

COP31 TÜRKİYE ANTALYA

# Scaling the Circular Bioeconomy:

## Agricultural Solutions to Climate Change

SOLUTIONS FROM THE LAND

U.S. Farmers & Ranchers in ACTION

PBPC Plant Based Products Council

U.S. GRAINS & BIOPRODUCTS COUNCIL

KOREA UNIVERSITY

NCCSD

WELCOME & OPENING REMARKS

# Scaling The Circular Bioeconomy:

## Agricultural Solutions To Climate Change




**A.G. Kawamura**

Solutions from the Land

SUPPORTING ORGANIZATIONS

# Scaling The Circular Bioeconomy:

## Agricultural Solutions To Climate Change

COP31 TÜRKİYE ANTALYA

Canadian Cattle Association

Iowa State University
Center for Sustainable Rural Livelihoods

Circular Bioeconomy Systems Institute

IICA

International Agri-Food Network

IFAD
Investing in rural people

Nuffield International Farming Scholars

SOLUTIONS FROM THE LAND



# Voices of Farmers Around the World:

## Circular Approaches for Scaling Bioeconomies

2026

SOLUTIONS FROM THE LAND

*"Farmers are not waiting for solutions — they are creating them."*

— Ernie Shea, President
Solutions from the Land



*"Learn about how farmers are experimenting with circular systems and practices that improve productivity and resilience while concurrently delivering agroecosystem services that benefit the public and the planet."*

WEBSITE

FACEBOOK

LINKEDIN




















## Building blocks that countries can use to scale bioeconomies:

- building policy frameworks and systems from the ground up not top down;
- maximizing the use of farmer-to-farmer knowledge sharing platforms and programs;
- prioritizing capacity building investments in cooling, processing and storage infrastructure, roads to transport inputs and outputs, and clean renewable energy sources of power;
- investing in innovation technology, research and development;
- guaranteeing fair and equitable, land and water rights;
- constructing finance mechanisms designed to meet local needs; and
- paying farmers not just a fair price for the commodities they produce but for the ecosystems services they concurrently deliver.

SOLUTIONS FROM THE LAND

KEYNOTE SPEAKER

# Scaling The Circular Bioeconomy:

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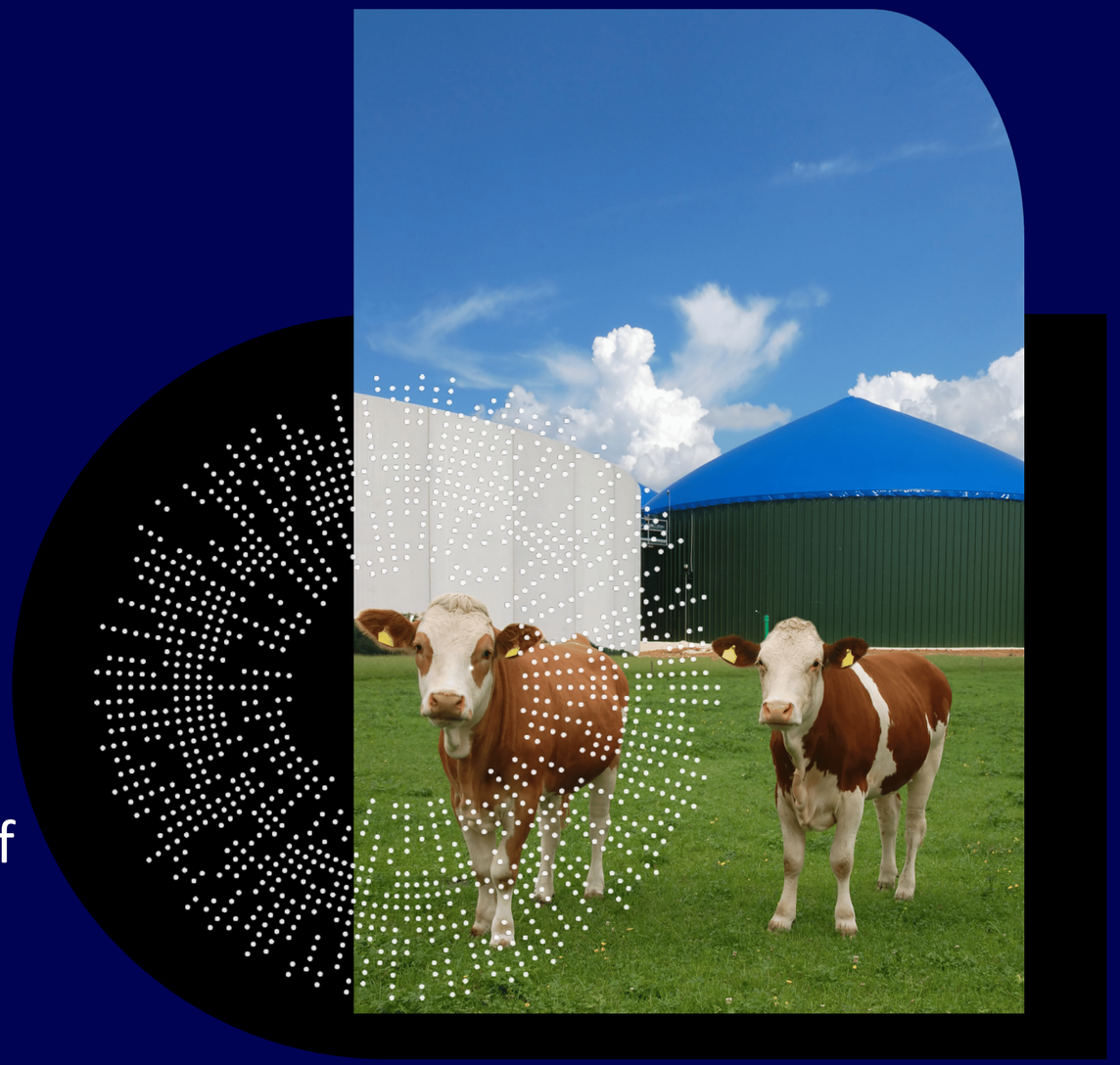



**Dr. Ed Barnes**

Circular Bioeconomy Systems Institute

Circular Bioeconomy Systems Institute

# Circular Bioeconomy Systems Institute (CBSI) Overview



A Strategic Initiative of the American Society of Agricultural and Biological Engineers (ASABE)

