GIC Group: CPC Intro

Ag Emission Reduction Futures Contracts to Reduce GHG Emissions and Increase Farm Incomes

SUMMARY

Goals and Objectives

- CPC (Commodity Plus Carbon) contracts are designed to offer hedging opportunities for ag suppliers and for industries in the ag supply chain.
- Merging carbon and crop prices in individual futures contracts (CPC corn and soybean futures are the first roll-outs scheduled for 2022/23) will create cash/basis premiums for growers.
- Develop a strategy which is market driven and rewards growers and the entire ag value chain at minimal transaction costs. The CPC system awards first adapters first and invites participation without long-term contractual commitments.
- Enhance the competitiveness of US grain exports and respond to new foreign market requirements in satisfying carbon footprint requirements.

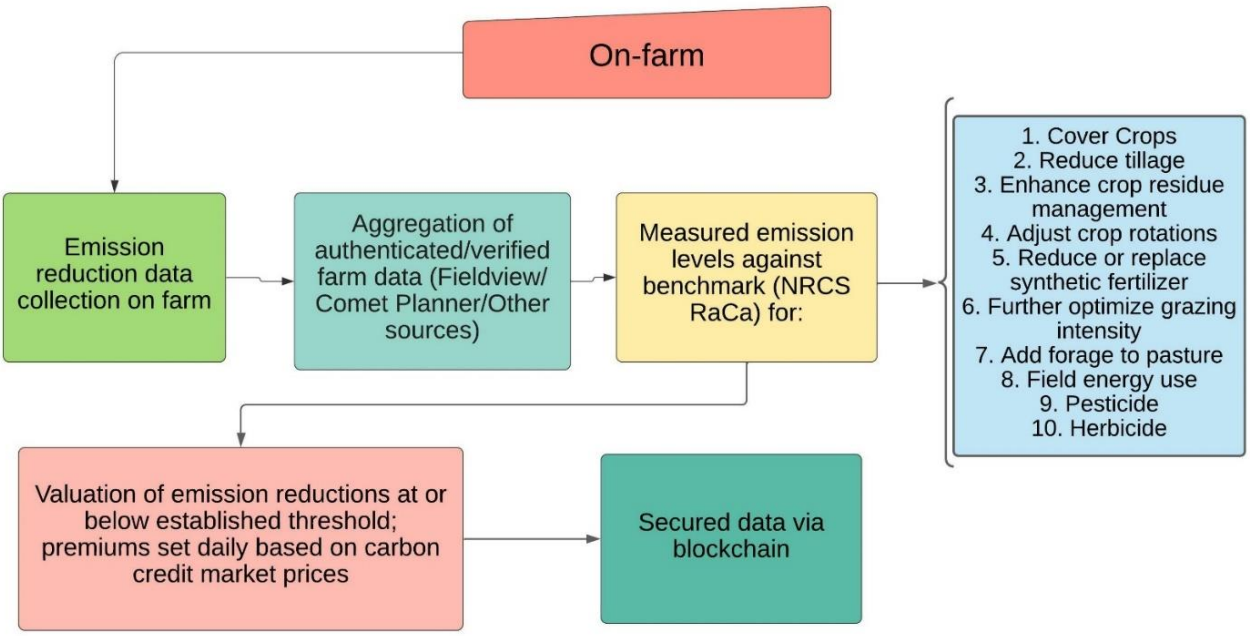
Compelling Need for the Project

- Grower margins decreasing due to inflationary input prices.
- Burdensome cost outlays and liability exposure in private sector direct carbon payment programs.
- Forecasts of lower prices for on farm carbon reduction practices based on lower carbon prices.
- Credible and reliable carbon data depends on access to diverse databases and verification systems.
- European Union's Green Deal strategy and potential changes in China's import regulations likely to introduce carbon tariffication for corn and soybean imports if suppliers fail to satisfy EU/ China standards.

How Does the CPC System Work?

- CPC futures contracts (corn/ soybeans) offers growers a monetary incentive in the form of cash/basis price premiums for reductions in carbon/ GHG emissions below an established benchmark on eligible CPC crops.
- CPC eligible crop participation is strictly voluntary. Growers are not bound by long-term contracts; instead, they earn premiums on CPC crop deliveries and are paid upon verification of the emissions level on a segmented field or by the certified load delivered to the local elevator. There are no transaction fees billable to growers, and first adapters will be the first to reap premiums from their CPC crop deliveries.

To participate, growers are required to allow for an array of on-farm data collection.



The CPC system will be using a mass balance certification process which will enable growers to deliver customary bundled crop.

