UF IFAS
UNIVERSITY of FLORIDA

AGRICULTURE AND
NATURAL RESOURCE
ECONOMICS PROGRAM

Agriculture Conservation and Carbon Programs

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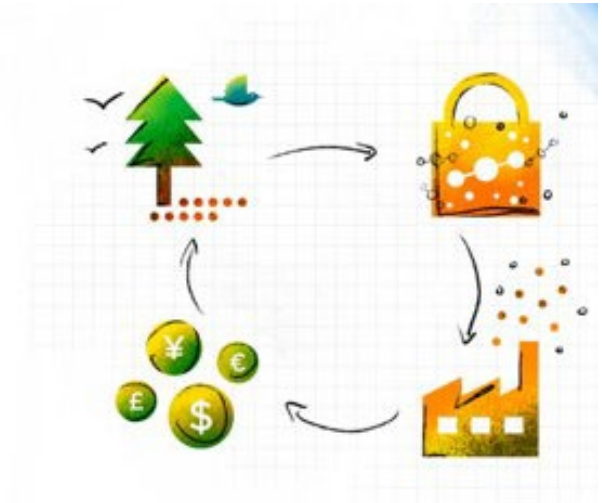
Introduction

Climate change is a global problem.

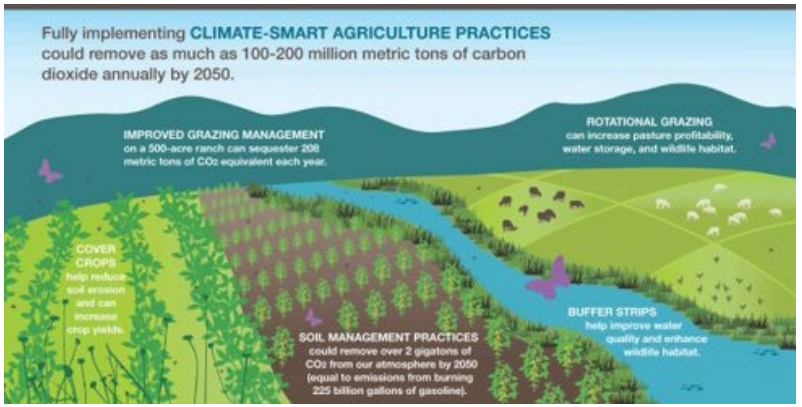
Introduction

Strategies to help reduce the effect of global warming:

Ecosystems Markets
E.g., Carbon Markets
(Pay for performance)



Conservation Programs
E.g., NRCS Climate Initiatives
(Pay for practice)



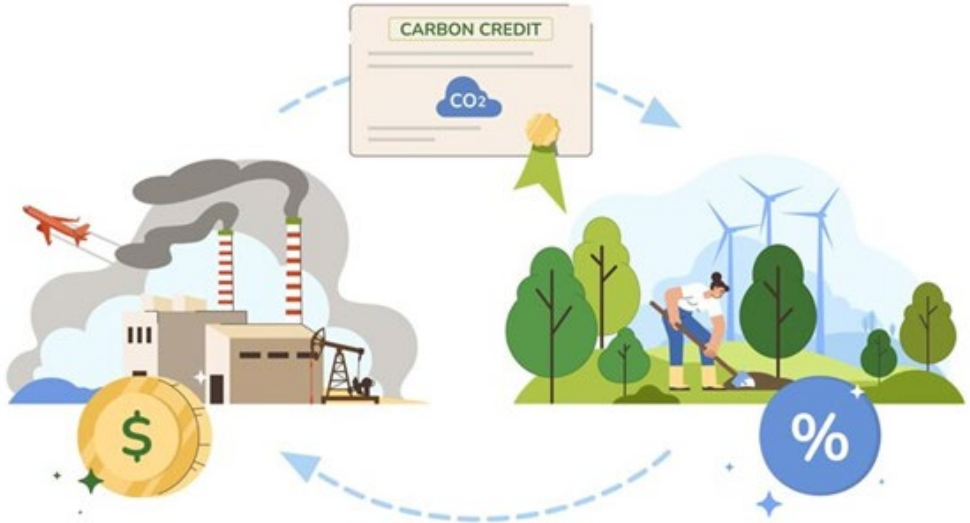
Sequester Carbon

Reduce/Avoid Emissions

Carbon Markets

Carbon markets allow industries that emit carbon (e.g., manufacturing companies and airlines) to trade with those who store carbon or have relatively fewer carbon emissions (e.g., forestry and agriculture).