ASABE
*Engineering a Sustainable Future*

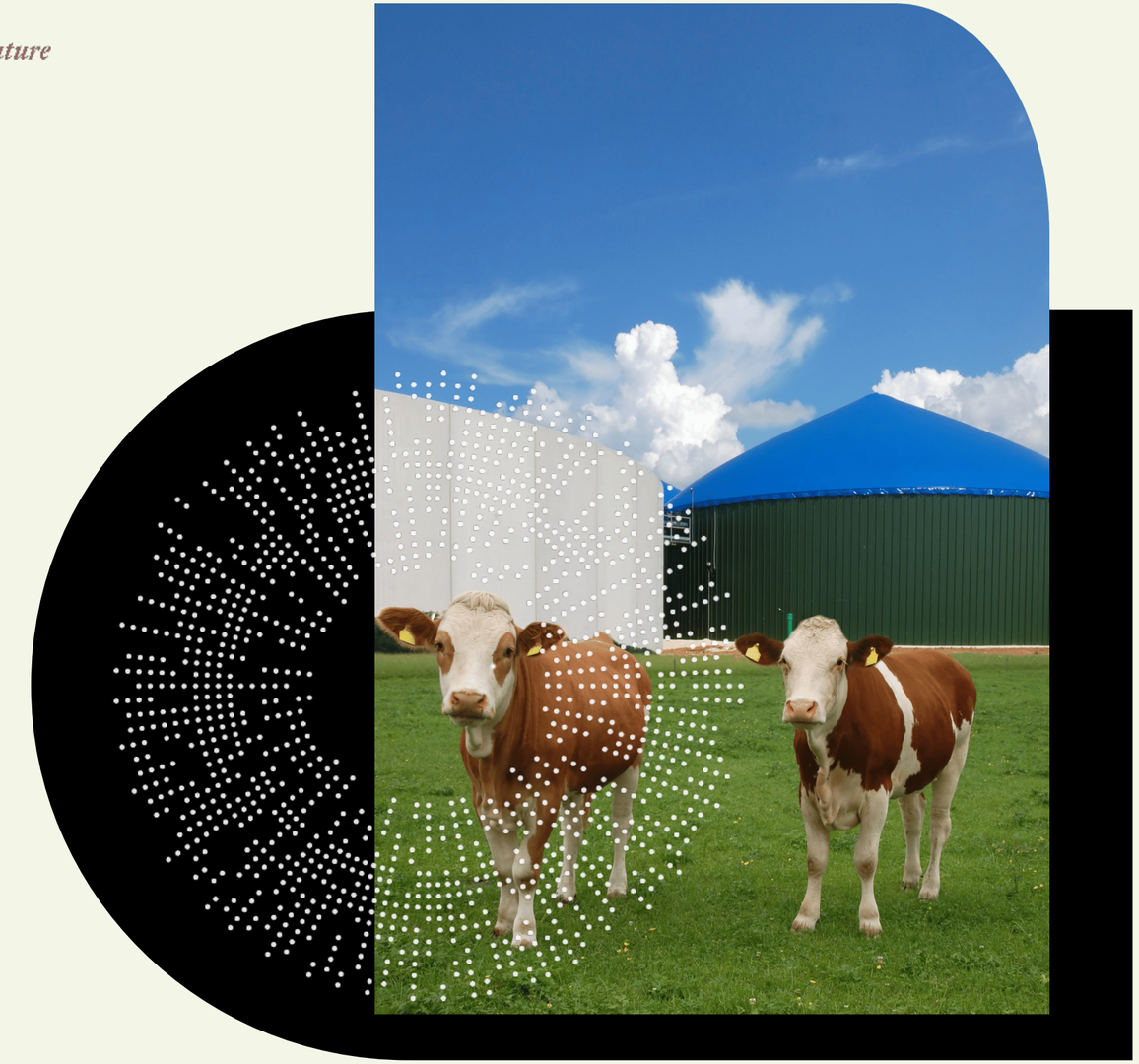
*COP31 – Solutions from the Land - Nov. 18, 2026*

Circular Bioeconomy Systems Institute

ASABE
*Engineering a Sustainable Future*

# Overview

- Who & What is ASABE & CBSI?
- System of Systems Approach
- Examples of CBSI members' Research Activities
- Developing Partnerships



# Circular Bioeconomy Systems Institute

ASABE

## MISSION

Advance education, professional development, and innovations for developing sustainable circular bioeconomy systems.

## VISION

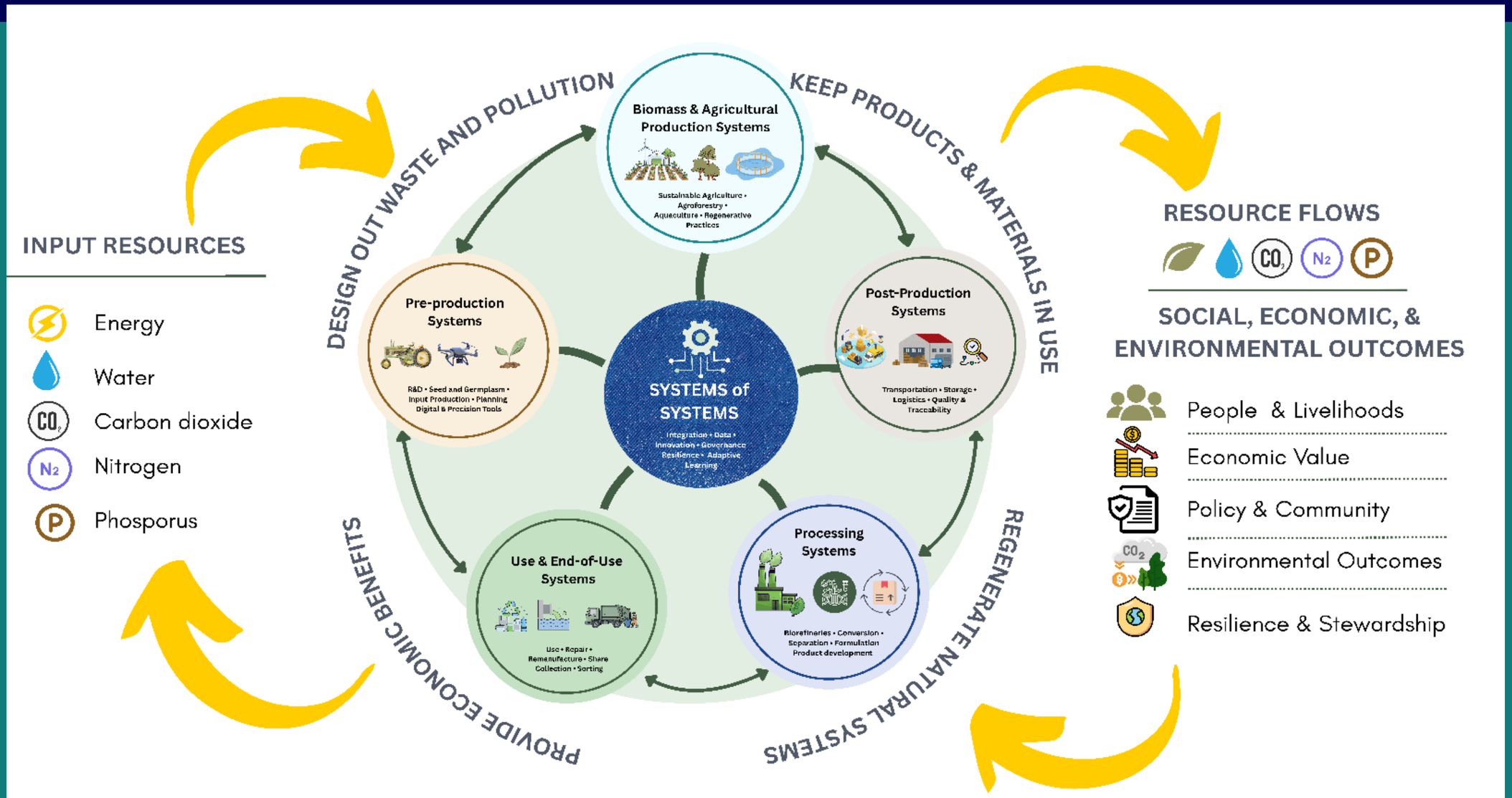
CBSI will be a leader in creating a healthy planet driven by vibrant, sustainable circular bioeconomy systems producing plentiful food, feed, forest products, and renewable resources.