Geographic Focus

Corn – Iowa, Illinois, Indiana, Nebraska, South Dakota
Soybean – Illinois, Iowa, Minnesota, Nebraska, Indiana
Canola – North Dakota, Montana, Washington, Idaho, Oklahoma
Sorghum – Texas, Kansas, Nebraska, South Dakota
HRW Wheat – Texas, Oklahoma, Kansas, South Dakota, Montana
SW Wheat – Washington, Oregon, Idaho, Montana
HRS Wheat – Washington, Montana, North Dakota, South Dakota

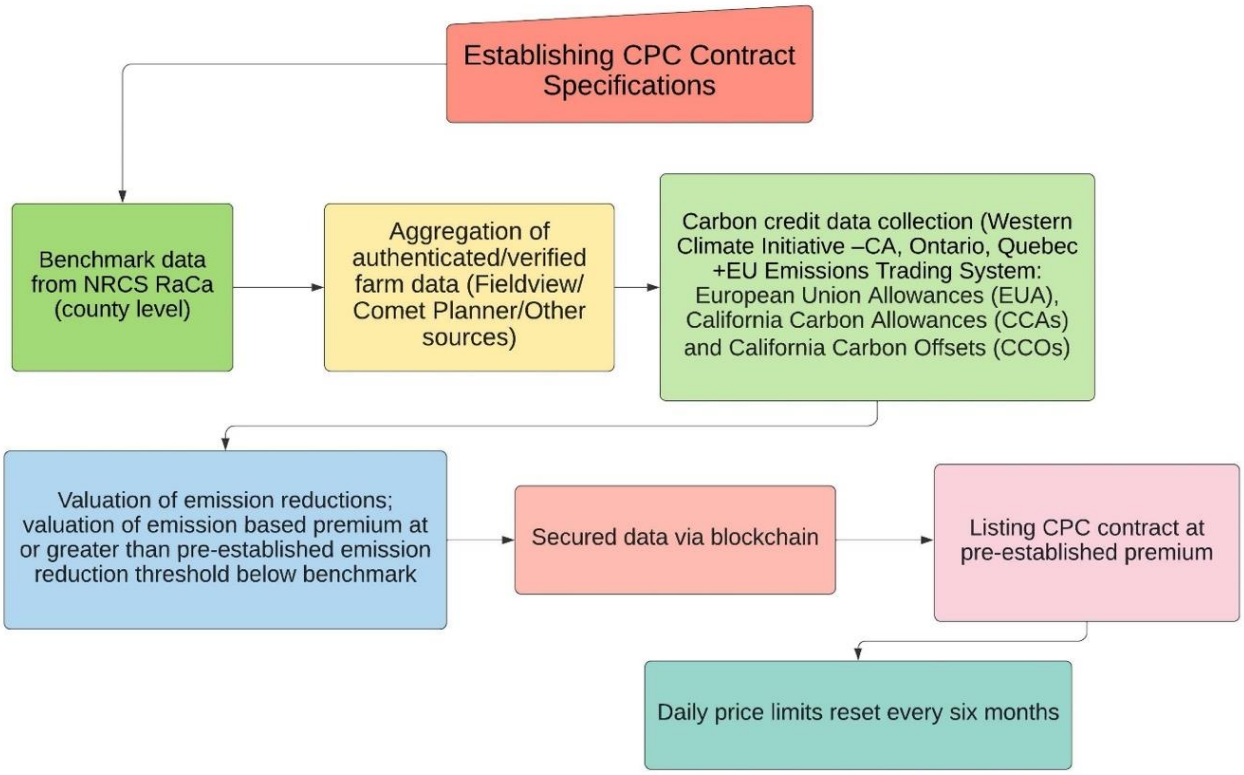
List of Project Partners

GIC Trade, Inc., dba "GIC Group": extensive work with cooperators; inter-agency sessions on CPC hosted by USDA; CPC pilot for corn and soybeans; presentations and focus groups on CPC to several grower and industry organizations; and founder and manager of international NGO (Global Food Safety Forum) on food safety.

