

Climate Smart Commodities & Carbon Management on-the-Farm:

Developing a Business Case



What's Driving Sustainability and Carbon Management in U.S. Agriculture?

External Drivers:

- GHG Footprint Attributed to Agriculture
- Consumer Expectations & Resulting Processor Behavior
- Supply-chain risk (& again, Resulting Processor Behavior)
- Federal & State Programs

Internal Drivers:

- ✓ Input Cost Volatility
- ✓ Precision Agriculture and Efficiency
- ✓ Stewardship Practices & Long-term Asset Management
- ✓ Risk management and Cost of Capital
- ✓ Enterprise-Scale Opportunity (5-30 year horizon)

Markets For Environmental & Sustainability Services

Regulated/Compliance Markets

Biofuels:
Renewable
Identification
Numbers (RINs);
Low Carbon Fuel
Standard (LCFS)

Electrical
Power:
Renewable
Electric
Certificate
(RECs)

**Transportation
Fuel Distributors**

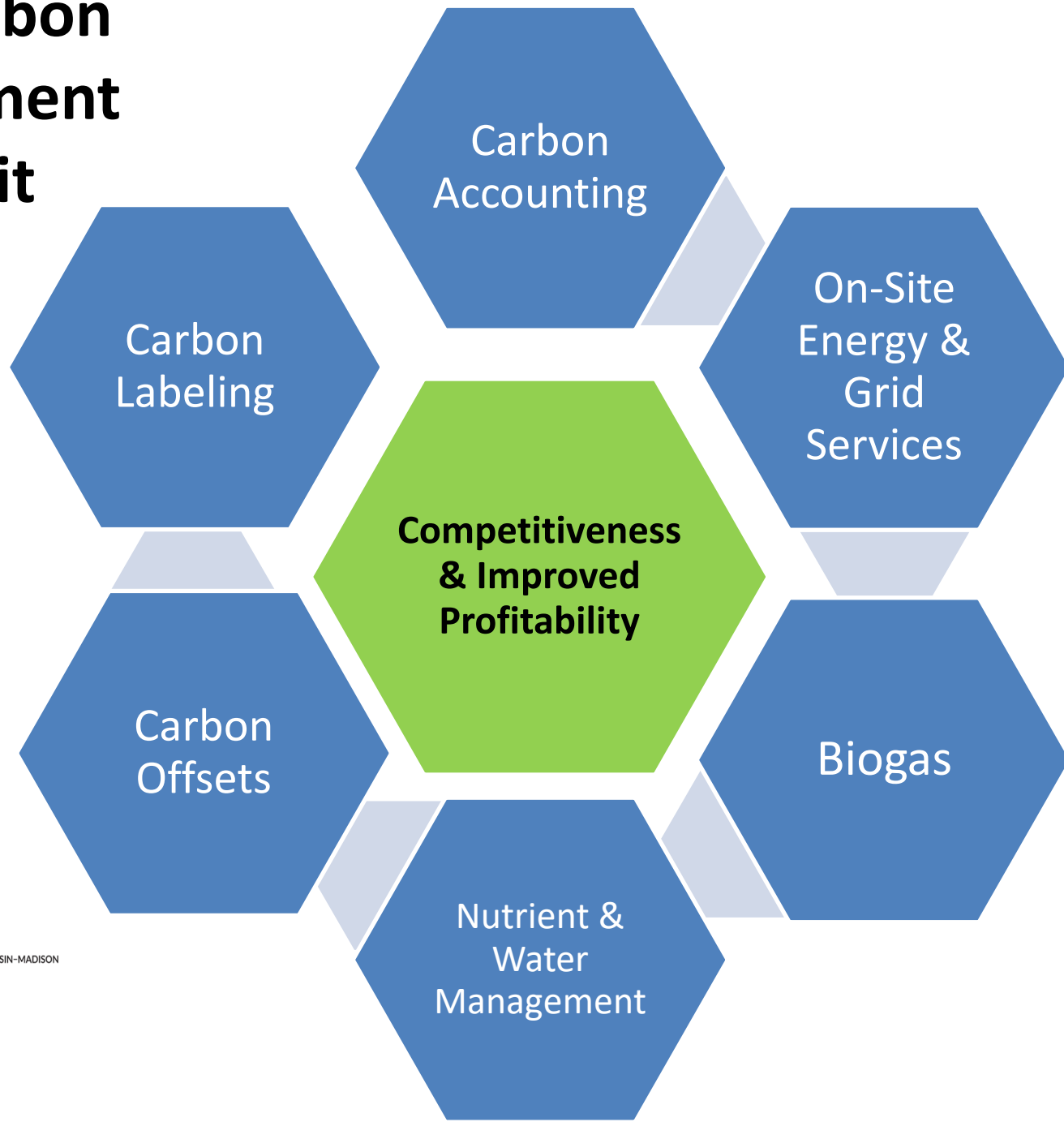
**Regulated
Utilities**

Voluntary Markets

Buying & Retiring RECs
Thermal RECS
GHG Protocol Scopes 1,2 & 3
Carbon Labeling

**Any, Especially Firms
Filing ESG Reports**

Farm Carbon Management Tool Kit



National Milk Producer Federation Net Zero Initiative

Four Key Areas of Focus

Feed production & practice changes:

- No/low-till farming and cover crops
- Renewable fertilizers
- Precision agriculture

Manure handling & nutrient management:

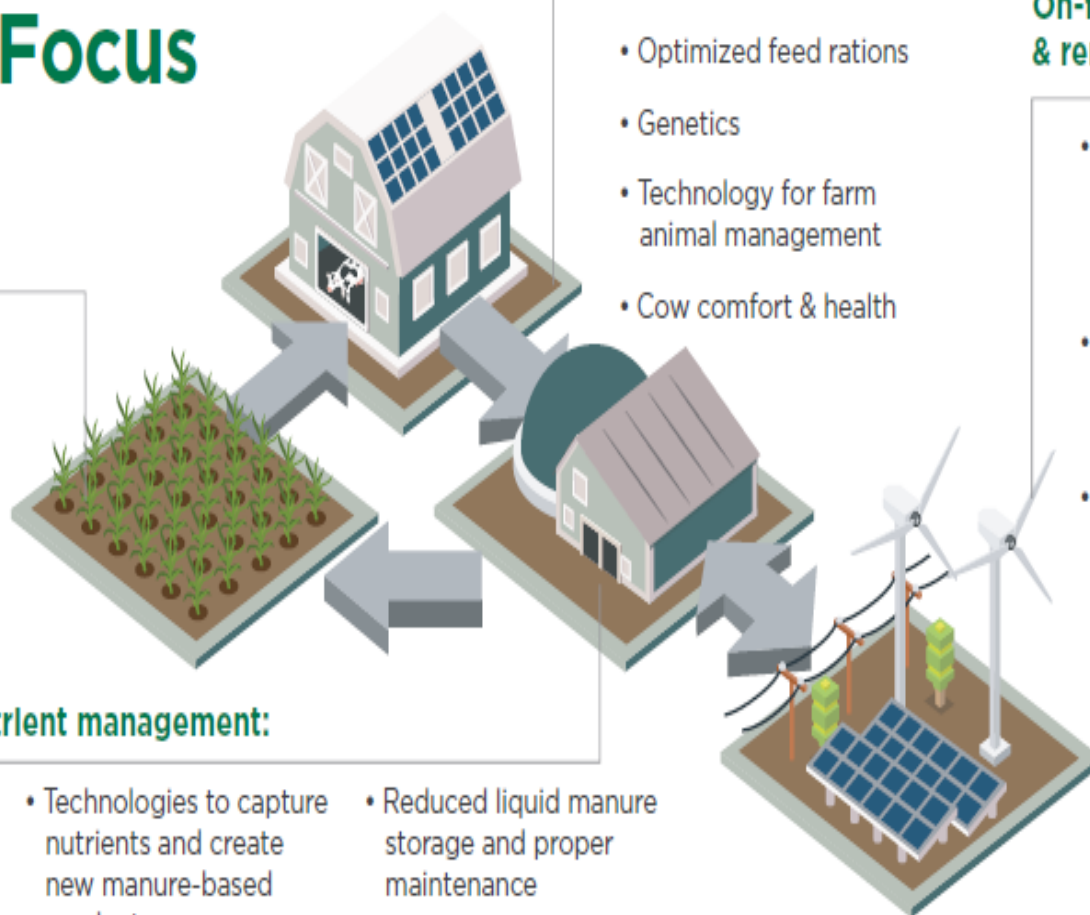
- Nutrient Management Planning (NMP)
- Anaerobic digesters turn manure into biogas
- Technologies to capture nutrients and create new manure-based products
- Reduced liquid manure storage and proper maintenance

Cow care & efficiency:

- Feed additives
- Optimized feed rations
- Genetics
- Technology for farm animal management
- Cow comfort & health

On-farm energy efficiency & renewable energy usage:

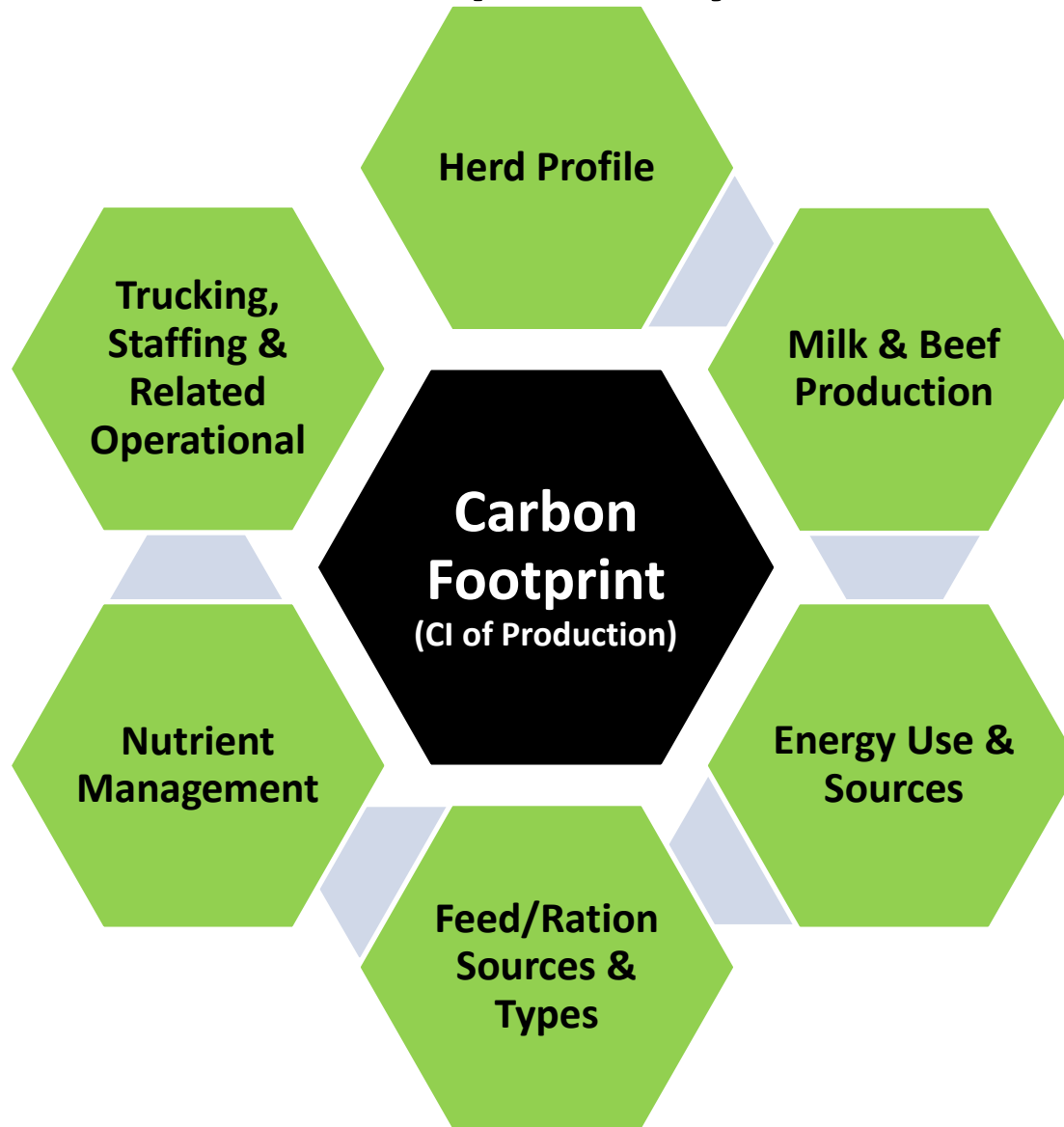
- LED lighting, variable speed vacuum pumps, high-efficiency refrigeration, and fans
- Conversion of biogas into electricity and/or renewable natural gas
- Renewable energy sources from wind/solar