## OUR WORKING TEAMS

- INNOVATE SYSTEMS
- DEVELOP METRICS & STANDARDS
- ORGANIZE MEETINGS
- PUBLICIZE & PROMOTE

COLLABORATING ACROSS SECTORS | ADVANCING KNOWLEDGE | DRIVING INNOVATION | BUILDING A SUSTAINABLE FUTURE

# System of Systems Approach




SYSTEM OF SYSTEMS · Illustration by Dr. Ziynet Boz, University of Florida

CBSI RESEARCH FOOTPRINT · ASABE AIM 2026

# What ASABE / CBSI members are working on

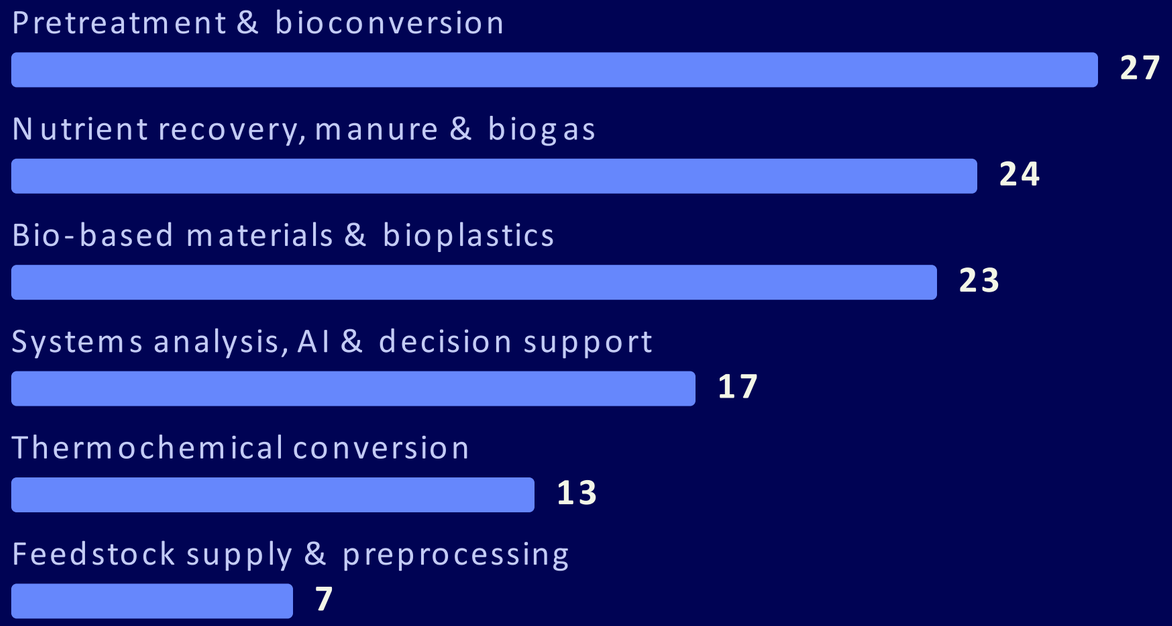
**115**
presentations in 12 technical sessions

**98**
presenting researchers

**42**
institutions: 31 U.S. universities, 4 federal labs, 7 international

**30**
U.S. states, plus 5 other countries

## Presentations by research pathway




**Cross-cutting:** 19 include techno-economic or life-cycle analysis; 20 use AI, machine learning or process modeling.

Source: ASABE 2026 AIM technical program (July 8 update); 3 CBSI-sponsored and 9 co-sponsored sessions. 4 talks on other topics not charted.

