



PennState Law

Center for Agricultural
and Shale Law



Dairy Industry Carbon Reduction Programs

**QUARTERLY DAIRY
LEGAL WEBINAR**



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and Shale Law

February 22, 2022

(4th Q 2021)



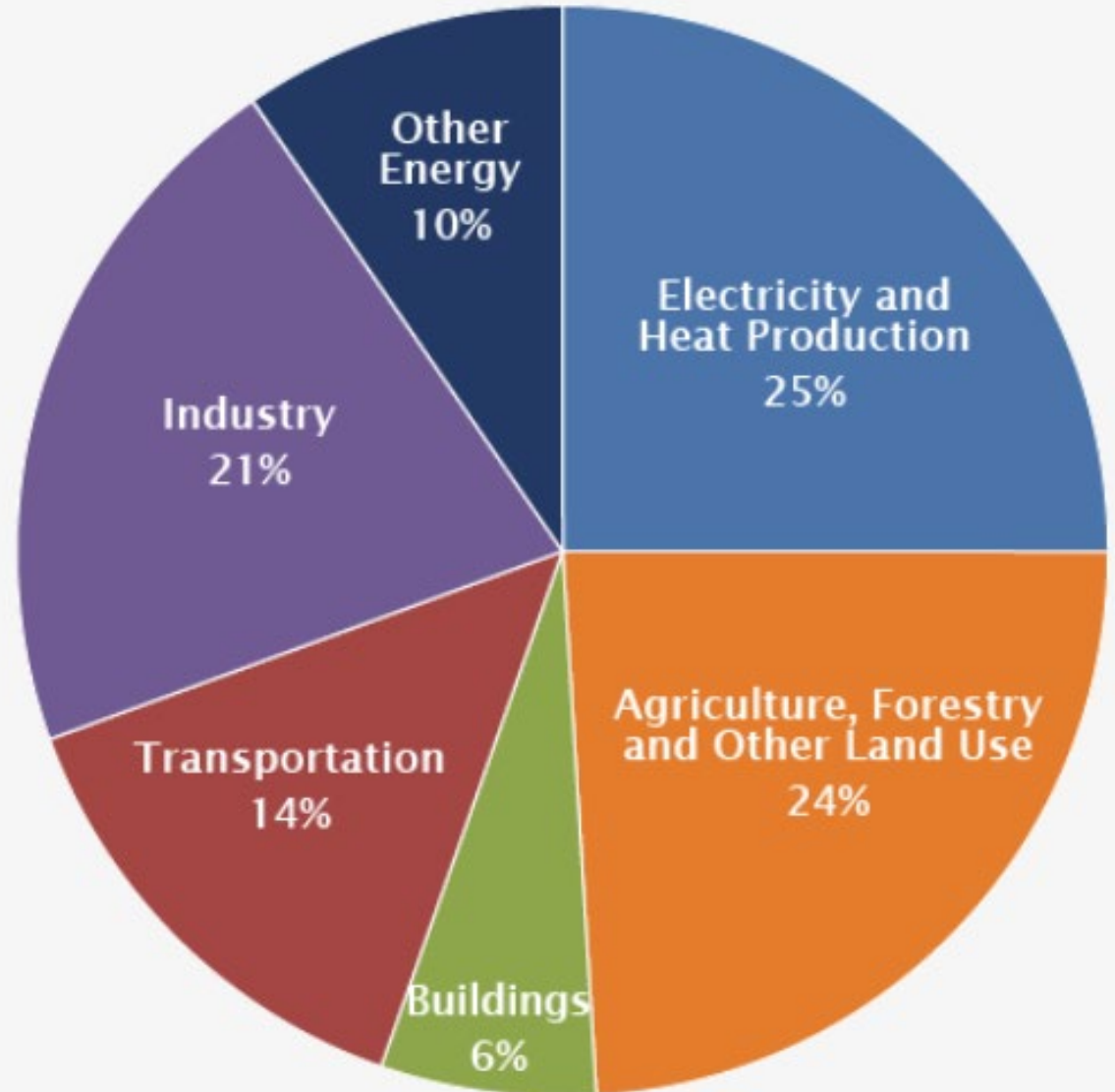
EPA GHG Emissions Data

Agriculture, Forestry, and Other Land

Use (24% of 2010 global greenhouse gas emissions): Greenhouse gas emissions from this sector come mostly from agriculture (cultivation of crops and livestock) and deforestation. This estimate does not include the CO₂ that ecosystems remove from the atmosphere by sequestering carbon in biomass, dead organic matter, and soils, which offset approximately 20% of emissions from this sector.*

*Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment, 2014

Global Greenhouse Gas Emissions by Economic Sector





Types of Carbon Programs for Dairy

1. Broad aspirational CHG reduction targets adopted by a stakeholder or group with which the producer is affiliated.
2. Programs, generally connected with a producer's cooperative, to collect data in preparation for and/or participate in, carbon reduction programs or carbon markets.