Visuals do not represent all possible practices, technologies or benefits. Each farm can voluntarily contribute to net zero efforts based on their individual operation.

NET ZERO INITIATIVE

Common Information Requirements for Carbon Accounting: Example Dairy Farm Carbon Footprint



Sources of Information

- Cropping & Crop Consultants;
- Herd Management Systems;
- NRCS/County Conservation;
- Utility & DNR Data;
- Milk Buyers;
- 3rd Party Soil Labs & Surveyors;
- Etc.

Key Federal Programs Influencing Agricultural Carbon Management & Sustainability

USDA: Climate Smart Commodity project awards announced in 2022 USDA is investing \$3.1 billion in 141 selected projects. Proof-of-concept projects, demonstrating feasibility

Inflation Reduction Act (IRA): \$369 billion, largest climate finance bill in U.S. history (more later)

Securities & Exchange Commission: Financial disclosure and transparency of Environmental, Societal and Governance (ESG) disclosures (expected Q1 2023)

Infrastructure Investment and Jobs Act (IIJA): Broadband, NRCS Watershed Programs, highway and electrical infrastructure

Reference: <https://sustainableagriculture.net/publications/grassrootsguide/farm-bill-programs-and-grants/>

Inflation Reduction Act: Conservation \$

CBO Conservation Baseline & \$18.05 Billion from IRA



AMERICAN FARM BUREAU FEDERATION*

www.fb.org

Source: Congressional Budget Office, HR 5376 EAS



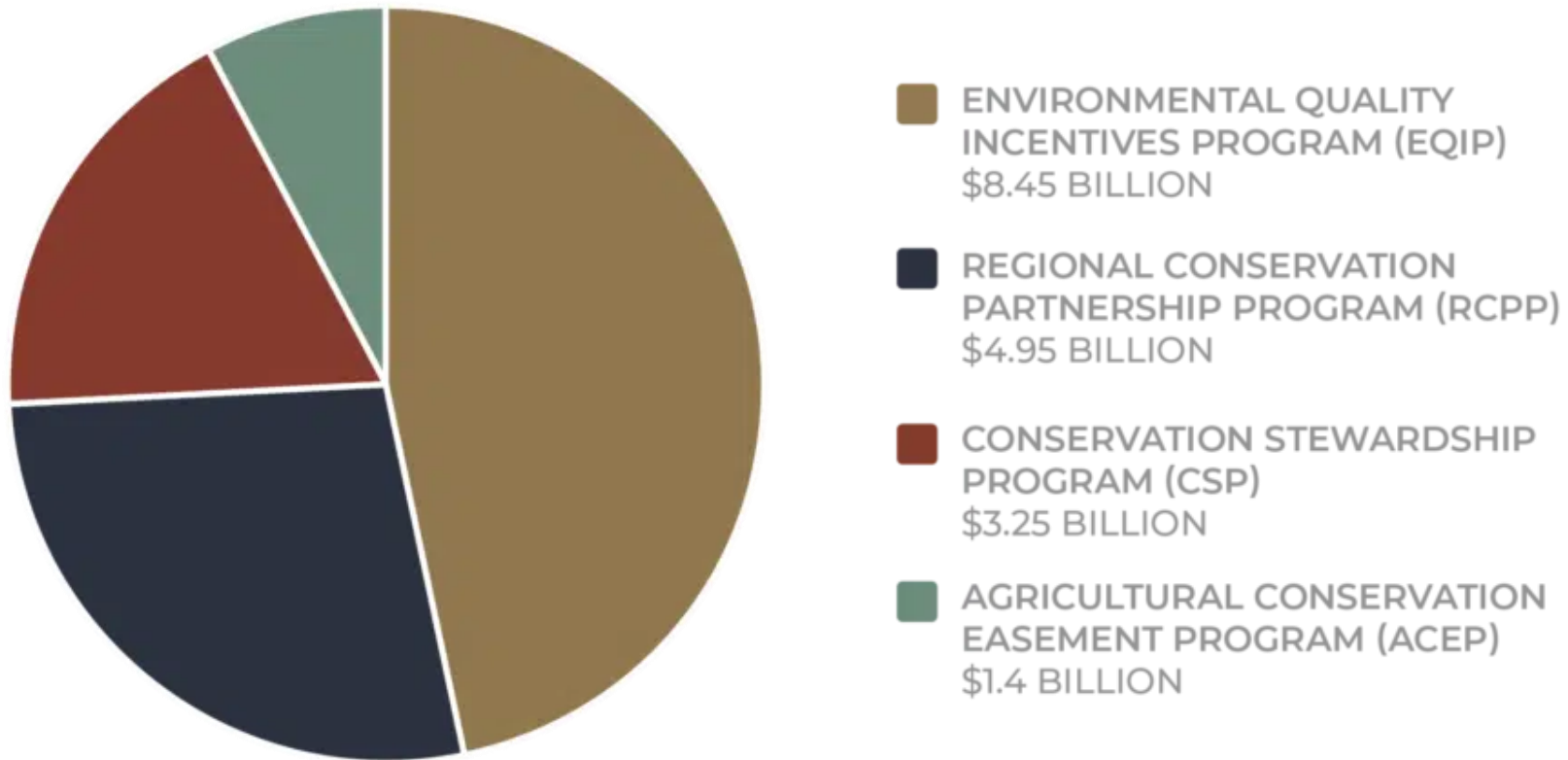
Extension
UNIVERSITY OF WISCONSIN-MADISON