# Specific Research Examples from NC State University



Lagoon Waste → Duckweed → Animal Feed

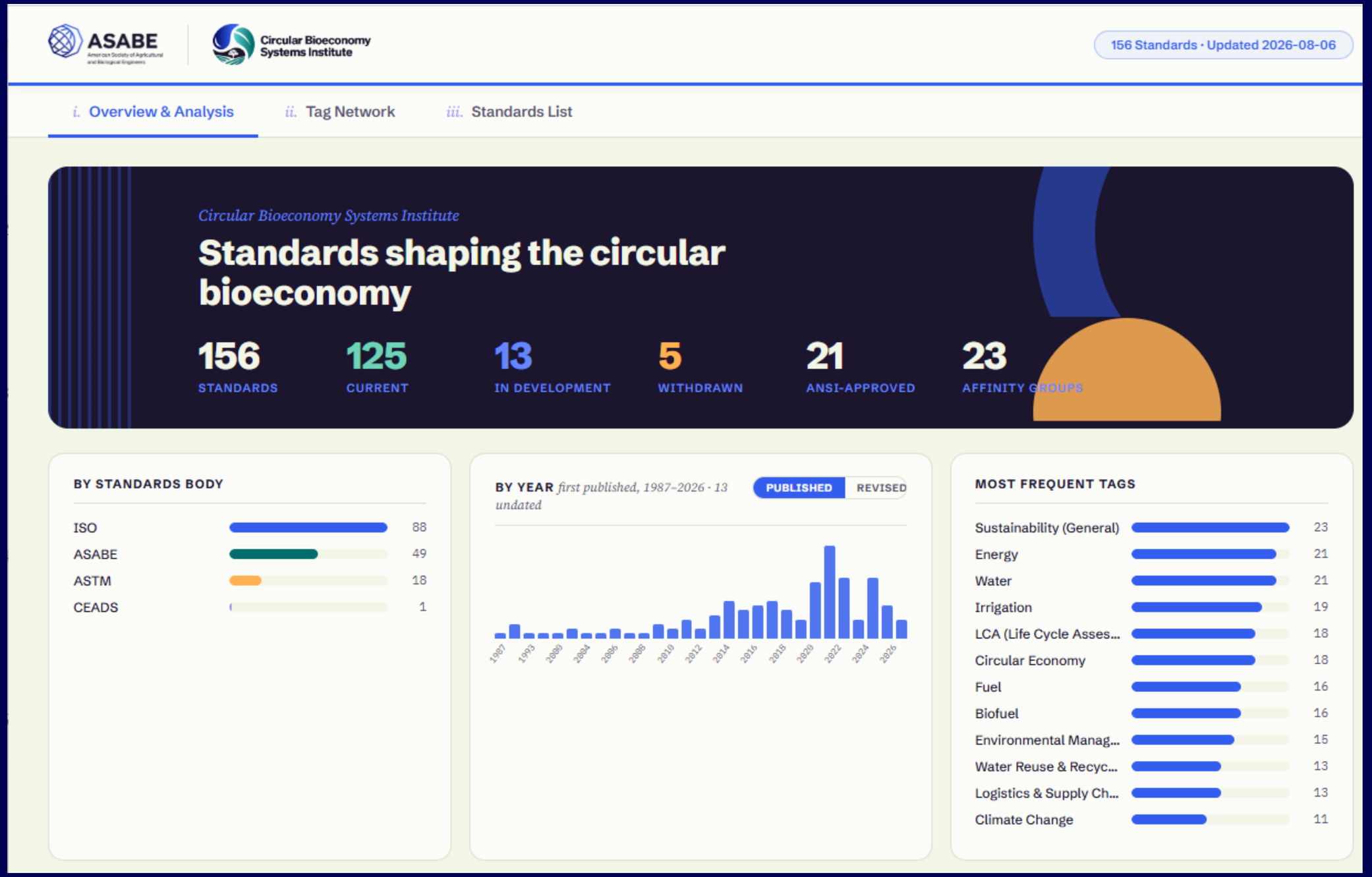


Concentrating & Capturing $CO_2$ During Composting

# Standards Inventory Dashboard

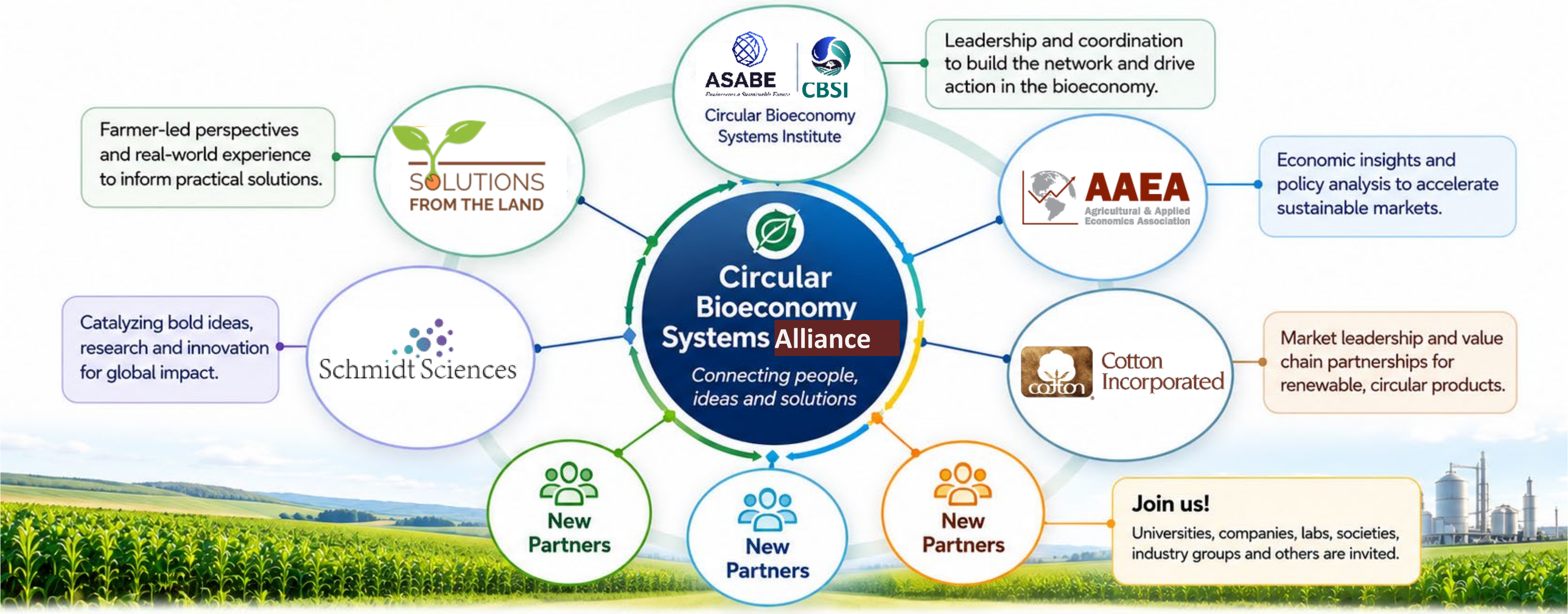
Available by Jan. 2027

*ASABE-CBSI.ORG*



# Stronger Together for a Sustainable, Circular Bioeconomy

*A growing network of partners advancing science, innovation and real-world solutions.*




**Our Goal:** Build a diverse, collaborative network that advances whole-system solutions for a resilient, circular bioeconomy.

**Connect**
Bridge science, industry, policy and practice

**Collaborate**
Spark innovation across the value chain

**Advance**
Enable circular, climate-smart and economically viable solutions

**Amplify Impact**
Create lasting benefits for people, communities and the planet

FARMER PANEL

# Scaling The Circular Bioeconomy:

## Agricultural Solutions To Climate Change



**Verity Ulibarri**
U.S. Farmer



**Dr. Gideon Nadiope**
Center for Sustainable Rural Livelihoods



**Chandrika Makwana**
Indian Farmer



**A.G. Kawamura**
Solutions from the Land




## Chandrika Makwana

Indian Farmer

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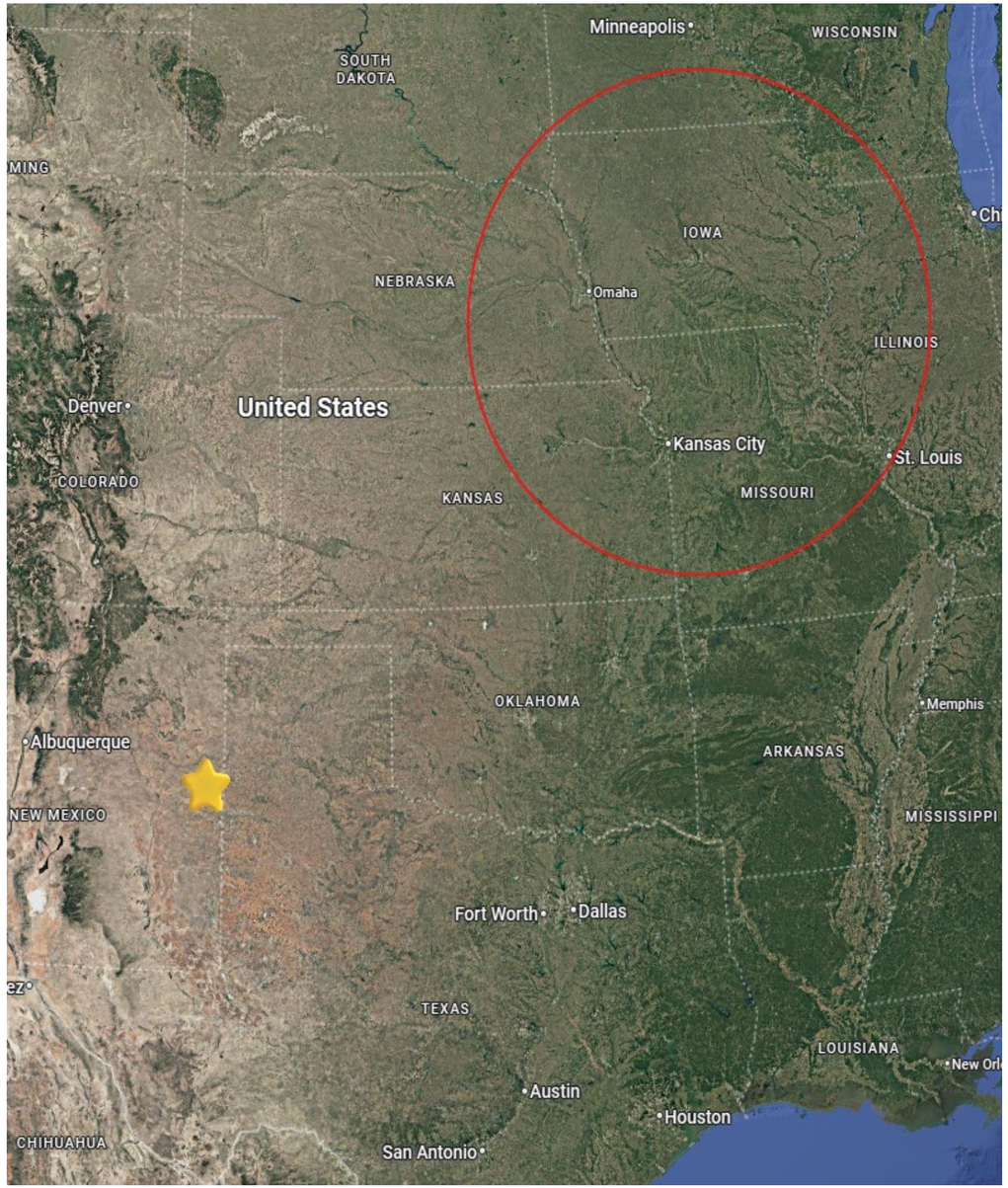
NCCSD