- Carbon markets allow farmers to generate additional revenue by adopting soil management practices that store carbon in soil (Her et al., 2022).
- The stored carbon is traded as a carbon credit.
- Carbon credits can be traded globally for greenhouse gas emissions reductions.



Carbon Offsets and Credits

Carbon credits are bought and sold in carbon markets.

- **Carbon offsets** are generated and traded in the form of **carbon credits**.
- Carbon offsets represent the amount of carbon sequestered or removed from the atmosphere.
  - Carbon offsets are generated through a process

    E.g., agroforestry, using no-till or other climate-smart practices (USDA, NRCS, 2022; Medina-Irizarry, et al., 2022).
  - The offsetting process measures the captured carbon, which is used to compensate for greenhouse gas emissions generated elsewhere (Courtnell, 2023).
- A carbon credit is equal to offsetting one metric ton (1,000 kg, or 2,205 lbs) of CO_{2e}.

A carbon credit is the instrument used to trade carbon offsets.

Carbon Market Assets

Carbon Equivalents (CO_{2e})

- ✓ Soil Carbon (sequestration)
- ✓ Nitrous Oxide (e.g., fertilizer efficacy) (emissions avoided)
- ✓ Biomass (sequestration)
- ✓ Energy Conservation (emissions avoided)
- ✓ Enteric Fermentation (emissions avoided)
- ✓ Waste and Manure (e.g., digesters) (emissions avoided or destroyed)

Slide adopted from Bruce Knight, "Beyond Cover Crops and Tillage: How Can We really Calculate Farm Carbon Emissions." *Agri Pulse*, January 8, 2024

How Assets are Created

Sustainable production practices qualifying for carbon credits:

- Cover crops
- Livestock grazing
- Crop rotation
- No-till/strip-till
- Anaerobic digesters
- Nutrient management
- Buffer strips
- Tree establishment

Carbon credits can be created by:

1. Reduction in carbon emissions.
2. Long term storage (sequestration) of carbon.

Carbon Market Rule Makers

- **The Gold Standard**
- **Verra (ACR)**
- Climate Action Reserve
- California Air Resources Board
- Science Bases Targets

Gold Standard®
Climate Security & Sustainable Development

VERRA

Carbon Trading Platforms

CORTEVA™ agriscience

indigo

CALIFORNIA AIR RESOURCES BOARD

2023 Low Carbon Fuel Standard (LCFS)
Verifier Accreditation Training for New Verifiers

ESMC Ecosystem Services Market Consortium

Live Carbon Prices Today

CarbonCredits.com Live Carbon Prices	Last	Change	YTD
Compliance Markets			
European Union	€65.49	−0.49 %	−18.80 %
UK	£34.80	−3.41 %	−23.52 %
California	$28.66	-	0.00 %
Australia (AUD)	$33.75	−0.74 %	+0.75 %
New Zealand (NZD)	$67.50	-	−2.39 %
South Korea	$6.36	−1.84 %	−5.54 %
China	$8.80	−0.47 %	−9.34 %
Voluntary Markets			
Aviation Industry Offset	$0.76	−11.63 %	+28.81 %
Nature Based Offset	$1.77	−2.21 %	+94.51 %
Tech Based Offset	$0.69	-	+16.95 %

CarbonCredits.com Real-time Pricing
Click here to learn how carbon credits are priced.

