



Iowa Carbon Sequestration Task Force – Meeting #4

December 6, 2021

Iowa's Carbon Sequestration Task Force Vision

**Iowa will be the leading state
for creating carbon value
through agricultural stewardship and energy generation.**

Work Group Meeting #4 Agenda

The goal of today's meeting is to

Present final science assessment findings and workgroup recommendations

1. Welcome and Opening Remarks

- A. Governor Kim Reynolds
- B. Secretary of Agriculture Mike Naig

2. Carbon Sequestration Science Assessment

- A. Iowa State University
- B. Presentation of Deliverables

3. Policy Review

- A. Workgroup Members
- B. Presentation and Discussion of Agriculture and Energy Workgroup Policy Recommendations

4. Closing Remarks



ISU Science Assessment Findings

Carbon Science for Carbon Markets: Emerging Opportunities in Iowa

Process: Collate, analyze existing information • Limited new data generation • “Progress, not perfection”

Task	Description	Due Date
1	Glossary	Sept 10
2	Summarize existing research on agricultural management and agriculturally based engineering practices	Sept 20
3	Methods for cost-effective monitoring	Oct 15
4	Estimate variation in carbon storage potential of Iowa agricultural soils	Nov 1
5	Estimate current rates of interest and adoption	Sept 20
-	Final report submitted to the State of Iowa & ISU Extension publications	Dec 15
-	Final publication freely available to the public through ISU Extension store	Approx. Jan 10

Big Picture Goal

Credible carbon credits
are a precondition for
carbon markets

- Confusion and/or uncertainty could impede market development
- Science can help inform development of sound policy
- Help Task Force achieve its vision

Report Contents

1. Overview
2. **Carbon Markets,
Past & Present**
3. **Measurement,
Recording, & Verification**
4. Cropping & Land
Management Practices
5. Livestock
Management Practices
6. Engineering Technologies
7. Practice Adoption
8. **Carbon Market Planning Tools**
9. Agroecosystem Modeling
10. Life Cycle Assessment
Modeling
11. Appendices
 - A. Glossary
 - B. Primer on Global
Warming Potential

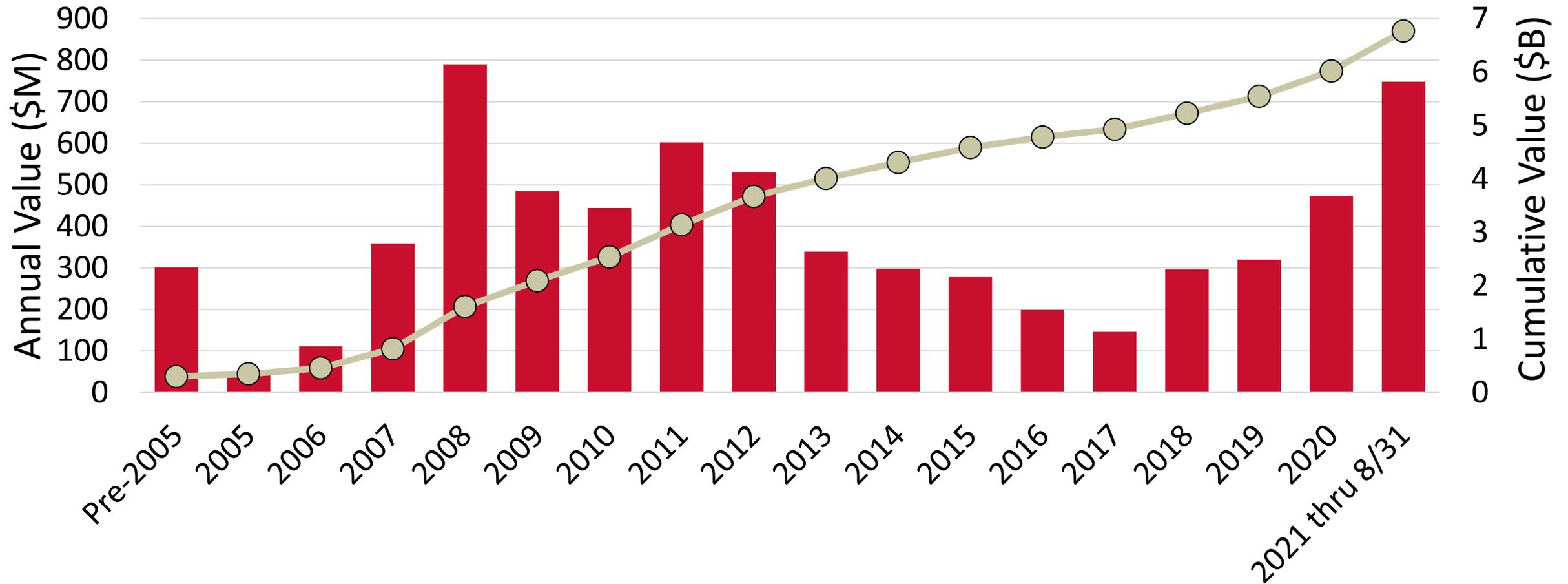
Major Take Home

Much is known that supports
credible carbon credits

- Key gaps remain
- Opportunities for farmers, government, industry, and science to help improve credibility