# AVVA Farms

Grain and Livestock farm headquartered in Clovis, New Mexico

Primary Products: Grain Sorghum, Wheat, Cattle, Hay & Forages






## Integrated Crop & Livestock System

- Multiple Complementary Revenue Streams
  - Diversify risk, capitalize on market infrastructure & opportunity
  - Enhance productivity & profitability of each acre

## Influencing Factors

- Semi – Arid Climate
- Limited Crop Options
- Non-irrigated crop land
- Loam-Sandy loan soils

## Local /Regional Market Landscape

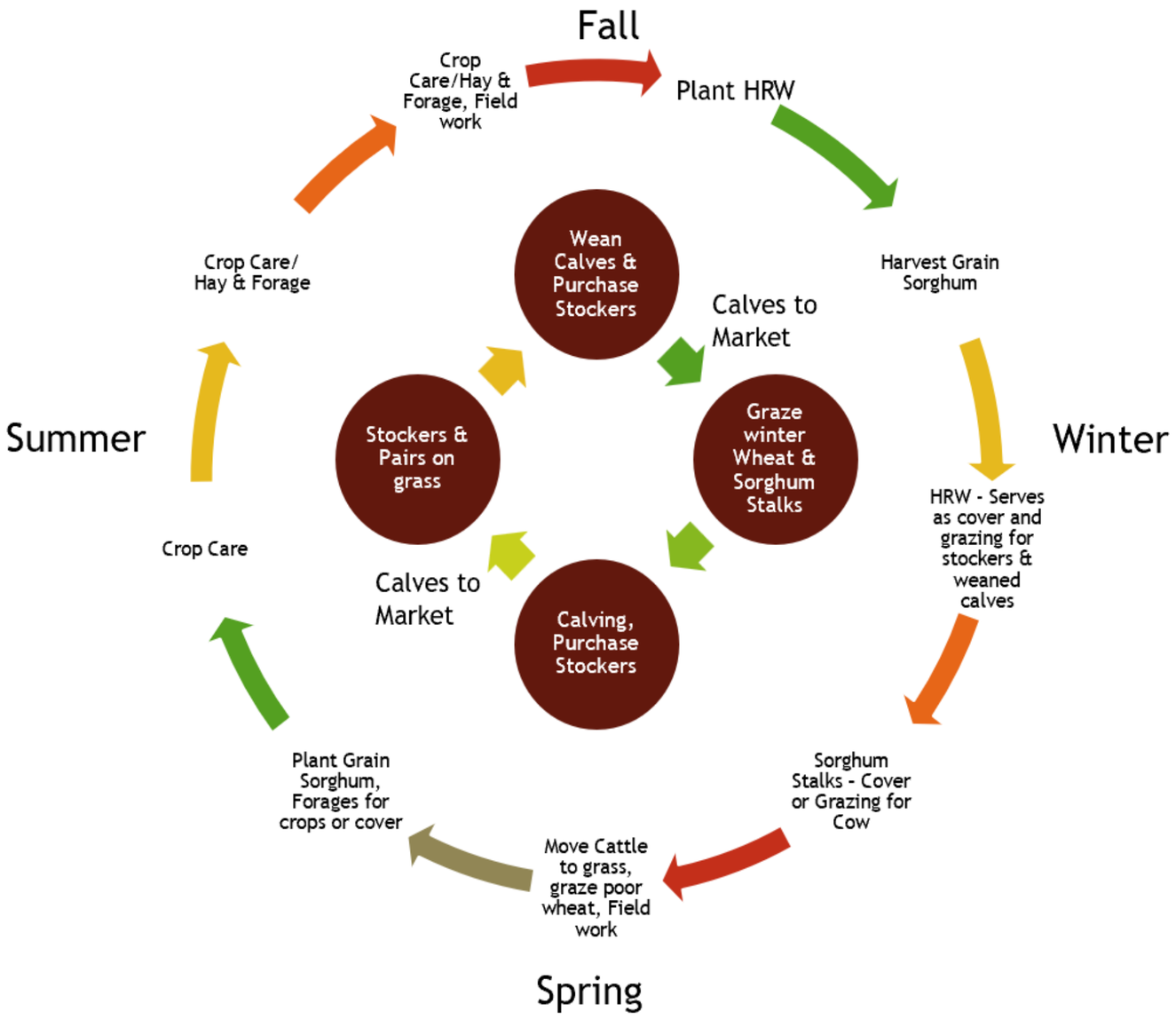
- Cattle – Feedyards & Packers
- Grain – Elevators, ethanol plants, feed mills
- Hay & Forages – Local Cow/calf operators, Feeders, Dairies

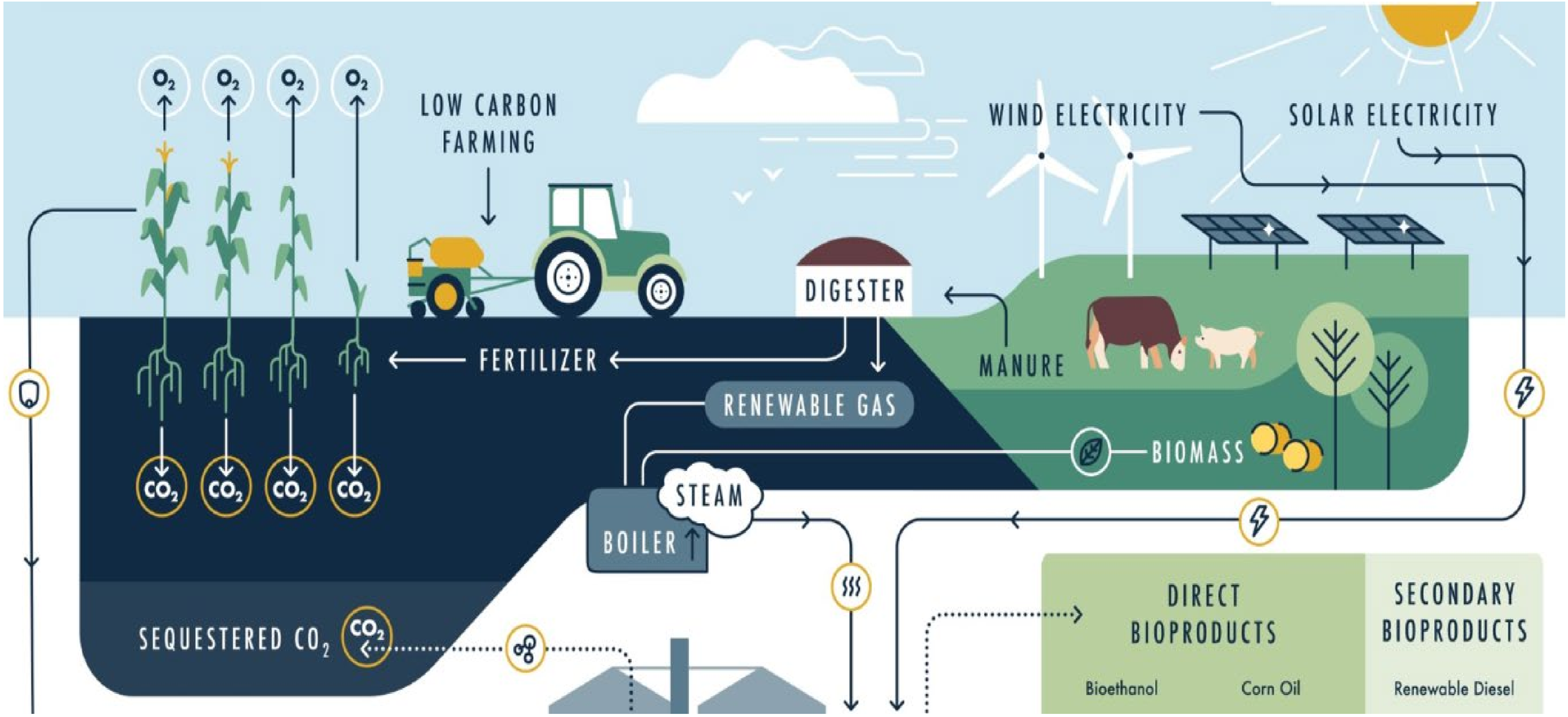
# AVVA Farms

Crop Rotation – Wheat, Grain Sorghum/Forage Sorg
Summer Fallow/Cover Crop

- Cover Crop – May be prior crop residue or a potential forage crop that is either harvested if conditions allow, grazed, or left for ground cove