Bayer Carbon Program

POWERED BY FIELDVIEW

NORI

CIBO

Nutrien Ag Solutions

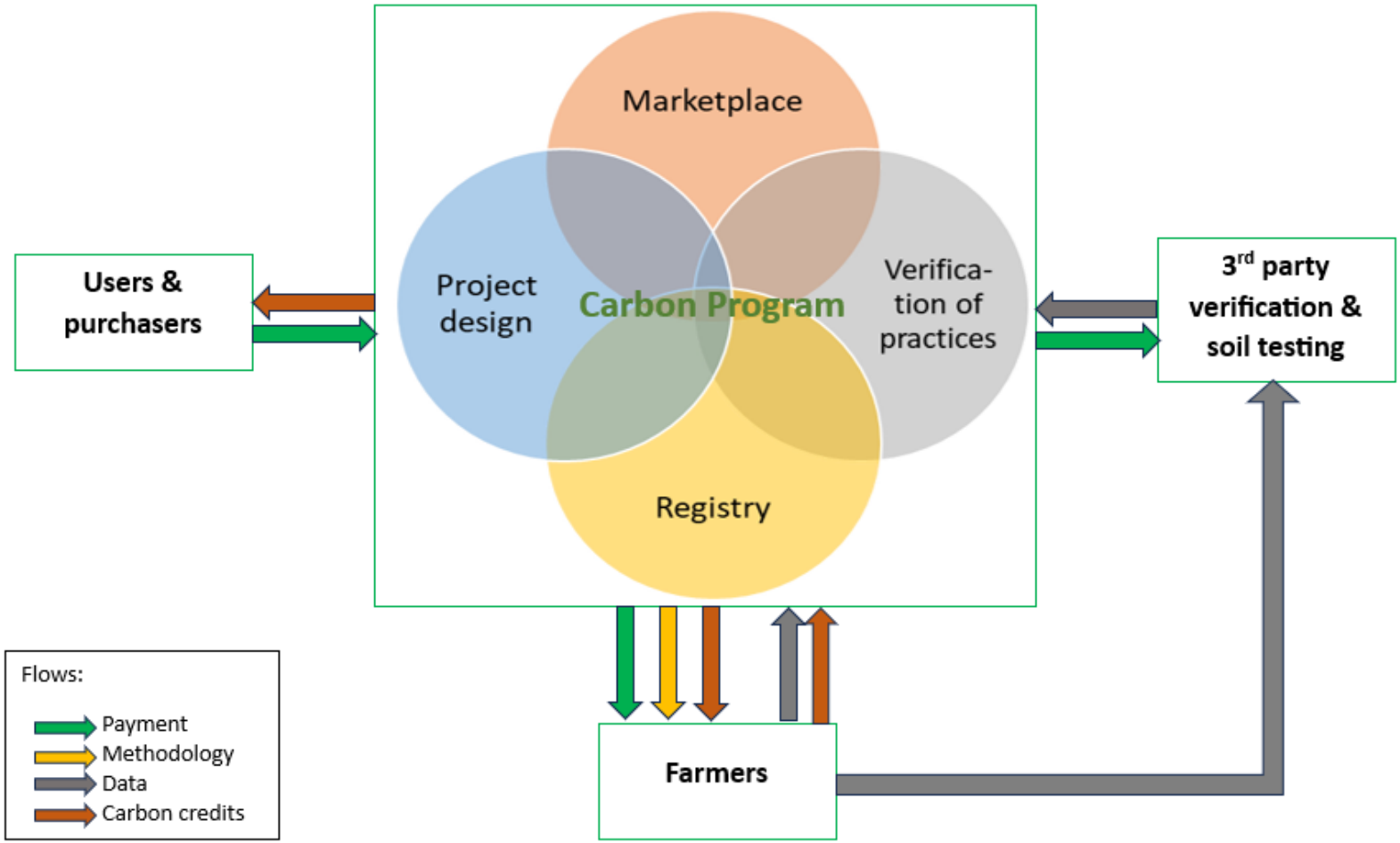
Soil and Water Outcomes Fund®

agoro™ CARBON ALLIANCE

TRUTERRA

Others: https://www.climateactionreserve.org/how/carbon-market-directory/

