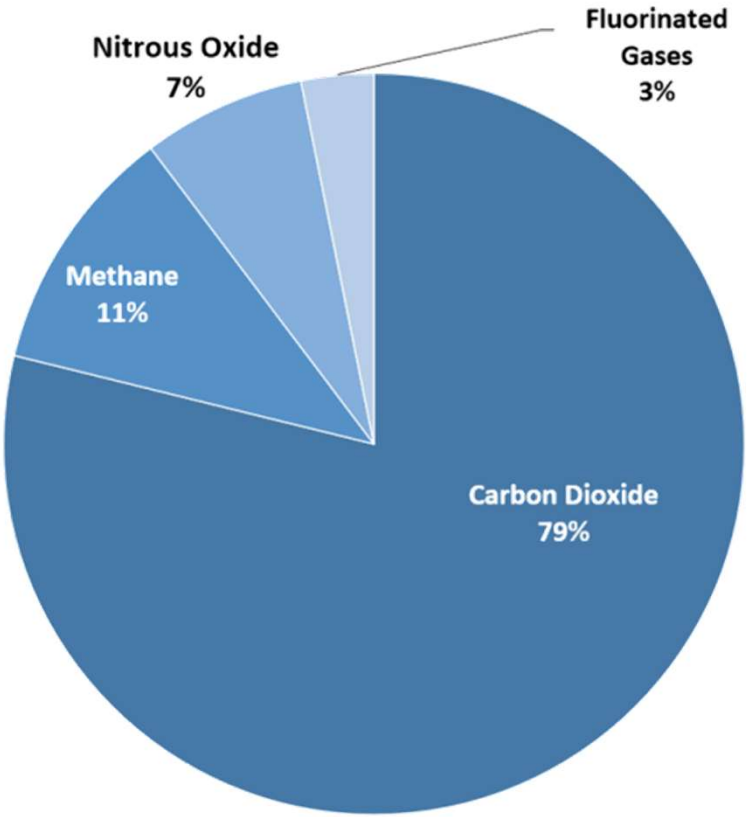
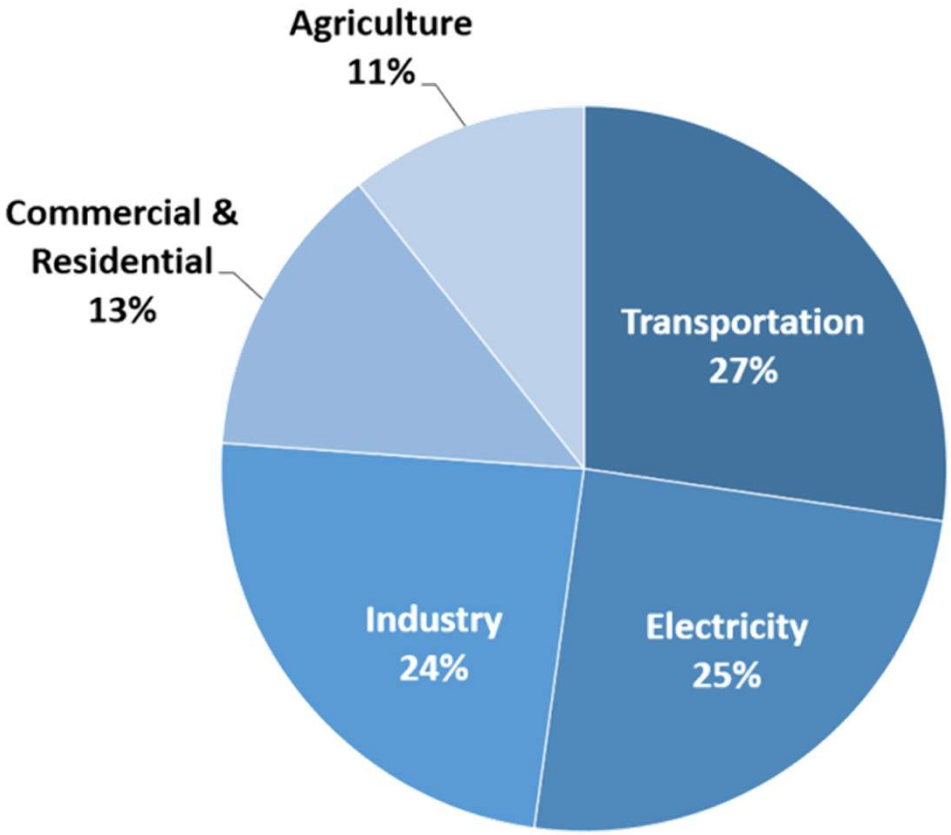
Tools for Communicating On-farm Opportunities to Combat Climate Change and Generate Carbon Credits

