

Implementing Conservation Practices that Increase Carbon Sequestration and Reduce GHG Emission

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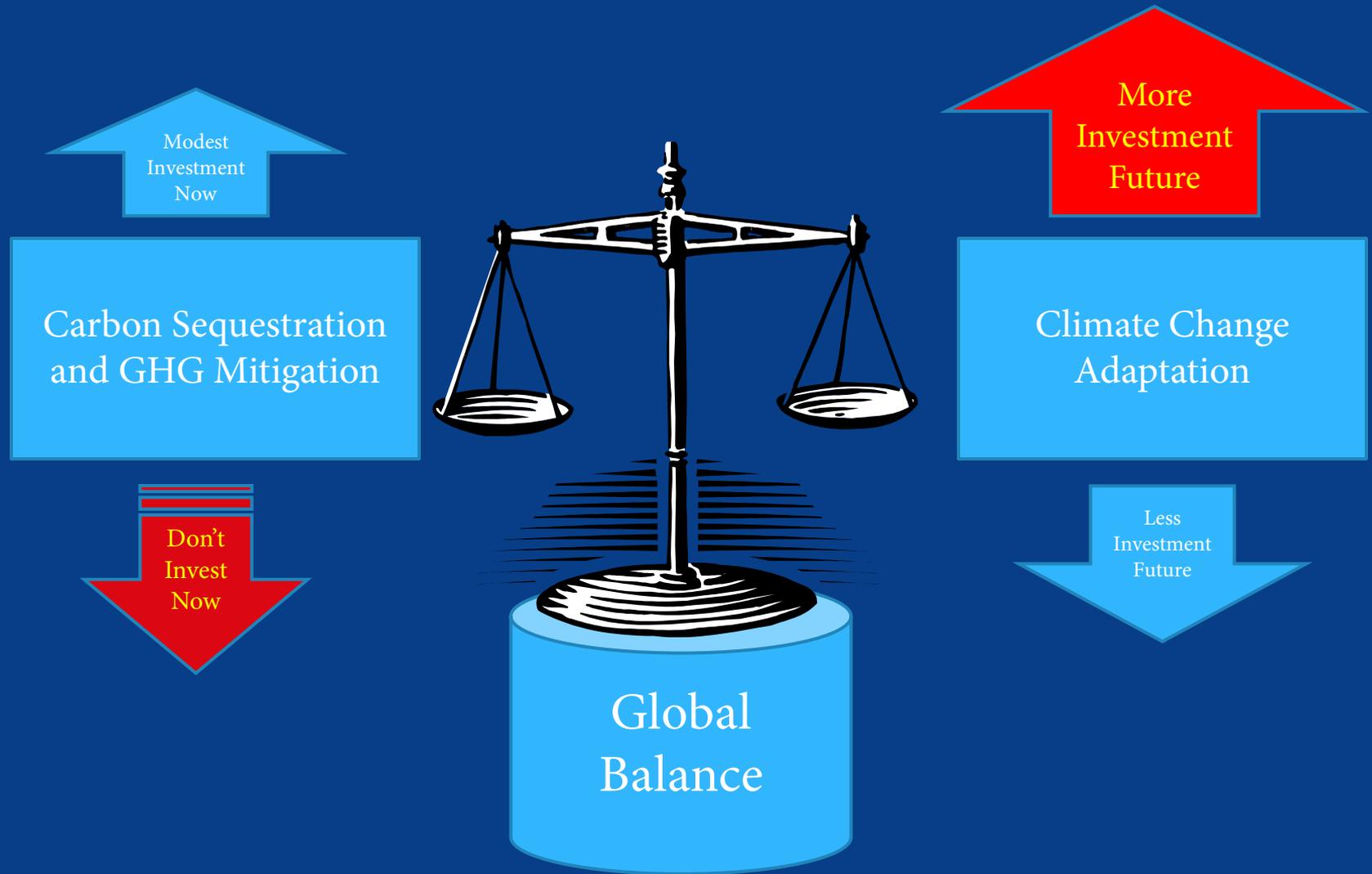
Summary

- Conservation Practices can increase resilience to extreme weather events and climate variability on agricultural lands
- Conservation Practices can reduce GHG emissions and increase carbon sequestration on agricultural lands
- USDA is developing quantitative tools to put numbers with what we know in our heart is 'good conservation'
- Quantification of conservation benefits can enable producers to voluntarily implement conservation and have these benefits recognized as Ecosystem Services – option of participating in Environmental Markets