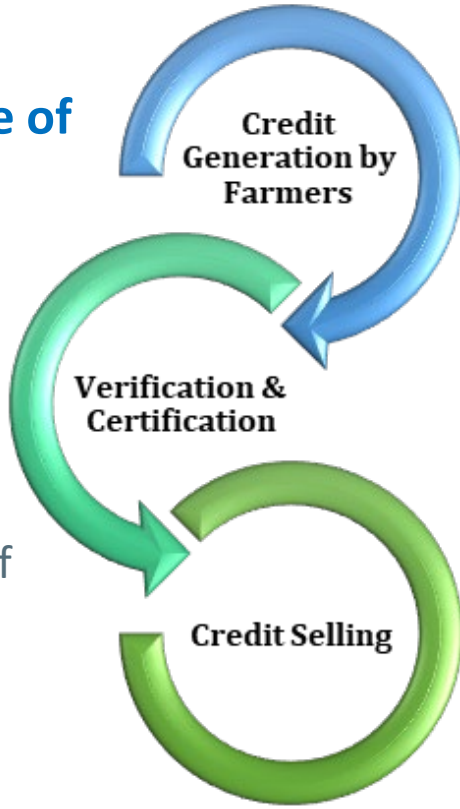
Carbon Programs



(Carbon program flowchart adapted from Plastina, 2022)

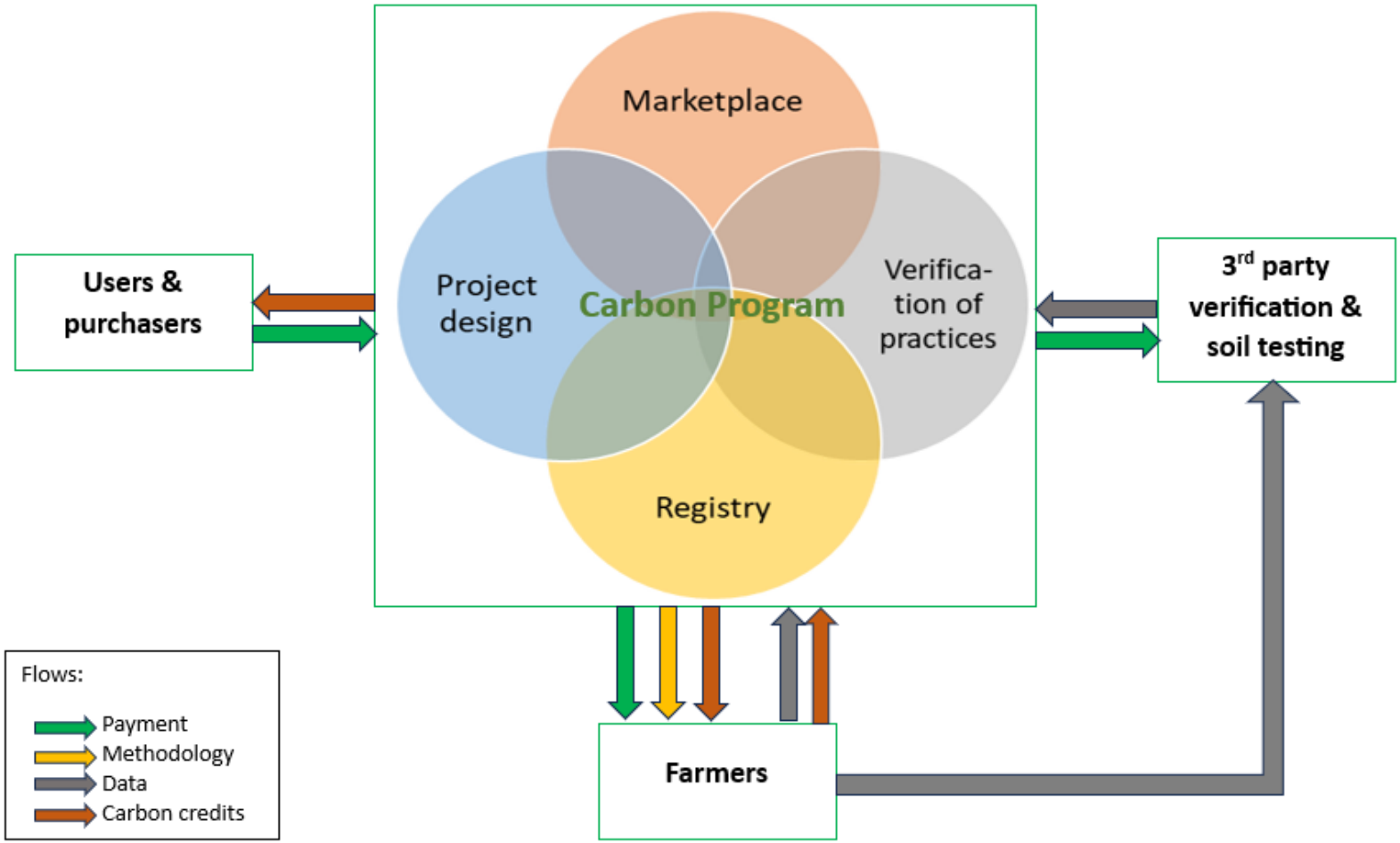
Carbon Programs

Facilitates generation, verification and certification, and issuance of carbon credits to farmers.