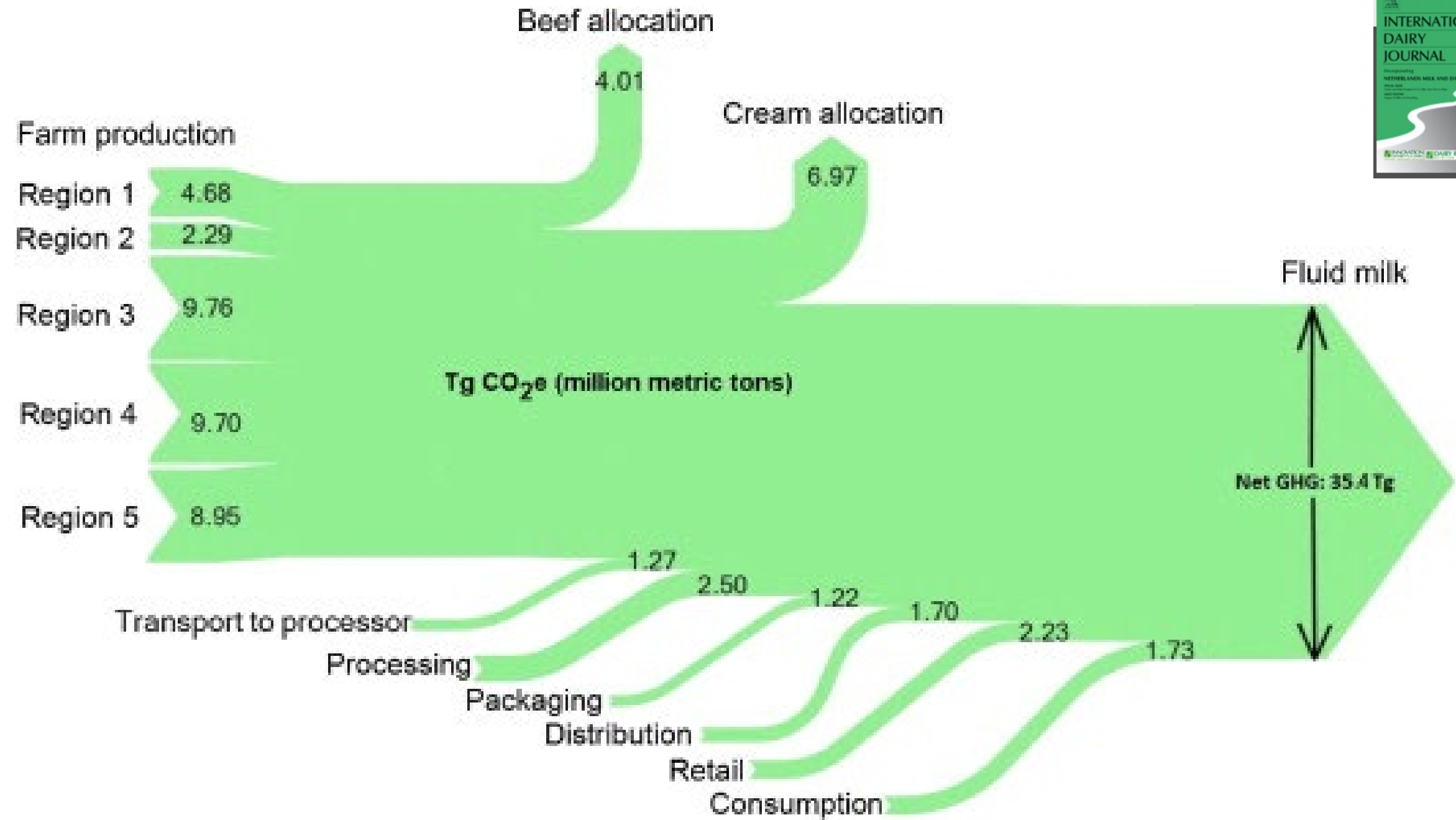
U.S. Dairy Net Zero Initiative (NZI)

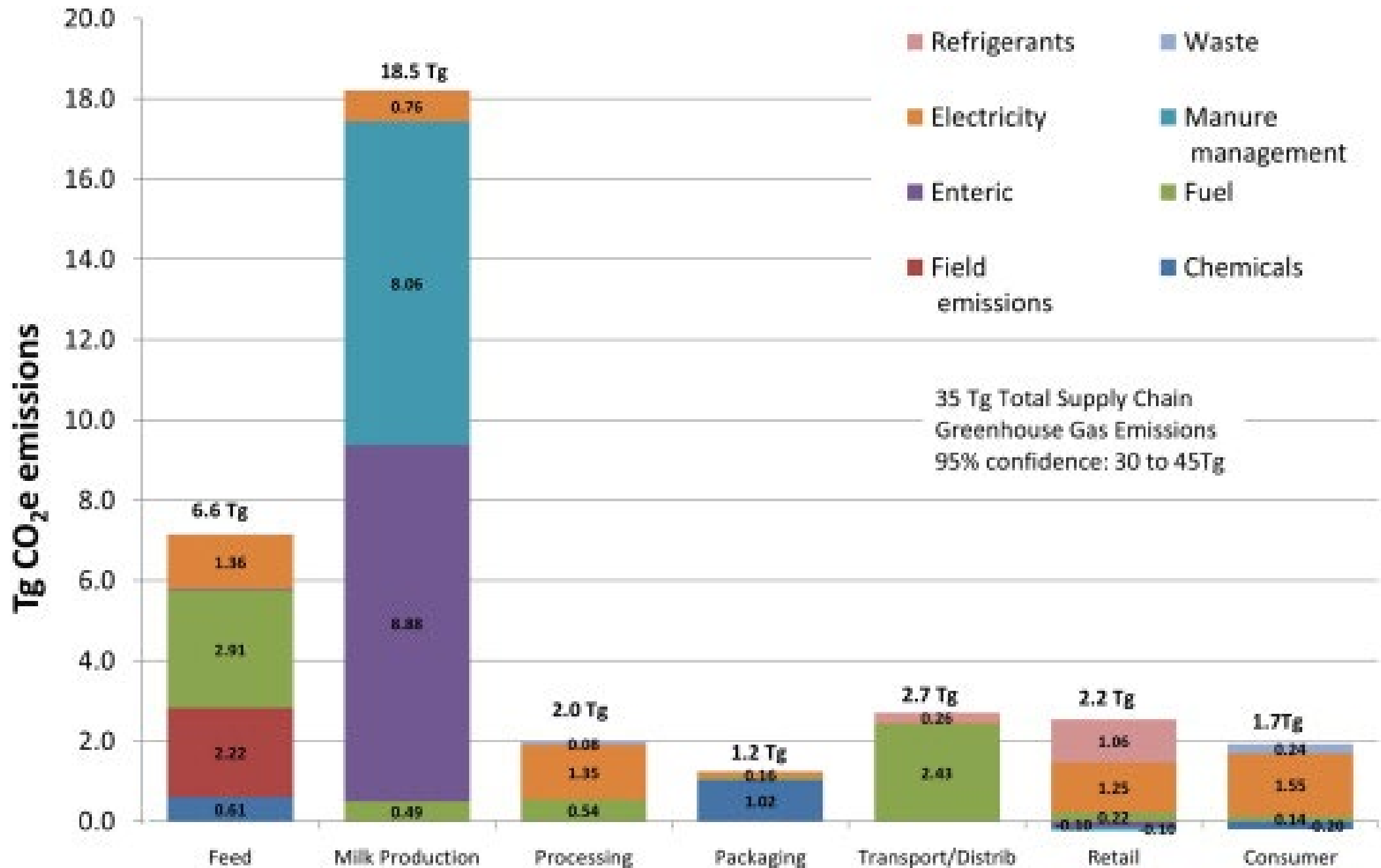
- [U.S. Dairy's Environmental Sustainability](#) webpage – NZI goals:
 - Achieve **GHG neutrality or better by 2050**.
 - Optimize water use while maximizing recycling.
 - Improve water quality to increase soil health by optimizing utilization of manure and nutrients.
- [2008](#) – US Dairy - “the first in the food agricultural sector to conduct a full life cycle assessment at a national level which showed it contributes just 2% of all U.S. greenhouse gas emissions” *International Dairy Journal*, 31, Supp.1 (April 2013)
- [In 2007](#): producing a gallon of milk uses 90% less land and 65% less water, with a 63% smaller carbon footprint than in 1944. *Journal of Animal Science*, Volume 87, Issue 6, June 2009.
- [In 2017](#): producing a gallon of milk requires 30% less water, 21% less land and a 19% smaller carbon footprint than it did in 2007. ***Journal of Animal Science*, Volume 98, Issue 1, January 2020.**