Inflation Reduction Act: Conservation \$

INFLATION REDUCTION ACT OF 2022

AGRICULTURE COMMITTEE FUNDING

(FARMDOC DAILY)



USDA Climate Smart Commodity 2022 Program



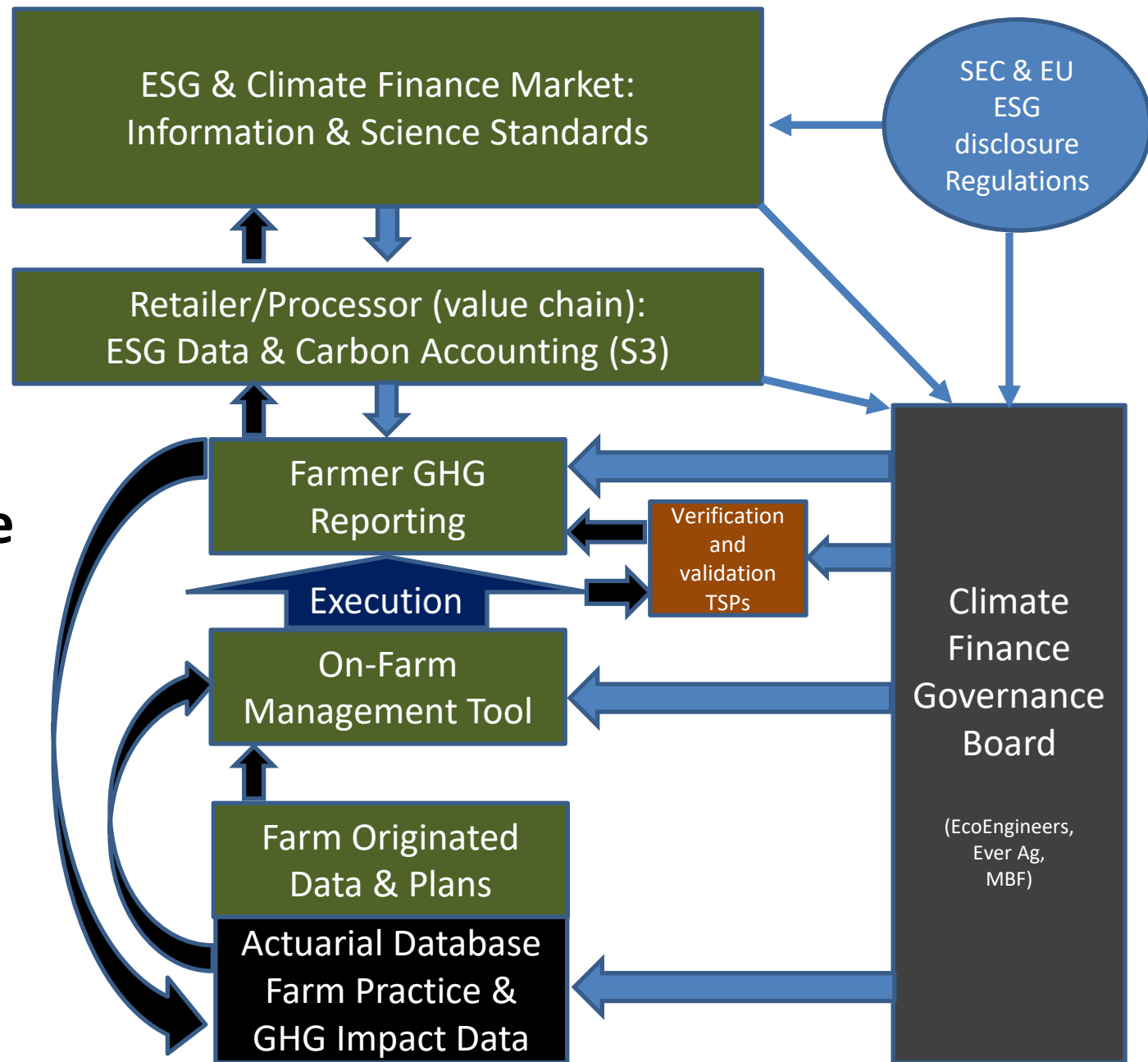
Program to assist in the adoption of sustainable practices for both conventional agriculture and innovative models.

Investigate and demonstrate cost/benefit of sustainable practices.