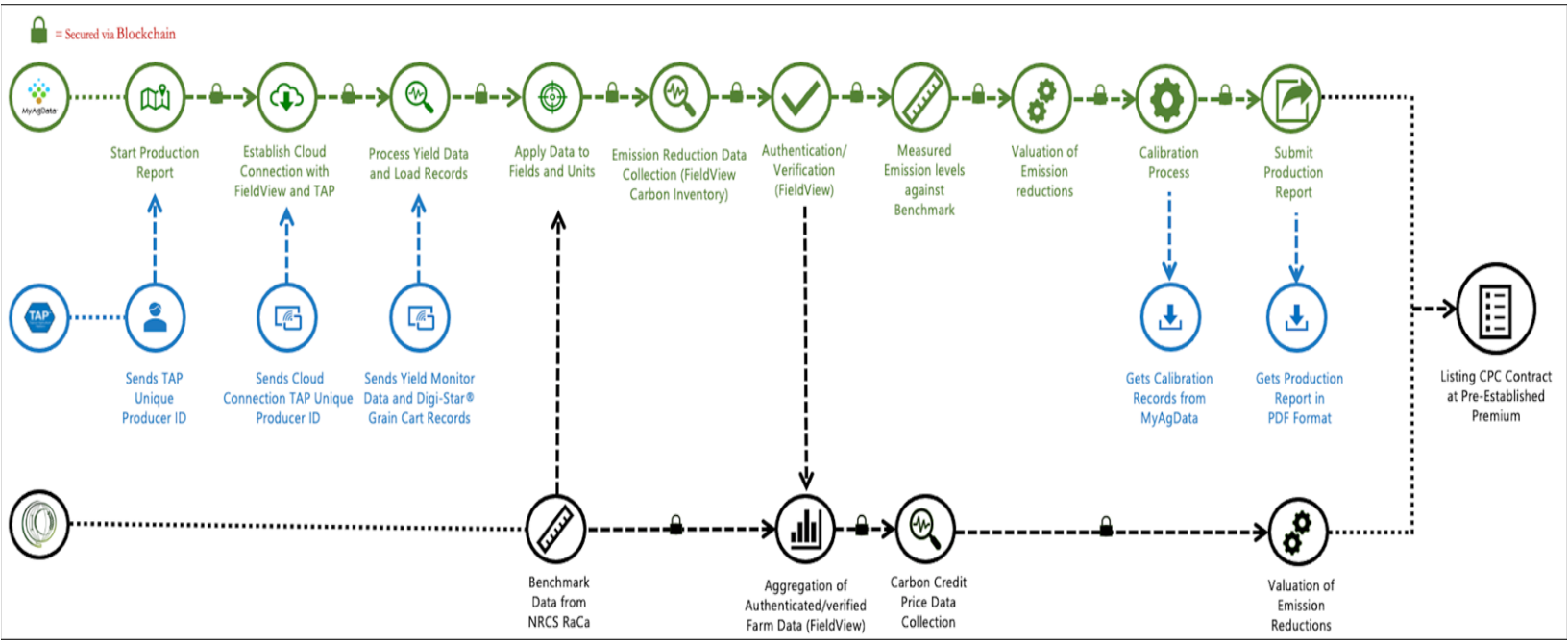
Subcontractors

IDM, LLC, dba “MyAgData”: collects, translates, organizes, and delivers field data for crop insurance, Farm Programs, private insurance products, carbon capture, crop traceability, and food safety. USDA selected MyAgData as a third-party reporting tool for use in sixteen specially chosen counties in Georgia, Illinois, Iowa, Nebraska, and North Dakota. The Nebraska pilot focused on precision ag acreage reports for Winter Wheat in 16 specific counties.

Large-Scale Project Plan



Measurement/quantification, monitoring, reporting, and verification



DATA COLLECTION

MyAgData®: MyAgData will collect and standardize planting, spraying, yield, and related field data. MyAgData allows a producer to enter, upload, or connect to where their data resides including Climate FieldView™ Plus, John Deere Operations Center, Topcon TAP, Ag Leader's AgFiniti®, CNH, AGCO, and the Ag Data Coalition. Connecting to Clouds makes data collection easy, quick and accurate by seamlessly capturing field activities such as harvest, cover crop, field preparation, seeding, and application. All of this collected data will be stored within a Microsoft Azure infrastructure that is secure and scalable. MyAgData® also utilizes Microsoft's .NET framework as the backbone of the application that users will use to upload their data.

Fieldview: The use of Fieldview data for CPC corn and CPC soybeans in this project will require grower consent and registration with MyAgData as the designated authenticator and verifier of CPC crop data. Climate FieldView Drive is an industry-first hardware device that enables seamless data collection from farm equipment used for most field-level activities regardless of manufacturer, brand, and type. Data collection capabilities include field-level data and practices such as Field Summary Data (e.g., Area, Boundaries, Crop, etc.) Tillage, Planting, Application, Irrigation, and Harvest Practices and activities. These capabilities are carbon quantification model agnostic, meaning high quality and verifiable field-level data collected at scale supports most carbon quantification models currently in use.