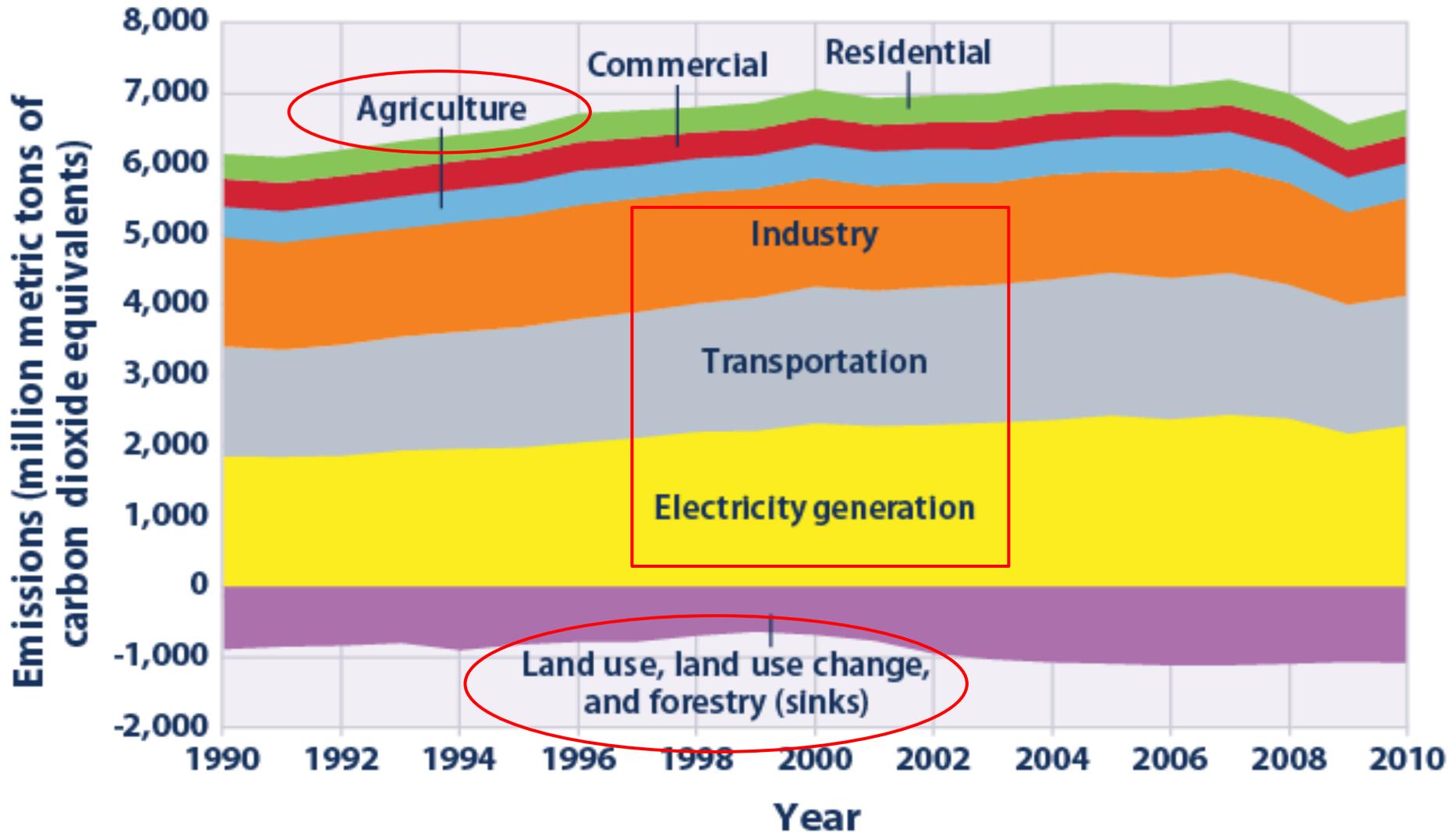


Setting the Context

Agriculture and Forestry – 2 x Exposed



U.S. Greenhouse Gas Emissions and Sinks by Economic Sector, 1990–2010

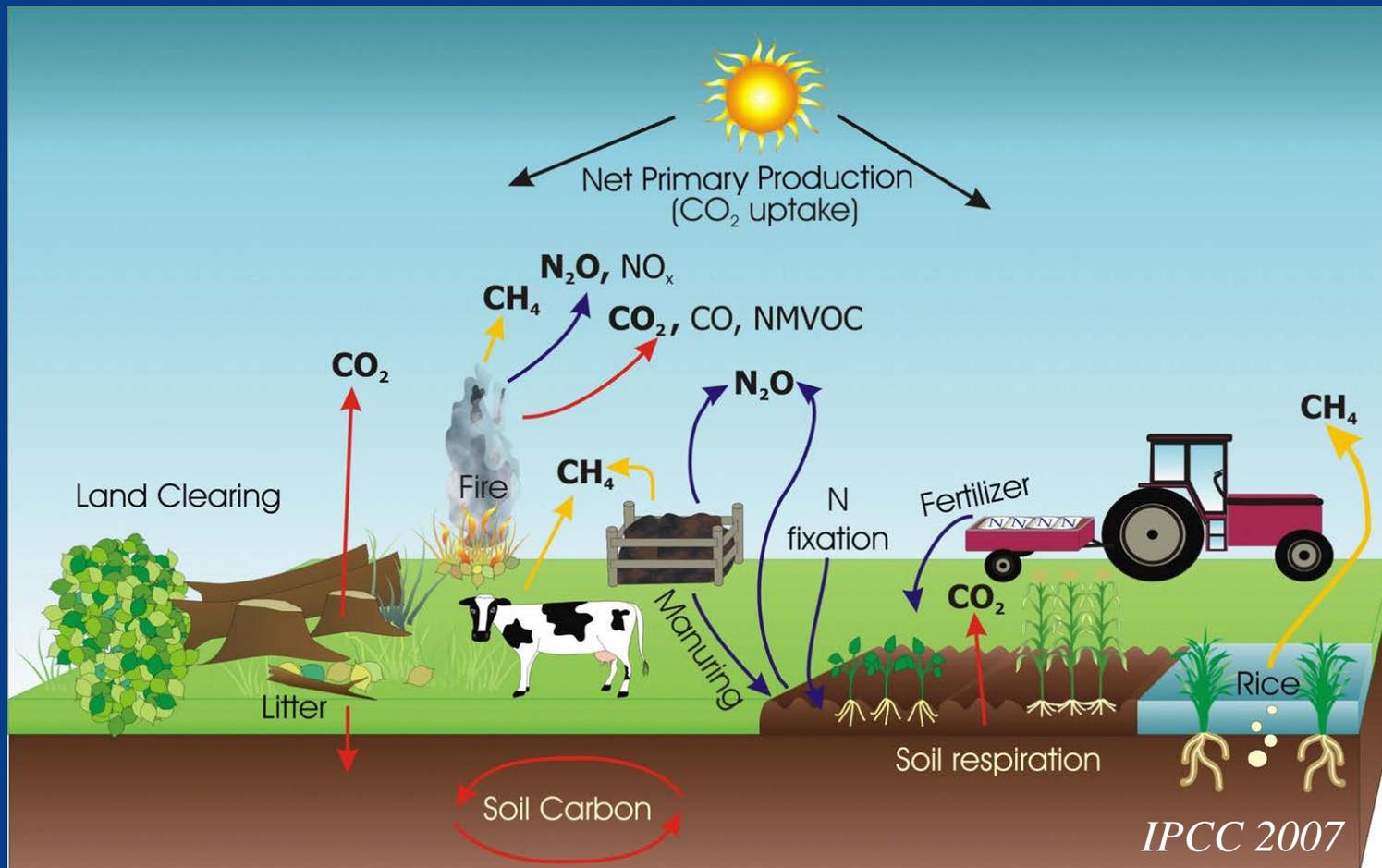


Data source: U.S. EPA (U.S. Environmental Protection Agency). 2012. Inventory of U.S. greenhouse gas emissions and sinks: 1990–2010. USEPA #EPA 430-R-12-001. www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climatechange/indicators.