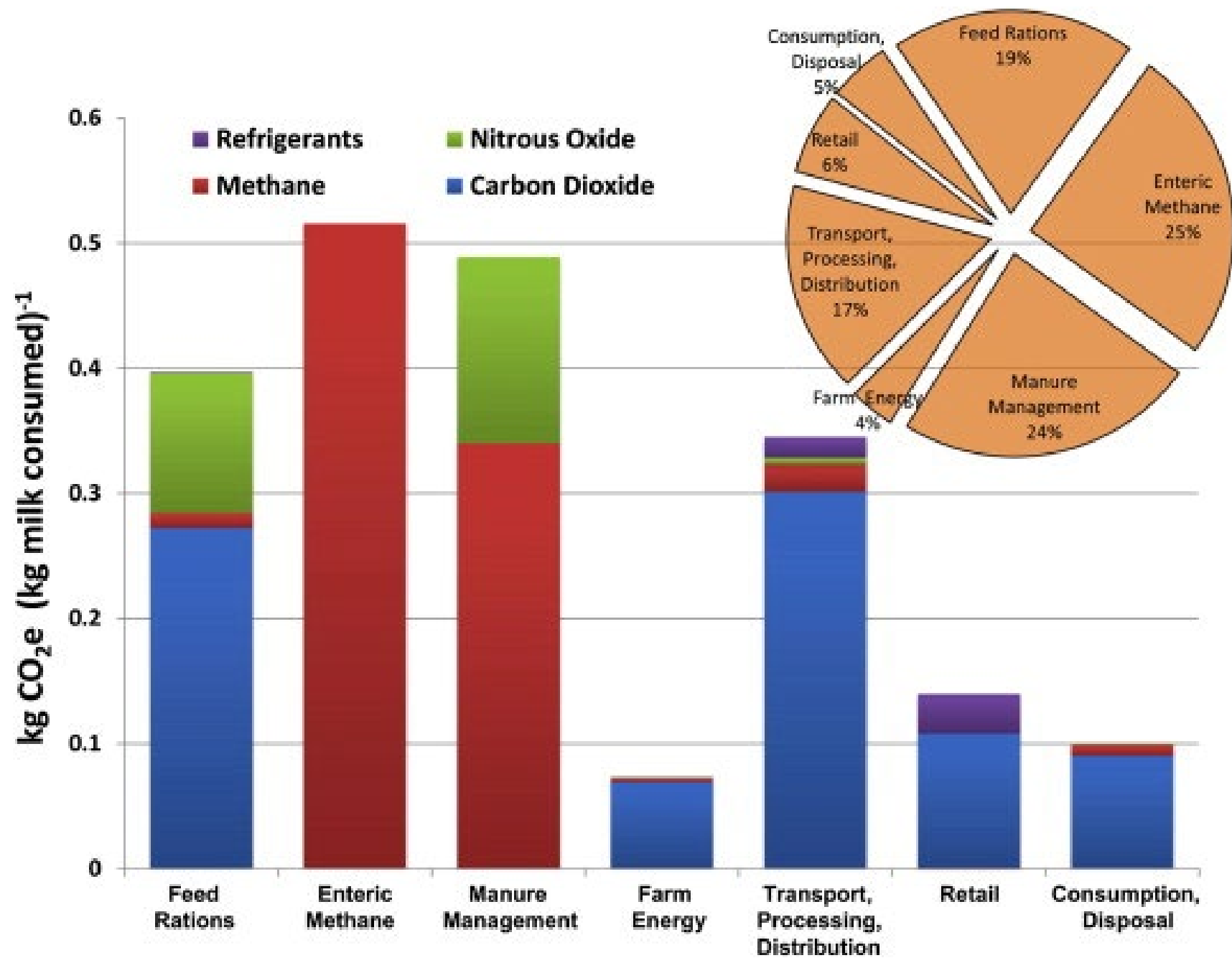


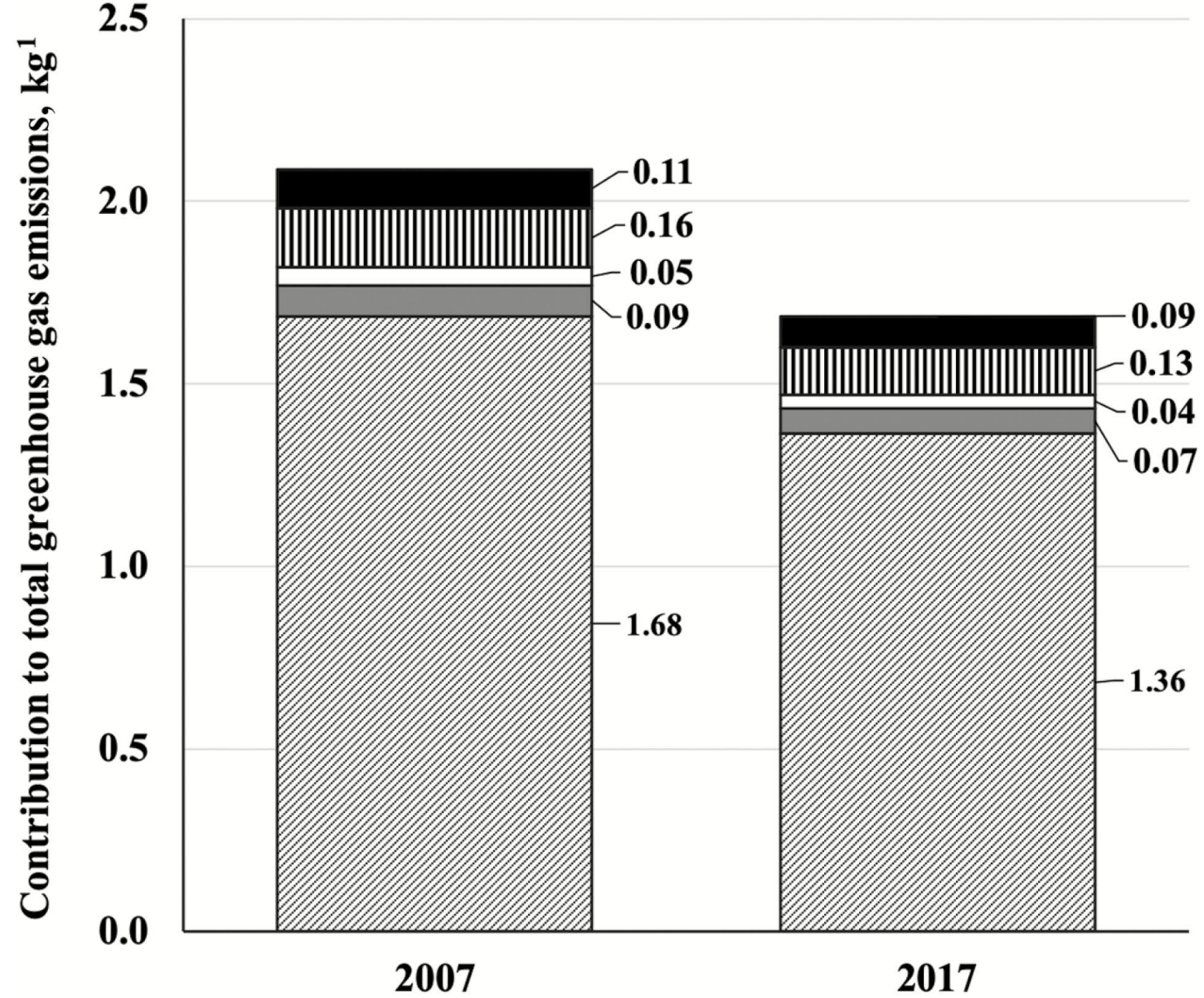


NZI also lists “corporate sponsors” Nestle (2020) and Starbucks (2021).









- Fertilizer and manure application carbon dioxide
- ▨ Cropping and crop input carbon dioxide
- On-farm electricity carbon dioxide
- Enteric and manure nitrous oxide
- ▨ Enteric and manure methane



Mitigating Dairy's Environmental Footprint

Estimated GHG contribution of each "print" to the total*:

Feed (26%) Enteric (35%) Manure (33%) – Energy (6%)

FEED 26%

- No/low-till farming
- Cover crops
- Nutrient management
- Precision agriculture
- Water use efficiency

MANURE 33%

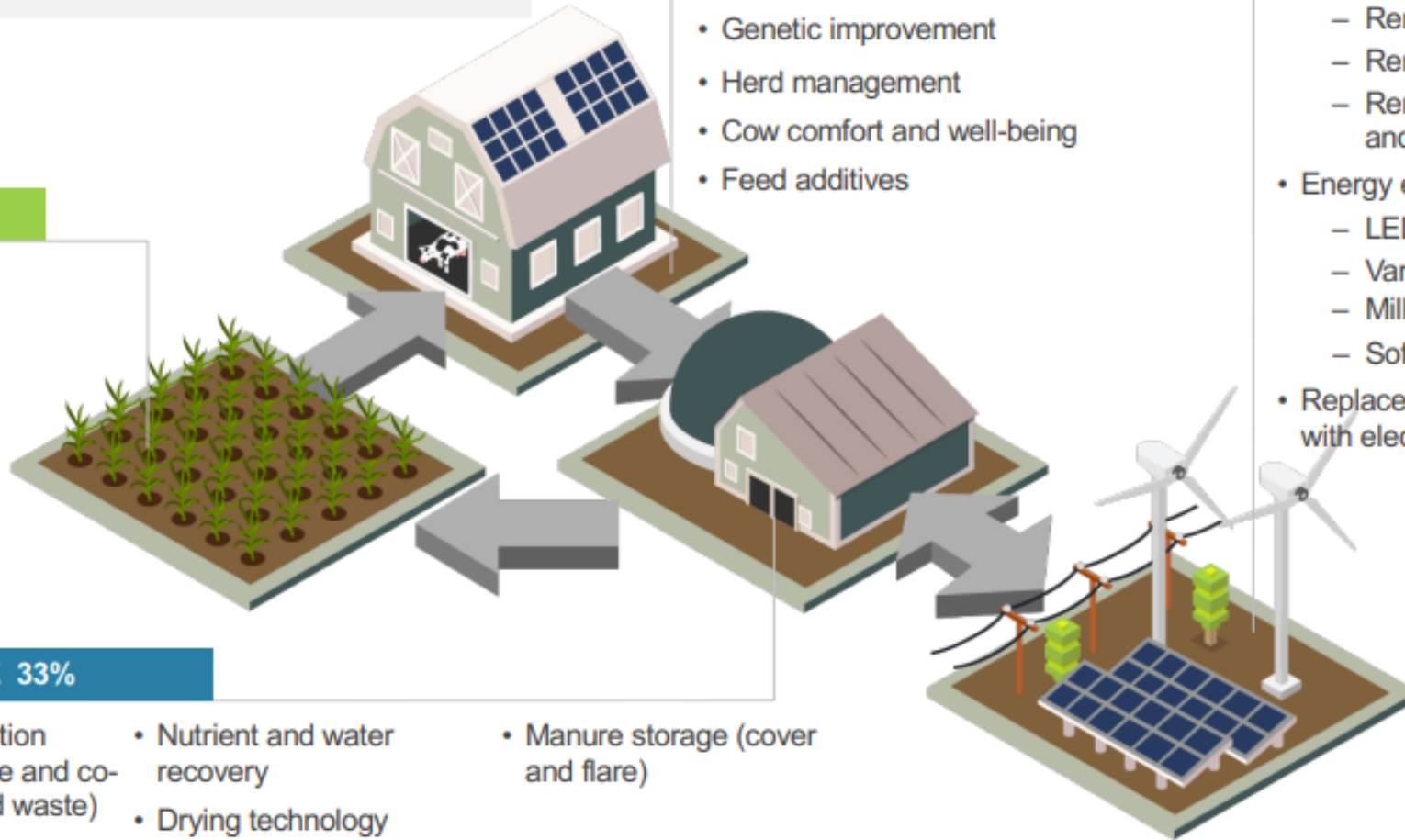
- Anaerobic digestion (includes manure and co-digestion of food waste)
- Renewable fertilizers
- Nutrient and water recovery
- Drying technology (elimination of lagoons)
- Manure storage (cover and flare)

ENTERIC METHANE 35%

- Diet management
- Genetic improvement
- Herd management
- Cow comfort and well-being
- Feed additives

ENERGY 6%

- Renewable energy:
 - Renewable electricity
 - Renewable natural gas
 - Renewable energy from wind and solar sources
- Energy efficiency:
 - LED lighting
 - Variable speed pumps
 - Milk pre-cooling technology
 - Soft start motors
- Replacement of fossil-fueled engines with electric motors





NZI – Components:

- **Groundwork** – “foundational science to increase what is known, fill in data gaps, improve the models used to estimate improvements, and identify areas for largest potential impacts.”
- **Dairy Scale for Good** – “implementing the full suite of best practices and technologies on 3-5 farms across the country, to prove the economic viability of reaching net zero GHG on farm . . . These pilots are intended to provide the scale needed to create benefit for all farms . . .”
- **Collective Impact** – “support broad, voluntary farmer adoption of proven best practices, technologies and combinations of both . . . To achieve solutions at scale, Collective Impact will increase awareness of technical assistance, financial support opportunities and more that can help all farms.”



