commodities.

The post-project potential to scale is significant due to its strategies to a) spur supply of climate-smart commodities, b) shape a private market certificate model that leverages the benefits of a public program, and c) develop tools and program design guidance that can effectively serve a national program. To inform future USDA actions to encourage climate-smart commodities, this project integrates robust stakeholder engagement and research to build models and program design recommendations.

- Design payment terms to rapidly scale the adoption of climate-smart production practices by covering practice costs and incentivizing behavior change while also reflecting the public value of environmental benefits. Focusing on de-risking producer investment in climate-

smart practices while also enabling them to earn a reasonable return for adopting those practices is key to ensuring the long-term viability of a CSAF program.

- Develop a model for compensating livestock practices in a manner that refines NRCS protocols to integrate GHG impacts and addresses high upfront costs.
- Recommend ways for USDA to encourage integrating productivity within climate-smart programs and demonstrate additional GHG benefits without penalizing early adopters.
- Refine a climate-smart program that is designed by producers and technical experts that focuses on being simple and practical for all producers, including underserved producers.
- De-risk investments in climate-smart practices and overcome supply chain barriers by designing a certificate model for the private sector to invest in and "claim" program benefits in their environmental impact improvement reporting.
- Release a final report on how lessons learned and perspectives generated through the pilot program, research, producer meetings, marketing efforts, and engagement with experts can inform the national scaling of a climate-smart commodity program.