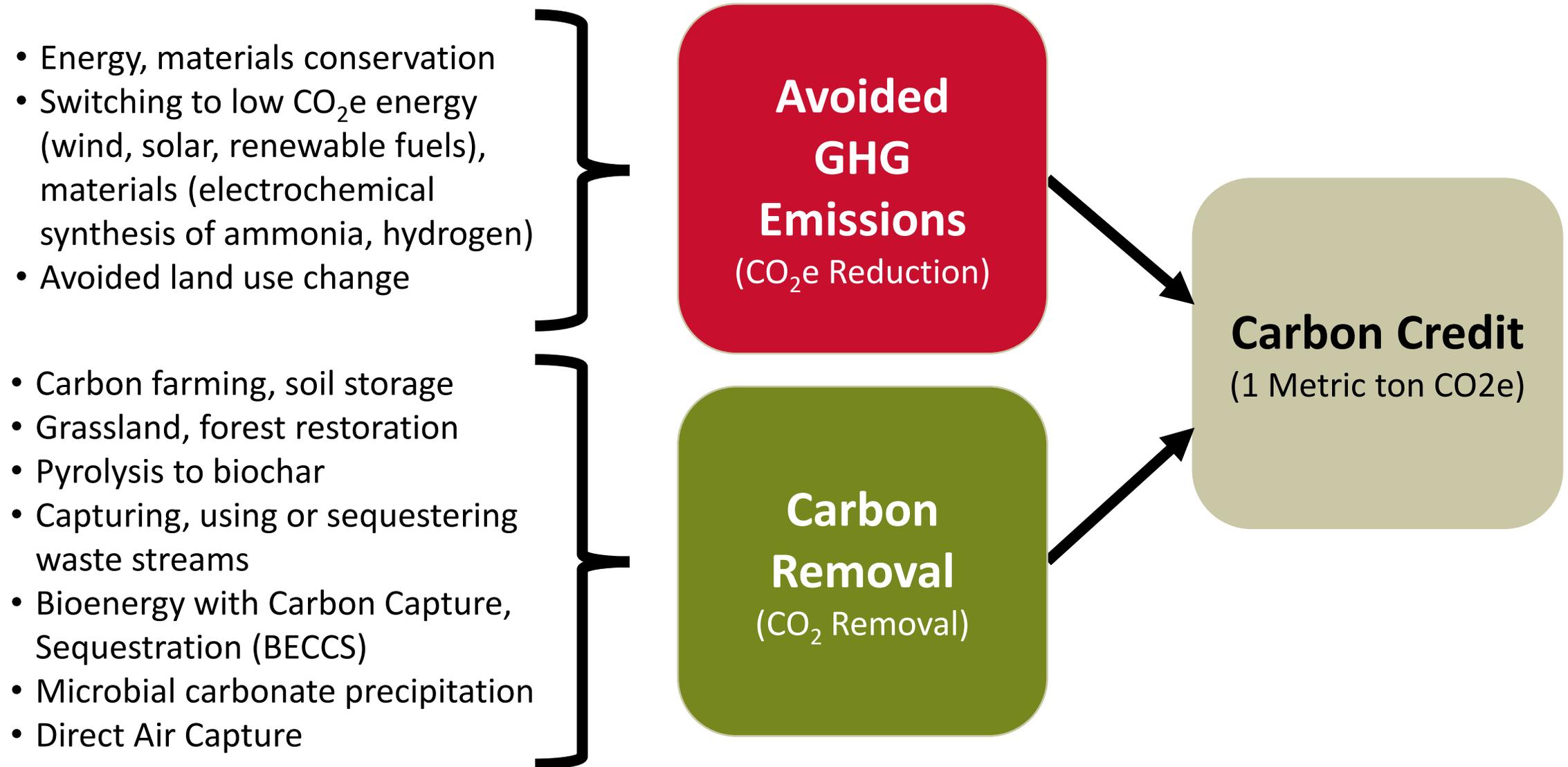
Size of the Carbon Opportunity Growing

Market Size by Traded Value of Voluntary Carbon Offsets,
pre-2005 to 2021-August-31



Redrawn from: Forest Trends' Ecosystem Marketplace. 2021. 'Market in Motion', State of Voluntary Carbon Markets 2021, Installment 1. Forest Trends Association, Washington, DC.

Many Pathways to Carbon Credits



Iowa Advantage: High Productivity at Meaningful Scale

Gross Primary
Production
from
US Corn Belt
Highest in
World

Image: NASA, 2014

Source: Guanter, L, et al. 2014. Global and time-resolved monitoring of crop photo-synthesis with chlorophyll fluorescence. *PNAS* 111, E1327-E1333.