- **Design and develop** projects that result in tradable carbon credits.
- **Verifies** whether an agricultural practice sequesters carbon.
- **Quantifies** the amount of carbon that can be sequestered.
  - This is done at the beginning of program to quantify the number of potential carbon credits that a farmer can generate.
- **Calculate and verify** the amount of carbon sequestered through the adoption of approved practices.
  - Uses accredited third-party verifiers.
  - This ensures that the amount of carbon sequestered meets the contractual agreement.
- **Registers** the verified carbon credit in one of the interconnected registries.
  - A unique serial number is issued for the credit.
  - The carbon credit can then be sold at the marketplace.

Carbon Programs



(Carbon program flowchart adapted from Plastina, 2022)

Payments to Farmers

There is no universal price of a unit of carbon credits.

There is significant time lag between a carbon credit project participation and the final purchase of the carbon credits.

Most programs do not pay growers for implementing practices. Rather, payments are for generated carbon from newly adopted conservation practices.

Contracts are complicated!

The farmer's contract will stipulate how and when s(he) is paid. Contracts vary widely and payments may be in cash, cryptocurrency, or credits toward purchases (Sellars et al., 2021).

Potential Carbon Credit Programs in Florida

- ✓ **The Florida Sequestering Carbon and Protecting Florida Land Program-**

Offers cost share for conducting certain approved forest management practices that establish new forest stands.

CIBO Impact-

A data platform that offers a carbon credit program for all US croplands. This program covers new no-till, low-till, cover- crops, nitrogen application, and change in crop rotation practices and offers a $20 incentive per carbon credit for the pilot program.

Agoro Carbon Alliance-

A subsidiary of Yara, was initiated by an input supply company covering corn, soybeans and wheat, and other cash croplands of the continental US. The program does not cover new practice costs but offers a $10 incentive per acre if farmers enroll more than 2,560 acres after 30 days of signing the contract.

Ecosystem Services Market Consortium (ESMC)-

A carbon and ecosystem services market entity that targets agricultural practices referenced in USDA, Natural Resources Conservation Service conservation practice standards

Carbon Program Eligibility

General requirements are that farmers must:

- ✓ Be located in the US;
- ✓ Have the rights to grow crops and implement practices on enrolled acres;
- ✓ Have field(s) that are not currently enrolled in a carbon farming program; and
- ✓ Be able to adopt climate-smart practices.

Carbon Markets: Things to Consider

Integrity: Contracts—agreement between buyers and sellers.

Permanence: How long the carbon be stored. Can be undone.

Transparency: Processes are clear.

Double counting: Making sure the same service/sequestered carbon is not sold twice

Data: Collecting and ownership.

Additionality: Is *new* carbon stored. The farmer must adopt practices they would not have adopted if the carbon credit payment was not offered.

Slide adopted from Bruce Knight, "Beyond Cover Crops and Tillage: How Can We really Calculate Farm Carbon Emissions." *Agri Pulse*, January 8, 2024

Discussion and Summary

- The current agricultural carbon credit market is not mature and is difficult to characterize.
- There are no carbon programs for specialty crop producers.
  - Investments need to be made to create a verification process for Florida's crops and soils.
- Carbon program participation is more common among row crop producers, but programs such as Agoro Carbon are making inroads into tree crop production as well.

Discussion and Summary

- Farmers could benefit from participating in carbon programs. However, there are initial costs of adopting sustainable practices.
- Contracts are complicated.
- Additionality can be subjective.
- Practices and stored carbon must be additional.
  - Farmers must enter the carbon market before other conservation programs to be eligible for payments.
  - Producers who are already using climate-smart or conservation practices are likely ineligible to participate in the market.
- Entering carbon markets does not preclude farmers from enrolling in USDA-NRCS programs.
- The process is intrusive.

THANK YOU!
QUESTIONS?

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