Create/improve models and practices which achieve GHG savings in agriculture

Climate Smart Commodities:

Climate Finance Governance Board



Voluntary Carbon Markets

- **Environmental, Societal & Governance (ESG) Markets**
 - Corporate
 - Financial Sectors
 - Carbon Accounting & Disclosure Practices
 - Subject to EU & SEC regulations
 - World Resource Institute Scope 1, 2 & 3 Categories
- **Private Equity & Corporate (mostly) Funded Farm Practice Vendors**

Quick References: <https://agfundernews.com/agri-carbon-market-map-companies-helping-harness-benefits-regen-ag>
<https://www.fwi.co.uk/arable/land-preparation/soils/6-companies-offering-carbon-based-payments-to-arable-farmers>

ESG Markets: Food Companies & Supply-Chain Expectations



Kraft*Heinz*



MARS

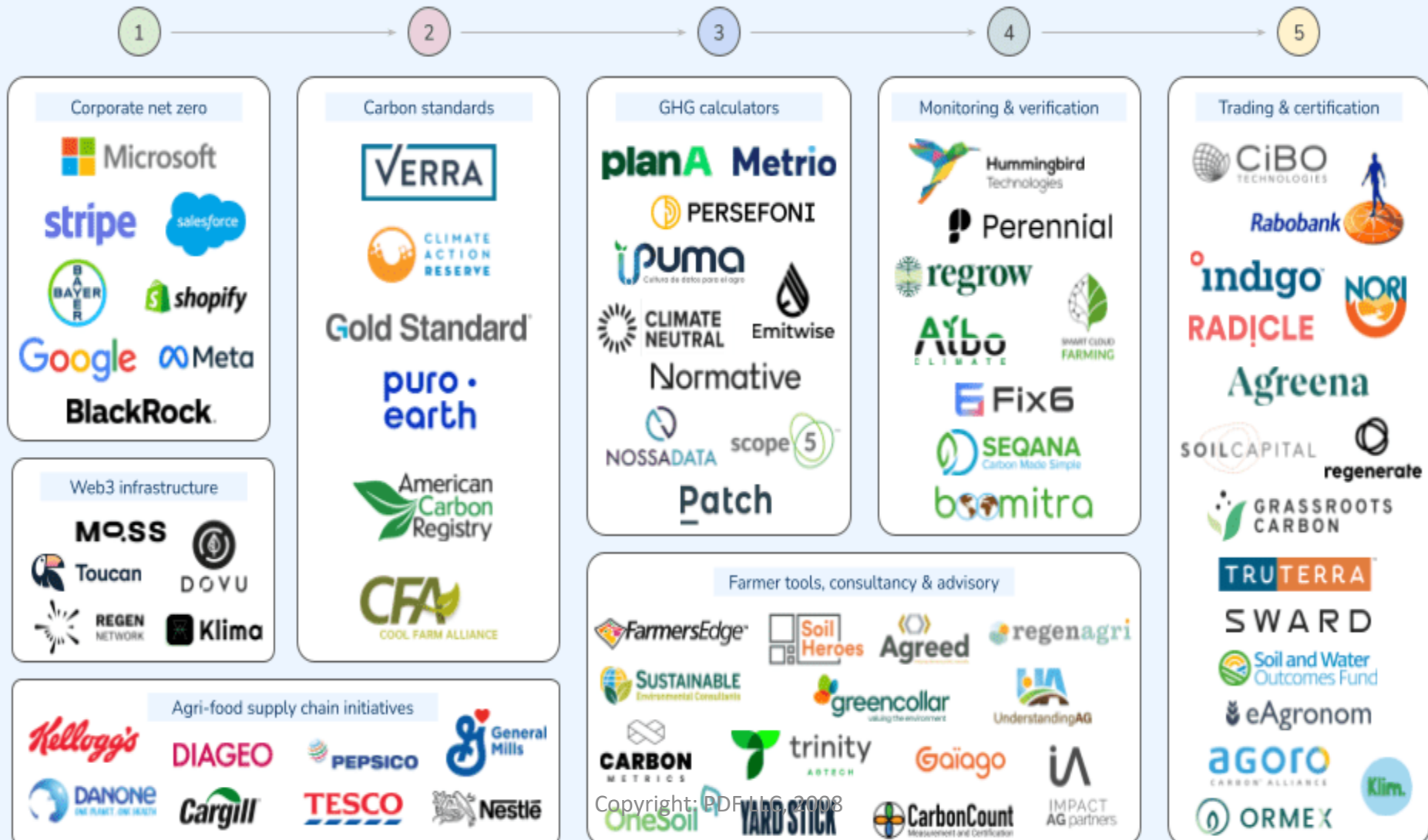


Smithfield
Good food. Responsibly.