Using FieldView™ Plus as an example, the data collection process will require the user to register within MyAgData, make a connection to FieldView™ Plus, and select the fields that will be used for CPC. FieldView™ Plus will provide MyAgData the necessary parameters that contain field location, areas, and boundaries along with data related to field activities like planting, application, harvest, tillage, irrigation, residue burning, and fuel and energy. The mandatory data requirements to establish baseline and calculate metrics must be completed in full. Additional data elements not collected by FieldView™ Plus will require manual user input in a streamlined fashion. Time saving functions such as being able to apply the data at a farm level instead of repetitive data entry at every single field will be available. MyAgData® will also need the user to enter prior history of their fields with a minimum of 3 years. This prior history will also include any crop rotation plans to help establish the baseline score. The user will be able to review their farm data using a built-in report generated in MyAgData®. If any changes need to be made, the user will have the ability to do so.

Once the user has entered their data, measurements of carbon inventory and carbon intensity at a farm level will be generated. Carbon inventory will be determined by utilizing NRCS' Soil Conditioning Index tool. This tool can predict the consequences of cropping systems and tillage practices on soil organic matter. Carbon intensity will be measured by taking the aggregate of the greenhouse gas emissions and applying it at a farm level or by acre. To determine these measurements, MyAgData is partnering with Field to Market to integrate the sustainability metrics within Field to Market's

Fieldprint® calculator. The data collected will be used to generate sustainability metrics for Energy Use, Greenhouse Gas Emissions, Soil Carbon, and Soil Conservation.

Energy Use -- calculates all energy used in the production of one crop in one year from pre-planting activities to the first point of sale. The energy use is calculated using a series of algorithms and designed to provide feedback on the energy used per unit, based on the crops and activities entered. Energy use is calculated based on energy source used and scores are converted into a common unit: British Thermal Unit (BTU). There are 7 subcomponents contributing to the total score. These are Management Energy, Application Energy (derived from GREET model), Manure Loading Energy, Seed Energy, Irrigation Energy, Post-Harvest Treatment Energy, and Transportation Energy. Greenhouse Gas Emissions – Calculates the total emissions from 4 main sources: energy use, nitrous oxide emissions from soils, methane emissions from flooded fields (rice), and emissions from residue burning. Emissions are calculated in units of pounds of carbon dioxide equivalent (lbs. CO_2e) per unit of crop production. This metric relies on the Energy Use metric.

Soil Carbon -- this metric is represented by a USDA NRCS tool, the Soil Conditioning Index (SCI). The SCI accounts for 3 major components that impact soil carbon: organic matter and residue returned to the soil, soil erosion from water and wind, and the soil impacting characteristics of field operations. This is calculated internally to the USDA model. The SCI calculation accounts for regional differences in organic matter and residue decomposition rates based on climate conditions at the field location as well as soil texture determined from the USDA SSURGO soils database. There is also an optional scenario tool for users to explore the potential quantitative impact of any changes in management practices on soil carbon using the USDA's COMET-Planner tool. Users select a field and indicate what practices have recently changed (or what practice they are considering changing) and COMET-Planner will return the annual expected soil carbon sequestration associated with that practice change.

Soil Conservation -- measure of soil lost to erosion from water and wind, calculated by using the USDA NRCS models and reported to the user as tons of soil lost per acre. It is an efficiency metric that uses a complex biophysical model to simulate crop growth, water flow across the field, and sediment runoff. The metric is calculated using 2 models: Water Erosion Protection Program and Wind Erosion Prediction Service. These model calculations are performed on NRCS computer servers and accessed via API services.

DATA VERIFICATION

Benchmark Emissions

Once the user is done entering their data, a benchmark score needs to be established based on the historical data and crop rotation. MyAgData® will create an XML file containing the farm's historical data that will be passed to the COMET API. The results will be delivered to MyAgData® via email that contains the farm information and the baseline scores for each field with emission values for CO, CO_2, CH_4, and N_20 measured in metric ton/year. These benchmark scores will be stored for each field along with a date and timestamp.

Current Year Emissions

Once the baseline values have been established, MyAgData® will take the data collected for the current year to get the emission values once harvest has been completed. Similar to the benchmark process, MyAgData® will create an XML file with the data collected from FieldView™ Plus and pass that to the COMET API to run. The results of the emission values will be delivered to MyAgData® via email and stored for each field. The newly stored emission values can be compared against the previously created benchmark values to determine the change in emission.

Future Runs

The USDA's COMET-Planner tool allows users to explore the potential quantitative impact of any changes in management practices on soil carbon. With this optional scenario tool, users select a field and indicate what practices have recently changed (or what practice they are considering changing) and COMET-Planner will return the annual expected soil carbon sequestration associated with that practice change. The results from COMET-Planner help a user evaluate potential carbon sequestration and greenhouse gas reductions from adopting various NRCS conservation practices.