American Farmland Trust

Overview of U.S. Greenhouse Gas Emissions in 2020

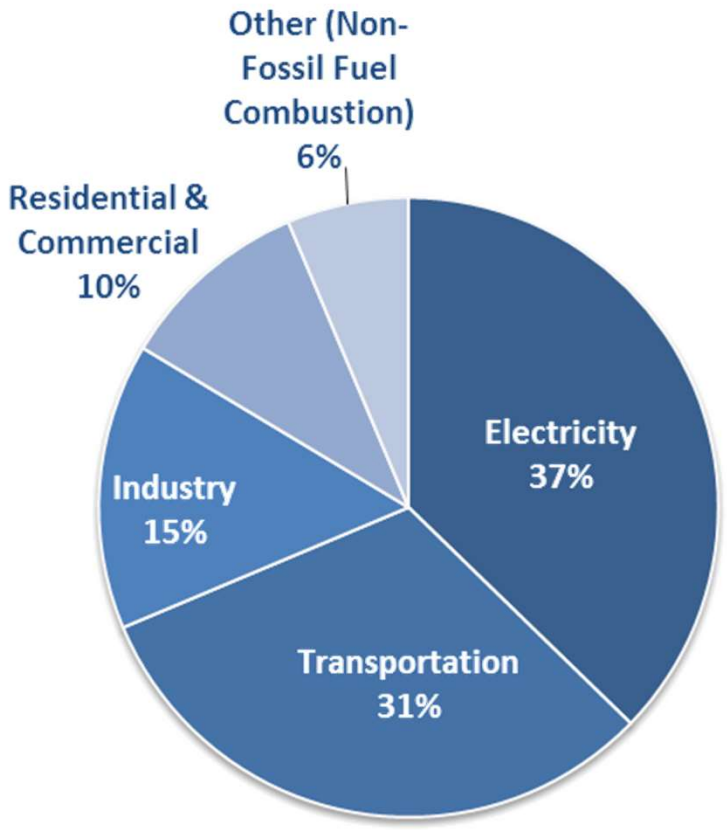


Total U.S. Greenhouse Gas Emissions by Economic Sector in 2020

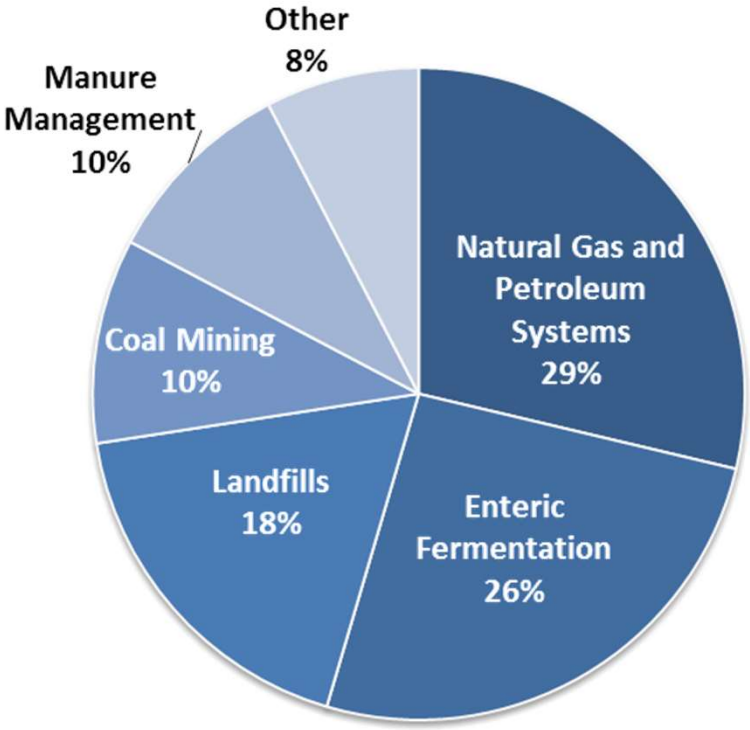


https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

Carbon Dioxide

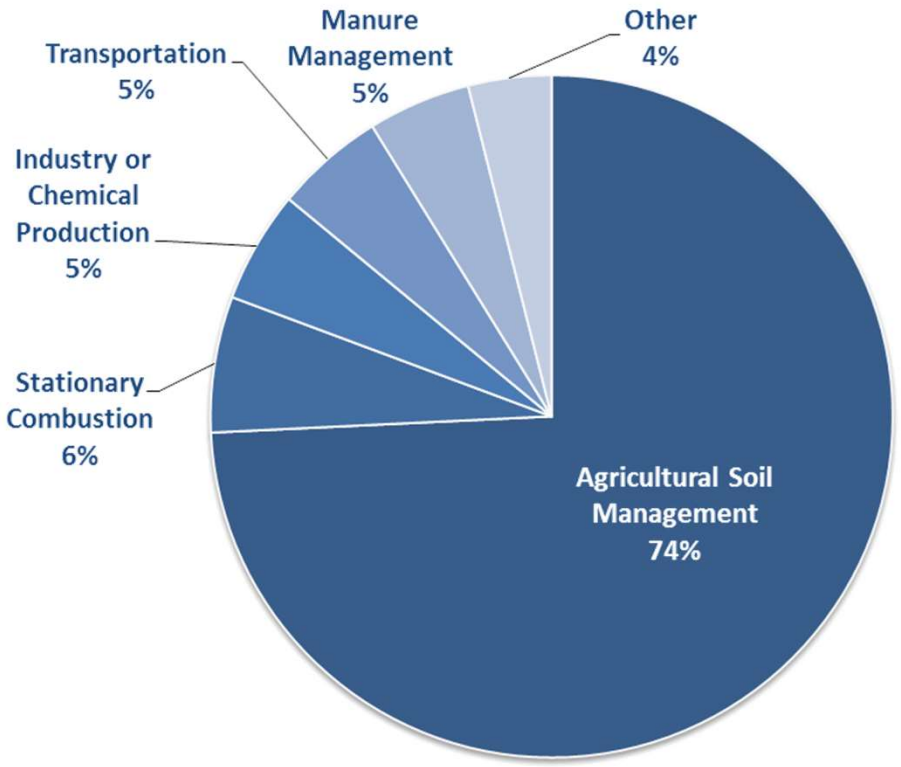


Methane



https://www.neefusa.org/weather-and-climate/climate-change/principal-greenhouse-gases-and-their-sources