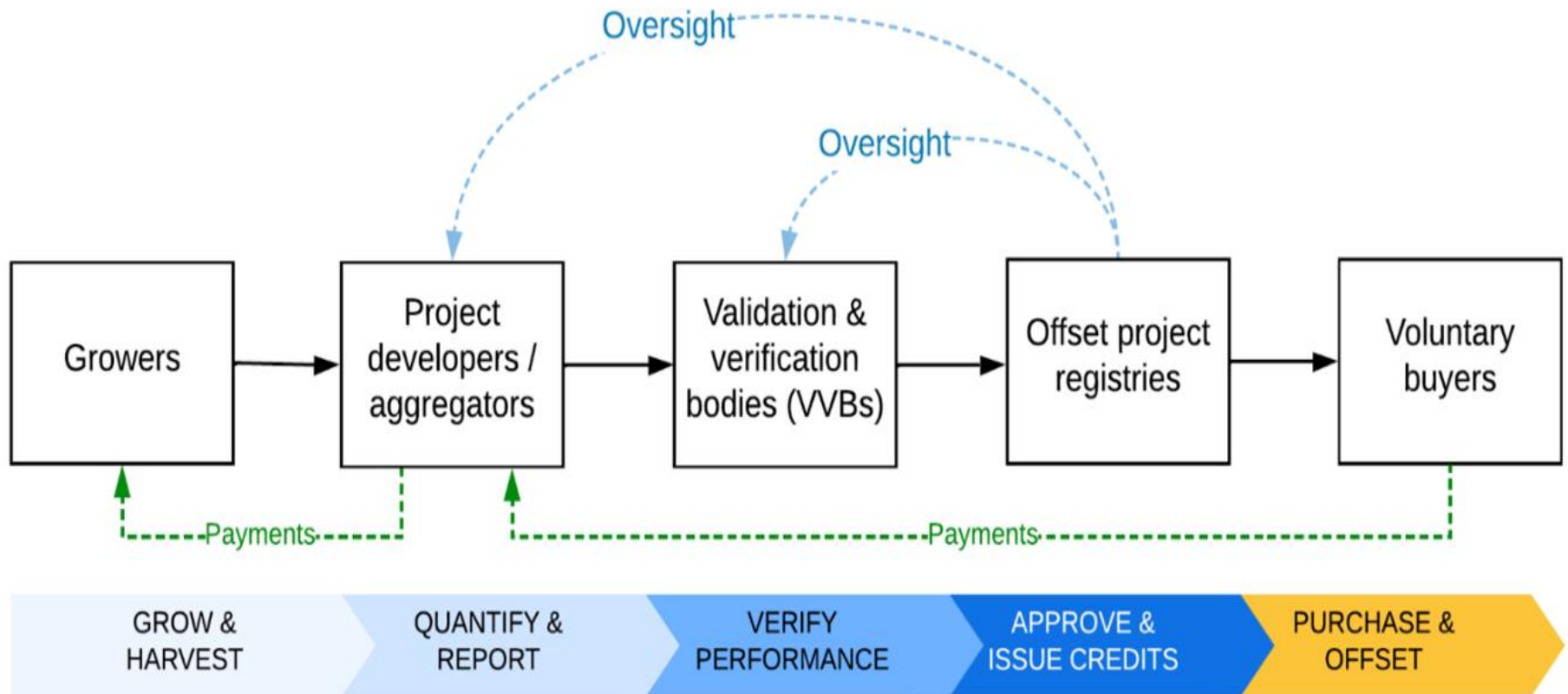


Land-Use/Farm Practice Carbon Vendors

Agri Carbon Landscape



Soil Carbon Contracting: Basics



Requires: Additionality, Permanence & Verification

Soil Carbon Contracting: Key Terms

- Control of Land
- Data Ownership
- Indemnification
- Impact on mineral, fossil fuel & other extraction rights
- Land title/transfer rights
- Other allowable uses (including hunting, fishing, foraging, etc.)
- Payment terms and metrics
- Parties, intermediaries and final markets
- Required Practices
- Benefit Stacking (or prohibition of such
- Dispute resolution, Insurance, Venue
- Term and right to opt out
- Verification

Farm Carbon Management: Baseline & Business Case

GHG Protocol Agricultural Guidance

Figure 4-1. Agricultural emissions sources

Mechanical

- Purchased electricity: CO₂, CH₄, and N₂O
- Mobile machinery (e.g., tilling, sowing, harvesting, and transport and fishing vessels): CO₂, CH₄, and N₂O
- Stationary machinery (e.g., milling and irrigation equipment): CO₂, CH₄, and N₂O
- Refrigeration and air-conditioning equipment: HFCs and PFCs

Non-mechanical

- Drainage and tillage of soils: CO₂, CH₄, and N₂O
- Addition of synthetic fertilizers, livestock waste, and crop residues to soils: CO₂, CH₄, and N₂O
- Addition of urea and lime to soils: CO₂
- Enteric fermentation: CH₄
- Rice cultivation: CH₄
- Manure management: CH₄ and N₂O
- *Land-use change*: CO₂, CH₄, and N₂O
- Open burning of savannahs and of crop residues left on fields: CO₂, CH₄, and N₂O
- Managed woodland (e.g., tree strips, *timberbelts*): CO₂
- Composting of organic wastes: CH₄
- Oxidation of horticultural growing media (e.g., peat): CO₂

Building Carbon Management Business Case:

$(Benefit - Cost)/Investment > ROI \text{ Hurdle}$

**Market
Incentive/Premium**

Cost Control

**Additional Products
& Revenue Streams**

**Operational
Resiliency**

**Risk Management
(price, supply &
production)**

**Other (including
difficult to
monetize benefits)**

Comparative Dairy Farm Income Statement	Conventional	Energy/Carbon Optimized
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Milk Sales	a	a+
Dairy Beef	b	b+
Grains & Forage	c	c+
Power & Grid Services		E
Biogas		F
Nutrient Sales		G
Carbon Offsets		H
Other	d	d
REVENUE	XXX	XXX++++

Market Response to Carbon Labeling & Lower CI/Unit

Revenue from Standardized Power Purchase Agreements with Revenue Stacking

RNG to pipeline, supported by expanded collection system

Compost/Recovered Nutrients

Enrollment into Carbon Offset Program

Feed & Health	j	j +/- lower CI feeds
Labor	k	k
Fuels	l	l +/- lower CI fuels
Seed, Fertilizer & Crop Treatments	m	m +/- lower CI inputs
Electricity	n	n > new rate
Rents	o	o
Repairs/ Maintenance	p	p
Supplies	q	q
Other	r	r
EXPENSES	YYY	YYY +/- lower CI inputs