Multiple Options for Carbon Removal



Ecological

Engineered



Less costly

More costly

Opportunity for measurement innovation

Easier to measure

More vulnerable to reversal

Less vulnerable to reversal

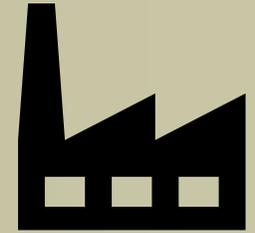
Employment co-benefits

Employment co-benefits

Environmental co-benefits

Technology leadership co-benefits

Multiple Options for Carbon Removal



Grassland,
Forest
Restoration

Carbon Farming
with Soil Carbon
Storage

Pyrolysis to Biochar

Microbial
Carbonate
Precipitation in Soils

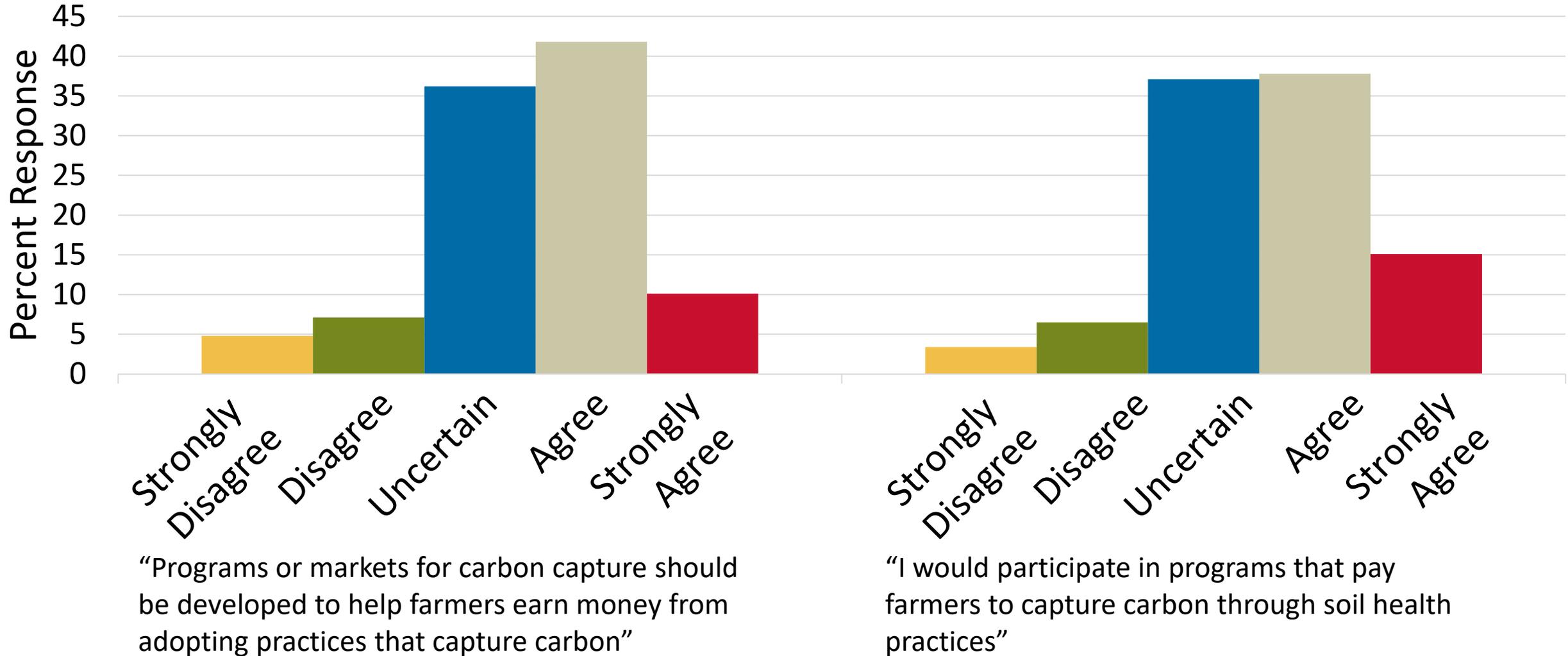
Anaerobic Digestion
of Waste Streams

Sequestration of
Biogenic Carbon
Dioxide Wastes

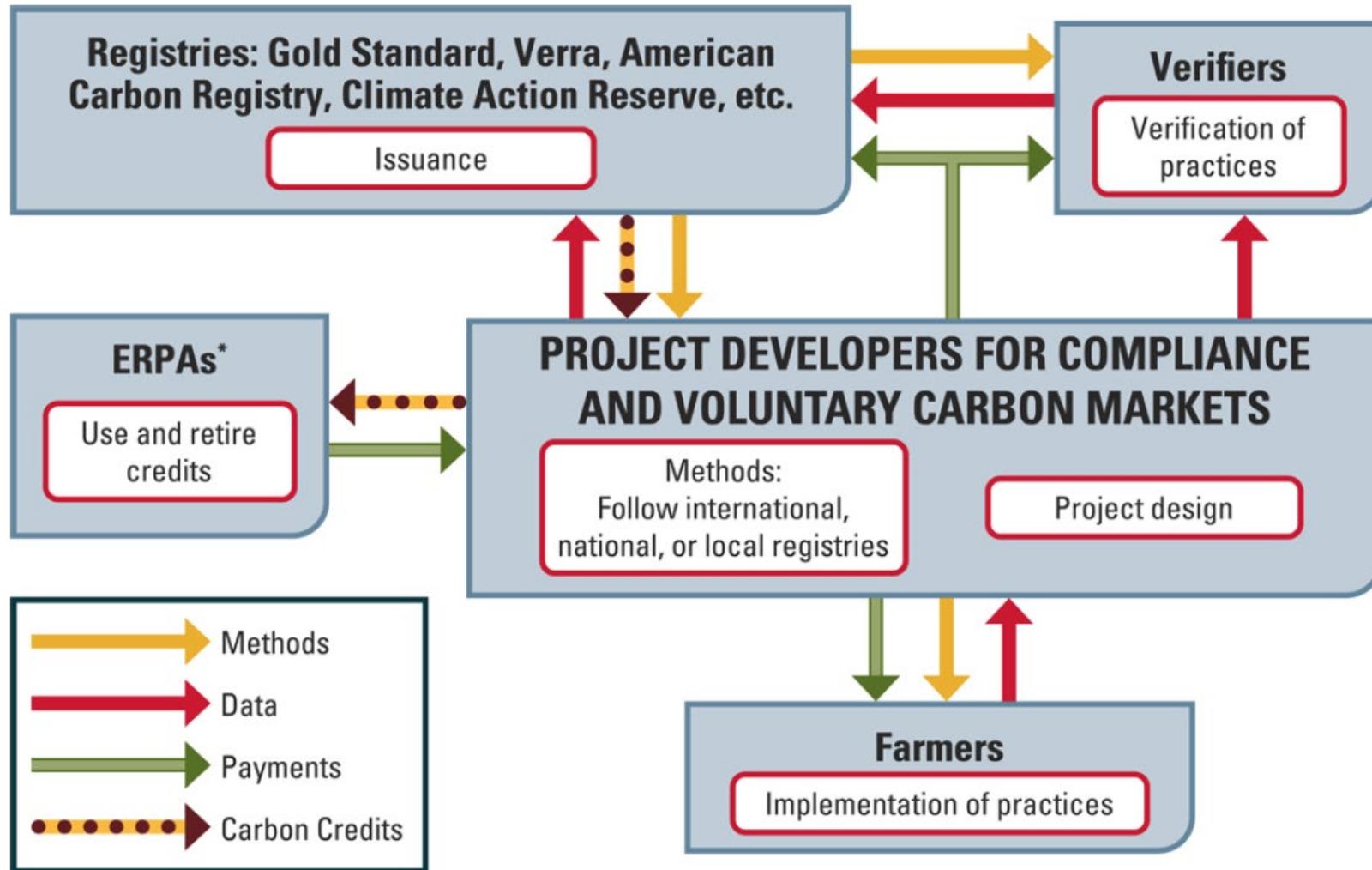
Bioenergy with
Carbon Capture
and Storage

Direct Air Capture

Iowa Farmers are Interested in Engaging in Carbon Markets, but there is Uncertainty