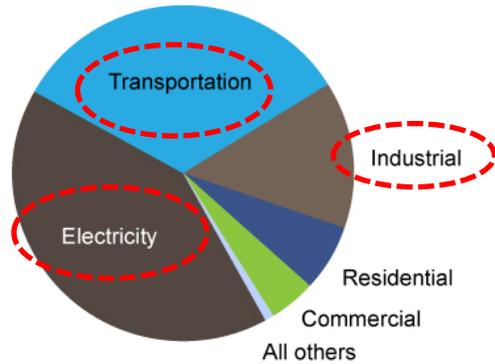
U.S. Agriculture and the Atmosphere: Three Main Greenhouse Gases(GHG) and Numerous Diffuse Sources and Sinks

- Carbon dioxide (CO_2)
- Nitrous oxide (N_2O)
- Methane (CH_4)

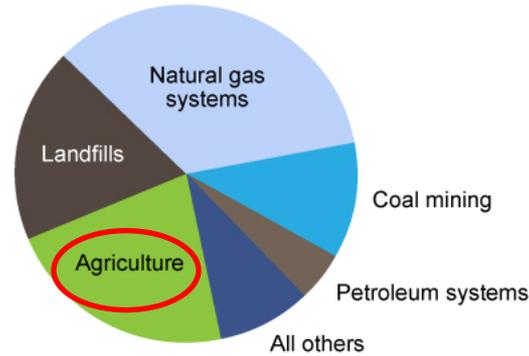


U.S. Ag. Sources by Greenhouse Gas

Carbon Dioxide (CO₂) Emission by Sector



Methane (CH₄) Emission by Sector



Nitrous Oxide (N₂O) Emission by Sector

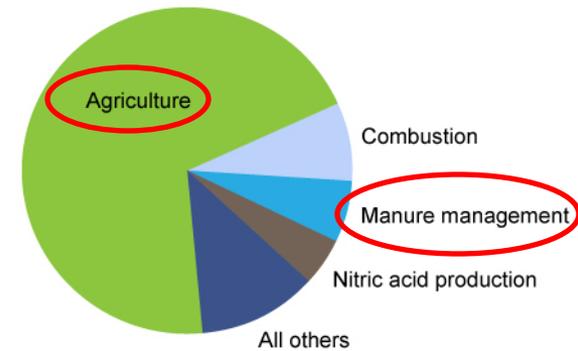


Figure ES-8: 2011 Sources of CH₄ Emissions

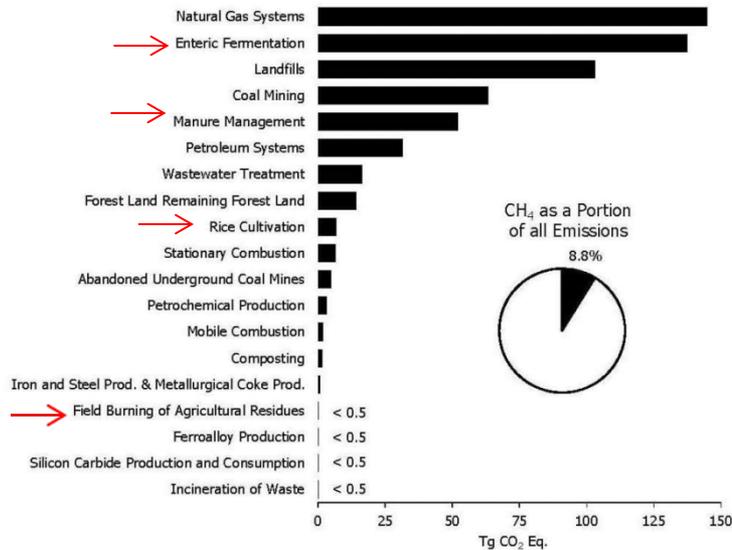
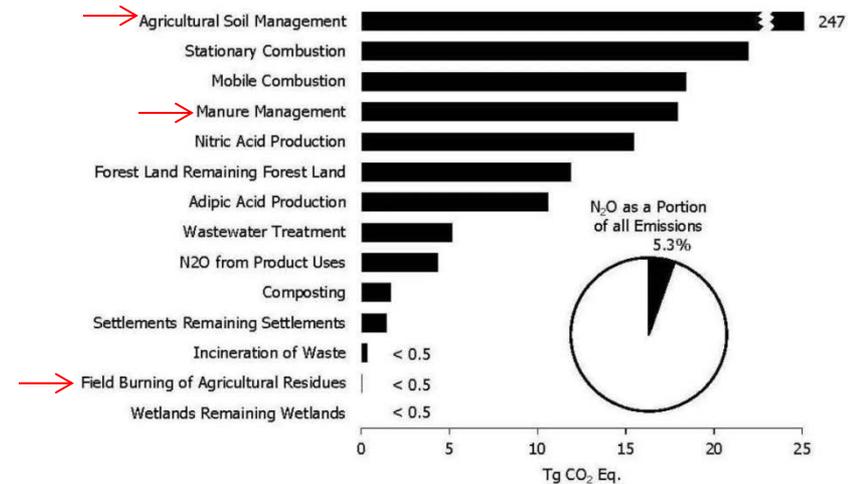
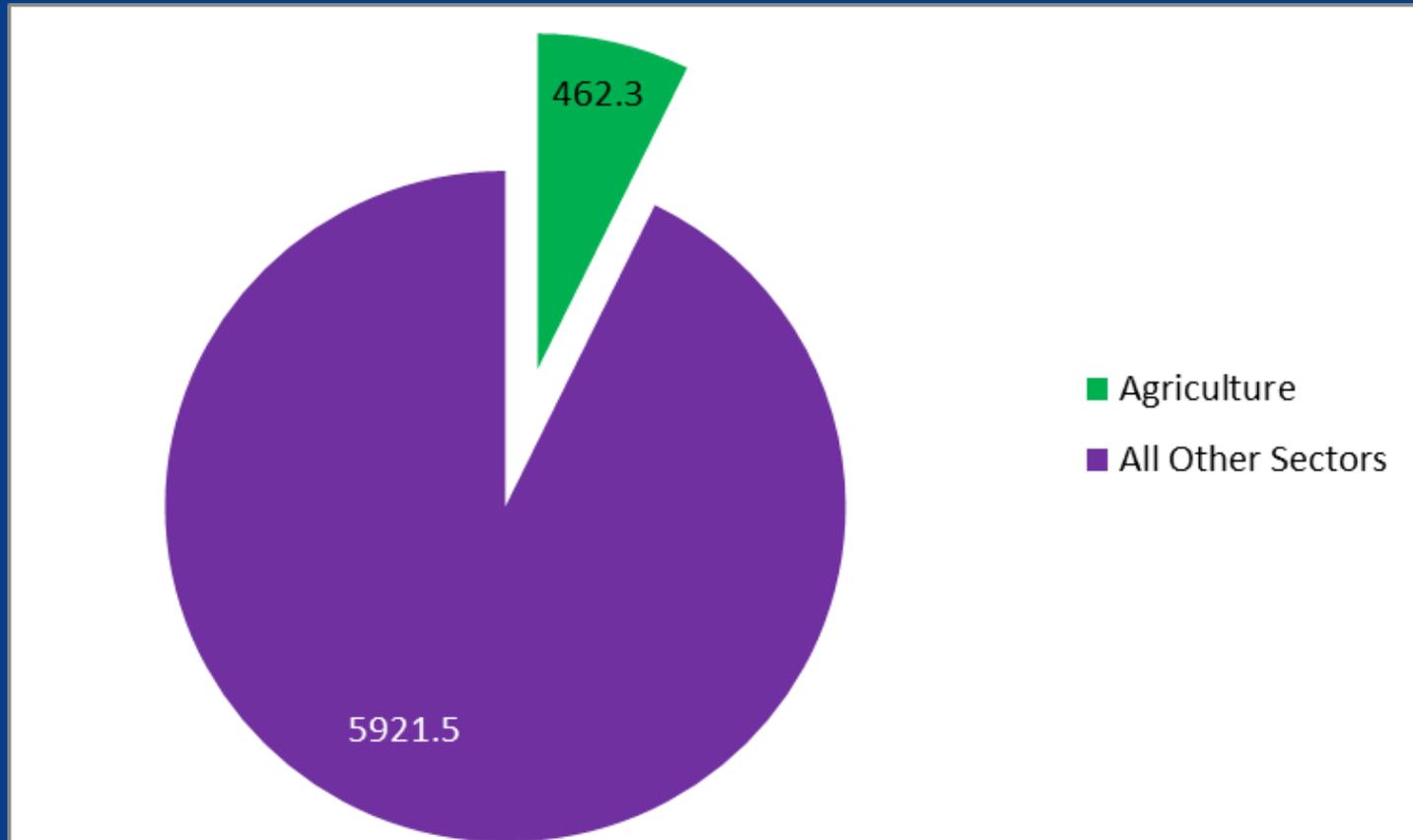


Figure ES-9: 2011 Sources of N₂O Emissions



U.S. Agriculture Sector is a Small Percentage (7.81%) of the U.S. GHG Emissions Inventory



A small percentage of a large emissions number...

$$7.81\% \text{ of } 5,921.5 \text{ Tg} = \mathbf{462.3 \text{ Tg}^*}$$

Note: As US fossil fuel emissions decline, ag. could become larger percentage of U.S. emissions.

*EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2010, (incl. sinks)

1	China	10,385.54
2	United States	6,866.92
3	European Union (27)	4,918.07
4	European Union (15)	4,024.09
5	India	2,326.19
6	Russian Federation	2,326.10
7	Japan	1,298.89
8	Brazil	1,162.62
9	Germany	926.67
10	Indonesia	823.41
11	Iran	727
12	Canada	726.63
13	Mexico	688.25
14	Korea, Rep. (South)	678.32
15	United Kingdom	627.46
16	Australia	587.53
17	South Africa	559.65
18	France	545.19
19	Saudi Arabia	542.1
20	Italy	514.62
21	Spain	407.97
22	Ukraine	390.35
23	Turkey	385.77
24	Thailand	381.94
25	Poland	377.3



Conservation Opportunity:
 Produce more food, fiber and fuel - sequester carbon and reduce emissions through working lands conservation

The U.S. Ag. Sector - 462.3**

California - 449.6 (7% ag)