- Cow/Calf – Feb/Mar Calving
- Stockers – Fall & Spring




O2
O2
O2
O2
LOW CARBON FARMING
WIND ELECTRICITY
SOLAR ELECTRICITY
DIGESTER
FERTILIZER
MANURE
RENEWABLE GAS
BIOMASS
CO2
CO2
CO2
CO2
STEAM
BOILER
SEQUESTERED CO2
CO2
DIRECT BIOPRODUCTS
Bioethanol
Corn Oil
SECONDARY BIOPRODUCTS
Renewable Diesel

# Farmer’s Perspective - SEE



**SOCIAL**

GOOD NEIGHBORS, RURAL DEVELOPMENT, IMPROVE LIVES



**ENVIRONMENT**

CONSERVATION, EFFICIENCY, IMPROVEMENT



**ECONOMIC**

PROFITABILITY, GENERATIONAL SECURITY

# AVVA Farms

## Established - 2011

- Leased 324 hectares
  - 30 stocker Calves
  - Pick up
  - Trailer

Perseverance
Lessons Learned
Business Acumen
Networking
Relationships
Mentorship
Legacy

## 2026

- Operate 3,845 hectares
  - 60% Cultivated
  - 70% Owned
  - 150 Head Cow/Calf
  - 100 Head Stockers
  - Equipment Fleet

# Our Journey














# Thank you!

Verity Ulibarri
verity@avvafarms.com

# COP 31- Farmer Pannel

## Agricultural solutions to climate change

**Dr. Nadiope Gideon**

**Center for Sustainable Rural Livelihoods**

**Iowa State University-Uganda Program**

## Examples of pathways helping small farmers mitigate climate change

- Minimum tillage – keeping the soil structure and texture health.
- Intercropping – for pest and disease control, nitrogen fixation, higher yields, crop failure prevention, effective land resources use.
- Cover cropping – weeds suppression, water infiltration and retention, nitrogen fixation.
- Organic mulching and trenching – temperature control, moisture retention, decomposing and soil amendment, soil erosion control.
- Agroforestry – incorporation of nitrogen fixing, coppicing fuel wood and fruits trees into mixed cropping systems e.g., glicidia, cassia, cocoa, jack fruits, cashew nuts, banana, coffee, etc.
- Integration of livestock/crop farming systems – crop residues and manure compositing, e.g., black soldier flies, poultry, goats, fish, etc.



*Figure 1: No till practices for improved soil health*



*Figure 2: Intercropping strategy. Case shown is a maize-grain amaranth intercrop.*



*Figure 3: Cover cropping (groundnuts as a soil cover) in a banana-Cacao-Jack fruits intercrop.*



*Figure 4: Banana-Coffee intercrop mulched using Maize stalks*



Feeding black soldier fly larvae with garden and poultry residues



Poultry feeding on Larvae for Soldier Flies



BSF residue is used as organic matter in vegetable garden.



Empty puparia ready for compositing

FARMER PANEL

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Seoul National University



**Pierre -Yves Guedez**
International Fund for Agricultural Development



**Tom Poole**
U.S. Grains & BioProducts Council



**Jamaica Gayle**
Plant Based Products Council

U.S. Farmers & Ranchers in ACTION

# Fueling Agriculture: Biofuels as the Catalyst




**Michael Crinion**

# Fueling Agriculture: Biofuels as the Catalyst

1. Agriculture possesses something no other sector can claim: the ability to address society's most pressing challenges, all at once.
2. But agriculture is facing a moment of reckoning. Crop yields are surging, harvests are hitting record highs, yet farmers and ranchers are struggling due to softening demand.
3. Biofuels is a solution. A landmark study from S&P Global Energy, commissioned by USFRA, shows biofuels can create new markets for farmers while improving food, energy and economic security.
4. Expanded demand for renewable fuels can help stabilize commodity prices, providing relief for consumers and communities hit hard by food and energy cost volatility.
5. A robust biofuel market could drive investment in precision farming, higher-yield crop varieties and conservation practices that boost productivity and reduce the environmental footprint of every acre.
6. The future is not about choosing between food and fuel. It is about creating the demand frameworks that allow agriculture to provide food, feed, fuel, climate, and rural development.