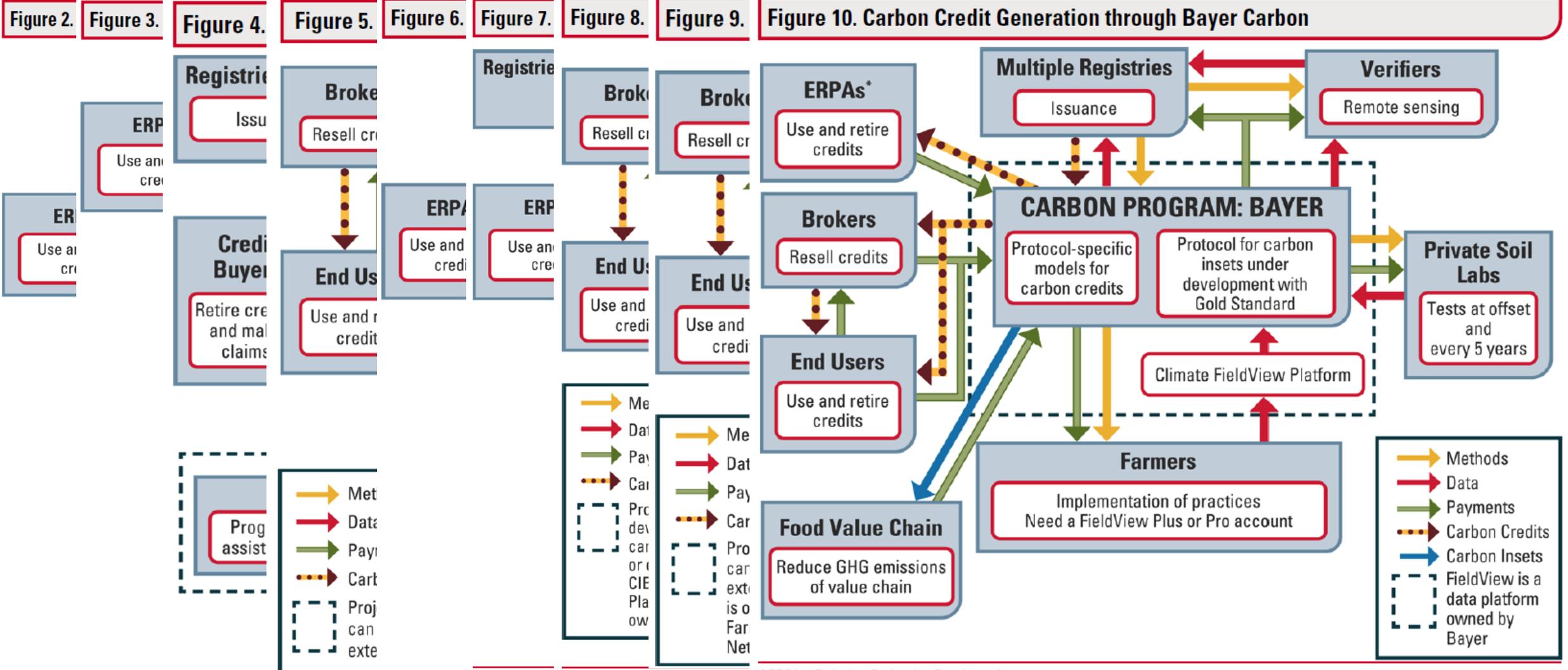


Traditional Carbon Offset Market Example



* ERPAs: Emission Reduction Purchase Agreements

Many Different Configurations of Carbon Markets

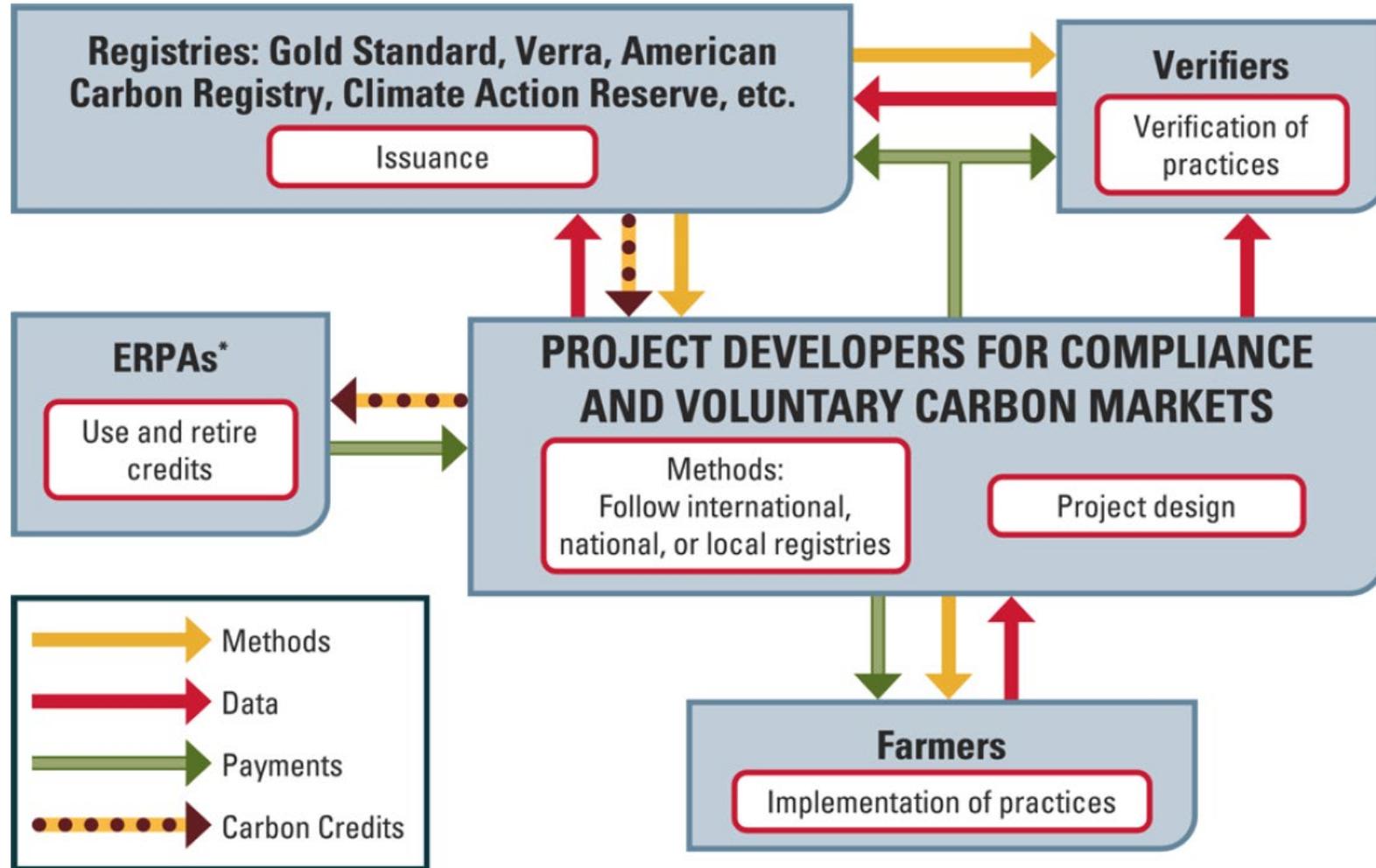


* ERPAAs: Emission Reduction Purchase Agreements

Need for Market Standardization

- Voluntary agricultural carbon markets in the United States can be viable, and many private firms are establishing a presence
- Lack of standards and guidance confuses farmers and carbon credit buyers, hindering market development
- Challenges to a robust marketplace for agricultural carbon credits are well understood and many hinge on the credibility and cost of the certification process

