
Natural
CLIMATE
SOLUTIONS
The Role of Agriculture
and Carbon Capture
in the Transition
MAY 13th
@ 3PM ET
CLIMATE X CHANGE
[SCPN]

State Carbon Pricing Network (SCPN)

- Nearly 4,500 advocates, legislators, government officials, business leaders, and academics working to price carbon pollution in their states
- Members across all 50 states
- Learn more at www.climate-xchange.org/network

Noa Dalzell

SCPN Manager

CLIMATE XCHANGE [SCPN]

SCPN Services

- Conduct **research studies** on the state-specific impacts of carbon pricing
- Help **draft carbon pricing bills** and provide technical assistance
- Offer opportunities for **cross-state collaboration**, like our monthly national SCPN call and quarterly legislative calls
- Share knowledge and information via our **monthly webinars** and **weekly newsletters**

CLIMATE X CHANGE [SCPN]

Today's Speakers

Max Neumeyer

MAD Agriculture

Jessie Martin

Carbon Washington

Matthew Sheffer

Hudson Carbon

Carbon Farming and Soil Health Policy

Max Neumeyer, Director of Policy

Background

Strands of regenerative agriculture

Rodale Organic	Permaculture/ Agroecology	Holistic Management	Soil Profits	"Nature as Measure" Farmsteading	Carbon Farming
Created the Regenerative Organic Certification (animal welfare, social fairness, soil health)	Ecological design based on indigenous traditions (eg *terra pretta* in Amazon)	Known for multi-paddock rotational grazing system	Focus on positive economics of conservation practices and reduced input costs	Smaller-scale family farm approach rooted in place	Emphasis on building soil organic carbon, climate and environmental cobenefits
Rodale Institute, Regenerative International	Carol Sanford, ReGen.Network	Savory Institute, Holistic Management International	Gabe Brown, Ray Archuleta, Soil Health Institute, Soil Health Partnership, No-till on the Plains, Noble Research Institute	Wendell Berry, Joel Salatin, Wes Jackson's Land Institute (perennial crops)	Marin Carbon Project, Kiss the Ground, Carbon Cycle Institute, Mad Agriculture

Source: Electris C. et al, *Soil Wealth: Investing in Regenerative Agriculture across Asset Classes (2019)*

Soil health principles

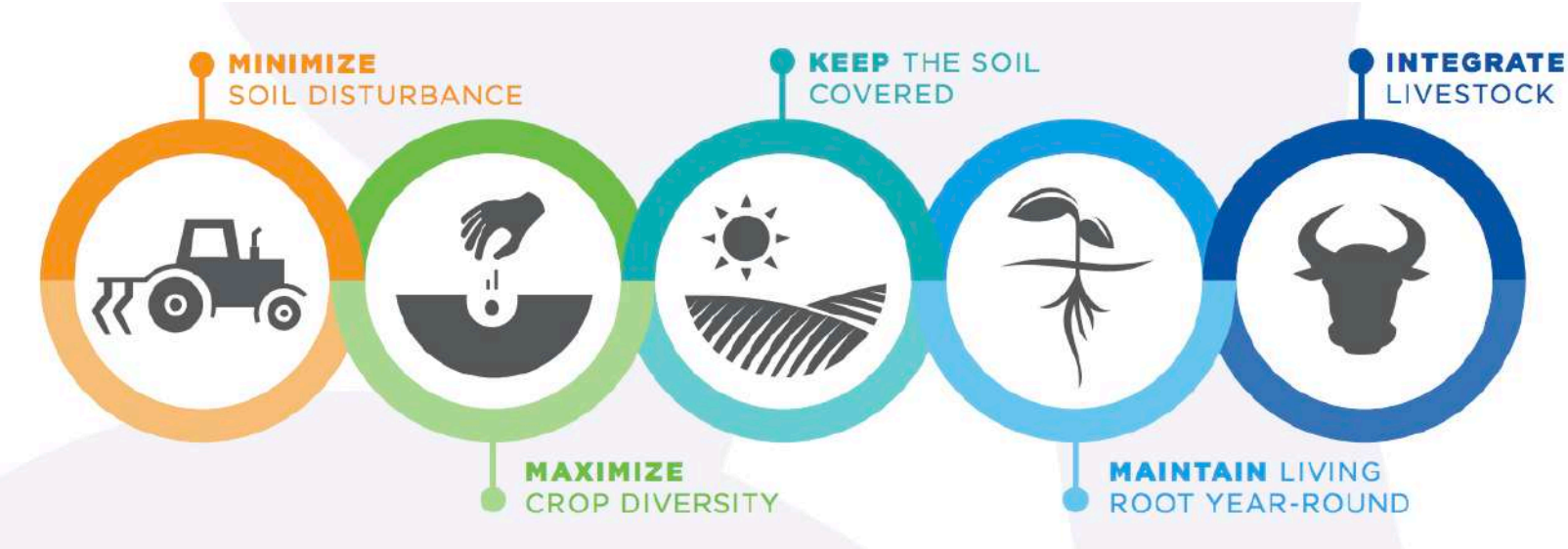
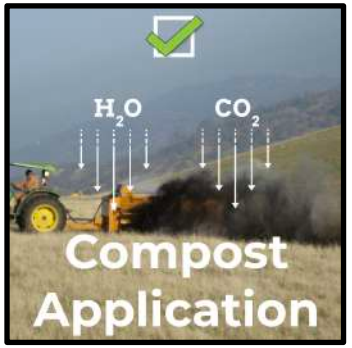
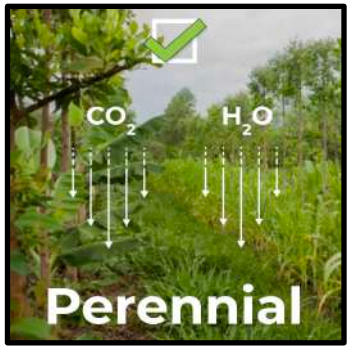
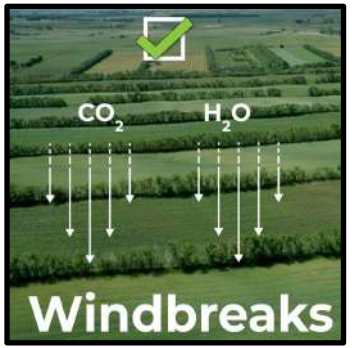


Image Credit: *General Mills Regenerative Agriculture Self Assessment*

Soil health practices







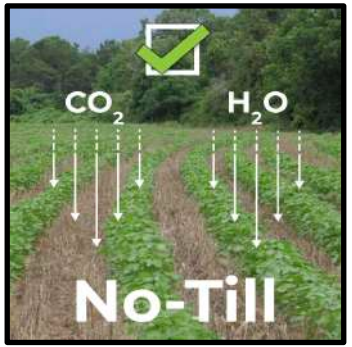


Image Credit: Kiss The Ground

Benefits of carbon farming


Builds soil fertility


Enhances farmer profitability


Improves the water cycle


Carbon sequestration


Increases biodiversity and resilience

Obstacles to implementation

Upfront costs, long-term benefits

Lack of a revenue premium for regenerative goods

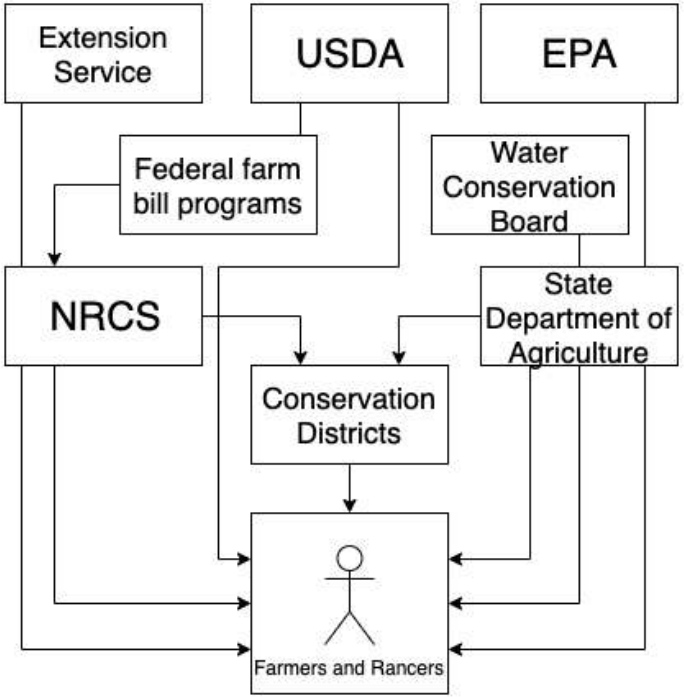
~~Farmers that rent land don't benefit from investments in soil~~

