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# **The “Green” Gold Rush: Opportunities and Risks of Carbon Markets for Washington Dairies, Digesters and Beyond**

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Georgine Yorgey, Center for Sustaining Ag & Natural Resources, WSU

Shannon Neibergs, School of Economic Sciences, WSU

Marcos Marcondes, Dept of Animal Sciences, WSU

Hernan Tejeda, Ag Economics, UI

Nina Gibson, masters student, WSU

# Thanks to

- Jay Gordon
- Njoe Nyoni
- Alicia McCarthy
- Katie Doonan & Heleene Tambet
- Our space and food hosts

Our funders:



**WESTERN  
EXTENSION  
RISK  
MANAGEMENT  
EDUCATION**



**National Institute of Food and Agriculture**  
U.S. DEPARTMENT OF AGRICULTURE



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# AM Agenda

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**10:10-10:30 Overview of Opportunities for Dairies to Mitigate Greenhouse Gas Emissions** *Georgine Yorgey, Center for Sustaining Agriculture and Natural Resources, Washington State University*

**10:30 - 12:00 PANEL with Q & A: Perspectives on Diverse Carbon Markets**  
*Georgine Yorgey, moderator*

**Current Carbon Market Offset Opportunities For Washington Dairies,** *John Thornton, Clean Future*

**Cooperative Perspective,** *Tammy Edmonds, Darigold*

**Carbon Market Economics and Risks,** *Shannon Neibergs, Economic Sciences, WSU and Hernan Tejeda, Ag Economics, U Idaho*

**12:00 - 12:45 LUNCH**



# PM Agenda

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**12:45 - 1:15 Environmental Stewardship: A Dairy Perspective**

*Njoe Nyoni, Dairy Farmers of Washington*

**1:15 - 1:45 PANEL with Q & A: Beyond Carbon Markets: Grants, Cost-Share, and Other Support**

**Sustainable Farms and Fields Opportunities, Karen Hills, WA State Conservation Commission**

**WSDA Resources, Nina Gibson, WSDA**

**NRCS Cost Share Opportunities**

**1:45 - 2:30 Considerations for On-Farm and Off-Farm Dairy Digesters**

*Embrey Bronstad, Brown & Caldwell*





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# Overview of Carbon Markets



Georgine Yorgey  
Center for Sustaining Agriculture & Natural Resources  
Washington State University  
yorgey@wsu.edu  
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# Pressures that Have Led to Carbon Markets



Image credits (clockwise from upper L: Girl Guides of Canada, USDA, State of WA, State of CA, San Jose Public Library, conceptphoto.info.



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# Introduction: Major Types of Carbon Markets



# Major Types of Carbon Markets



Clean Fuels Programs (WA, OR, CA)    Regulatory Markets (e.g. CA and WA)



Offset Markets



Supply Chain / Inset Markets

**Federal Renewable Fuel Standard**

**Other Grant and Cost-Share Programs (e.g. Sustainable Farms and Fields)**





# Is there opportunity?

Climate-related considerations:

- What climate related emissions are occurring currently, that can be realistically and economically reduced?
- What opportunities are there to generate renewable energy or build soil carbon?

# Is there opportunity?

Economic/legal considerations:

- Are the economic opportunities that will cover some or all of the costs of a new practice that is desirable for the operation?
- Do they generate any revenue in *addition* to covering costs?
- Are there other incentives beyond carbon markets that might also help cover costs?
- What am I committing to contractually, and for how long?



# Is there opportunity?

Operational considerations:

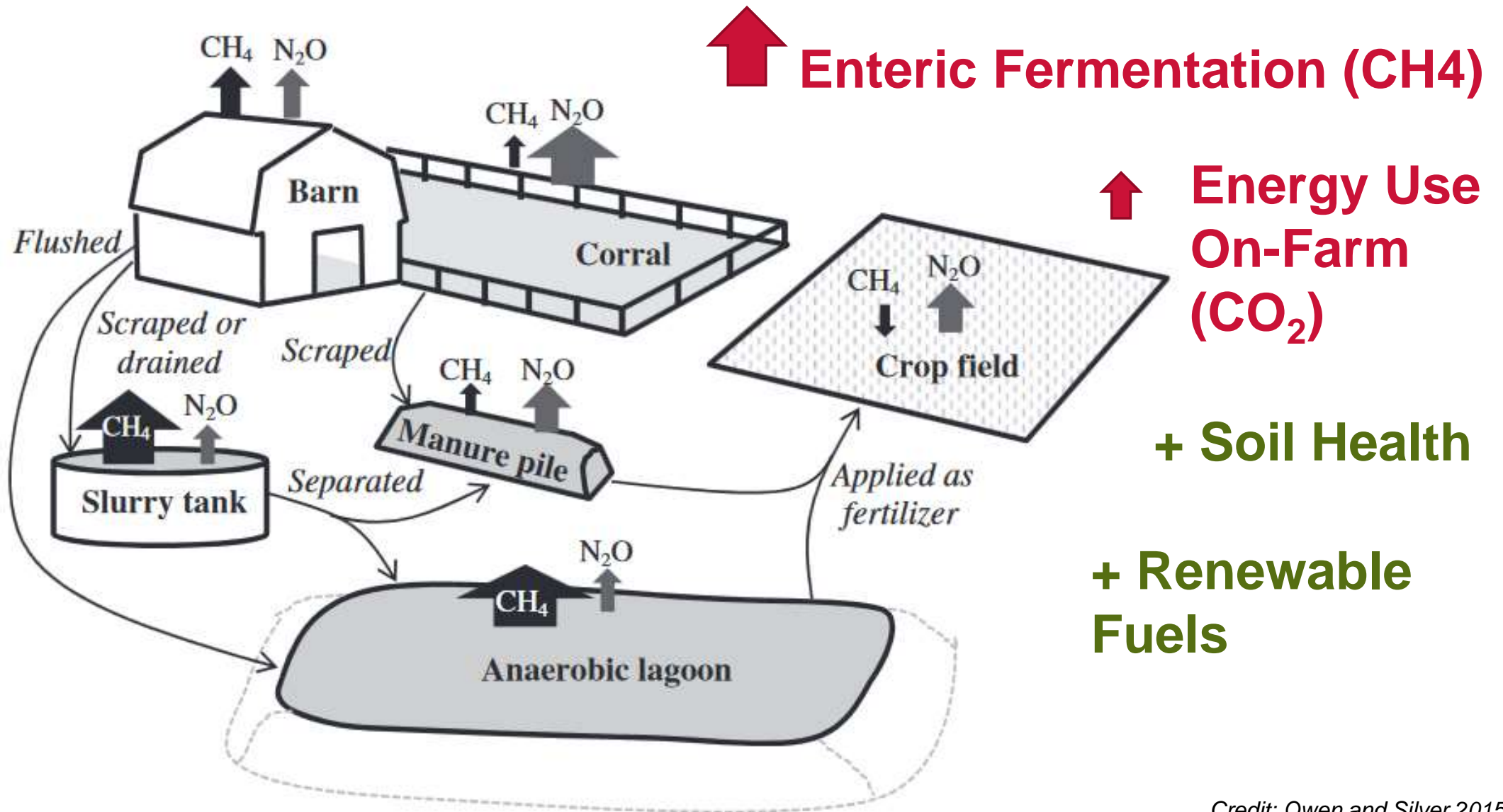
- How does this fit in with my larger business plan?
- What other co-benefits might this new practice provide to my operation?
- Are there any potential negative/unintended consequences?
- What new risks does it create? Can those risks be managed?

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# Greenhouse Gas Emissions on Dairies