Inputs with lower CI rating

Reduced Power Costs due to expanded Net Metering & Lower \$/kwh

Potential Impacts to Profitability

EBDITA	ZZZ	ZZZ +/-
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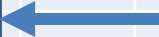
								Financial Return on Total Capital Deployed	Carbon Reduction Attributable to Option	Impact on Farm's Product CI if Carbon Reduction Internalized	Farm Financial Impact from Reduced CI	Carbon Reduction Allowable as Offset	Additional Carbon Offset Verification Costs	Carbon Offset Price	Farm Revenue from Carbon Offset Sale	Total Return on Capital From Option Direct + Carbon
	Option	Savings	Revenue	CapEx	OpEx	EBDITA	ITC									
Power	On-site Solar Solar + Storage Biogas Genset Biogas + Solar Wind Wind+Storage Wind, Solar, Storage Energy Efficiency Utility Renewable Program Other															
Fuels	Biodiesel Blending CNG Retrofit for Heavy Equipment Biogas for NG or Propane Biomass for NG or Propane Electrification of Dryers/Boilers EV for Combustion Engines Other															
Nutrient Mgmt	Solids Separator Solids Separator & Compost Tea Water Irrigation Digester, RNG Digester, Power/Genset w/o CHP Digester, Power/Genset w/ CHP Lagoon clarifier & Irrigation Nutrient Recovery, precipitator Nutrient Recovery, distillation Nutrient Recovery, UF/RO Manure practice: knifing Manure practice: pumping Manure practice: other Fertilizer Switch (lower CI) Precision Application System Other															
Logistics	Reduction in Machine Hours: Tillage Reduction in Produce-2-Market Miles Reduction in Input-2-Farm Miles Other															

Farm Models Financial
Cost/Benefit of Option



Farm Determines Carbon
Savings Attributable to Option

Carbon
Conversion
Actuarial Platform
& Place-based,
Farm Management
Model



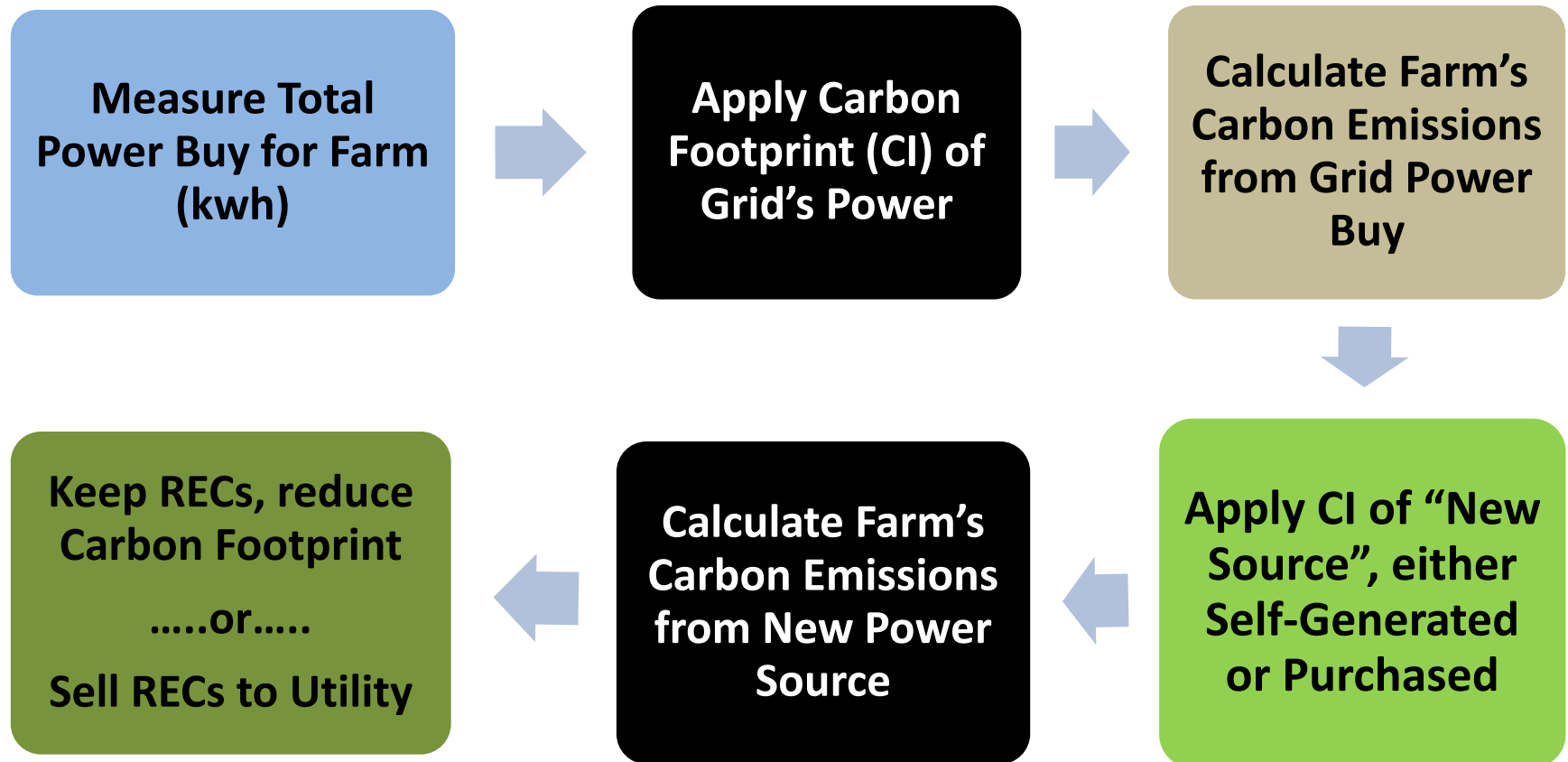
Farm Models
Cost/Benefit of
Applying Carbon
Savings Internally