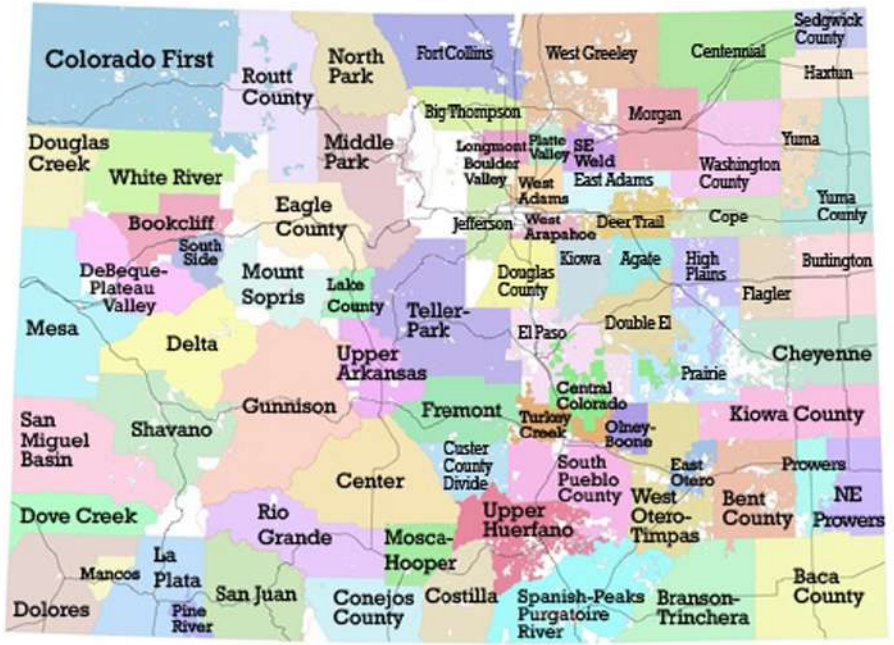
Increased profits, but reduced yields

Access to financing, tools and equipment

Awareness and difficulty of change

The ecosystem of soil health policy

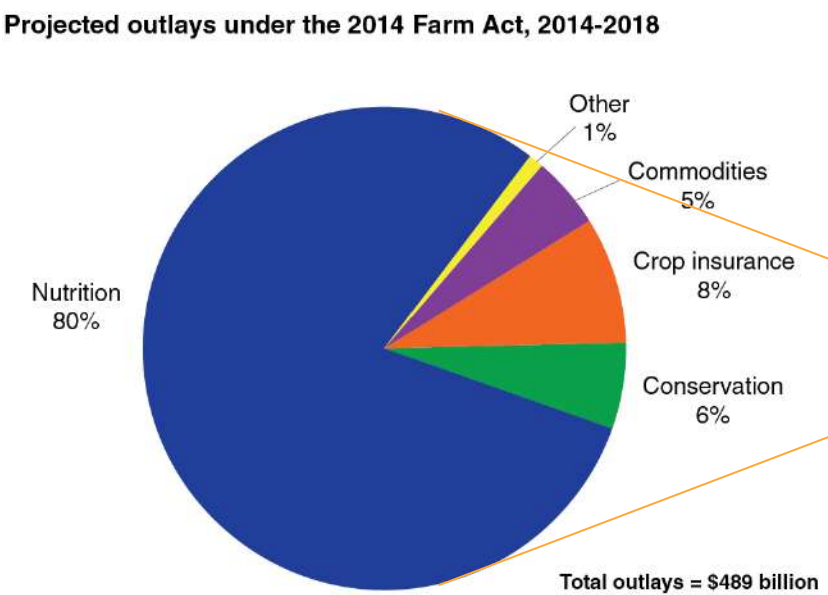




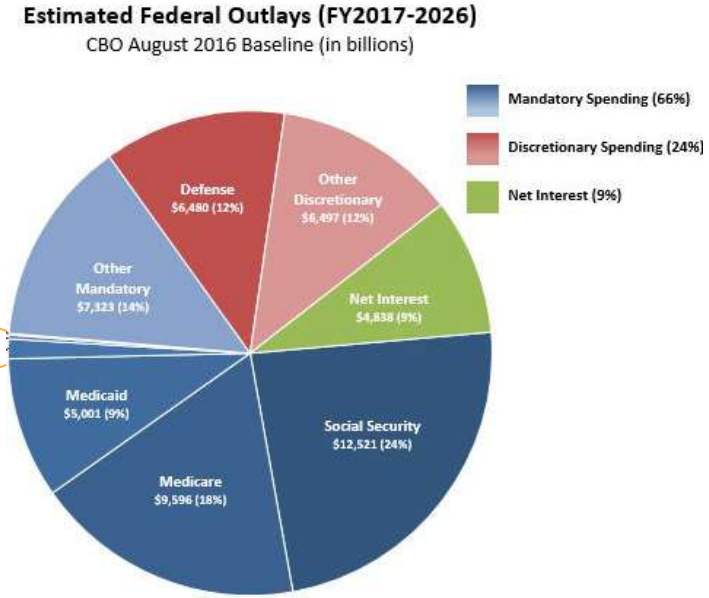
Source: Colorado Watershed Assembly

Federal Soil Health Policy

The Farm Bill is a small part ($489B) of the federal budget



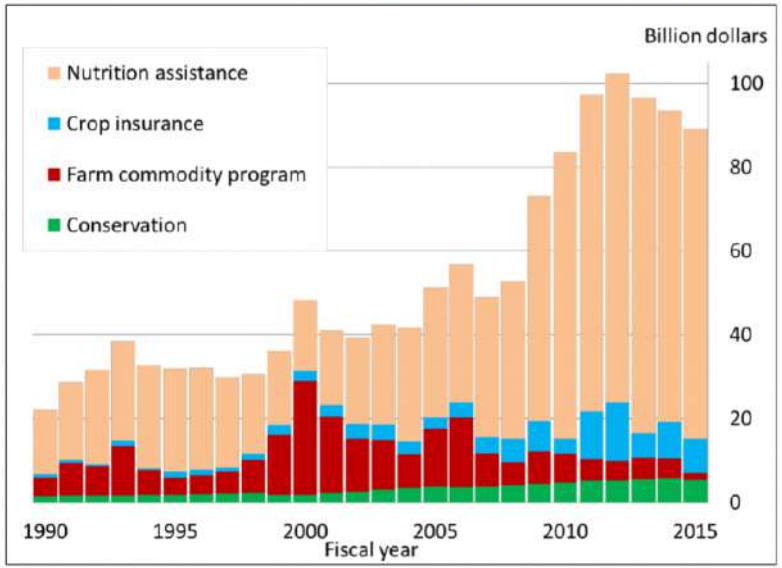
Source: USDA Economic Research Service using data from Congressional Budget Office, Cost Estimates for the Agricultural Act of 2014, Jan 2014.



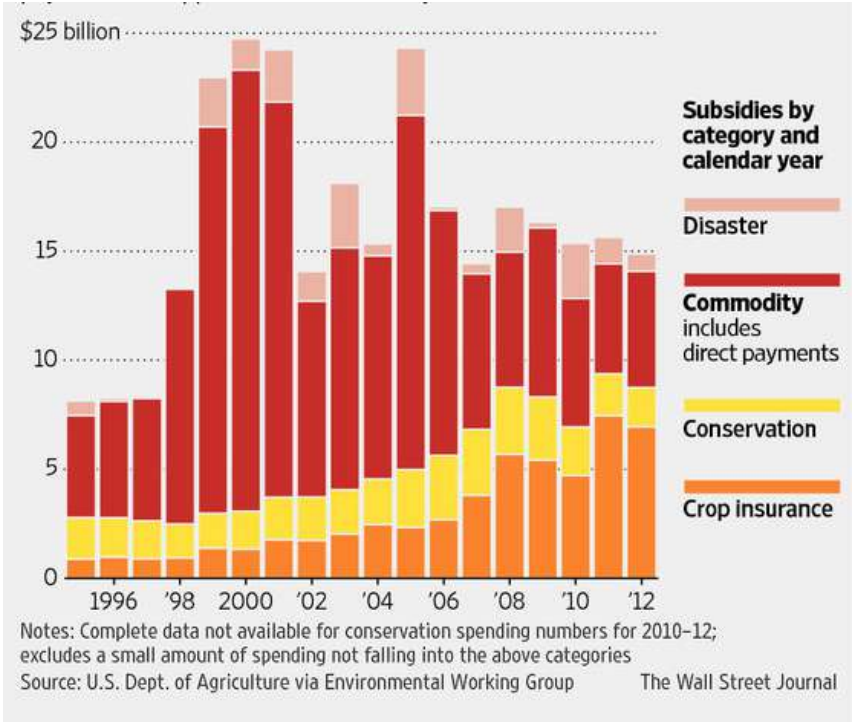
Source: https://farmpolicynews.illinois.edu/2016/12/2018-farm-bill/

The share of farm bill spending on conservation has decreased

Figure 3. Farm Bill Spending by Major Mandatory Programs



Source: CRS, using USDA data, including USDA Farm Service Agency, "Table 35," *Agricultural Outlook;* USDA Risk Management Agency, "Program Costs and Outlays by Fiscal Year;" J. Glauber, "Crop Insurance Reconsidered," *American Journal of Agricultural Economics*, 2004; USDA Farm Service Agency, "Output 3," *Commodity Estimates Book;* USDA Natural Resources Conservation Service, "Soil and Water Conservation Expenditures, 1935-2010," 2011; and USDA Food and Nutrition Service, "National Level Annual Summary, Participation and Costs."



CRP, CSP, and EQIP make up the bulk of conservation spending

Conservation Reserve Program (CRP)	•Protects soil, water quality, and habitat by removing highly-erodible or environmentally sensitive land from agricultural production through long-term rental agreements. •24 million acres authorized. Projecting to cost **$2 billion in 2019.**
Conservation Stewardship Program (CSP)	•Rewards advanced conservation systems through 5-year renewable payment contracts to farmers and ranchers to actively manage, maintain, and expand conservation practices like rotations, cover cropping, rotational grazing, and IPM on working farms. •7.5 million acres. $700 million in 2019 increasing to **$1 billion by 2023.**
Environmental Quality Incentives Program (EQIP)	•Supports working lands conservation through cost-share and technical assistance payments to farmers and ranchers; includes Organic Initiative to support organic practice adoption, High Tunnel Initiative for vegetable production, and multiple regional landscape scale initiatives. •13 million acres. $1.75 billion in 2019 increasing to **$2.23 billion by 2023.**