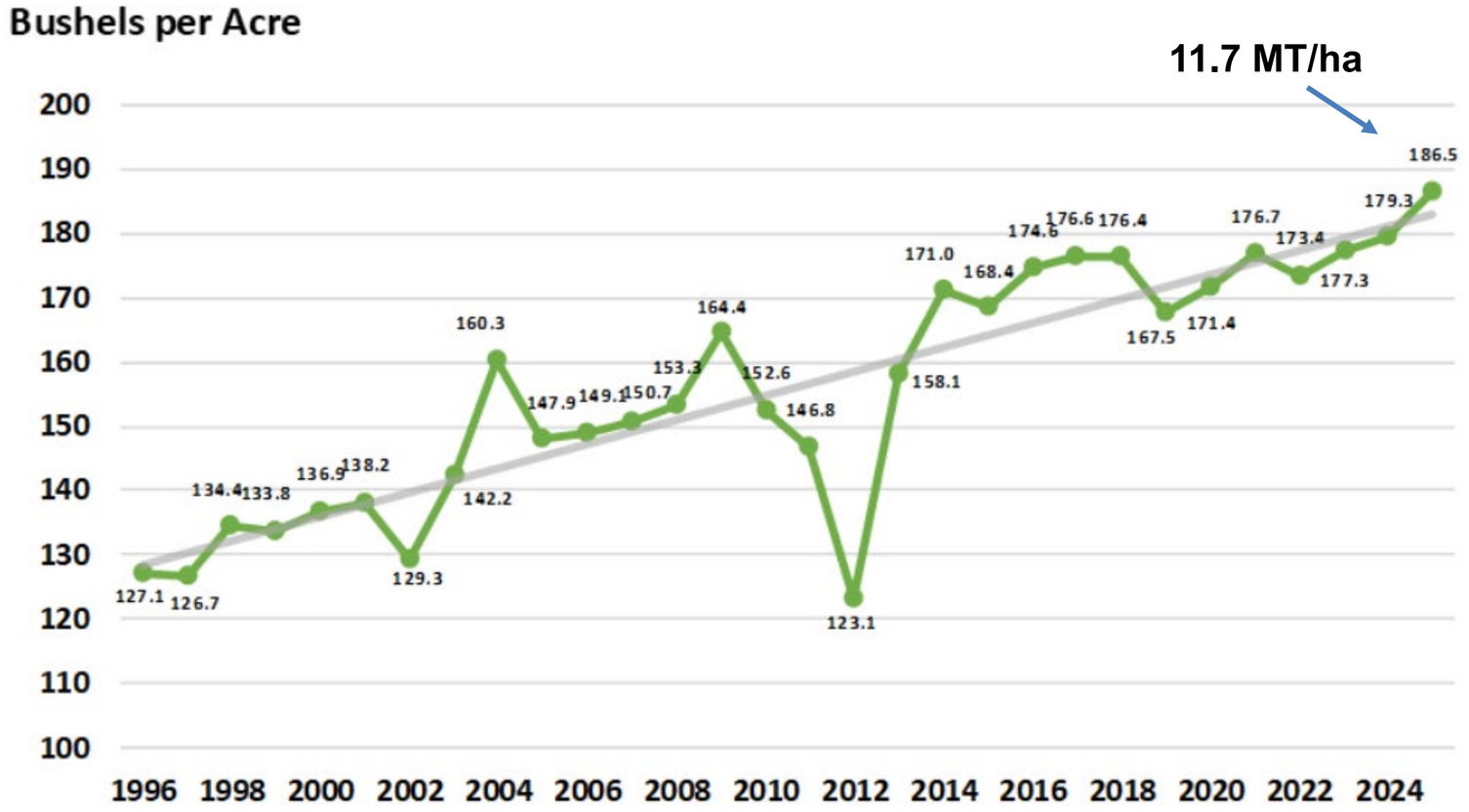
# Scaling the Circular Bioeconomy

## COP 31 2026

U.S. GRAINS & BIOPRODUCTS COUNCIL
20 F St. NW, Suite 900 \ Washington, DC 20001
202-789-0789 \ www.grains.org

# Historical Corn Yields

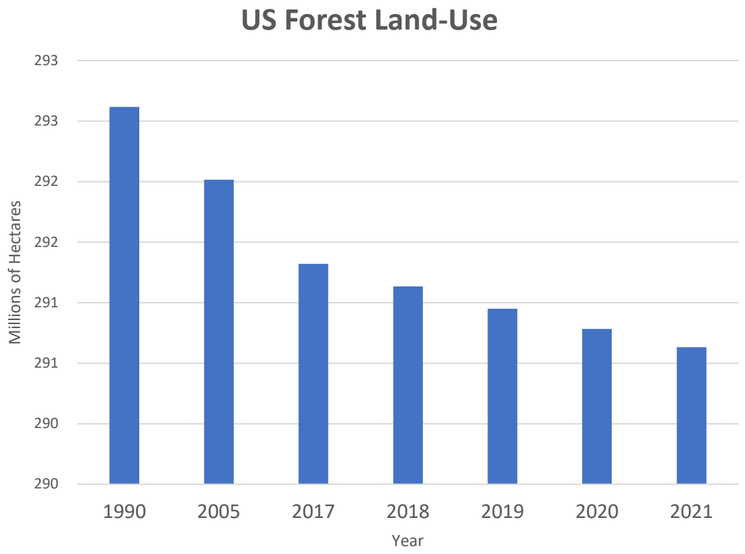
# United States

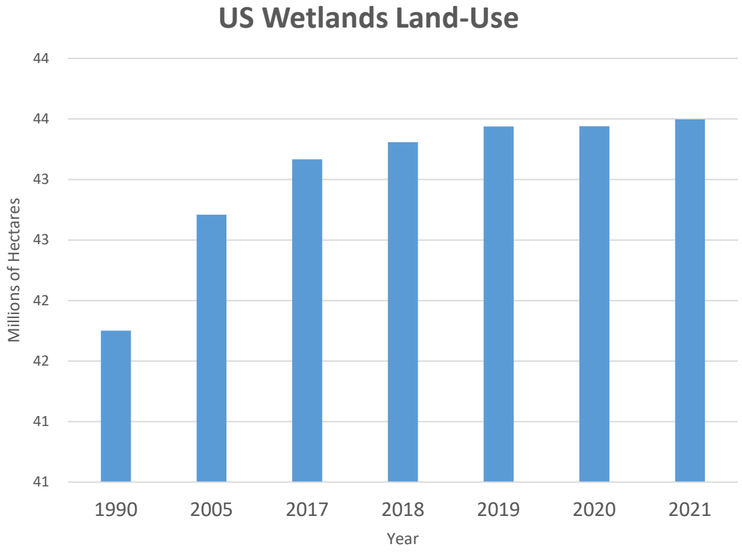


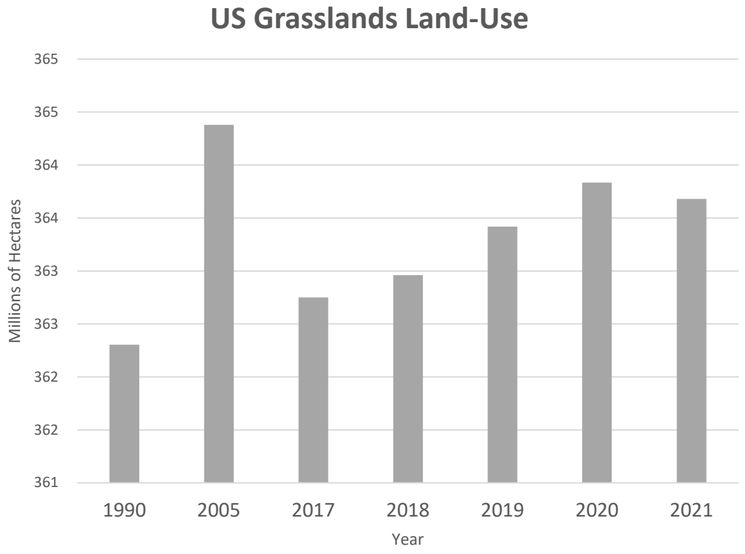

United States Department of Agriculture
National Agricultural Statistics Service

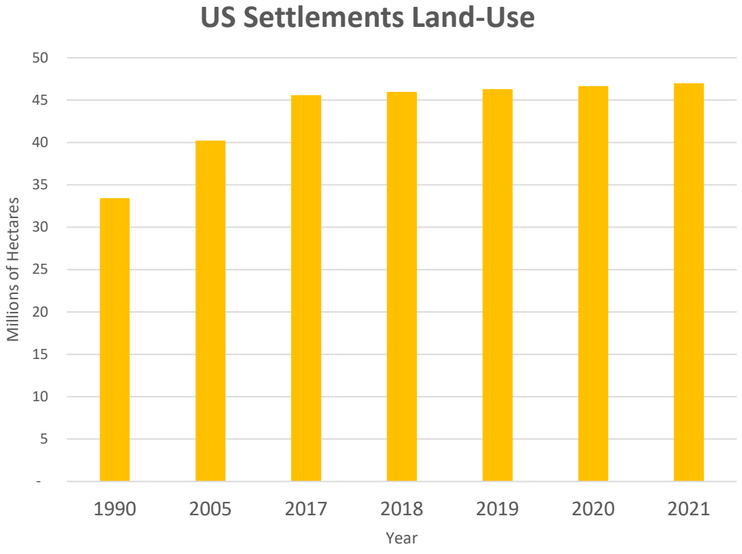
January 12, 2026

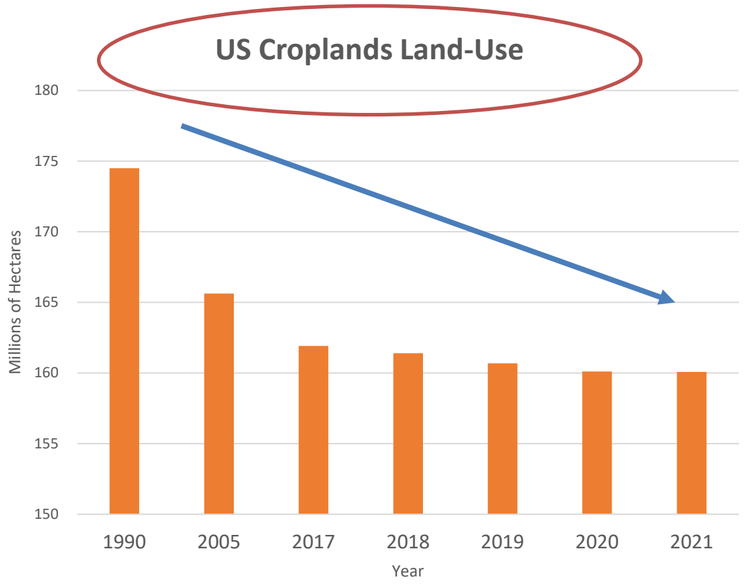
# Increased Production without Land Expansion




U.S. GRAINS & BIOPRODUCTS COUNCIL

Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021 Chapter 6: Land Use, Land-Use Change, and Forestry

# Growing Sustainably

U.S. farming has increased in efficiency and productivity since the 1980's through technological advances in equipment, improved seeds and hybrids, and targeted resource allocation.