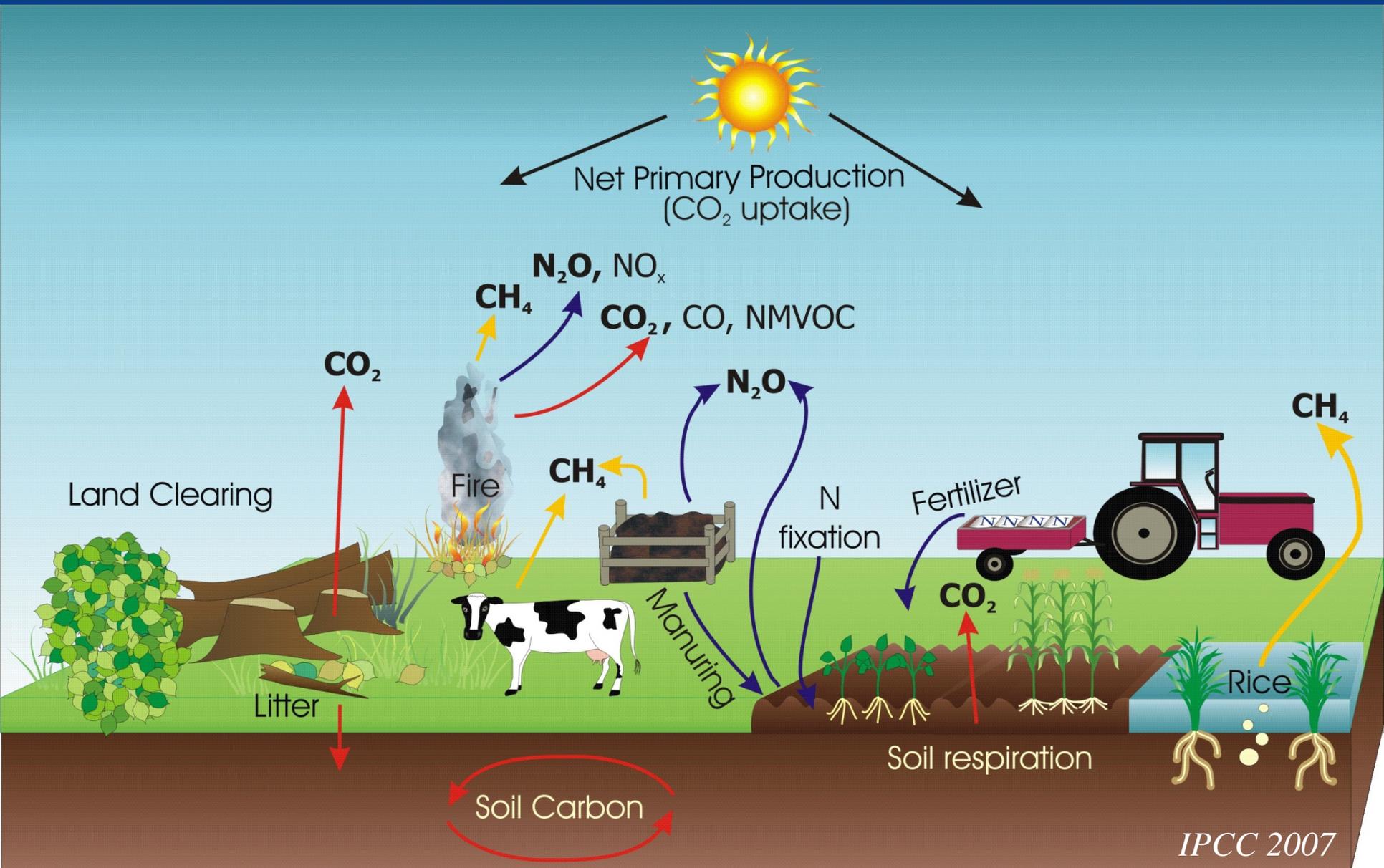
**Based on the World Resources Institute, Climate Data Explorer, 2010 data on a GDP basis the U.S. Ag Sector would rank 28th according to World Bank 2007 GDP statistics
 ***In 2010 California's economy was 9th largest in the world

How does the sector capitalize on a conservation business opportunities?

Where does the funding come from?

How do we quantify the benefits?

Agricultural GHG sources and sinks – Conservation Opportunity

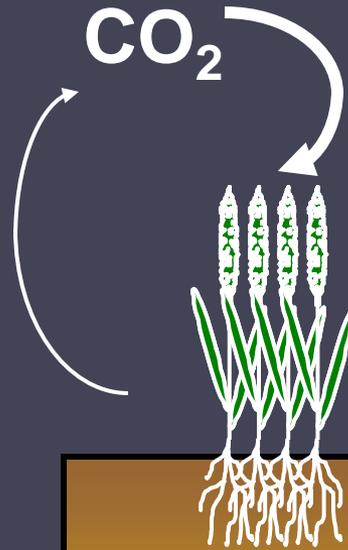


Improved Agricultural Practices – Reduce and Sequester (and Adapt)

Conservation buffers



Conservation tillage



**Soil organic
matter**

Cover crops



Improved rotations



Avoided Grassland
Conversion



Leverage Conservation Partnerships and Market Ecosystem Services

Environmental Defense Fund CIG Projects

Water and Residue Management

Methane and Nitrous Oxide Emission Reductions

Quantification and Aggregation

SALE

California's Regulatory Market (AB32)

\$\$\$ Return to Producer for Avoided Emissions



One of the Eligible Practices in CA: Dry Seeding

Em. Market (Q1/Q2 2011)