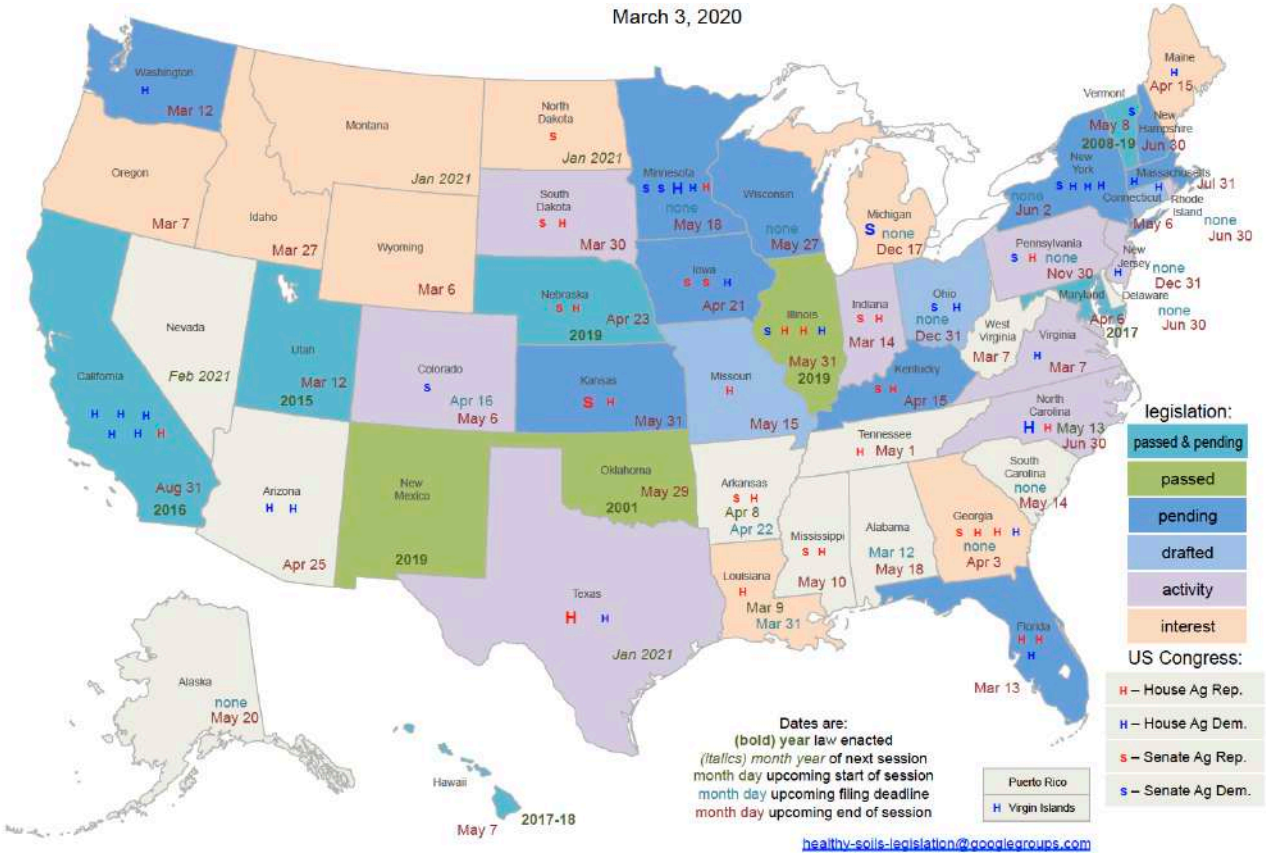
Other federal conservation programs

Regional Conservation Partnership Program (RCPP)	•Enables state and local agencies, non-profit organizations, and other entities to partner regionally with the Natural Resources Conservation Service on special projects to promote farmer adoption of conservation activities to address key natural resource concerns. •91 projects funded. **$300 million per year.**
Conservation Innovation Grants (CIG)	•Offers competitive grants to support projects by groups and producers (including on-farm research and demonstrations) to develop and improve access to innovative resource conservation solutions for farmers and ranchers nationwide. •**$37.5 million per year** ($25 million for On-farm Conservation Innovation Trials).
Conservation Loans	•Offers federal guarantees on private loans to help farmers and ranchers implement qualified conservation practices on their farm, with a priority for beginning farmers. •**$150 million per year.**

Priorities for federal soil health policy

State-level soil health policy

Soil health policy in the states



Source: Soil4Climate, https://www.soil4climate.org/news/healthy-soils-legislation-update-may-2019

Soil health policy in the states

- **New Mexico:** HB 204 and SB 218 (2019)
  - Defines healthy soils and ID's soil health principles
  - Includes: soil assessment and education program, healthy soil advisory board, workshops and training
  - Creates "soil health champions"
  - $5.15M for program (FY2020)

- **Nebraska:** LB 243, LB 729 and LB 283 (2019)
  - Creates Healthy Soils Task Force to develop health soils initiative by 2021
  - Provides incentive of $20-45/acre for planting cover crops
  - $250,000 for soil health and climate change research at University of Nebraska

- **California:** SB859 and AB1613 (2016)
  - Creates Healthy Soils Program
  - Defines healthy soils, coordinate agency efforts, R&D, incentives, education
  - AB2377 (2018) – 5% of Climate Smart Ag funding for technical assistance (25% of funds for socially-disadvantaged farmers)
  - $7.5M for program and demonstrations

Source: Lehner, P. and Henderson E., "State Soil Health Initiatives: Building Momentum" (2019)

Soil health policy in the states

- **Maryland:** HB 1063 (2017)
  - Defines and supports healthy soils by directing the Agricultural Department to support practices through incentives, R&D, possible funding

- **Oklahoma:** HB 1192 (2001)
  - Creates advisory committee to identify and support practices through R&D, education
  - Funding and opportunities for carbon trading

- **Utah:** HCR 8 (2015)
  - Calls on all agencies "with authority to manage lands to increase soil carbon sequestration"

Source: Lehner, P. and Henderson E., "State Soil Health Initiatives: Building Momentum" (2019).

Possible state-level policy solutions

Baseline soil health map and data collection	Soil health champion program and demonstration projects	Producer-to-producer education programs and technical assistance
Direct federal funds towards soil health (EQIP / CSP)	Labelling / market development	Preferential purchasing through government procurement

Soil health work in Colorado

- **Colorado Collaborative for Healthy Soils:** A bottom-up, big-tent community effort to organize the agricultural community around a soil health program.

    - **Core Principles:** Producer-centered, Science-based, Participatory, Action-oriented, and will only consider policies and programs that are Voluntary / Incentive-based

    - **Short-term Goals:** (1) Give feedback to CDA as they consider ideas for a Colorado soil health program; (2) Ensure there is adequate funding for soil health activities across the state; (3) be a forum for participants to learn about related initiatives across the state.

Ideas for a soil health program

- **Soil Health Grant Program:** Grants for conservation districts, other organizations and producers for demonstration, education and implementation activities.
- **Bringing Established Programs to Colorado:** Funding to bring the Illinois STAR program, Ecosystem Services Market Consortium and the Soil Health Partnership to Colorado.
- **Soil Health Testing and Research Program:** Free / reduced-cost soil health testing program that provides producers with an onramp to access new revenue streams and samples to CSU researchers to improve soil health testing in Colorado and better understand where we stand as a state.
- **Shared Knowledge and Continued Learning:** Creation of open-source resources and a knowledge-sharing platform focused on helping farmers apply context-specific methods to improve the soil health of their land.

Private-sector initiatives

Corporations are making soil health a priority

…and many more!

Markets for ecosystem services

Voluntary carbon offset markets

American Carbon Registry

Verified Carbon Standard

Carbon removal markets

NORI

indigo

Ecosystem Services Market Consortium

SOIL HEALTH INSTITUTE

NOBLE RESEARCH INSTITUTE

BUNGE

Cargill — Helping the world thrive

DANONE NORTH AMERICA

General Mills — Making Food People Love

indigo

The Nature Conservancy — Protecting nature. Preserving life.

Big goals for soil health policy

- Order of magnitude increase in conservation spending
- Manhattan project scale investment in soil health RDD&D
- Payments for a range of ecosystem services (eg water, biodiversity)
- Price on carbon that pays for carbon sequestration on working lands
- Discounts on crop insurance for conservation practices
- New crop subsidy system that prioritizes soil health

Thank You!

Max Neumeyer max@madagriculture.org (917) 828-4887

Sustainable Farms & Fields

Investing in sustainable farms, fields, and supply chains in Washington state

carbon WASHINGTON

Jessie Martin
Executive Director
May 13, 2020 | ClimateXchange
carbonwa.org

carbon WASHINGTON

Our vision is for net-zero carbon emissions in Washington state, and a prosperous, healthy future for all.

Effective

Efficient

Equitable

carbon WASHINGTON


Economic Stimulus + Recovery
Rebuilding for resilience with a price on carbon
Public-Private Partnerships
Investing in sustainable farms, fields, and supply chains
Shared Values, Shared Stories
Defining a just transition for all Washingtonians
carbon
WASHINGTON

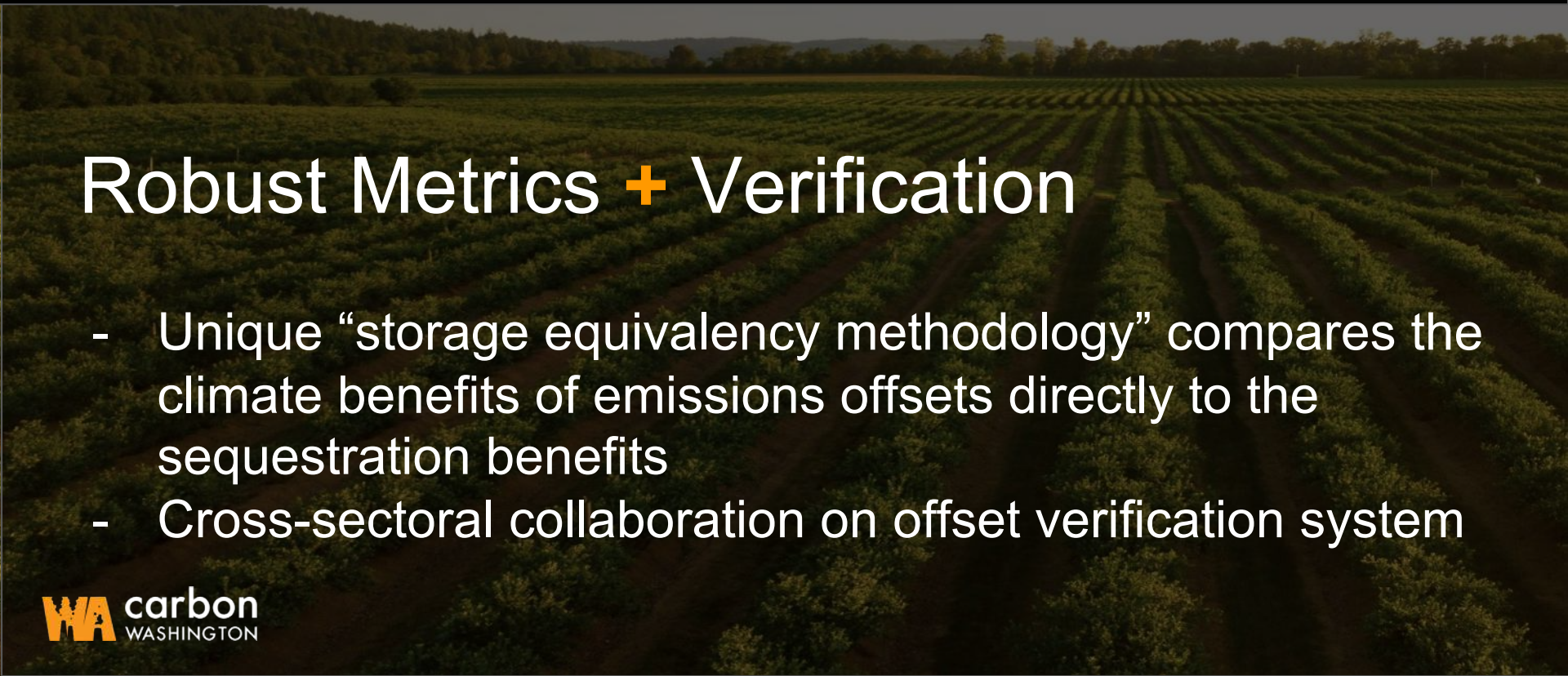
Sustainable Farms & Fields

Increased Natural + Economic Resilience

- Increases ecosystem function and environmental health
- Serves farmers' bottom lines
- Reduces exposure to economic risk

carbon WASHINGTON

Sustainable Farms & Fields



Robust Metrics + Verification

- Unique “storage equivalency methodology” compares the climate benefits of emissions offsets directly to the sequestration benefits
- Cross-sectoral collaboration on offset verification system