# Greenhouse Gases on Dairies



# Estimated Current Emissions

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%

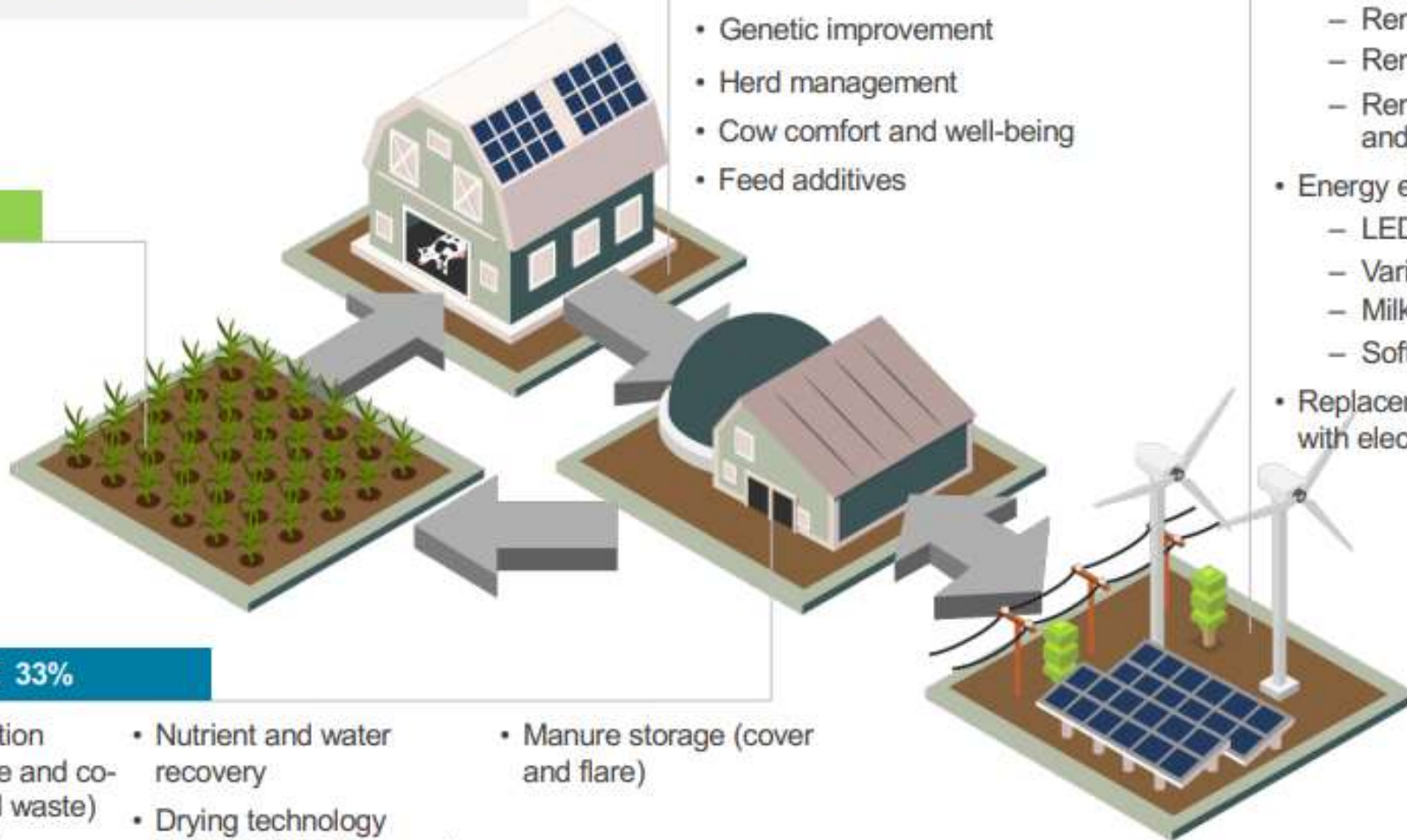
- Anaerobic digestion (includes manure and co-digestion of food waste)
- Renewable fertilizers
- Nutrient and water recovery
- Drying technology (elimination of lagoons)
- Manure storage (cover and flare)

## 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



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# **3 Possible Carbon Market Scenarios – and some carbon market concepts**



# A Few Comments



- These markets are still in development!
- Different markets have need for different types of measurement and verification
- High quality markets generally have protocols to ensure that carbon offsets are:
  - Additional
  - Not Overestimated
  - Permanent
  - Not claimed by another entity
  - Not associated with significant social or environmental harms