Nitrous Oxide



Agriculture is largest source of N2O

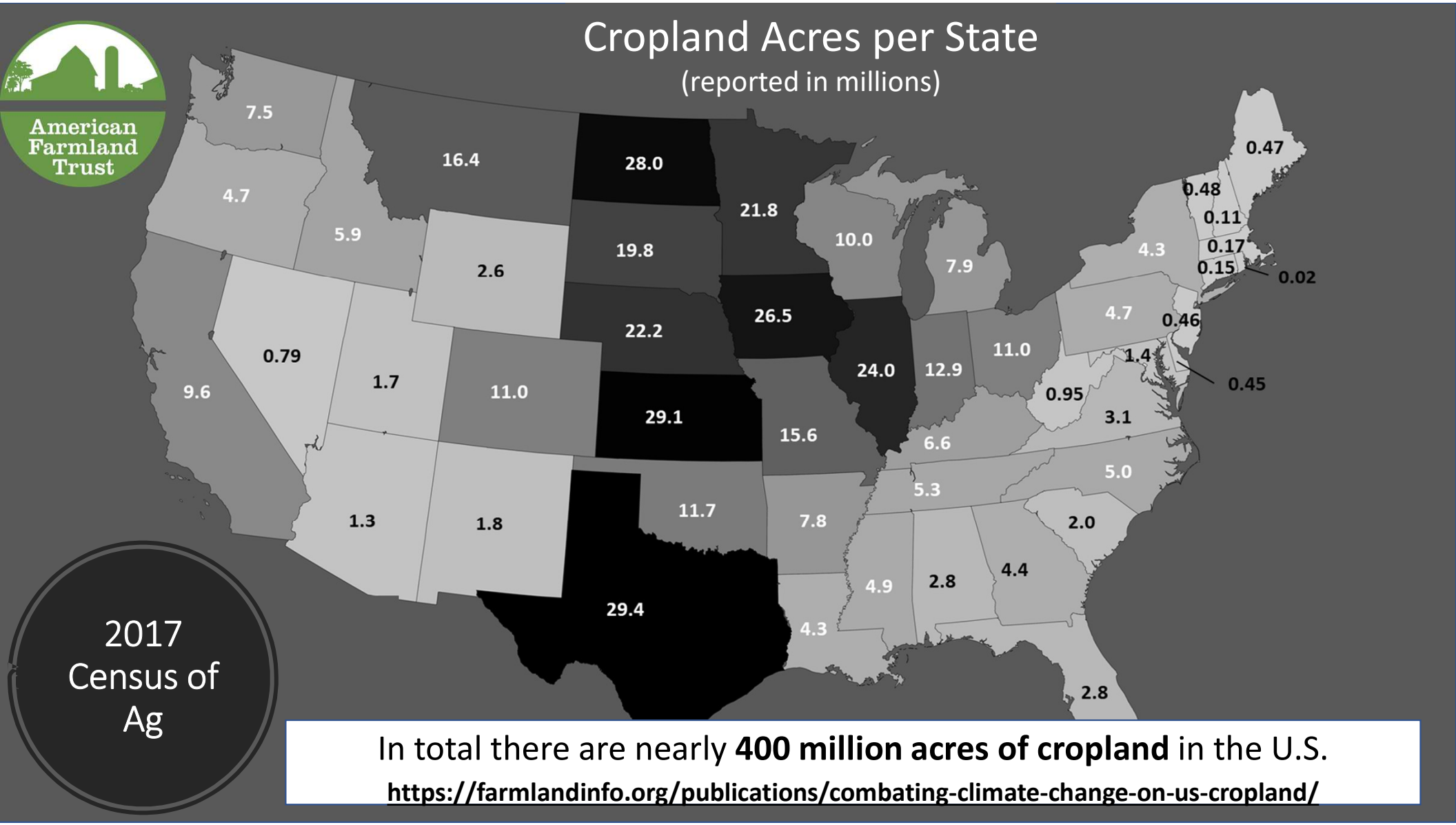
> Agricultural Soil Management

- Synthetic fertilizers
- Organic amendments (manure, compost, biosolids, etc.)
- Residue N
- Mineralization and Asymbiotic Fixation
- Drained organic soils

https://www.neefusa.org/weather-and-climate/climate-change/principal-greenhouse-gases-and-their-sources