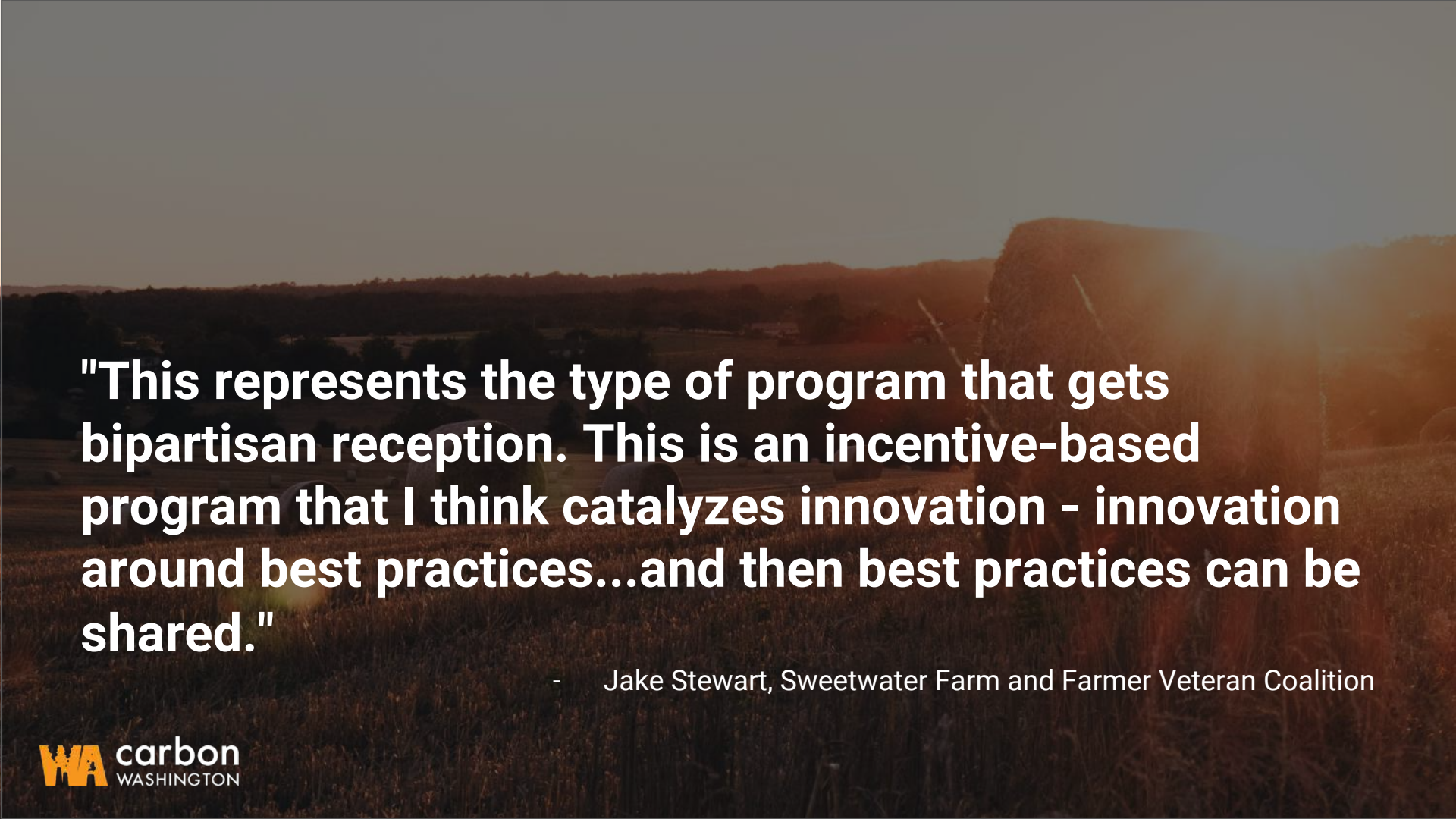
carbon WASHINGTON

Sustainable Farms & Fields

Farmer-led ideas + innovation

- Cover crops
- Anaerobic digesters
- No till
- Precision ag
- Natural areas
- **The next big thing…**

carbon WASHINGTON


"This represents the type of program that gets bipartisan reception. This is an incentive-based program that I think catalyzes innovation - innovation around best practices...and then best practices can be shared."
- Jake Stewart, Sweetwater Farm and Farmer Veteran Coalition
carbon
WASHINGTON

2019
Legislative Session

- Needed more input from key stakeholders

- Funding for agriculture programs already scarce

- Put ag on defense

WA carbon WASHINGTON

Getting back to work...together

Stakeholder Engagement + Coalition Building

- Survey to farmers
- Stakeholder meetings
- Gap analysis
- Dedicated staff

carbon WASHINGTON

2020
Legislative Session

- Language developed by key stakeholders

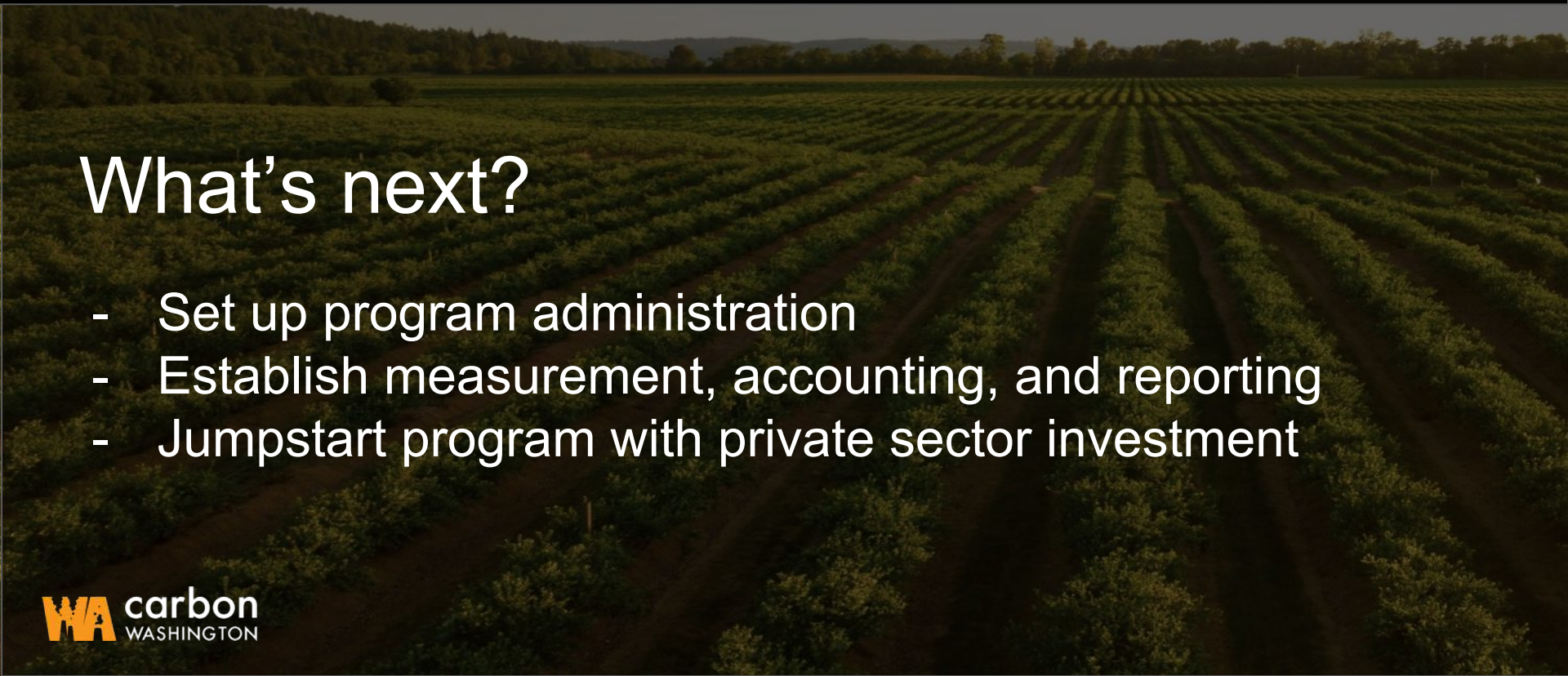
- Collaborative process

- Farmer support

WA carbon WASHINGTON


"That language represents a year-long discussion among a broad stakeholder group that, frankly, those conversations don't happen that often...it's another shining example of what happens when you give reasonable people enough time to have a conversation about important issues."
- Tom Davis, WA State Farm Bureau
WA carbon WASHINGTON

Sustainable Farms & Fields



What's next?

- Set up program administration
- Establish measurement, accounting, and reporting
- Jumpstart program with private sector investment

carbon WASHINGTON

Sustainable Farms & Fields

- Reduce atmospheric carbon
- Increase supply chain resilience
- Create economic value and deliver public benefits from private investments
- Foster private sector innovation in the public sector and and cross-sectoral knowledge sharing

carbon WASHINGTON


“Our dairy farmers are being asked by their customers to offer low-carbon milk, and there's some exciting technology to be able to work on that, and this bill holds innovative things like that.”
- Jay Gordon, WA State Dairy Federation
WA carbon WASHINGTON


carbon
WASHINGTON
Questions?
jessie@carbonwa.org
www.carbonwa.org
THANK YOU

Agricultural Systems Research

Modeling & Remote Sensing

Carbon Offset Market Infrastructure

HUDSON CARBON

PRACTICES

- Tillage reduction
- Maximized soil cover to maintain photosynthesis
- Increased biodiversity
- Improved nutrient cycling
- Increase water use efficiency and infiltration
- Animal integration
- Increase terrestrial carbon stocks across the farm (soils, trees, etc.)