Ducks Unlimited and The Climate Trust CIG Projects



Preserving Grasslands And Not Tilling – grazing and haying permitted



\$\$\$ Return to Producer for Avoided Grassland Conversion

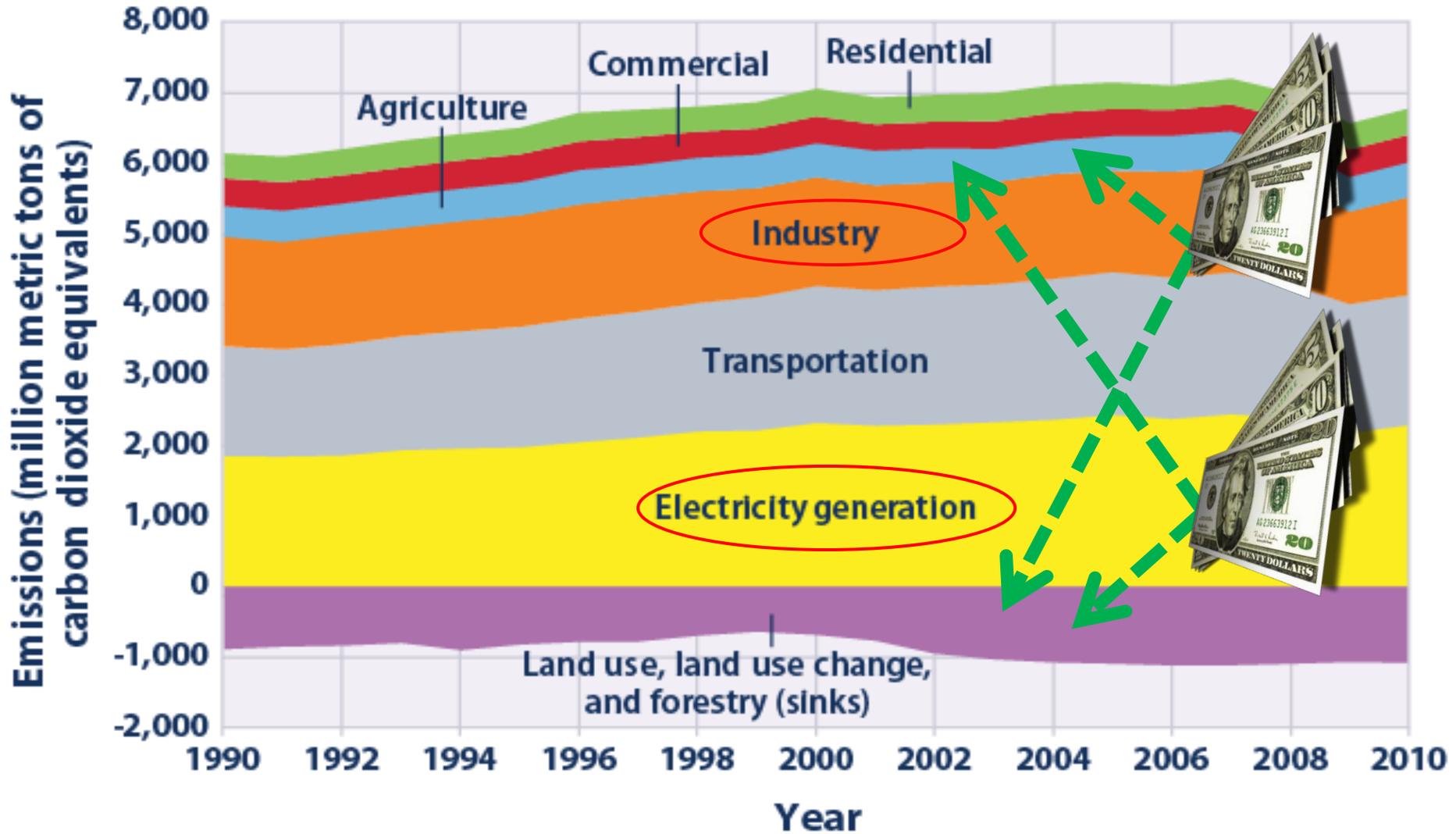
Aggregation



SALE

Major US Automobile Manufacturer

U.S. Greenhouse Gas Emissions and Sinks by Economic Sector, 1990–2010



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U.S. Ag. Sources of Greenhouse Gas Emissions

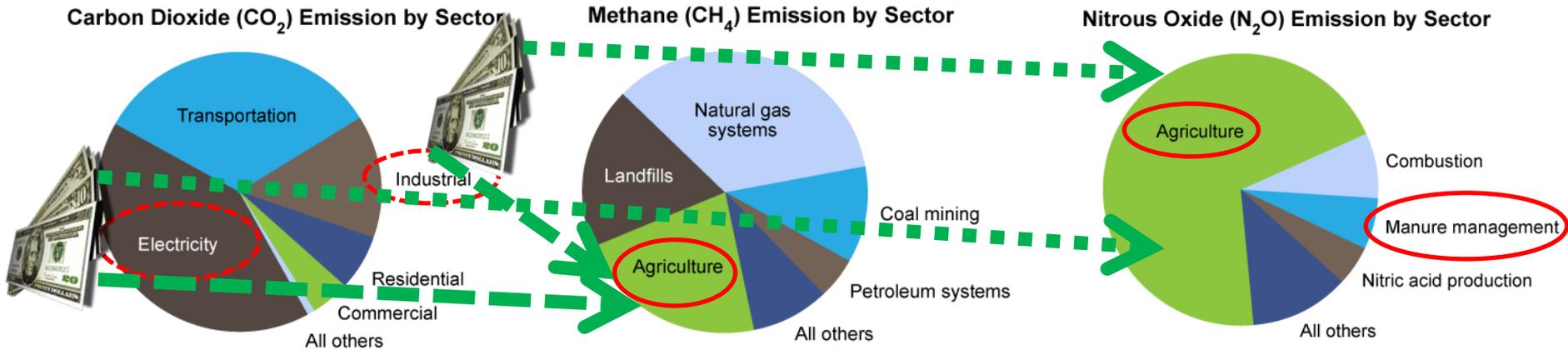
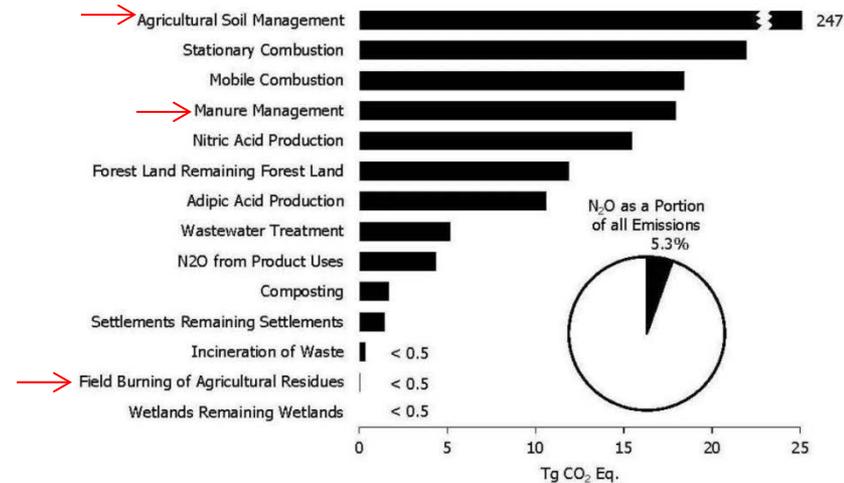
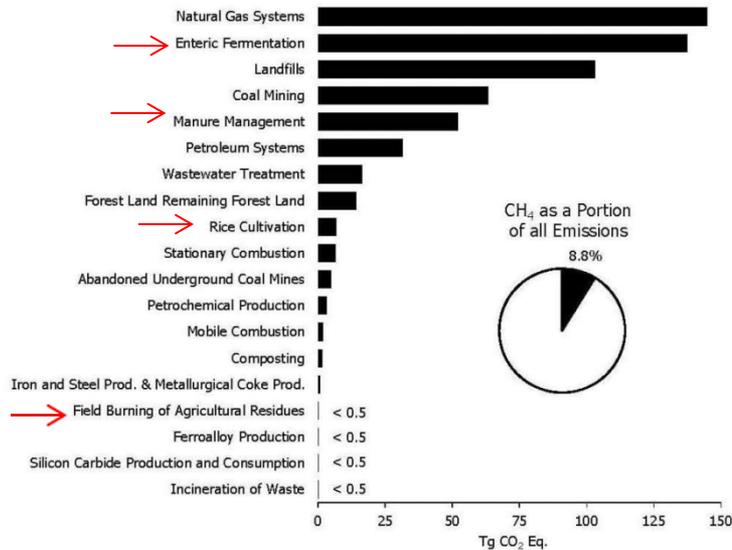