Understanding Carbon Dioxide Equivalents

- Values in this presentation are expressed as carbon dioxide equivalents (CO2e) and reported in metric ton (tonne) increments.
- CO2e is a measure used to compare the emissions from various greenhouse gases based on their global-warming potential
- The three main GHGs reported for agricultural practices include
  - Carbon Dioxide (global warming potential of 1)
  - Nitrous Oxide (global warming potential of 298)
  - Methane (global warming potential of 25)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Cropland Acres per State
(reported in millions)
7.5
4.7
16.4
5.9
2.6
28.0
19.8
22.2
21.8
26.5
10.0
7.9
0.47
0.48
0.11
0.17
0.15
0.02
4.3
4.7
0.46
1.4
0.45
0.95
3.1
6.6
5.0
5.3
2.0
4.4
2.8
2.8
11.0
12.9
24.0
9.6
0.79
1.7
11.0
29.1
15.6
11.7
7.8
1.3
1.8
29.4
4.9
4.3
2017 Census of Ag
In total there are nearly **400 million acres of cropland** in the U.S.
https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/

What is the GHG reduction potential for farmland?

IT DEPENDS!

Practice	Average Emission Reduction Coefficients
Cover Crops	0.16 – 0.77 Tonnes CO_2e / ac / yr
No-till / Strip Till	0.40 – 0.74 Tonnes CO_2e / ac / yr
Combined Practices (including Spring N application)	0.76 – 1.13 Tonnes CO_2e / ac / yr

Table depicting ranges of average emission reduction coefficients summarized from meta-analysis and various cropping system models across multiple soil depths and geographic regions.

https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/

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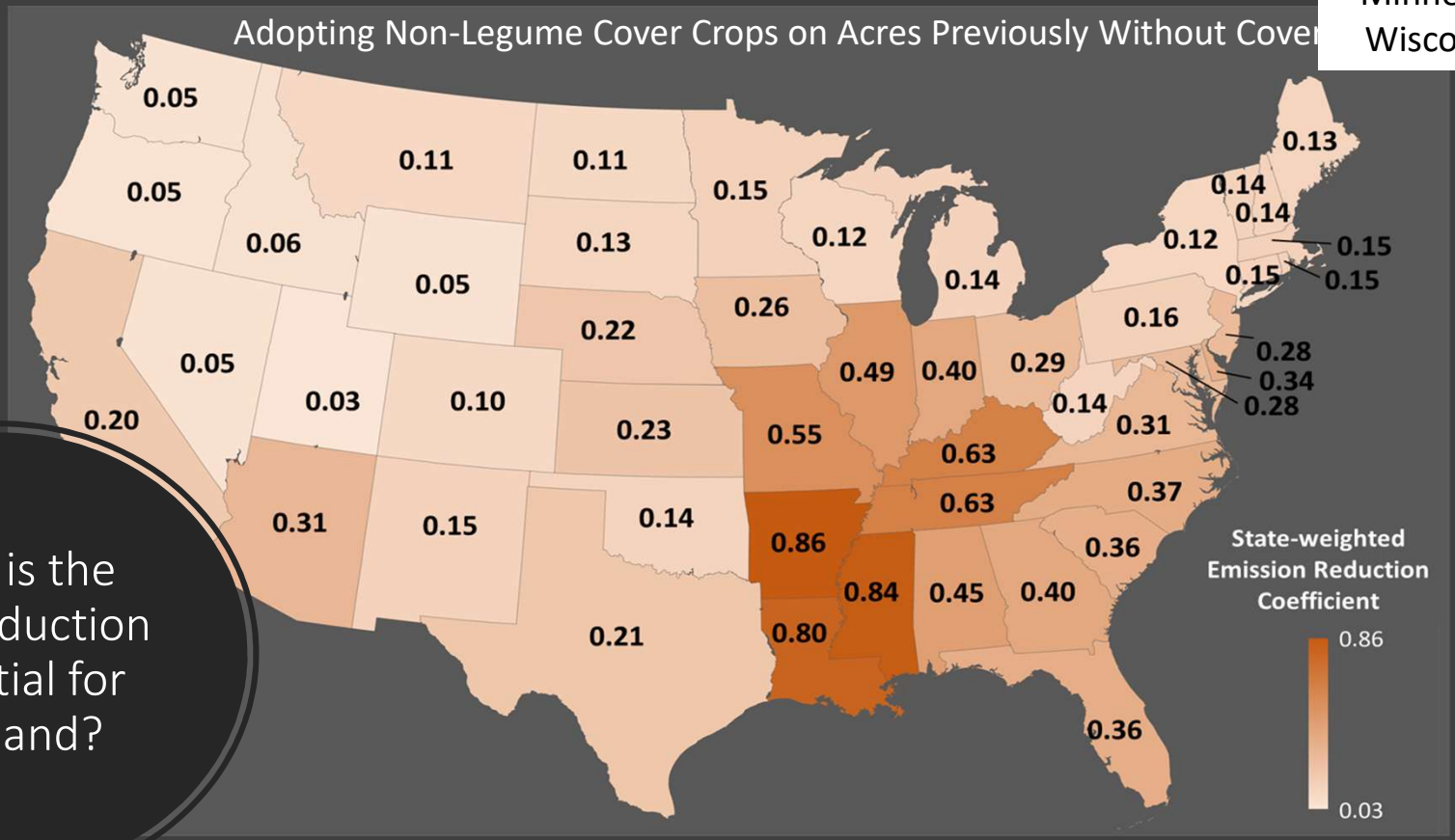
Estimates of GHG Reduction Potential: Cover Crops