Aspirational commitments by entity:

- The Bel Group (France):



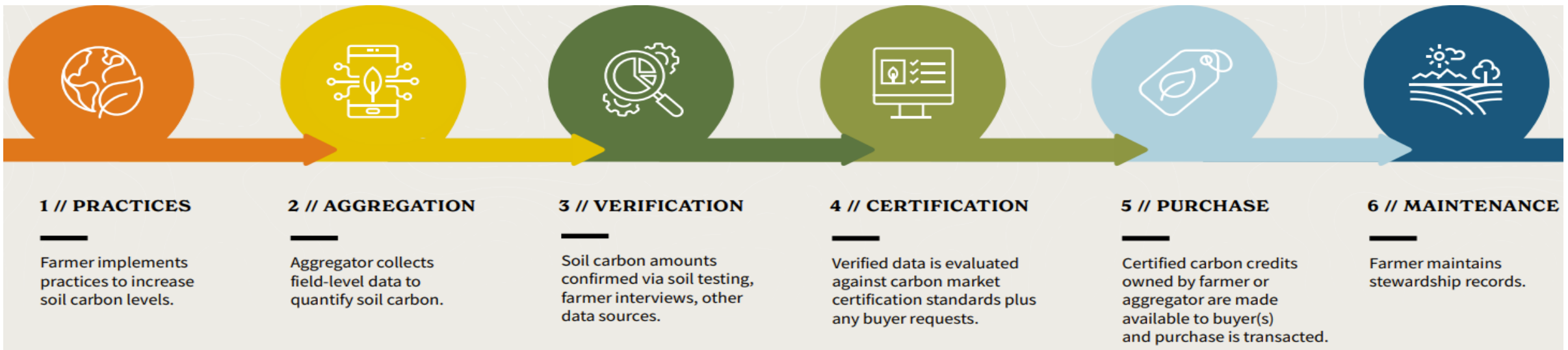
2/10/22 announcement – “to help limit global warming to below +1.5°C . . . a net **reduction of one-quarter** of greenhouse gas emissions throughout Bel’s entire value chain by **2035**, and the integration of carbon tracking as a tool for steering its activities.”



TRUTERRA™

Cooperative-Owned Carbon Market Program

- Feb. 2021: **Land O'Lakes / TRUTERRA™** = “first-ever farmer-owned carbon marketplace.” -- Truterra is a wholly-owned subsidiary of LOL, but participation does not seem to be limited to LOL members.
- Microsoft is the purchaser of credits (carbon negative by 2030).
- \$20/ton of carbon sequestered. 2021 : LOL members paid \$4M for > 200K tons





TRUTERRA[™]

(cont.)

PATHWAY 1: 2022 TRUTERRA[™] CARBON PROGRAM

Earn \$20/ton for additional carbon removed due to practice changes on eligible land for up to three years back with no fees and favorable contract terms. Participating farmers will receive a one-time payment paid in full upon completion of verification (fall 2022).

THE DETAILS:

- Qualifying management practices include reduced/no-till and addition of cover crops.
- Practice change must have been made between crop year 2019 and crop year 2021.
- Payments are made based on carbon tonnage.
- The program is available within cropping systems including corn, soybeans, wheat, or cotton in rotation.
- Farmers who participated in 2021 also may participate.

TRUTERRA[™] 2022 CARBON PROGRAM



TRUTERRA™

(cont.)

PATHWAY 2: 2022 TRUTERRA™ CARBON MARKET ACCESS PROGRAM

Earn \$2/acre for eligible practice change in crop year 2022 with no long-term commitment. The Truterra carbon market access program rewards you for taking the first step toward improving soil health in preparation to market your carbon next year. Participating farmers may also be eligible to participate in future carbon program(s) for carbon removed through these practices at the end of crop year 2022 in addition to their \$2/acre payment.

THE DETAILS:

- Farmers maintain all carbon rights.
- Qualifying management practices include new implementation of reduced/no-till and/or cover crops.
- Practice change must be made in crop 2022 (including fall 2021).
- Payment will be made upon satisfactory completion of data collection.
- Capacity is limited and is available within cropping systems including corn, soybean, wheat, or cotton in rotation.

TRUTERRA™ 2022 CARBON PROGRAM



2022 TRUTERRA™ CARBON PROGRAMS

FREQUENTLY ASKED QUESTIONS

- **Q. How much carbon might be in my soil?** Can I estimate my carbon amount before I commit to participating?

Data from the Soil Health Institute, a Truterra collaborator, indicate one acre of regeneratively managed soil can sequester between .2 to .75 tons of carbon annually, depending on region, practices, and soil types. Farmers who express an interest in the Truterra carbon program can receive an indication of the range of carbon they can anticipate monetizing as a part of the enrollment process.

- **Q. Can I participate again if I was part of the original carbon program in 2021?**

Yes. The original Truterra carbon program compensated farmers for additional carbon removed between 2016-2020. The same acres can be enrolled to claim payment for the additional carbon removed during the 2021 crop year provided all practices were maintained per the carbon services agreement.



FARM Environmental Stewardship

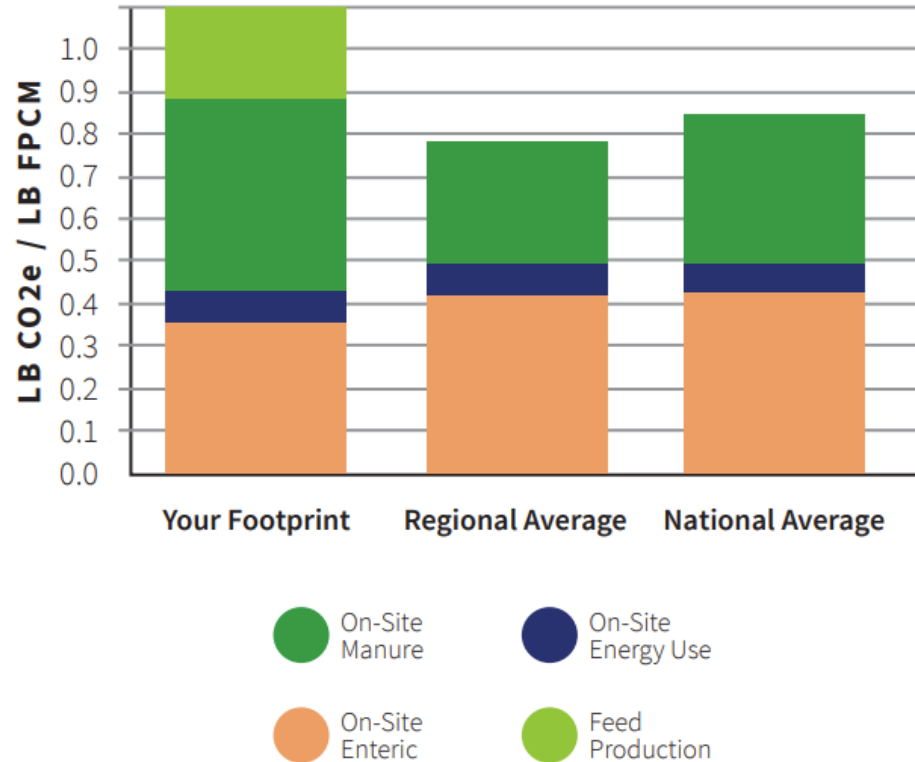
[FARM Environmental Stewardship Evaluation
Preparation Guide, 2020-2023, Version 2.](#)

“The evaluation results are life cycle based – in other words, they represent all of the GHG emissions and energy use associated with the farm’s milk production, from the point of resource extraction (‘cradle’) to the farm gate. For example, the GHG emissions associated with energy use represent emissions from drilling or mining the energy source, processing the fuel, and burning it on the farm.”