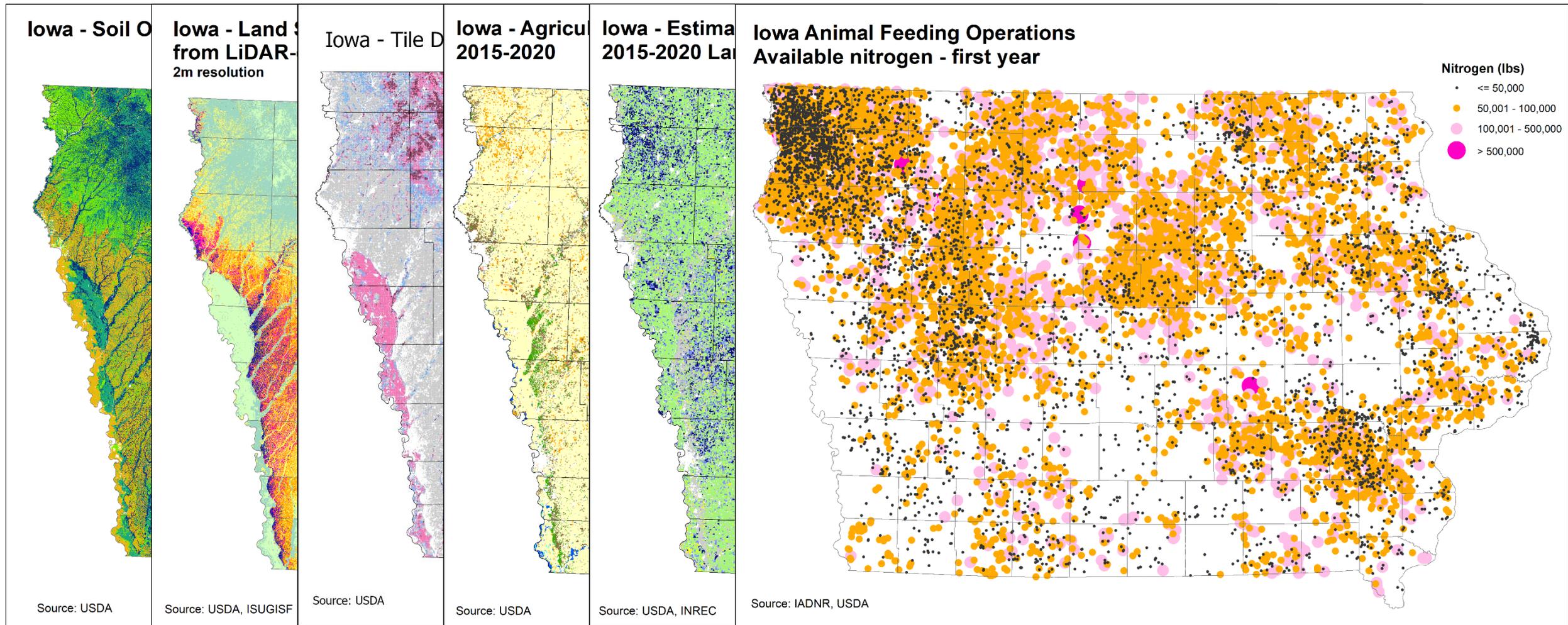
Increasing Credibility & Reducing Cost of Measurement, Reporting, & Verification (MRV) of Credits is Crucial



- Carbon markets need data
- Farm-level practice implementation data are comparatively cheap & easy to collect
 - Automation will make cheaper & easier
 - Data ownership & transferability are issues
- Environmental measurement is not standardized, costly, and slow
- Opportunities for collaboration & innovation

* ERPAs: Emission Reduction Purchase Agreements

Iowa Advantage: We're Already Data-rich



Need for Multidimensional, Credible Tools & Technical Service in Addition to Data

- Better integration of data and tools could enhance efficient agricultural management of carbon and additional outcomes
- Publicly available, science-driven analysis and decision tools (e.g., ACPF & ACPF-FiNRT; GREET) can be leveraged and expanded
- Public data and tools foster private innovation and investment

Increasing Credibility & Reducing Cost of Measurement, Reporting, & Verification (MRV) of Credits is Crucial

- MRV for carbon markets is complex, changing, with great need for standardization
- **Current and ongoing need for close collaboration across sectors to design and standardize efficient and credible ways to gather required data**
- Further automation of practice data collection from farm machinery to support MRV and practice adoption is needed and likely
- **Lower-cost, credible tools for measuring soil organic carbon are urgently needed**
- MRV for reduced methane emissions from manure storage or treatment with methane capture is relatively well established, and favors high-value credits and useful, marketable product (i.e., RNG)

Four Potential Scenarios

*High demand for low-value
ag carbon credits*

*High demand for high-value
ag carbon credits*

*Low demand for low-value
ag carbon credits*

*Low demand for high-value
ag carbon credits*

Carbon Already Providing Value to lowans in Multiple Ways



Category	Carbon (CO2e) "Customer"
Improved Yield through Soil Health	Producer & Grain Buyer
Improved Land Value through Improved Soil Organic Carbon	Land Owner
Reduce Input Costs & Conservation Rental Payment (CRP) on Low Performing Acres	Farmer, Taxpayer
Insets - Reduced Emissions & Increased Soil Organic Carbon on Commodity Production Acres	Agricultural Corporations
Offsets - Avoided Emissions & Increased Soil Organic Carbon	Non-ag Corporations
Clean Fuels Policies (e.g., CA-LCFS, RFS2) for Ethanol/Biodiesel/RNG	Petroleum Corporations & Consumers of Clean Fuels
Reduced Costs Due to Production of Environmental Co-benefits (e.g., Clean Water, Flood Control)	Society

Major Take Home

Much is known that supports
credible carbon credits

- Key gaps remain
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Policy Recommendations

Policy recommendations span across agriculture and/ or energy





1. Fertilizer Management

IMPLEMENTATION STRATEGY

Update static nitrogen fertilizer rate recommendations to a dynamic modeling system including agronomics, weather, changes in technology, and economics:

- Focus on optimization of nitrogen management more local, on-farm vs. static and/or arbitrary rates across broad geographies.
- Conduct several hundred annual trials to enable next-generation fertilizer management with data far exceeding that of other states and apply the latest advances in super-computing and quantitative modeling to forecast best management practices.
- Increase adoption of fertilizer management recommendations and gain credibility through ongoing education.