# tonnes CO2e/ac/yr
Illinois = 0.49
Iowa = 0.26
Minnesota = 0.15
Wisconsin = 0.12



What is the GHG reduction potential for farmland?

https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/

Estimates of GHG Reduction Potential: N

# tonnes CO2e/ac/yr
Illinois = 0.73
Iowa = 0.71
Minnesota = 0.58
Wisconsin = 0.54

What is the GHG reduction potential for farmland?

https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/

Benefits of Investing in Soil Health

↑ insulative cover
↓ evaporation

↑ infiltration
↑ H_20 storage
↓ runoff **/ flooding risks**
↓ drought risk / **irrigation needs**

↑ weed suppression
↓ herbicide use / **fuel use**

↑ soil organic matter / **carbon sequestration**
↓ compaction

↑ diversity
↓ plant stress
↓ pesticide use

↑ nutrient cycling
↓ fertilizer inputs / **N_2O emissions**
↓ **water pollution**

Bold items are prospects for ecosystem market incentives

Background - *What are ecosystem markets?*

Payments to protect, restore or mitigate for impacts to ecosystems.

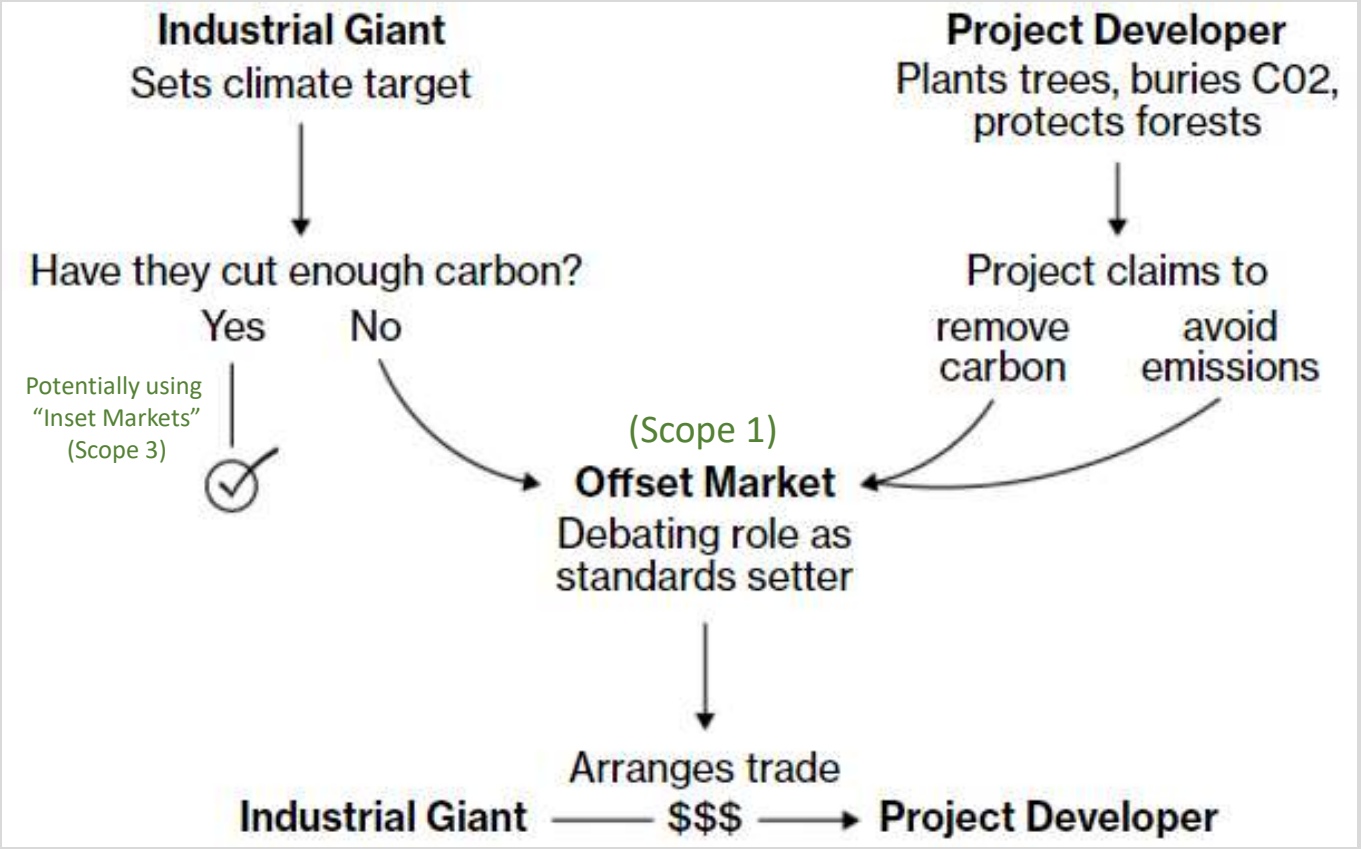
Practices are often part of traditional state and federal incentive programs.