Scenario 1:  
Reducing Methane  
Emissions from  
Manure  
Management





Scenario 2: Reducing  
Methane Emissions &  
Producing Bioenergy

# Scenario 3: Building Soil Carbon



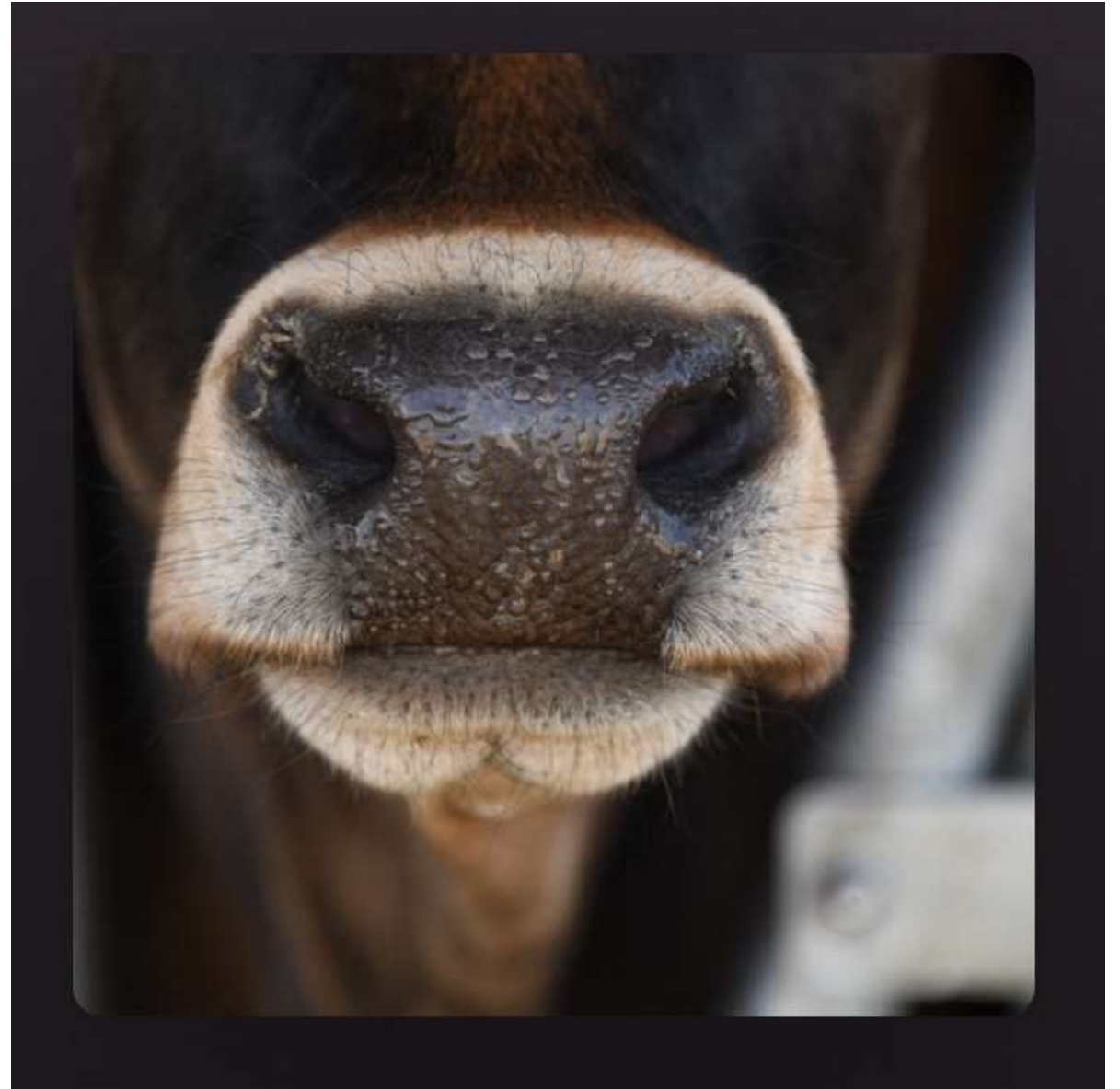


# **Some Additional Resources (beyond the rest of today!)**



# Workshop Resources and Carbon and Cow\$ Podcast

[https://csanr.wsu.edu/  
program-areas/climate-  
friendly-farming/carbon-  
and-cows-podcast/](https://csanr.wsu.edu/program-areas/climate-friendly-farming/carbon-and-cows-podcast/)



# WSU Anaerobic Digestion Systems Factsheet Series

<https://csanr.wsu.edu/publications-library/energy/anaerobic-digestion/> (Or see direct links on the Carbon and Cow\$ webpage)



# Resources

[farmlandinfo.org/publications/top-10-things-ag-carbon-markets](https://farmlandinfo.org/publications/top-10-things-ag-carbon-markets)



# TOP 10

**Things You Wanted to Know  
About Ag Carbon Markets**





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# Feel free to contact me!



Georgine Yorgey  
Center for Sustaining Agriculture & Natural Resources  
Washington State University  
yorgey@wsu.edu  
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