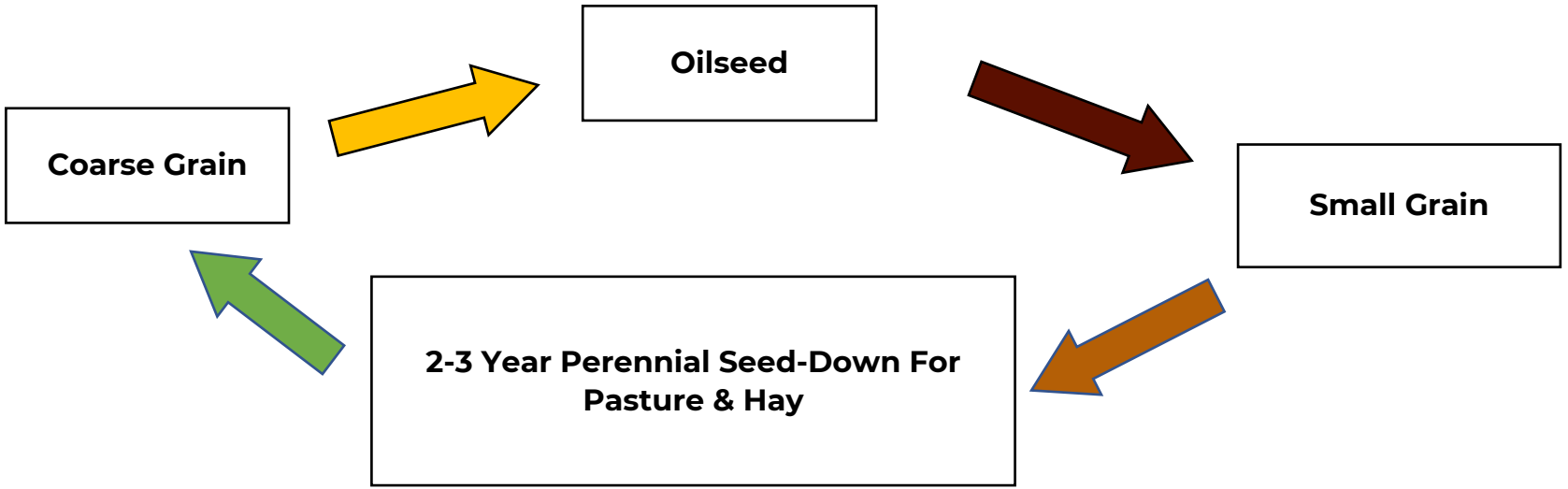
ORGANIC NO-TILL WITH ROLLING & CRIMPING

COVER CROPPING

GRAZING

COMPOSTING

CROP ROTATION



Crops: Corn, Soybean, Sunflower, Wheat, Barley, Oats, Rye, Buckwheat, Field Peas, CBD Hemp

EXAMPLE ROTATION

CORN

WHEAT

SUNFLOWER

3-4 YEARS PERENNIAL

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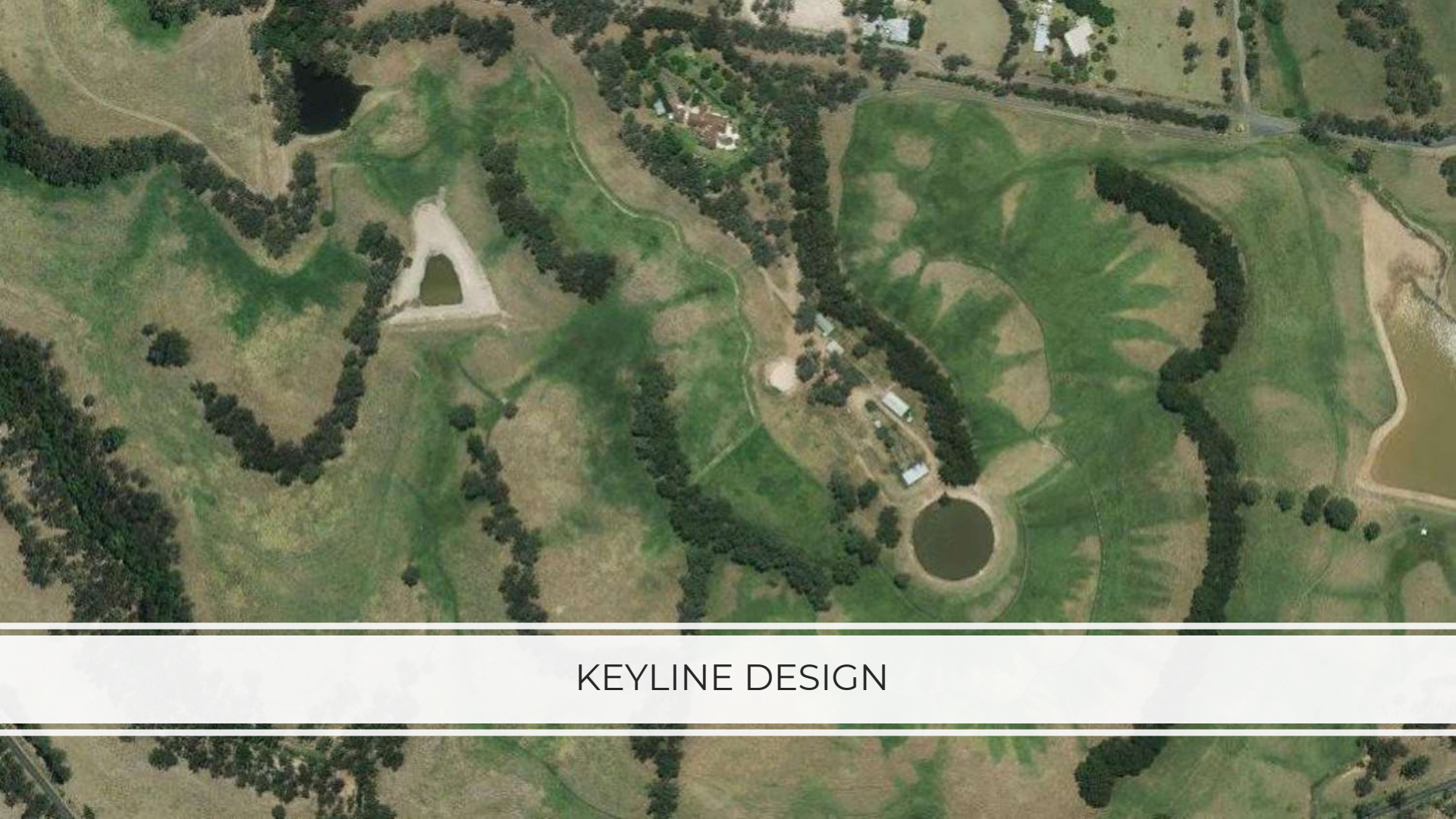
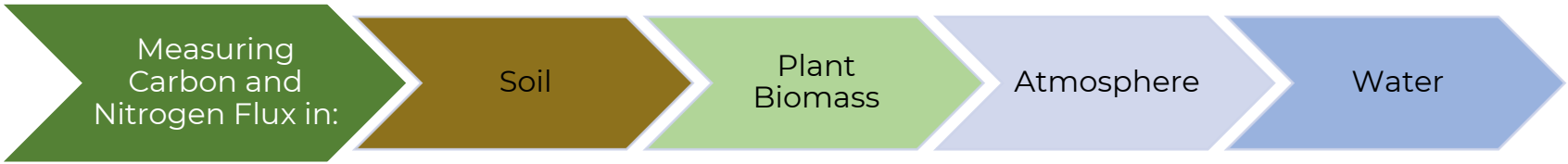


KEYLINE DESIGN

AGROFORESTRY: TREE PLANTING PLAN FOR STONE HOUSE FARM (our pilot research farm)


Measuring Carbon and Nitrogen Flux in:
Soil
Plant Biomass
Atmosphere
Water

BIOMASS SAMPLING

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ONE-METER SOIL CORE SAMPLING

Core is divided into 5 horizons, at 10cm, 20cm, 30cm, 60cm, & 100cm.

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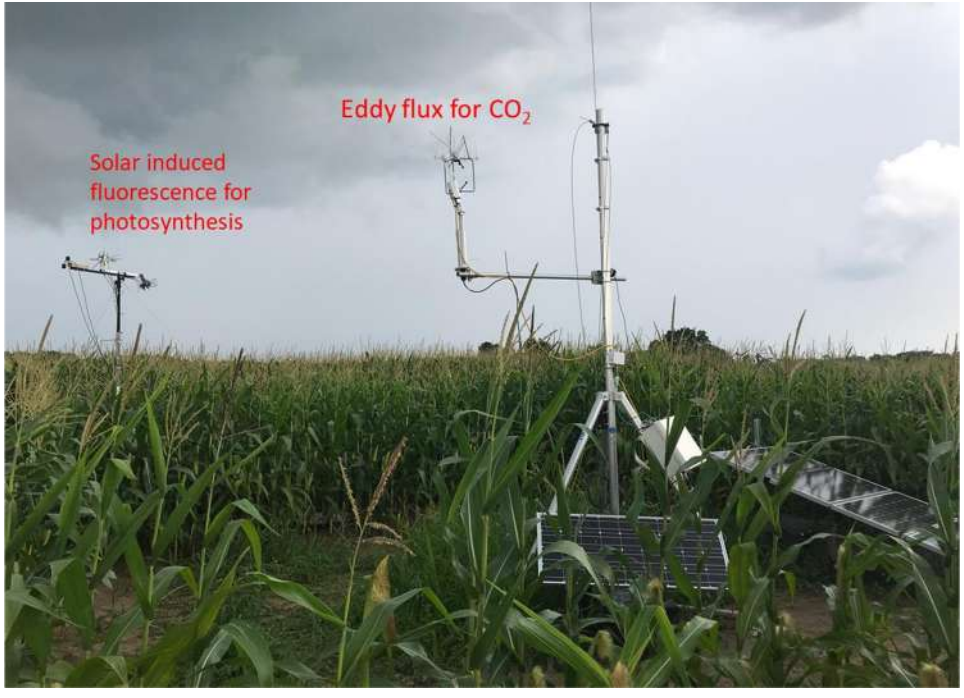
GREENHOUSE GAS FLUX: PORTABLE CHAMBER

HUDSON CARBON

EDDY COVARIANCE METHOD

Provides continuous, high-frequency, spatially integrated measurements of GHG's across a large footprint area.



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STREAMFLOW MONITORING FOR DRAINAGE SWALES AND STREAMS

Data set:
Flow Volume
Velocity
Quality Parameters:
- Dissolved Oxygen
- Dissolved Organic Matter
- pH/Temperature
- Nitrate
- Ammonium

HUDSON CARBON

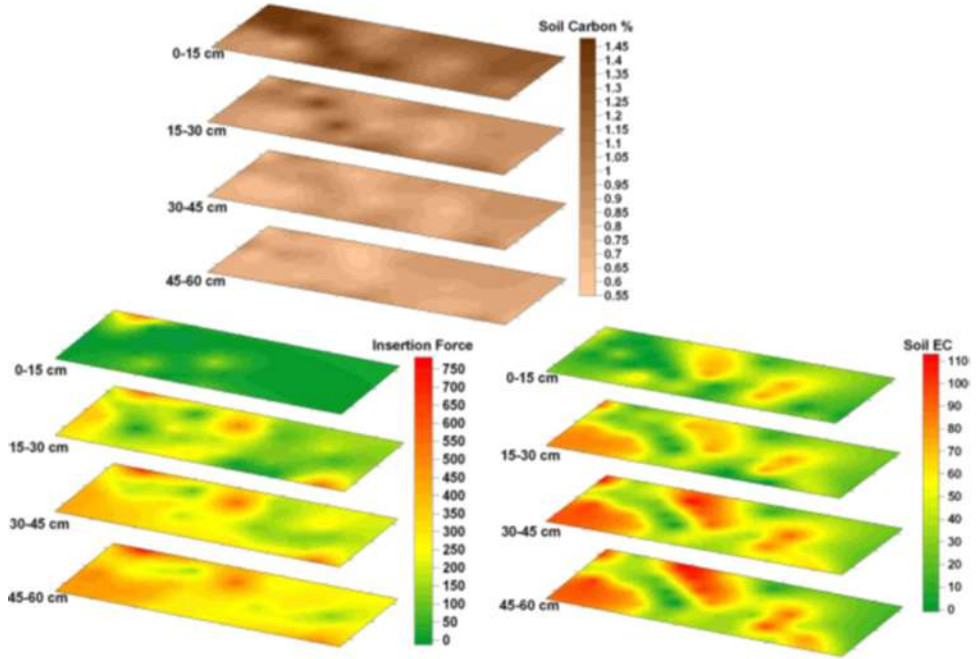
Large-Scale Monitoring TECHNIQUES

On-The-Go Soil Variability Mapping
Electrical Conductivity Sensor coupled with a Spectrophotometer that measures red and near-infrared reflectance to map soil surface variability.