“GHG results are reported in **pounds of carbon dioxide (CO₂) equivalent per pound of fat and protein corrected milk (FPCM)**. FPCM normalizes milk to the same scale, so farms can track their results consistently even if milk output changes year to year. With each Environmental Stewardship evaluation, farmers, cooperatives and processors can **assess change over time, identify areas of operational improvement, and report progress to their customers.**”

Not a carbon program per se but is a data collection effort for any carbon program an individual producer may be involved in through their cooperative or otherwise.

Figure 1. Example: Your Farm Greenhouse Gas Emissions



“Continuous Improvement

Use the [FARM Environmental Stewardship Reference Manual](#) as a guide for identifying continuous improvement opportunities (see Figure 2). If results are higher in a particular GHG category, focus on that section of the manual. Each section gives tips and considerations for how you can improve your farm’s footprint in ways that make business sense.”

Figure 2. Guide to Navigating the FARM Environmental Stewardship Reference Manual

Emissions Type	Relevant Reference Manual Chapter(s)	Chapter Page	Example Topic Areas Covered
All	Chapter 2: Moving Forward	Page 8	<ul style="list-style-type: none"> Selecting a specialist/vendor Financing options
On-Site Enteric	Chapter 3: Feed Chapter 4: Productivity	Page 16 Page 38	<ul style="list-style-type: none"> Ration formulation Feeding Herd health
On-Site Manure	Chapter 3: Feed Chapter 5: Manure	Page 16 Page 58	<ul style="list-style-type: none"> Manure storage and treatment options Ration formulation
On-Site Energy Use	Chapter 6: Energy	Page 72	<ul style="list-style-type: none"> Energy efficiency options for milking, ventilation and lighting



Organic Cooperative Program



- CROPP (Coulee Region Organic Produce Pool) aka Organic Valley – “Organic Valley Secures \$2.2M+ in Public & Private Funding” for 3 Northern California member farms to develop “Dairy Carbon Farm Plans,” driven by CA CHG emissions requirements require emissions reductions of as much as 40% by 2030.
- “Scale learnings” to other 36 member farms in California, “and potentially across the entire cooperative of more than 2000.”



California's Low Carbon Fuel Standard (LCFS)

- Getting media attention right now over out-of-state dairy farmers generating income from a California carbon reduction program.
- California pays for the generation of “RNG” credits (e.g. methane production via an anaerobic digester) which are then sold by CA state government to CA entities needing compliance with CA CHG emissions laws. The program was intended to deal with transportation fuels production. The generation of the RNG can occur **in any state**, provided it is sold to an interstate pipeline (which requires some “cleaning” and involves trucking it to a pipeline.) (These CA payments are separate from any federal renewable energy credits generated.)
- [What's Worth More: A Cow's Milk or its Poop?](#), Aaron Smith, UC Davis (2/3/21)
- [California has carbon credit opportunities for out-of-state dairies](#), Maxson Irsik, High Plains Journal (1/15/21)
- [How dairy farmers are cashing in on California's push for cleaner fuel](#), NPR Morning Edition (2/10/22)
- [How cow manure from New York is bolstering California's emissions goals](#), Politico (2/19/22)



THANK YOU!

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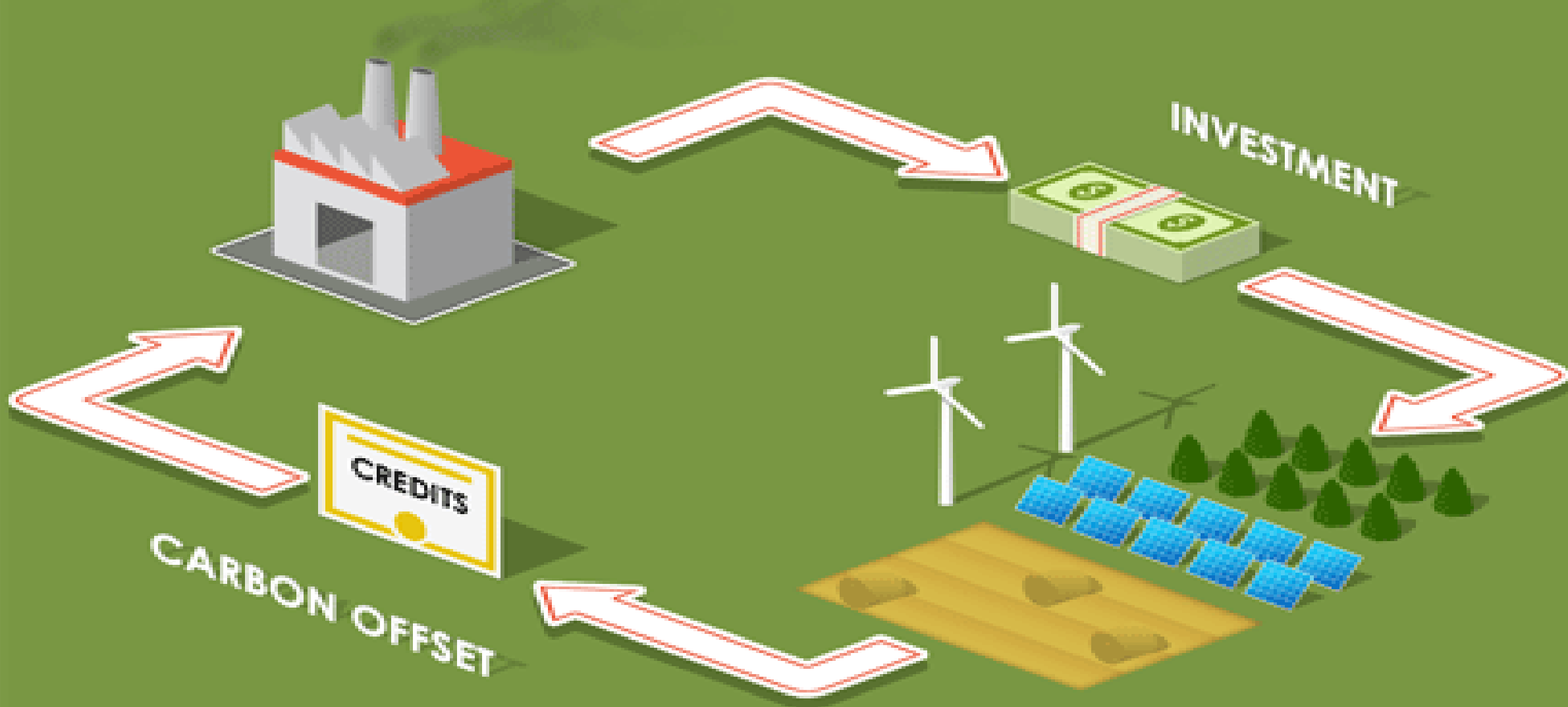