After the first year, MyAgData® will continue to collect the FieldView™ Plus data and use those values to determine the farm's emission values. Any changes in management practice or application will be reflected in the emission for subsequent years.

CARBON REGISTRY

The project will be registered with Climate Action Reserve (CAR). CAR has thorough requirements on methodology approval, project validation and verification. These methodologies and protocols are all based on ISO 14064. The ISO 14064 series outlines the requirements at the organizational level for the quantification and reporting of greenhouse gas emissions. CAR has developed a Soil Enrichment protocol that details how users can adopt agricultural management practices that are intended to increase soil organic carbon storage and/or decrease net emissions of CO, CO_2, CH_4, and N_20 from agricultural operations. The protocol provides guidance on how to quantify, monitor, report, and verify agricultural practices that enhance carbon storage in soils. The protocol is not limited to a specific set of activities as long as the project management practices have changed from the baseline scenario, result in measurable changes to SOC or GHG emissions. The Soil Enrichment Protocol is designed to ensure the complete, consistent, transparent, accurate, and conservative quantification and verification of GHG emission reductions associated with a soil enrichment project.

TIER CONSOLIDATION: ON-FARM EMISSION LEVELS

MASS BALANCE

The mass balance principle is widely used in supply chains through which material with a certified chain physically flows through several locations. The proposed project will

develop under trial conditions the mass balance software architecture to maintain the identity of CPC crop deliveries to local elevators.

In the example of the EU protocol for renewable energy, mass balance procedures should be followed to preserve the SSAP /RED (Soy Sustainability Assurance Protocol/ Renewable Energy Directive) compliant claim throughout the supply chain. It is very common that the different companies are trading material with a certified claim simultaneously with a non-certified claim. In order to avoid limitations in storage facilities, the certified claim can be disconnected from the physical soybeans, when mass balance calculation rules are followed, as per **Article 18 1** in the RED.

Designing mass balance procedures is critical to the CPC system in that it will enable crops with different sustainability characteristics to be physically bundled so long as they are kept administratively segregated Allocating unique reference numbers to all outgoing batches is considered best practice with respect to the prevention of multiple counting.

The mass balance system for tracking that will be employed by CPC protects both the supplier and the buyer. Suppliers will be grouped in three emission reduction tiers below benchmark, based on optimization of the use of current and early-stage technologies and resulting inputs[1].

Baseline GHG Emissions and Emission Reduction Potentials	Quanitity	Unit	Reuction Potential	Unit
Business as Usual Case	2469	kg CO2e/ha	0	kg CO2e/ha
Tier 1 (Reductions of 15%)	2098.65	kg CO2e/ha	370.35	kg CO2e/ha
Tier 2 (Reductions of 23%)	1901.13	kg CO2e/ha	567.97	kg CO2e/ha
Tier 3 (Reductions of 31%)	1703.61	kg CO2e/ha	765.39	kg CO2e/ha

It will also enable the buyer or series of buyers in the value chain, including processors and retailers, to substantiate and verify carbon sourcing claims for Scope 3 emissions credits and/or emission credit claims for marketing purposes.

BLOCKCHAIN SECURITIZATION OF INFORMATION

All CPC data, serving as the basis for CPC contract and transaction valuations, will be secured by blockchain which offers auditable and accepted trust by all parties to futures transactions. Blockchain will play the role of a data ledger. Utilizing the capabilities of blockchain, trust factors in the distributed ledger are established. Blockchain is decentralized, encrypted, and cross-checked, which allows the data to be strongly backed. It offers a new level of security, data transparency and auditability. With these

[1] USDA, edited by Edward S. Buckler, approved April 9, 2021

attestation properties, it is an ideal instrument for the implementation of mass balance requirements in the CPC system.

VALUATION METHODOLOGY

CPC futures contracts serve as the basis for spot/ basis prices on individual CPC crops. The futures price will weight 75% of the price of each respective CPC contract price on the cash price of the crop at the time of listing plus 25% on the average price of carbon credits. The regulatory sources for price discovery of the mean price for the carbon now under consideration are WCI (Western Carbon Initiative) and EU ETS, and for voluntary markets are N GEO, Euronext, and Low Carbon 100 Europe Index. The project will be monitoring carbon market prices 24/7 and publishing its averages and projections to all CPC grower participants. It will also be expanding its sensitivity analyses to test further its current findings of a consistently favorable premium price for CPC crop futures under all market scenarios.