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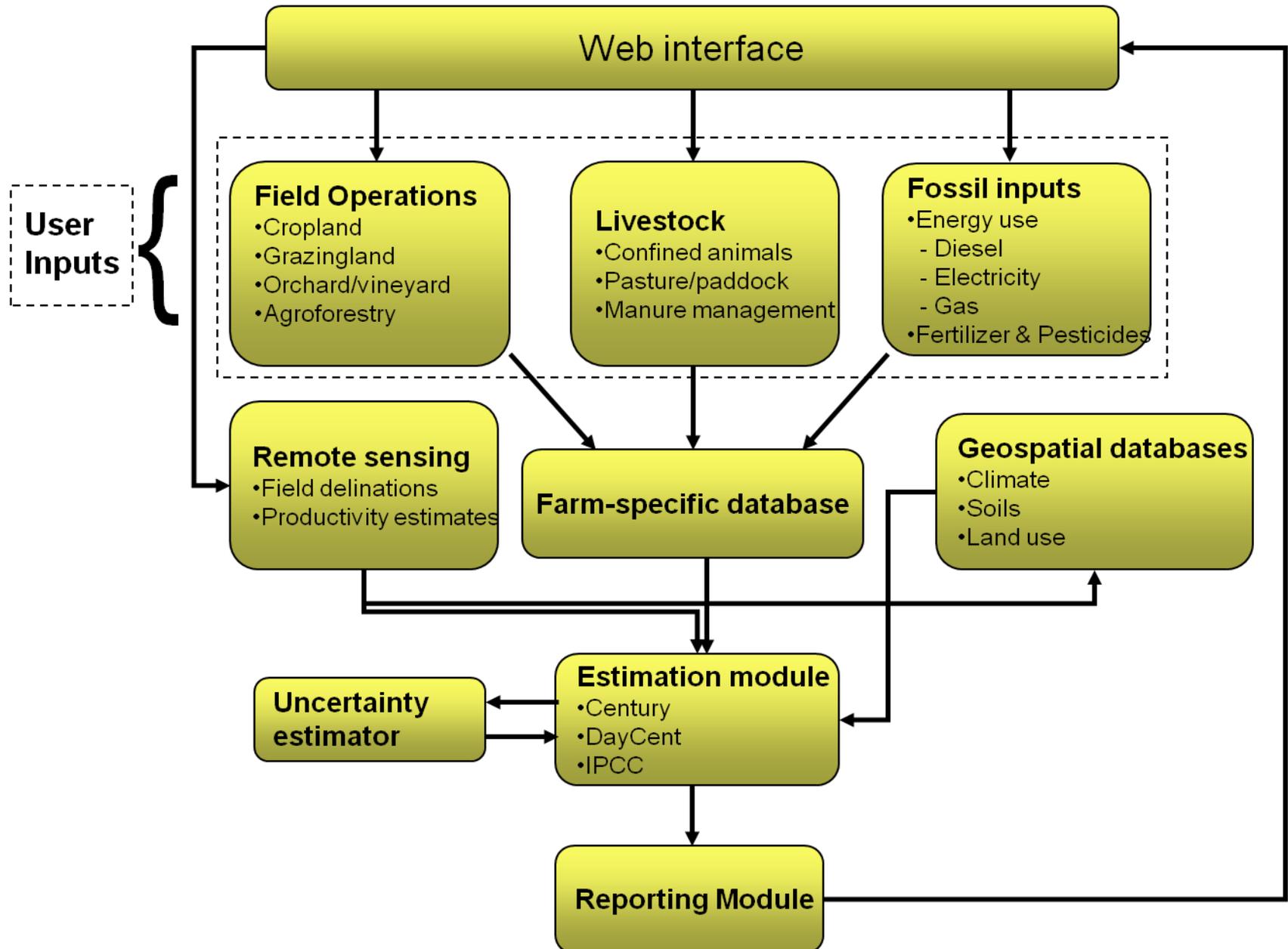


In order for the markets to function we need:

- **Market Confidence (or mandate) – credits must be real**
 - **Third-party Verification**
 - **Pilot projects to cut the pathway**
- **Buyers and Sellers**
- **Transparent Quantification Techniques**
 - **Ag credits provide co-benefits and ancillary benefits**