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Carbon Contracts and Markets



CARBON SEQUESTRATION - HOW IT WORKS

① PHOTOSYNTHESIS

During photosynthesis, plants convert carbon dioxide (a gas) into sugar (carbohydrate molecules).

② NUTRIENT EXCHANGE

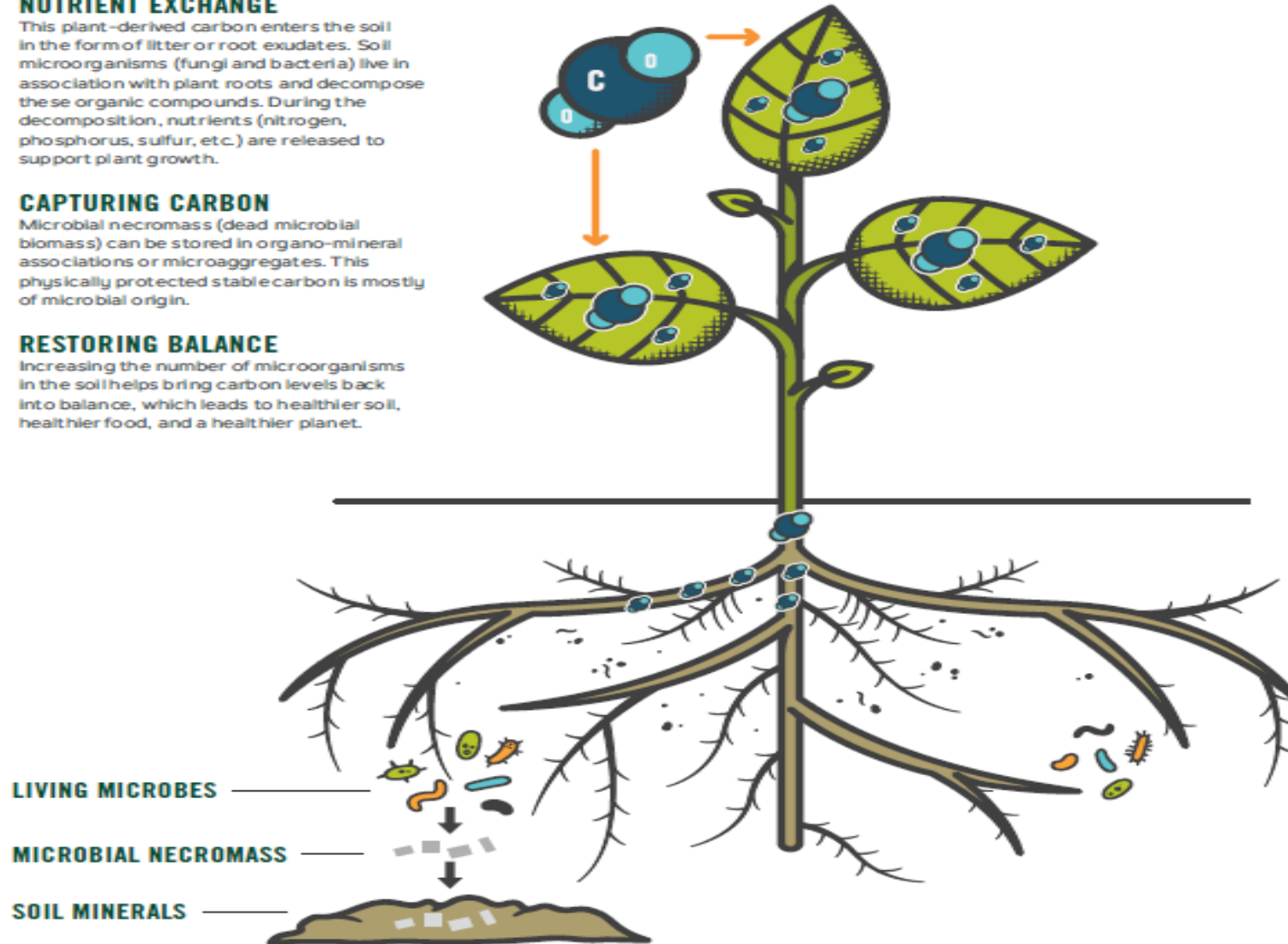
This plant-derived carbon enters the soil in the form of litter or root exudates. Soil microorganisms (fungi and bacteria) live in association with plant roots and decompose these organic compounds. During the decomposition, nutrients (nitrogen, phosphorus, sulfur, etc.) are released to support plant growth.

③ CAPTURING CARBON

Microbial necromass (dead microbial biomass) can be stored in organo-mineral associations or microaggregates. This physically protected stable carbon is mostly of microbial origin.

④ RESTORING BALANCE

Increasing the number of microorganisms in the soil helps bring carbon levels back into balance, which leads to healthier soil, healthier food, and a healthier planet.



Moyer, J., Smith, A., Rui, Y., Hayden, J. (2020). Regenerative agriculture and the soil carbon solution [white paper]. (https://rodaleinstitute.org/wp-content/uploads/Rodale-Soil-Carbon-White-Paper_v11-compressed.pdf)



The Growing Climate Solutions Act of 2021

S. 1251 - U.S. Senate passed on 6/24/21 by vote of 92-8

USDA/EPA study of U.S. carbon markets:

- Seeks to make it easier for farmers to participate in voluntary carbon credit markets.
- Nothing is mandatory, completely voluntary.