HUDSON CARBON

Large-Scale Monitoring TECHNIQUES

Soil Profile Variability Mapping
The same sensors mounted on a 1-meter account for variability throughout the soil profile.



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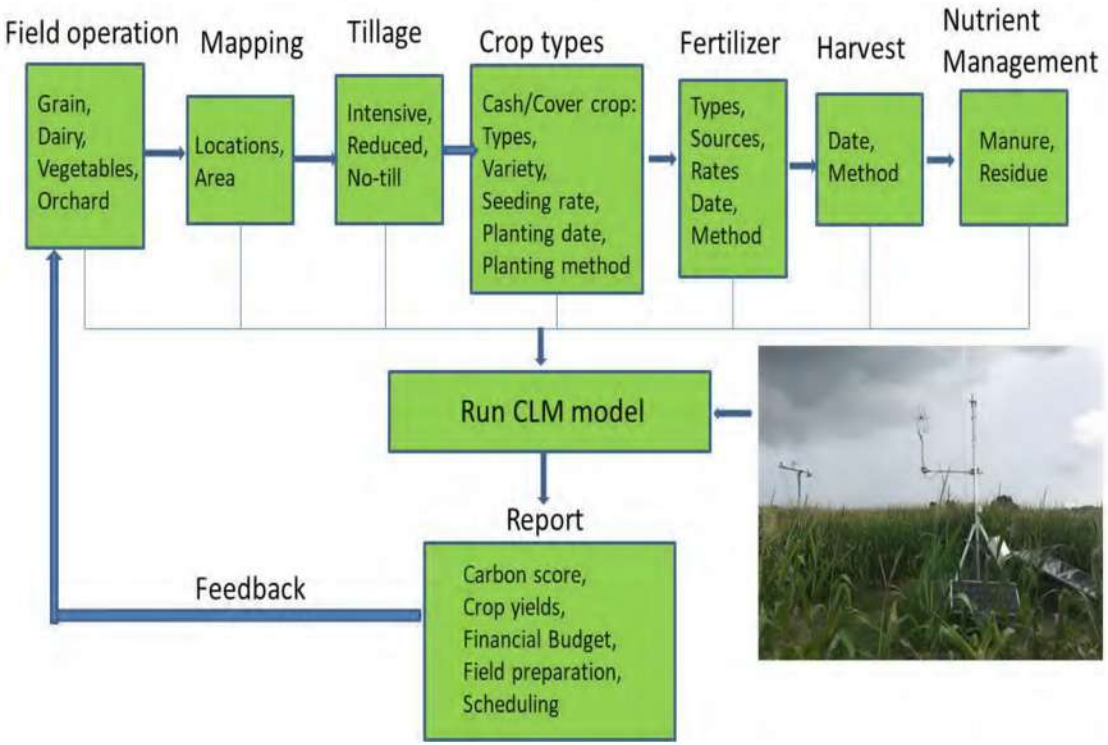
REMOTE SENSING & MODELING:

Essential Ecosystem Service Market Infrastructure: Hudson Carbon's On-Going Work

- Offset registries use process-based models to quantify generated offsets using farm management data.
- Currently available models were not designed to quantify offsets in complex, regenerative systems, and therefore significantly under-count the benefits of these systems.
- Using our data, we are currently engaged in calibrating the best existing models, as well as developing a new model that can better quantify offsets in complex systems,
- We are also building a user-friendly (i.e. farmer-friendly) API that also so that farmers will actually use the tool.
- We are also engaged in the development of a remote sensing platform to track field-level management, which will significantly reduce project administration costs.

BIOREGIONAL APPLICABILITY OF MODEL THROUGH CONTINUED GROUND-TRUTHING AND CALIBRATION



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Offset Project Registration and Credit Marketing

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THE PROBLEM

Farmers should be paid for the carbon sequestration generated through the practice of **Regenerative Organic Agriculture**.

Existing carbon markets have historically under-counted environmental benefits of **Regenerative Organic Agriculture**.

These same markets have also failed to differentiate **Regenerative Organic Agriculture** from other sources of offsets in compelling ways.

HUDSON CARBON

THE SOLUTION

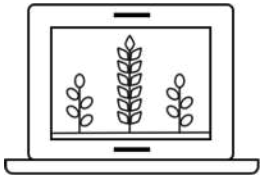
An alternative market strategy:

A Consumer-funded Carbon Offset Marketplace

OUR MARKETPLACE ENABLES F2C (FARMER TO CONSUMER) CARBON OFFSETS
TO INCENTIVIZE REGENERATIVE ORGANIC AGRICULTURAL PRACTICES

REGENERATIVE ORGANIC FARMER
SEQUESTERING CARBON THROUGH FARMING PRACTICES

CARBON CYCLE CLEARINGHOUSE
BUILDING A GLOBAL RESERVE OF NATURALLY SEQUESTERED CARBON



OFFSET GUARANTEE
ENABLING THE VERIFICATION OF QUALITY OFFSETS

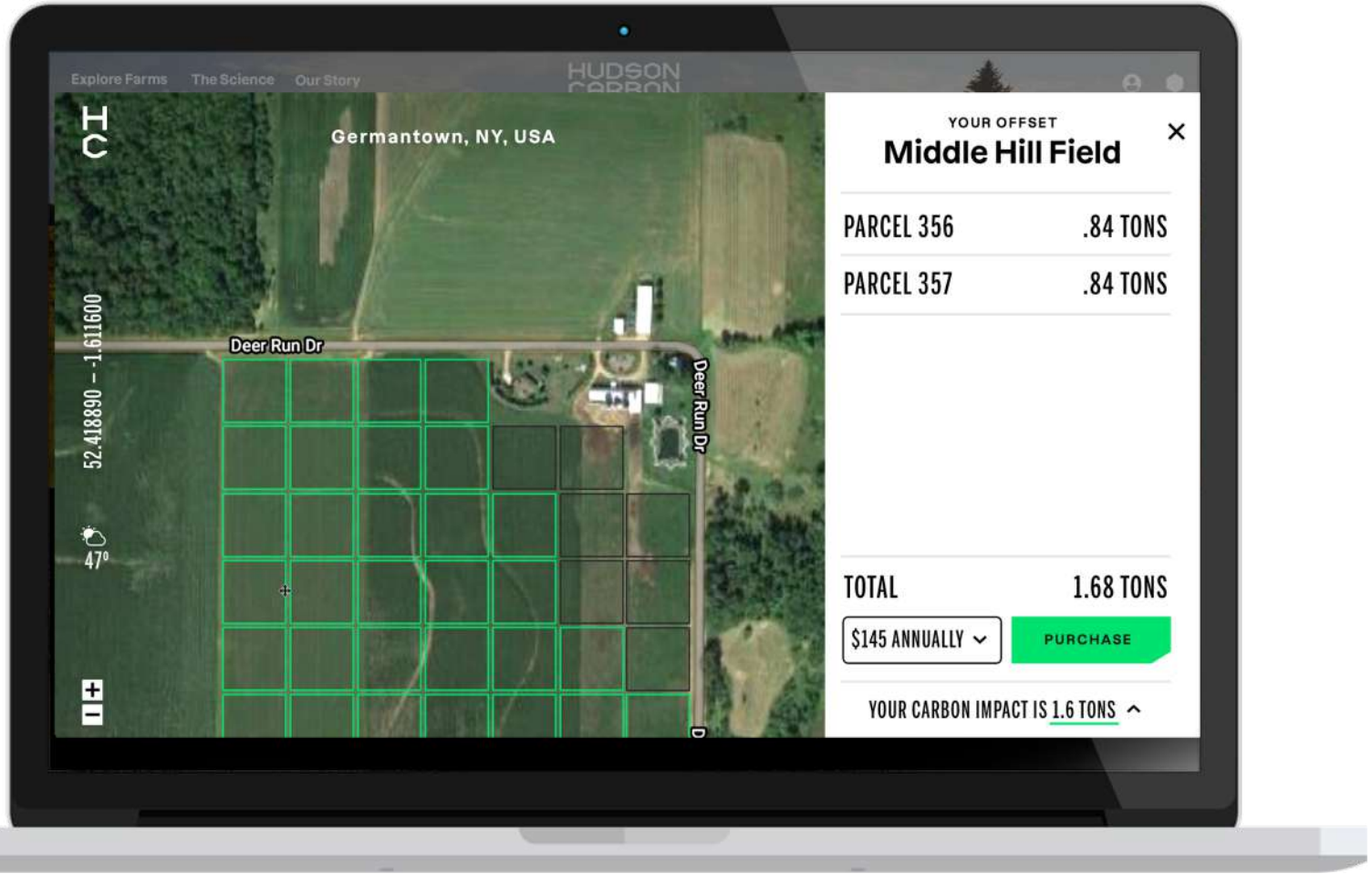
MARKETPLACE
CREATING A CUSTOMER-ORIENTED PLATFORM

CARBON BUYER
CONNECTING FARMERS WITH CLIMATE-CONCERNED PEOPLE

HUDSON CARBON

WE ARE BUILDING A CARBON OFFSET MARKETPLACE.

WE CONNECT INDIVIDUALS AND BUSINESSES WITH FARMERS TO SELL VERIFIABLE, PLACE-BASED, TANGIBLE, AND TRANSPARENT CARBON OFFSETS.