**56%** Decrease in irrigation water use per bushel

**54%** Decrease in energy use

**48%** Decrease in greenhouse gas emissions

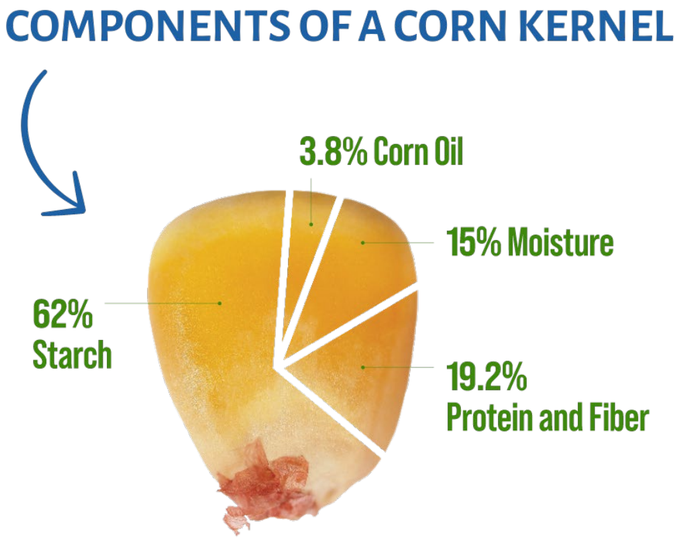
**44%** Decrease in land use per bushel

**40%** Decrease in soil loss per acre

Source: Field to Market Report, 2021

# Food and Fuel

Ethanol production results in fuel, high protein animal feed, corn oil, $CO_2$, and more - products that often go back into our food systems




**Only the starch portion of the corn kernel is used for ethanol production**

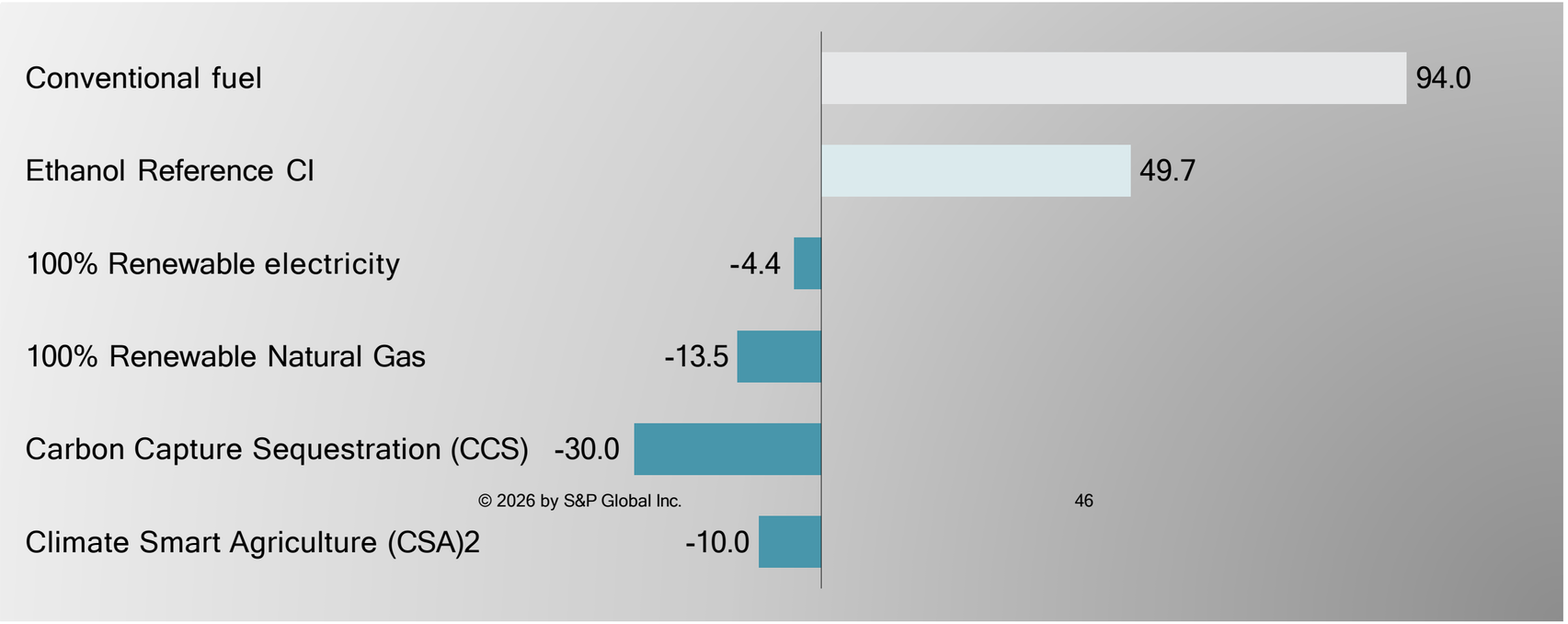
**1 bushel (56 lbs) of corn**

- **2.9 gallons of ethanol**
- **14 pounds of DDGS**
- **1 pound corn oil**
- **16 pounds of CO2**

# Increased Carbon Reduction Opportunities

**Opportunity of further reducing ethanol carbon intensity (CI)[1]**

g $CO_2e$ / MJ




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**The environmental benefits biofuels deliver by reducing greenhouse gas (GHG) emissions need to be coupled with recognition for the significant additional reduction potential through CCS, CSA and other technologies**

Note: 1.CI reduction' results are indicative. Actual results of specific GHG mitigation may vary by plant, equipment and settings. 2. CI reduction from CSA is indicative and based on Notice 2024-37, jointly released by the US Department of Treasury and IRS in 2024 for 40B SAF credit eligibility. The USDA's interim rule (Notice USDA-2024-0003) for CSA biofuel feedstock was released in January 2025 but was not finalized at the time of this analysis and, therefore, was not used. 3. CI can be below zero only for manure-derived fuel.

Source: S&P Global Energy analysis of Argonne National Lab 45ZCF-GREET Model

U.S. GRAINS & BIOPRODUCTS COUNCIL

PARTNER PANEL

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CLOSING SPEAKER

# Scaling The Circular Bioeconomy:

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**Sally Higgins**

COP 31 Youth Climate Champion

COP31 TÜRKİYE ANTALYA PYCC COP31 PRESIDENCY YOUTH CLIMATE CHAMPION

# Back Future Farmers

## Creating Commercial Pathways for the Next Generation of Agriculture



Thank you for your support to

# BACK FUTURE FARMERS





COP31 TÜRKİYE ANTALYA

# Thank you

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