1. Look at how voluntary carbon markets operated over the past four years, including supply of and demand for ag carbon credits.
2. Project supply and demand for ag carbon credits for the next four years.
3. Identify complications associated with measuring and verifying long term carbon sequestration and other activities that prevent, reduce or mitigate greenhouse gas (GHG) emissions in agriculture and forestry.
4. Identify complications for small, beginning and socially disadvantaged producers participating in carbon markets.
5. Evaluate the potential USDA role for improving carbon reduction measurement technologies.
6. Examine the extent to which existing carbon markets adequately consider unique challenges facing ag producers regarding carbon credit verification, additionality, permanence and reporting, given regional variations and different ag business arrangement.
7. Analyze whether current carbon markets have sufficient flexibility to deal with disrupting those agricultural practices generating carbon credits due to unavoidable events including production challenges and natural disasters.



Potential carbon credit generating activities:

1. Land or soil carbon sequestration.
2. Emissions reductions resulting from fuel choice or reduced fuel use.
3. Livestock emissions reductions, including emissions reductions achieved through (a) feeds, feed additives, and the use of byproducts as feed sources; or (b) manure management practices.
4. On-farm energy generation.
5. Energy feedstock production.
6. Fertilizer or nutrient use emissions reductions.
7. Reforestation.
8. Forest management, including improving harvesting practices and thinning diseased trees.
9. Preventing the conversion of forests, grasslands, and wetlands.
10. Restoring wetlands or grasslands.
11. Grassland management, including prescribed grazing.
12. Current practices associated with private land conservation programs administered by the USDA Secretary.
13. Other activities that the secretary, in consultation with the Advisory Council, determines to be appropriate.



What is in the proposed Act?

- Establish voluntary USDA carbon saving **measurement and verification protocols**.
- USDA also would establish an advisory committee to oversee operation of the USDA program to certify **GHG technical assistance providers** and **third-party verifiers**.
- Creation of a **USDA website** where certified technical assistance providers and third-party verifiers would be listed.
- **Producer protection requirements** that certified technical assistance providers and third-party verifiers would — “to the maximum extent feasible” — be required to follow.
 - The providers and verifiers would be required to act in good faith, and to provide realistic estimates of costs and revenues relating to carbon saving activities and verification.
 - Technical assistance providers would, in addition, be required to ensure — “to the maximum extent feasible” — that farmers and ranchers receive a fair distribution of revenues from the sale of ag carbon credits.



The questions to be asked with any carbon contract:

1. **What will you be required to do to generate the credit (practices, etc.)** – most will require new or different farming practices, such as no-till, cover crops, and replacing traditional fertilizer with soil amendments or the like. Other possibilities include transitioning to perennial crops or re-forestation.
2. **How long will the contract last** – these are likely to be long term, probably 10 years or much longer. The current marketplace is seeking long periods of carbon sequestration, some up to 100 years. The length of the contract will tie up the land's use for significant periods, and likely impact sale and leasing opportunities. It may also impact transfers of the land through estate planning.
3. **How much will you get paid** – this should be a function of how much carbon will be captured on the land. It is difficult to determine current prices for carbon credit prices, but some indicators suggest prices of \$5 to \$9/ per metric ton. It will be important to know how many acres will be required to capture one ton of carbon.

[Courtesy of Joel Cape](#), Cape Law Firm, PLC



4. **When will you get paid** – this is likely to be tied to the sale of the carbon credits by the aggregator and could be many months after the carbon-sequestering activities are completed. The practices required will probably incur some expense, or possibly a sacrifice in yield, so the payment will be used to counter the expense and hopefully result in profits. The landowner will also want to examine available options in the event of payment default.
5. **What are the consequences of getting out of the contract** – it is likely to be quite difficult to exit the contract since these are typically viewed as long-term arrangements. One comparable example would be early termination of a CRP contract – there the landowner is required to repay all of the CRP payments, plus interest and a penalty.
6. **Will liens or restrictive covenants be placed on the land** – the contract may allow the aggregator to place a lien or other restrictive covenant on the land to ensure compliance. This would greatly impact options for use and transfer of the encumbered acreage.
7. **Who owns and gets access to the data** – data regarding the land and practices will be collected by the aggregator to verify carbon storage. The data will also be communicated in some fashion to the marketplace to authenticate the carbon credit. The farmer will want to understand what data will be released and how.
8. **How will the carbon be verified** – the science of carbon verification is quite new, and its accuracy may be questionable. Current verification methods are time-consuming and expensive. This is likely to affect the value of the contract.



RESOURCES

Aiken, J.D. **"Ag Carbon Credits,"** Cornhusker Economics, UNL Department of Agricultural Economics. April 21, 2021. Overview of ag carbon market.

<https://agecon.unl.edu/ag-carbon-credits>

Aiken, J.D. **"Ag Carbon Offsets and the Carbon Bank"** FARM Series 21-0312, UNL Department of Agricultural Economics. April 2, 2021. Provides introduction to ag credits as pollution offsets and to a possible USDA carbon bank, which is not part of S. 1251.

<https://farm.unl.edu/policy-legal-finance/ag-carbon-offsets-and-carbon-bank/04022021-0956>

Crespi, John M. & Kristin A. Tidgren. **"The First Legal Step for an Agricultural Carbon Market is in the Growing Climate Solutions Act of 2021."** May 2021. Compares the proposed Growing Climate Solutions Act to USDA regulation of organic food. 5 page report.

<https://www.card.iastate.edu/products/publications/synopsis/?p=1325>

Plastina, Alejandro & Oranuch Wongpiyabovrn. **"How to Grow and Sell Carbon Credits in US Agriculture."** Iowa State University Extension & Outreach, July 2021. Very helpful report comparing 11 private voluntary ag carbon programs across 26 factors.

<https://www.extension.iastate.edu/agdm/crops/pdf/a1-76.pdf>

Sellars, Sarah and others. **"What Questions Should Farmers Ask about Selling Carbon Credits?"** Farmdoc Daily (11):59, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, April 13, 2021. Excellent bulletin that estimates per acre revenue for several carbon saving ag activities.

<https://farmdocdaily.illinois.edu/2021/04/what-questions-should-farmers-ask-about-selling-carbon-credits.html>

Swanson, Krista and others. **"Growing Climate Solutions Act Impact on Farmers."** farmdoc daily (11):66, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, April 22, 2021. Overview of carbon markets; short discussion of the Growing Climate Solutions Act. 3 page newsletter.

<https://farmdocdaily.illinois.edu/2021/04/growing-climate-solutions-act-impact-on-farmers.html>

COMET-Farm – Whole Farm and Ranch Carbon and Greenhouse Gas Accounting System

COMET
Farm

USDA United States Department of Agriculture
Natural Resources Conservation Service

Colorado
State
University

Whole Farm and Ranch
Carbon and Greenhouse Gas
Accounting System.

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What is COMET-Farm?

COMET-Farm is a whole farm and ranch carbon and greenhouse gas accounting system.

The tool guides you through describing your farm and ranch management practices including alternative future management scenarios. Once complete, a report is generated comparing the carbon changes and greenhouse gas emissions between your current management practices and future scenarios.

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