Payments are generated via **outcomes** verified at the field level (not necessarily practice-specific).

Markets exist for carbon sequestration, GHG reductions, water quality, and others.

https://ilsustainableag.org/ecomarkets/

Carbon Credits (Simplified)



Measurable reduction or avoidance of GHG

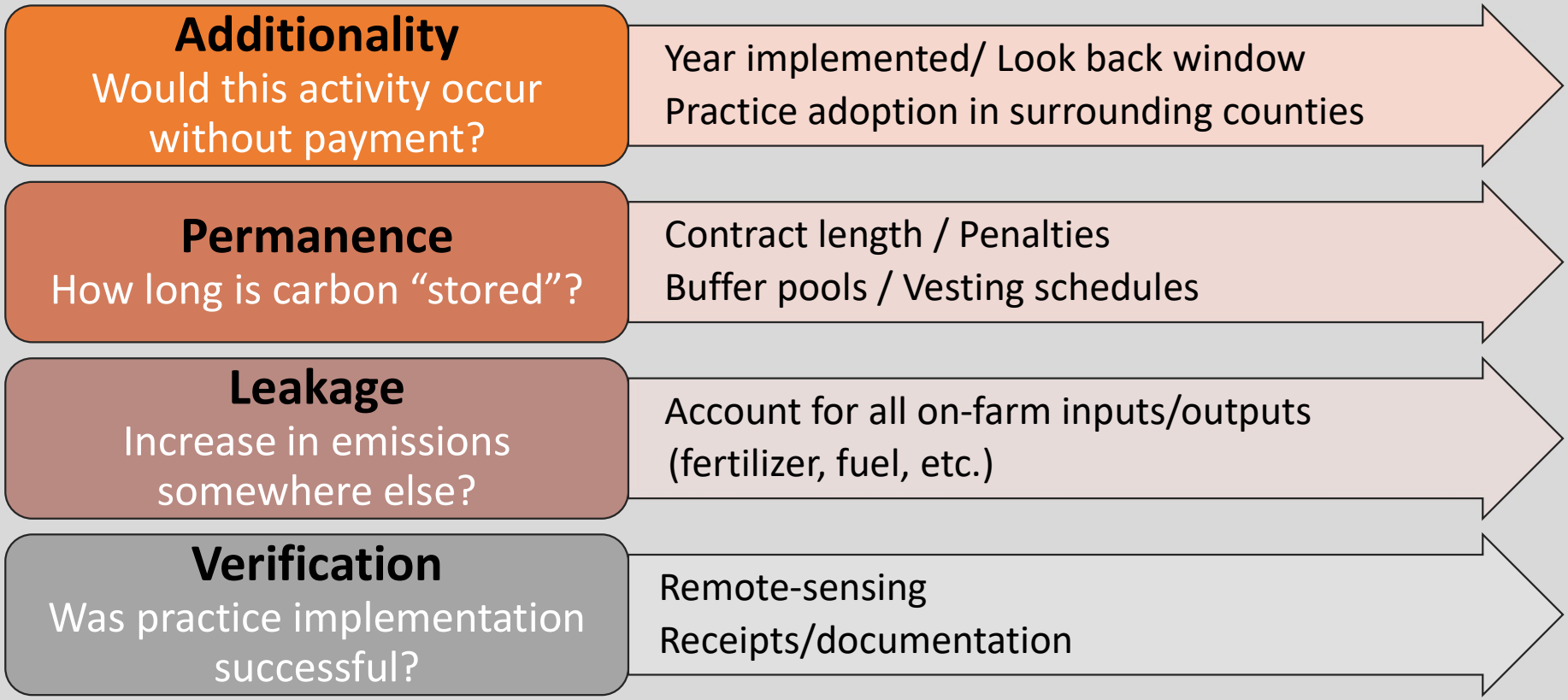
Equivalent to 1 metric tonne (2,205 lbs) CO2e