COMET-Farm Quantification Tool

www.comet-farm.com



COMET-Farm Utilize NRCS Data Sources like the Soil Survey Data

Parcel Locations - COMET-FARM +

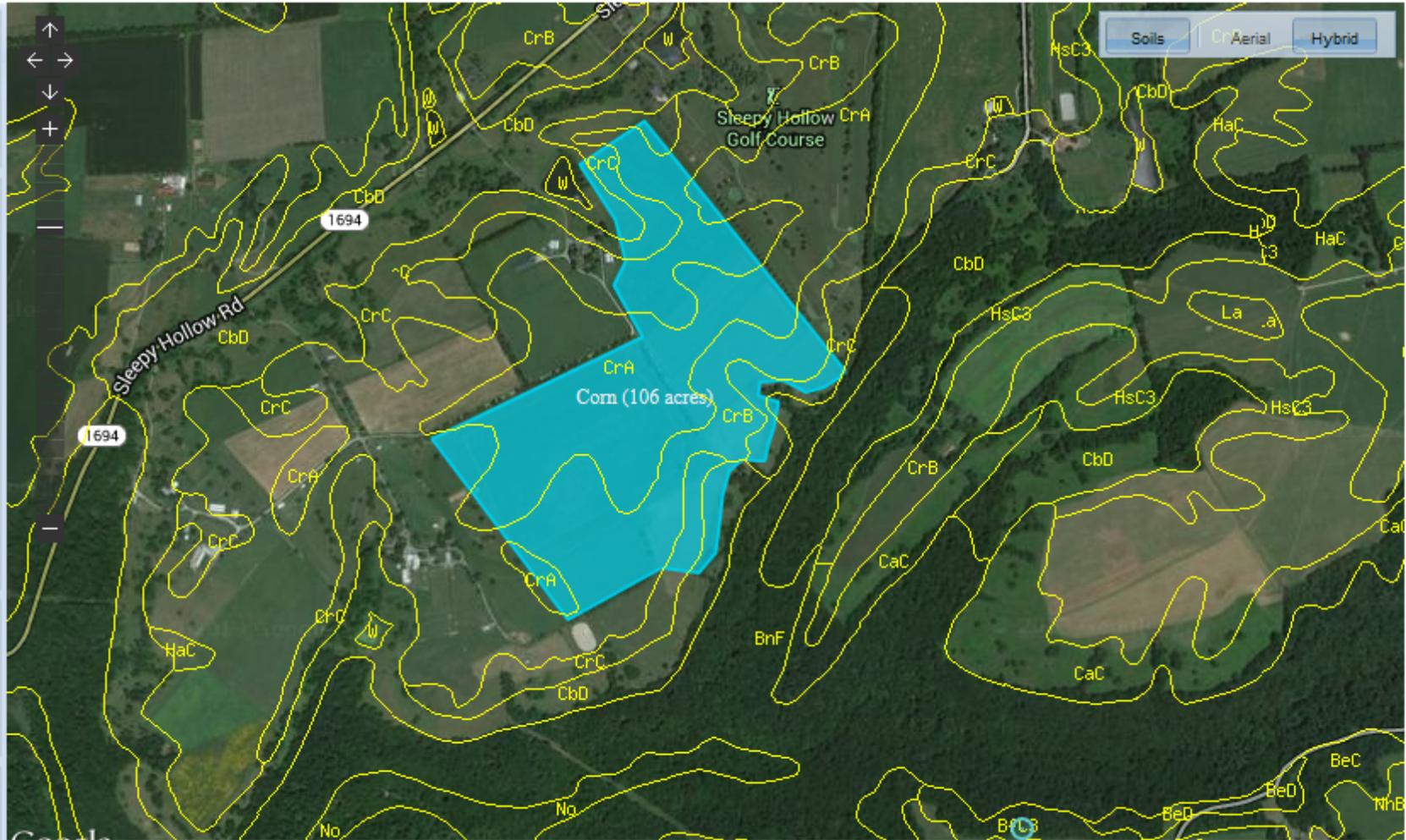
https://cometfarm.nrel.colostate.edu/FieldLocation#

Parcel Locations → Historic Management (Pre-2000) → Current Management (2000-Present) → Future Management (Scenarios for 10 year period)

Zoom to your parcels, then use one of the 'Add Parcel' buttons to define each parcel location. Each parcel must have a unique management history. When finished, click the button to the right.

I am done defining parcels >>

- Navigation
 - Pan / Zoom
 - Find Location
- Parcel Management
 - Add Parcel by point
 - Add Parcel by polygon
 - Modify Parcel
 - Delete Parcel
 - Delete All Parcels
 - ESRI Shape File Upload
- Soil Info
 - View Soil by Click
 - Export Soil Information
- Help
 - What is Parcel by point?



Report a map error

COMET-Farm is supported by:

- US GHG Inventory Methods,
- Peer-Reviewed Publications, and
- Science-Based Methods document developed by USDA's Climate Change Program Office (pending)

Public Review
Draft

Contract No.
GS-23F-8182H

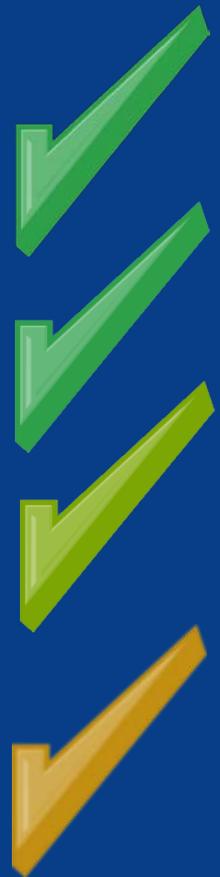
August 2013

Science-Based Methods for Entity-Scale Quantification of Greenhouse Gas Sources and Sinks from Agriculture and Forestry Practices



Summary

- Conservation Practices can increase resilience to extreme weather events and climate variability on agricultural lands
- Conservation Practices can reduce GHG emissions and increase carbon sequestration on agricultural lands
- USDA is developing quantitative tools to put numbers with what we know in our heart is 'good conservation'
- Enable producers to voluntarily implement conservation and have these benefits recognized as Ecosystem Services – option of participating in Environmental Markets



*Planning today...
for a better tomorrow.*

Extra Slide – COMET-Farm Baseline and Emission
Reduction Explanatory Slide

COMET-Farm can be found at www.comet-farm.com

Understanding COMET-Farm (Inventories) and Carbon Trading