STATE BUDGET ALLOCATION: Yes; \$1 million/yr for 10 years

LEGISLATION REQUIRED: Yes; appropriation

RATIONALE

- Production of nitrogen fertilizer and nitrous oxide emissions from nitrogen fertilizer are a source of CO₂e from Iowa agriculture.
- Current nitrogen recommendation system (i.e., the MRTN) is a, plot-level, data-limited, and static model that does not account for changes in weather and farmer innovations.
- Environmentally and economically optimum nitrogen inputs vary from field-to-field and year-to-year.
- A dynamic system will improve nitrogen fertilizer use efficiency, energy efficiency, and water quality while reducing CO₂e emissions.

MEASURES OF SUCCESS

- Robust data and next generation science from on-farm research across the state, led by ISU.
- Reduction in carbon emissions.
- Improved efficiency of nitrogen use.
- Emerging markets for ag commodities.

2. Renewable Fuels



IMPLEMENTATION STRATEGY

Develop policy to support the biofuels legislation similar to that introduced in 2021 and other efforts to further low carbon usage of renewable fuels to expand beyond existing markets (e.g., aviation fuels):

- Senate File 549 and House File 859 proposed biofuels standards in Iowa, including standards for ethanol. The bills, still eligible for consideration in 2022, also propose to increase total annual investments in biofuels infrastructure.
- The policy can be broadened to include other opportunities to generate value to Iowa farmers.

STATE BUDGET ALLOCATION: Yes, TBD

LEGISLATION REQUIRED: Yes

RATIONALE

- This legislation is already vetted with stakeholders.
- Iowa is the largest producer of fuels from corn and soybeans and has no biofuel standards.
- A state program that incentivizes the use of ethanol and biodiesel can further low carbon farm practices.
- Large international airports in the Midwest region will demand supply.

MEASURES OF SUCCESS

- Increased biofuels production and usage in the state and the country.
- Legislation and administrative rule enacted.
- Science-based carbon accounting for corn production with tracking is developed.



3. Carbon Ignition Fund

IMPLEMENTATION STRATEGY

Initiate various funding and incentive strategies to successfully add carbon value:

- Administer agriculture and energy demonstration project grants or incentives through existing organizations (e.g., IDALS, IEDA).
- Add value to carbon markets to spur participation of sellers and buyers.
- Demonstrate the viability of carbon related practices and technologies.

STATE BUDGET ALLOCATION: ~\$5 million

LEGISLATION REQUIRED: Yes; appropriation

RATIONALE

- Funds are needed to support participation in carbon monetization.
- Investment will signify Iowa's leadership in carbon value creation.
- Fund can leverage momentum created by ecosystem services farmers already deliver and encourage "stacking".
- Enables the best technologies in both ag and energy sectors.
- Could increase the number of eligible practices in existing programs.
- Promotes consumer awareness and builds farmer trust.

MEASURES OF SUCCESS

- Incentives provided or grants awarded.
- Number of demonstrations sponsored.
- Acres of farmland enrolled in carbon programs.
- Supply chain brands impacted.
- Amount of carbon sequestered.



4. Carbon Initiative at the Bioeconomy Institute

IMPLEMENTATION STRATEGY

Create the Carbon Initiative at the Bioeconomy Institute, led by ISU, to serve as a trusted source of information:

- Align with the Task Force vision and utilize strategies and archived recommendations to provide value to the carbon marketplace. Report to the Governor, legislature, and related state agencies, who will provide input to guide current and future research.
- Leverage resources with additional public and private funding and partners in support of the overall effort.
- Maintain a research focus to advance understanding and technology that will guide programs and could inform policy, but not advocate for or propose policy or legislative changes.
- Disseminate research-based information to farmers, landowners and assist the public with educational opportunities.

STATE BUDGET ALLOCATION: Yes; \$2 million/yr

LEGISLATION REQUIRED: Yes; appropriation

RATIONALE

- ISU is a proven and trusted research entity with existing facilities, structure, and expertise to position Iowa as a leading state in carbon value research.
- Seamless pathway to ISU Extension and Center for Agricultural and Rural Development to translate research to practical use and policy/economic analysis.
- Drive ag commodity-based products to the forefront via an ongoing presence.
- Facilitate connections with other researchers, ISU Electric Power Research Center - a catalyst for collaboration in ISU-industry power systems research, and others to improve the efficiency, reliability, and resilience of energy-generation.

MEASURES OF SUCCESS

- Foster outside investment in carbon related research, energy production and agricultural commodities/value added programs.
- Maintain and solidify Iowa's position as a national leader in renewable fuel and energy production.
- Increased carbon value and voluntary market participation.