Includes CO2, methane, N2O

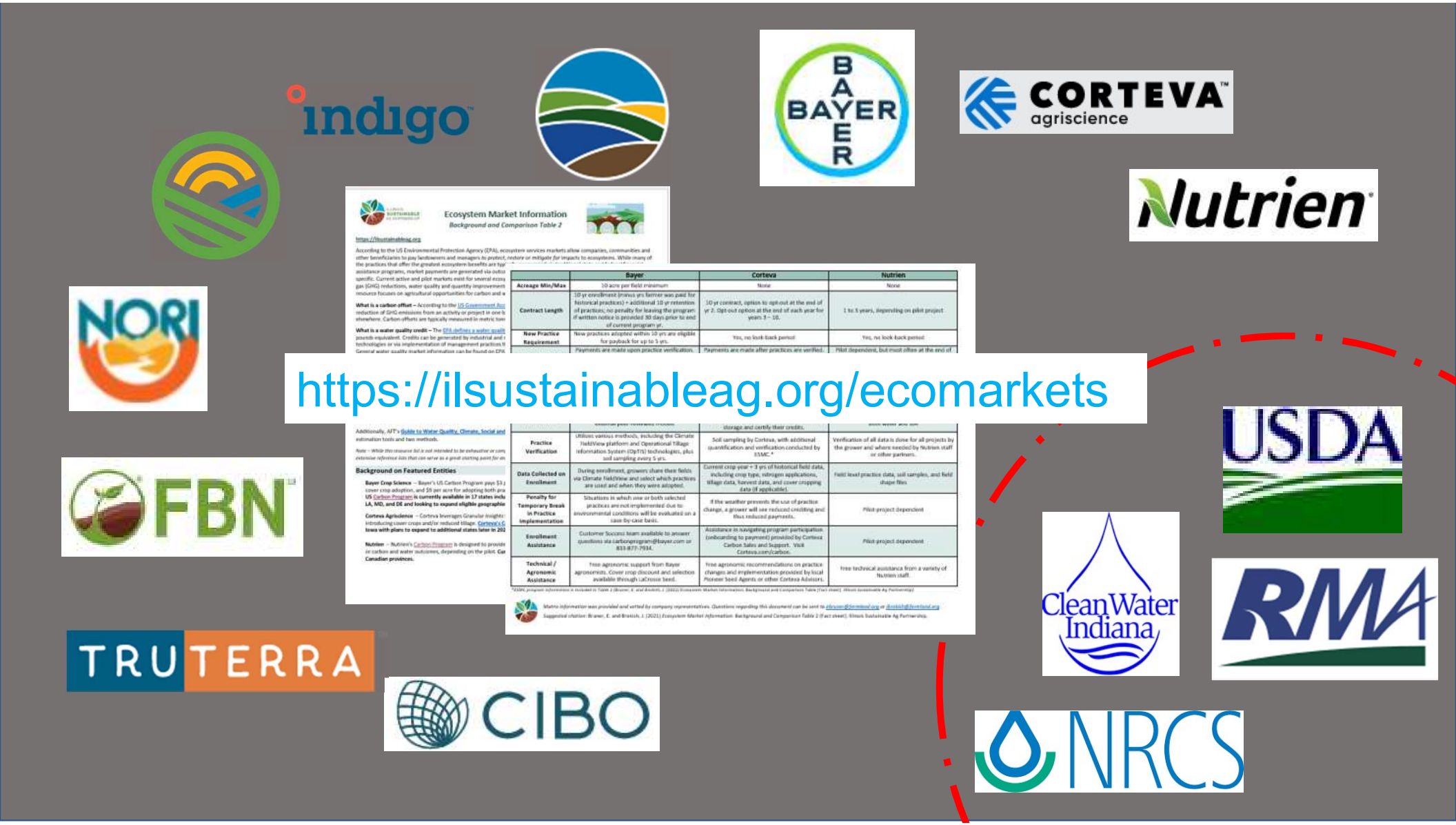
Traded via compliance or voluntary market

Source: Bloomberg

Keys to Credit Generation



https://ilsustainableag.org/ecomarkets/


indigo
BAYER
CORTEVA agriscience
Nutrien
NORI
FBN
TRUTERRA
CIBO
USDA
Clean Water Indiana
RMA
NRCS
Ecosystem Market Information
Background and Comparison Table 2
https://ilsustainableag.org/ecomarkets

Potential Payments (back of envelope)

		Illinois	Iowa	Minnesota	Wisconsin
Cover Crop	tonnes CO2e	0.49	0.26	0.15	0.12
	Payment(1)	$ 7.35	$ 3.90	$ 2.25	$1.80
	EQIP(2)	$ 34.90	$ 23.02	$ 22.13	$33.00
No-till	tonnes CO2e	0.73	0.71	0.58	0.54
	Payment(1)	$ 10.95	$ 10.65	$ 8.70	$8.10
	EQIP(2)	$ 17.29	$ 11.25	$11.38	$17.19

Values are per acre basis

(1) Average carbon payment = $15 / tonne of CO2e

(2) FY22 Payment Schedules – cover crop payment based on "basic" component (single species, winter kill); no-till payment for no-till / strip-till component.