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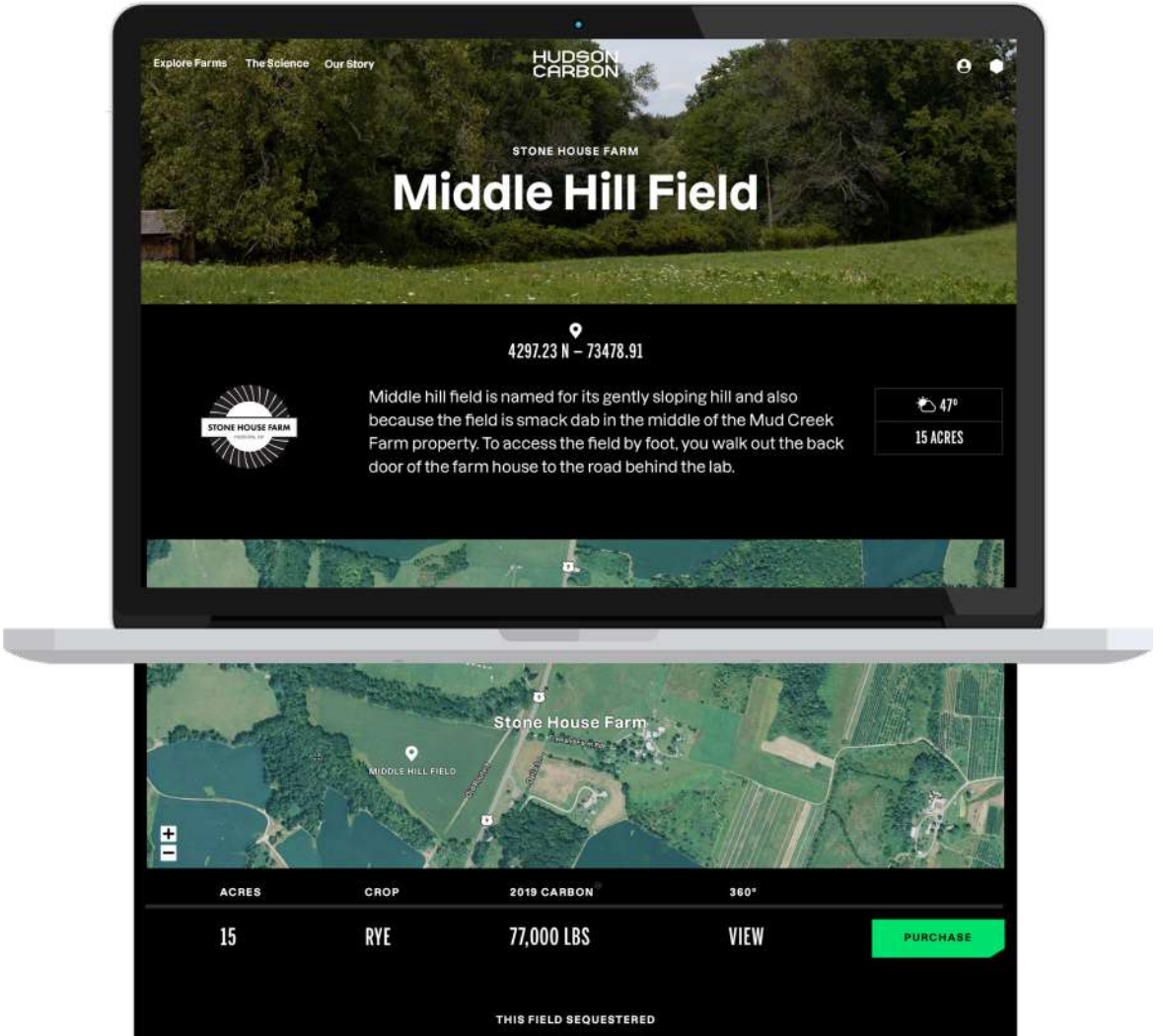
THE MARKETPLACE

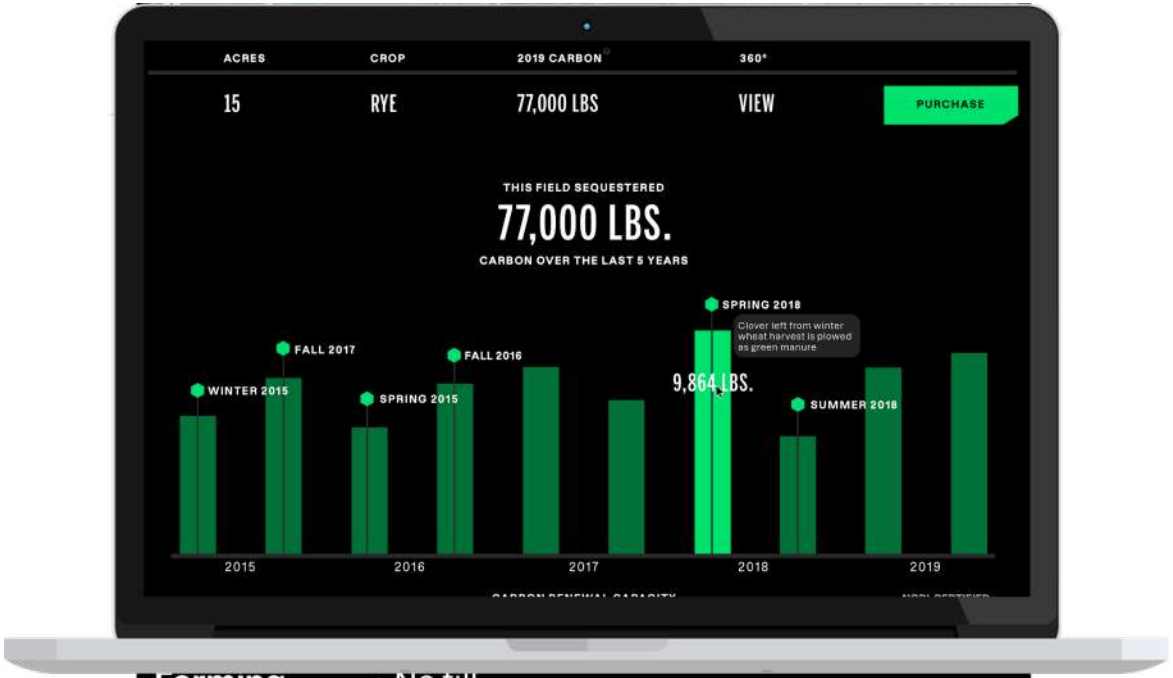
CONNECTS CONSUMERS OF CARBON WITH REGENERATIVE ORGANIC FARMERS THROUGH VIVID FARM IMAGERY TO ILLUSTRATE AND LOCALIZE THEIR IMPACT.



HUDSON CARBON

THE MARKETPLACE

PROVIDES RELIABLE EXTERNAL VERIFICATION OF SOIL CARBON CREDITS.



Farming Practices

- No till
- Minimal till
- Compost
- Cover crops
- Frost seeding

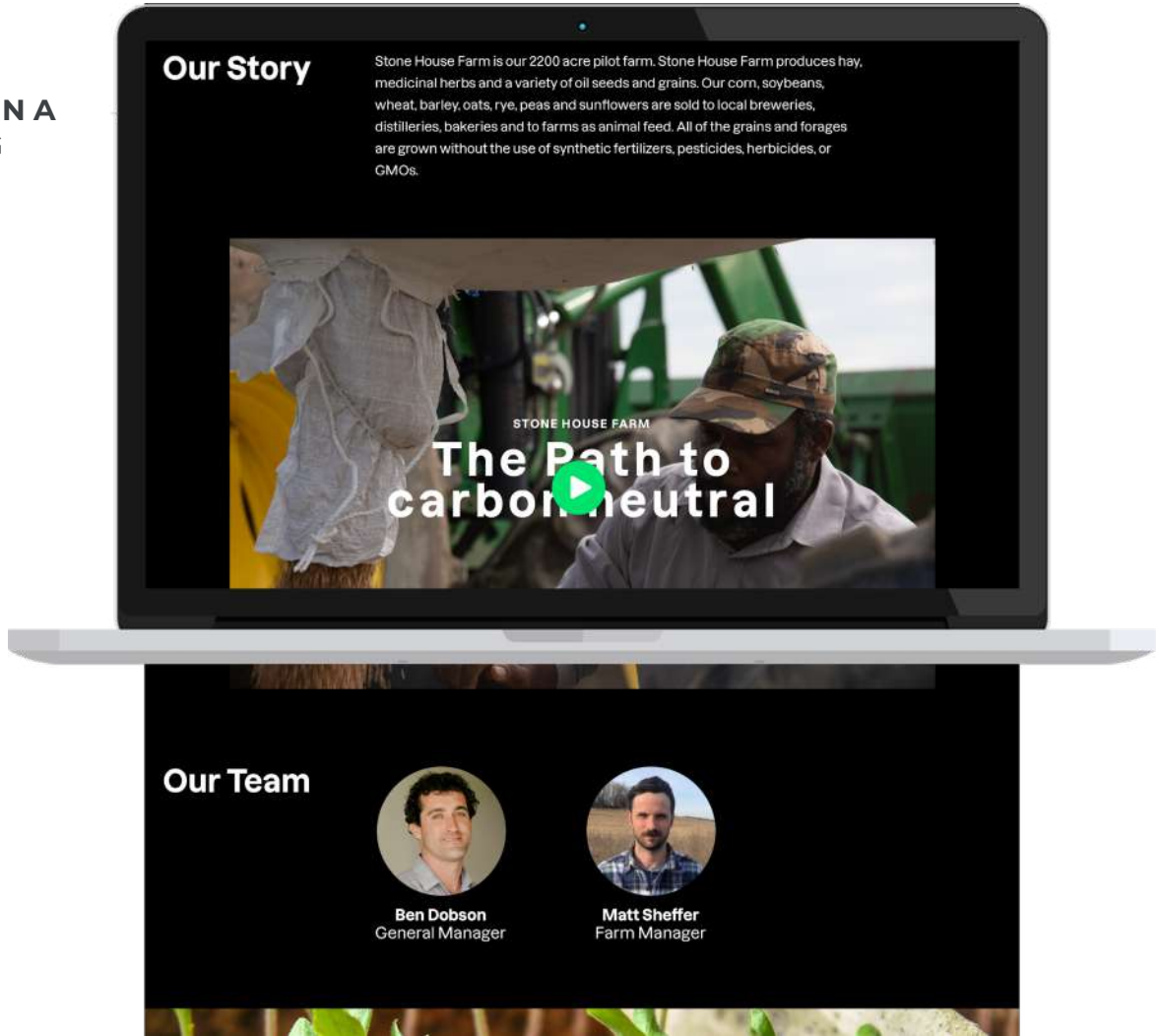
Notables

Middle hill field is named for its gently sloping hill and also because the field is smack dab in the middle of the Mud Creek Farm property. To access the field by foot, you walk out the back door of the farm house to the road behind the lab. The 15 acre field starts at the edge of the dirt road where the chickens and a pair of goats who hang out and nibble the hemp plants.