5. Low-Carbon Energy Generation & Flexible Rates

IMPLEMENTATION STRATEGY

Support policies and regulations to advance incremental investments and innovation in Iowa's energy economy:

- Propose legislation that enables a rate-regulated public utility the authority to create flexible ratemaking mechanisms outside of the traditional rate case context to respond quickly to meet businesses' demands / goals of net-zero carbon emissions.
- Promote the study, research, and implementation of new technologies and broader adoption of existing low-carbon generation sources and affordable baseload generation.

STATE BUDGET ALLOCATION: None

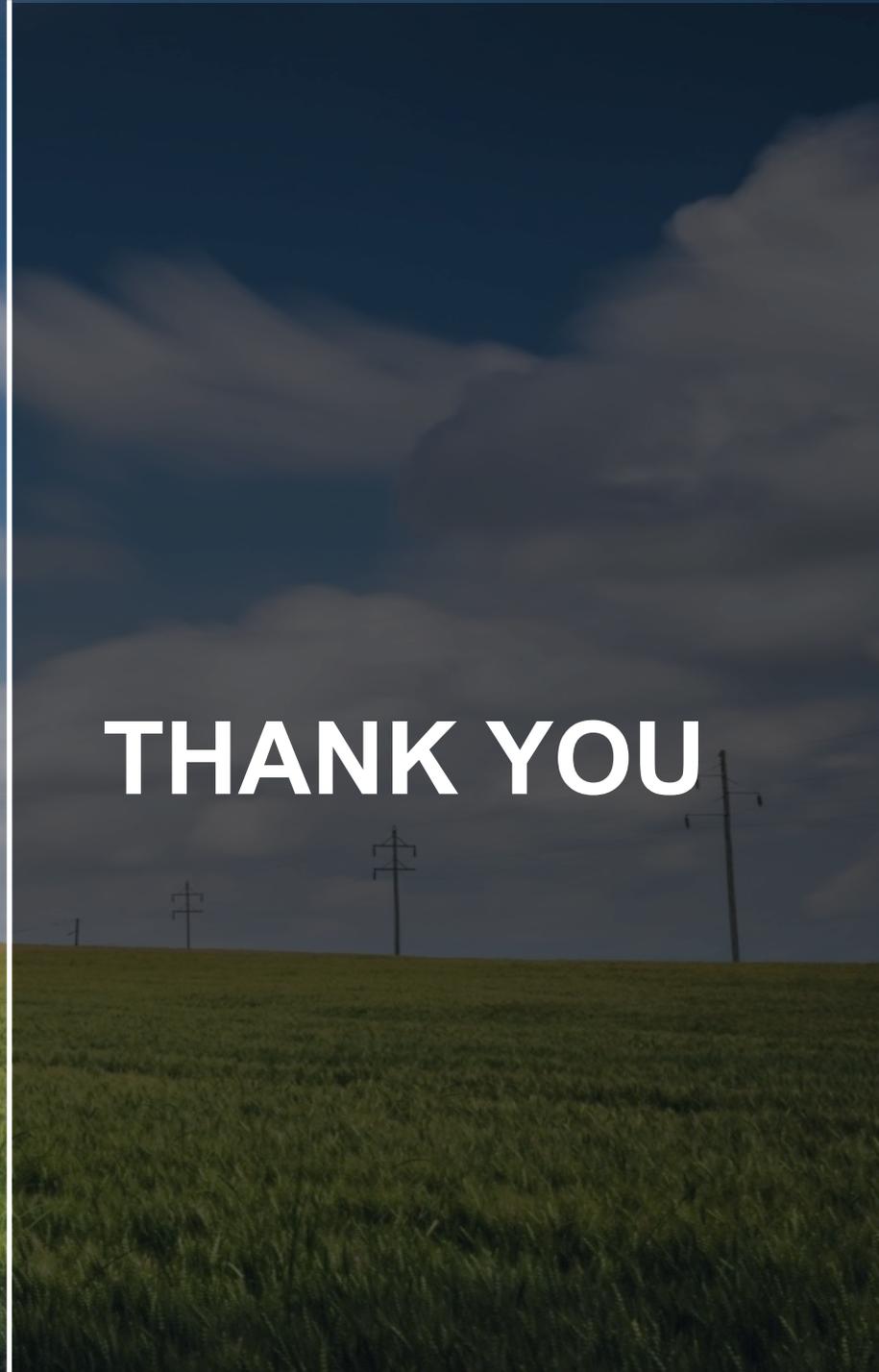
LEGISLATION REQUIRED: Yes

RATIONALE

- Industries are setting net-zero carbon goals and mechanisms to quickly respond as needed.
- Similar actions successfully expanded Iowa's wind industry.
- Lower investment risk is needed for cutting edge technologies.
- Iowa should continue our leadership in renewable energy.
- Technology neutral strategies will prove most economical.
- Claiming the state "open for business" with low carbon generation will spur economic development.

MEASURES OF SUCCESS

- Reduction in carbon emissions.
- Increased development in low carbon energy resources including wind, solar, energy storage, biogas, nuclear and green hydrogen.
- Approval of optional rates with no subsidies or negative impact on customers.
- Number of customers utilizing low carbon tariffs.
- Customer savings.



THANK YOU