Markets Take-away

Market incentives alone may not be the most cost-effective means to accelerate practice adoption

- May not be sufficient to justify management changes
- Not currently competitive with existing financial incentives

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May be right for a farmer already planning to change

Increased ROI when payments are stacked

Advice for Farmers

Realistic Goals / WHY?

Management Changes

Technical Support

Records Requirements

Components of a Soil Health System

- No-till or Reduced Tillage
- Cover Crop
- Crop Rotation
- Integrate Livestock
- Rotational Grazing
- Pollinator Planting
- Organic mulches
- Strip cropping
- Silvopasture
- Agroforestry
- Controlled Traffic
- Prescribed Fire
- Nutrient Mngt
- IPM
- Residue Retention
- Mulching
- Composting
- Biochar
- Add perennials to rotation

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Practices on list have potential for incentive payments, sequester / reduce GHG, improve water quality, and increase profits

Benefits of Investing in Soil Health

↑ insulative cover
↓ evaporation

↑ infiltration
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↓ **water pollution**

Bold items are prospects for ecosystem market incentives

Summary

- ✓We have an enormous opportunity to scale adoption of soil health systems on over 400 million acres of cropland in the United States
- ✓Increasing adoption of cover crops and no-till will require additional investment
- ✓Ecosystem markets can help to increase implementation beyond acreages incentivized via state and federal programs
- ✓Not all practices and programs fit every farm. Farmers should set realistic goals and then find a program that suits their needs.

For More Info:
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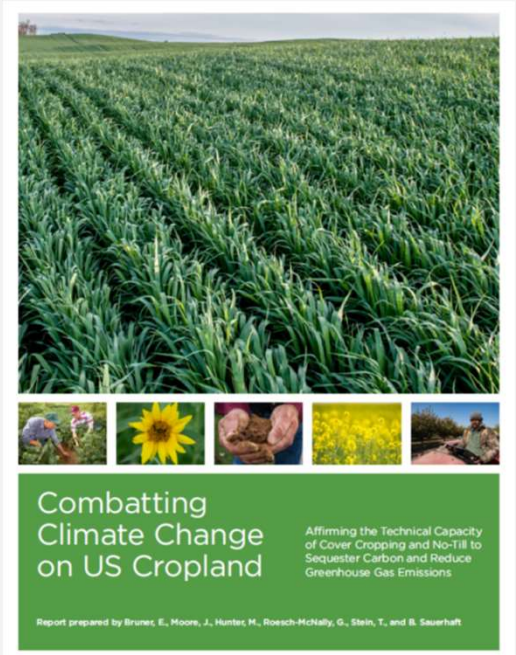
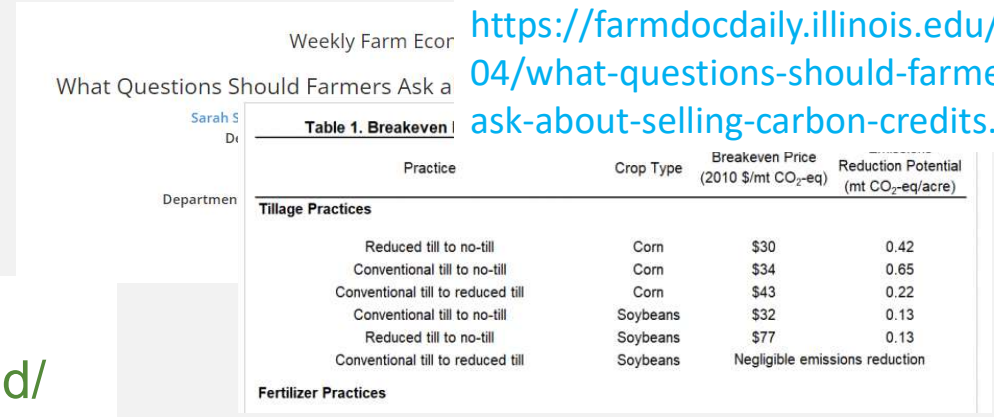
Resources to help you…



https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/

https://ilsustainableag.org/ecomarkets/

https://farmland.org/project/farms-under-threat/


Weekly Farm Ecor

What Questions Should Farmers Ask a

Table 1. Breakeven

Practice	Crop Type	Breakeven Price (2010 $/mt CO_2-eq)	Reduction Potential (mt CO_2-eq/acre)
Tillage Practices			
Reduced till to no-till	Corn	$30	0.42
Conventional till to no-till	Corn	$34	0.65
Conventional till to reduced till	Corn	$43	0.22
Conventional till to no-till	Soybeans	$32	0.13
Reduced till to no-till	Soybeans	$77	0.13
Conventional till to reduced till	Soybeans	Negligible emissions reduction	
Fertilizer Practices			

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

Thank you!

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American Farmland Trust
SAVING THE LAND THAT SUSTAINS US

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