Farm Models
Cost/Benefit of
Selling Carbon
Savings as Offset

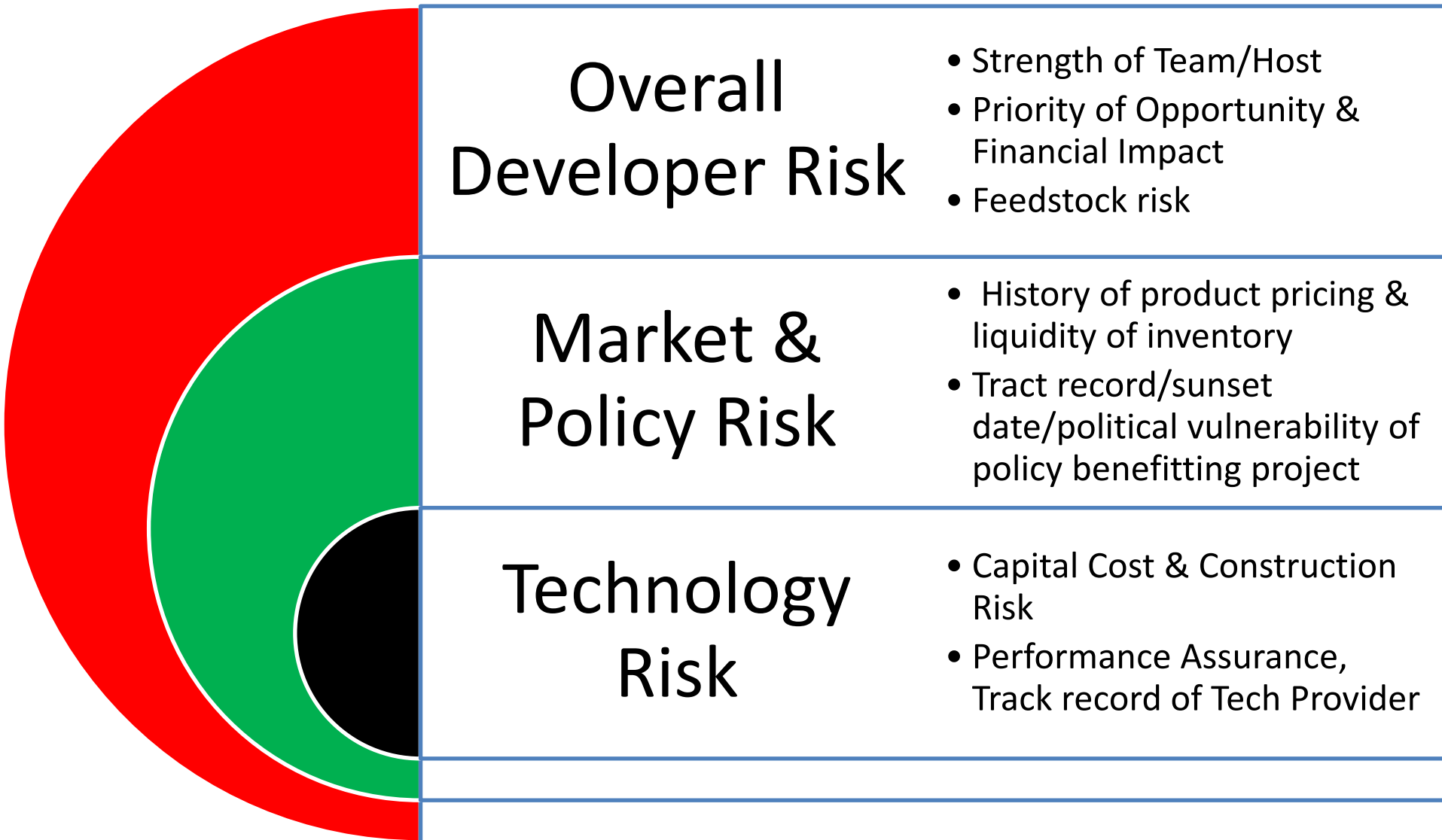


Farm: Go/No-Go/Wait Decision

Illustration: Determining Carbon Impact of Replacing Grid Power with Renewable



Assessing Creditor Risk



Upon the Horizon: Scanning Next Level Developments & Issues

- **State rules and regulations** regarding distributed energy resources, including ownership, buy-back rates, net metering
- Transparent and trusted “**practice = carbon impact**” by **farm location**, including fuel type impacts
- **FERC** regulations on DER aggregation & wholesale markets
- **SEC** rules on carbon accounting disclosures
- Outcomes of **USDA** demonstration projects
- Continued pressure on **financial markets** to reflect climate-related risks in credit assessments and cost-of-capital (supply-chain)
- Eligibility and impact of **IRA funding and tax credits**
- **Consumer preferences & labeling**

Q&A

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Soil Carbon Contracting References & Resources

- <https://www.csis.org/analysis/soil-carbon-sequestration-myths-realities-and-biden-administrations-proposals>
- <https://agrilife.org/texasaglaw/2022/01/24/understanding-evaluating-carbon-contracts/>
- <https://nationalaglawcenter.org/carbon-contracts/>
- <https://www.agriculture.com/crops/conservation/what-farmers-need-to-know-about-carbon-contracts>
- <https://www.aglaw.us/janzenaglaw/2021/9/22/the-building-blocks-of-a-soil-carbon-contract>
- <https://soilhealthnexus.org/carbon-credits-and-carbon-agreements/>
- <https://www.greenbiz.com/article/6-differences-between-forestry-and-soil-carbon-offsets>
- <https://www.fwi.co.uk/business/business-management/agricultural-transition/the-carbon-trading-conundrum-risk-or-revenue-generator>
- <https://www.agproud.com/articles/55224-carbon-contracts-do-you-know-the-science>