HUDSON CARBON

THE MARKETPLACE

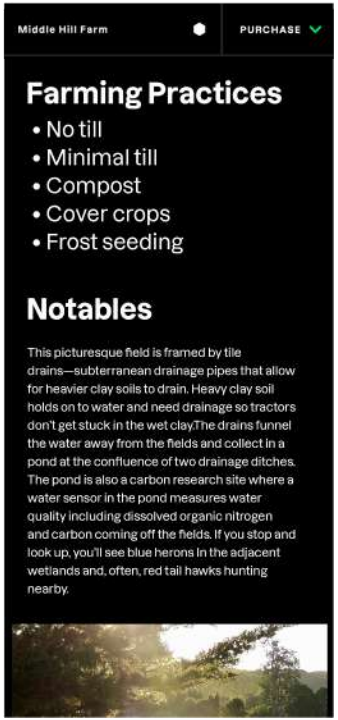
FOSTERS A CONNECTION TO REAL PEOPLE IN A REAL PLACE DOING THE WORK OF PUTTING CARBON BACK INTO THE SOIL.

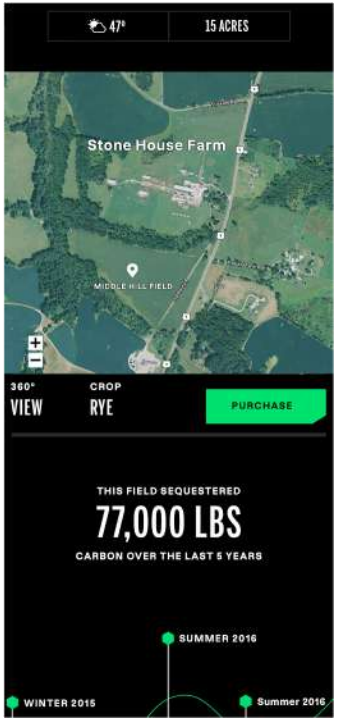


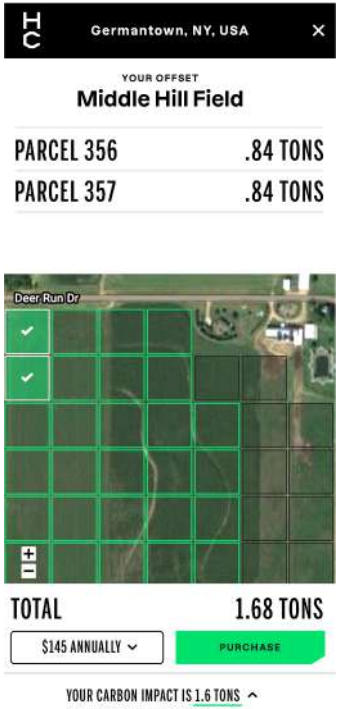
HUDSON CARBON

THE MARKETPLACE.

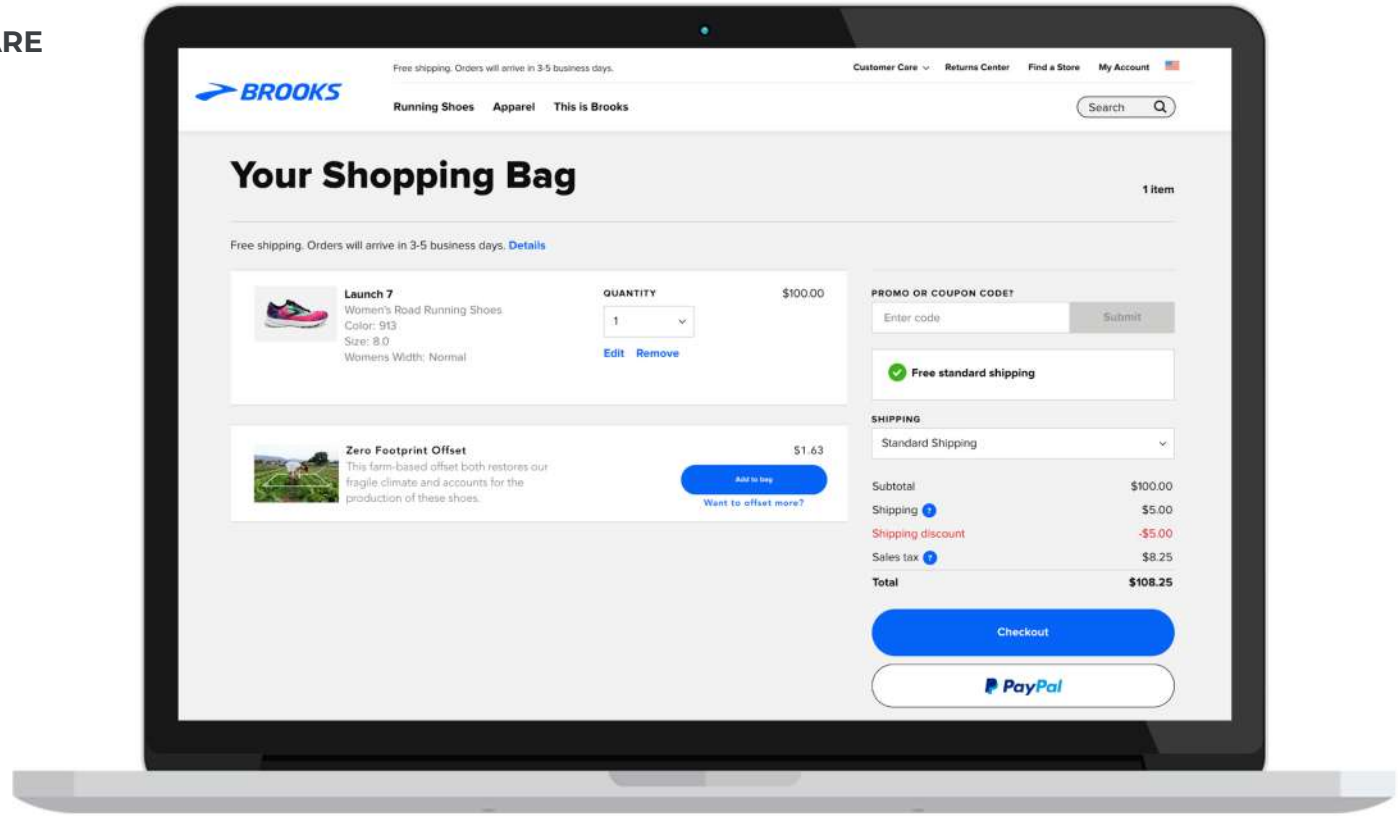
AN ACCESSIBLE, EASY TO USE PLATFORM WITH A MOBILE INTERFACE.







OFFSETS WITHIN E-COMMERCE TRANSACTIONS, ACCESSING CUSTOMERS WHERE THEY ARE AND GENERATING HIGHER OFFSET PRICES.



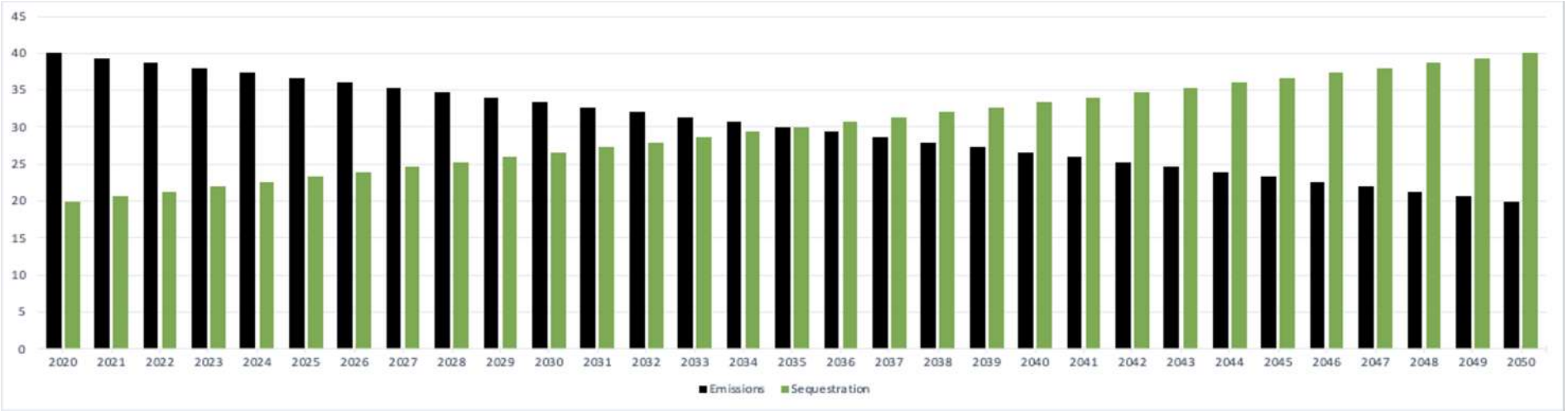
HUDSON CARBON

THE MARKETPLACE

PRICING MODEL - Elements of a Functioning Carbon Market

- A carbon market must function to reduce rates of emissions AND increase rates of sequestration through ecosystem restoration. [The biosphere and oceans currently absorb 55% of anthropogenic emissions annually.]
- To do so, it must fully adopt the principles of the carbon cycle, and connect the problem directly to the solution.
- In other words, the value of carbon must be related to its appropriate place, and the price must be high enough to motivate the right kind of behavior.

IDEAL TREND IN EMISSIONS AND SEQUESTRATION RATES (INVERTING THE CURRENT 2:1 RATIO)



PRICING MODEL - The Price Point

The current price range of carbon (somewhere between $8 and $20 per ton) DOES NOT MOTIVATE the right kind of behavior modification to alter the relationship between emissions and sequestration.

Farmers will not be motivated to make a ***whole-system*** transition for any less than $150-$200 per acre per year. A sequestration rate of 1.5-2 tons/acre/year of carbon is achievable with a whole-system transition to regenerative organic agriculture.

Therefore, a price at which behavior will start to shift on the supply side of the market is of **$100 per ton** of carbon.

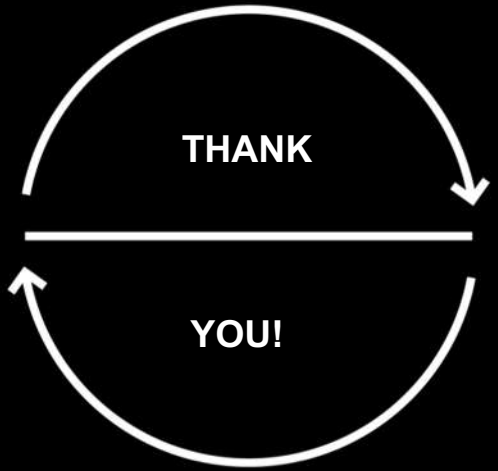
[The demand side is tricky, and will ultimately require better policy levers to motivate behavior.]

MARKETING

Our marketplace model fosters the necessary direct connection between the problem and the solution, between consumers of carbon, and those that manage land to put it back in its proper place.

Our direct-to-consumer marketing approach has the potential to achieve an economy of scale:

- Decrease the unit of sale (fractions of a ton)
- Offering a yearly subscription (offsetting through a payment plan)
- Promote the idea of offsetting through brand partnerships



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HUDSON CARBON

Questions?

Please use the Q&A Box to submit your questions!