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Overview of Carbon Markets



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Why A Workshop on Carbon Markets?

CONSUMERS

67% base product choices on concerns for the environment or social well-being

62% have switched to comparable products/services that have a positive impact

INVESTORS

BlackRock



STATE STREET

Vanguard

Decarbonize portfolios

Increase investment in climate solutions

SUPPLY CHAIN



50% by 2030



Net zero by 2039

Avoid 1 gigaton of GHG emissions by 2030



Dairy Environmental Stewardship and Net Zero Initiative (NZI)

Vision

US dairy is an environmental solution

By 2050, US dairy collectively commits to:

- Achieve **greenhouse gas (GHG)** neutrality
- Optimize water use** while maximizing recycling
- Improve **water quality** by optimizing utilization of manure and nutrients



Slide adapted from Dairy Farmers of Washington





Major Types of Carbon Markets

Major Types of Carbon Markets



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

Federal Renewable Fuel Standard

Other Grant and Cost-Share Programs (e.g. EQIP)



Offset Markets



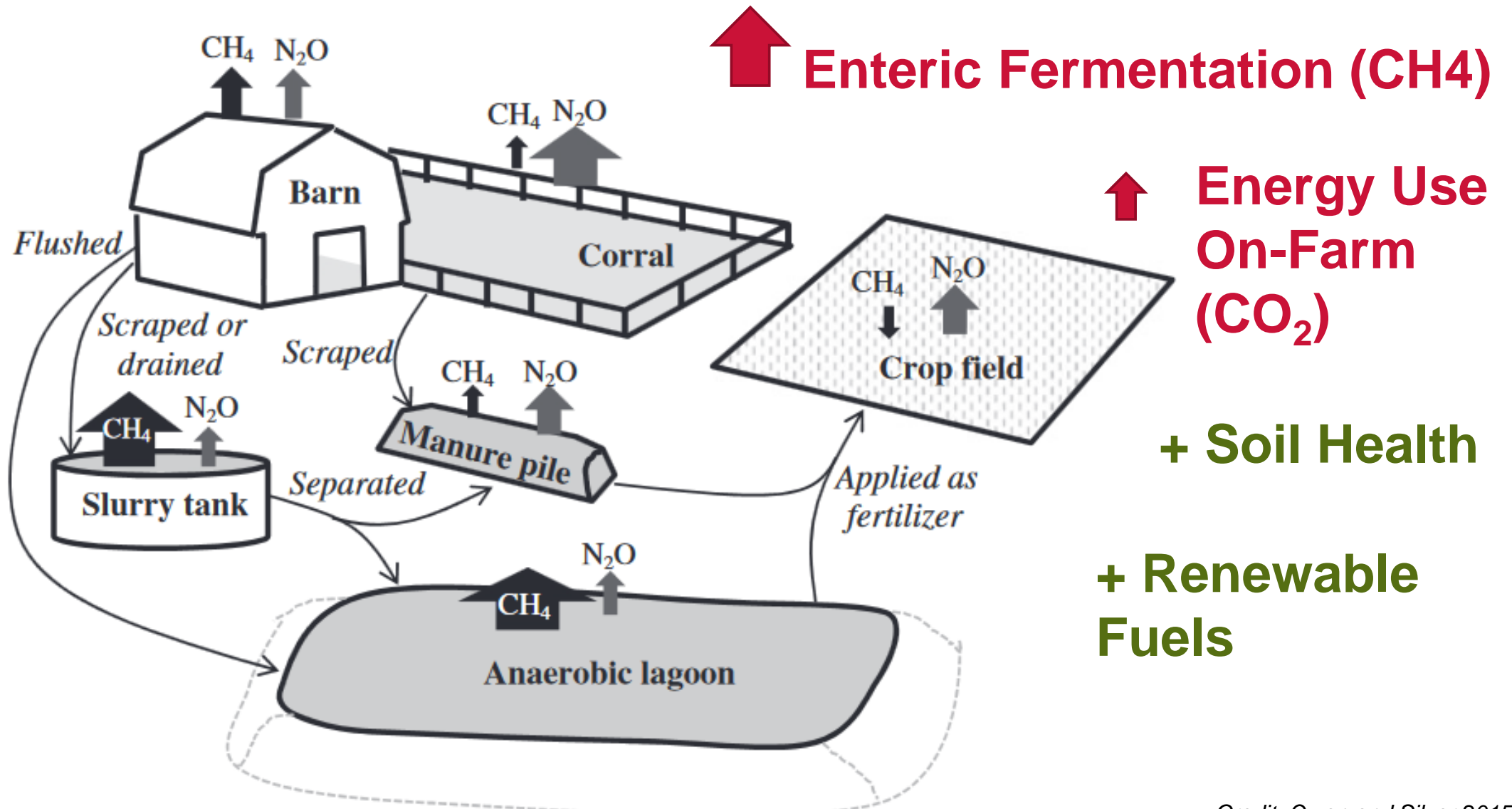
Supply Chain / Inset Markets





Greenhouse Gas Emissions (and Removals) 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%)**

ENTERIC METHANE 35%

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

ENERGY 6%

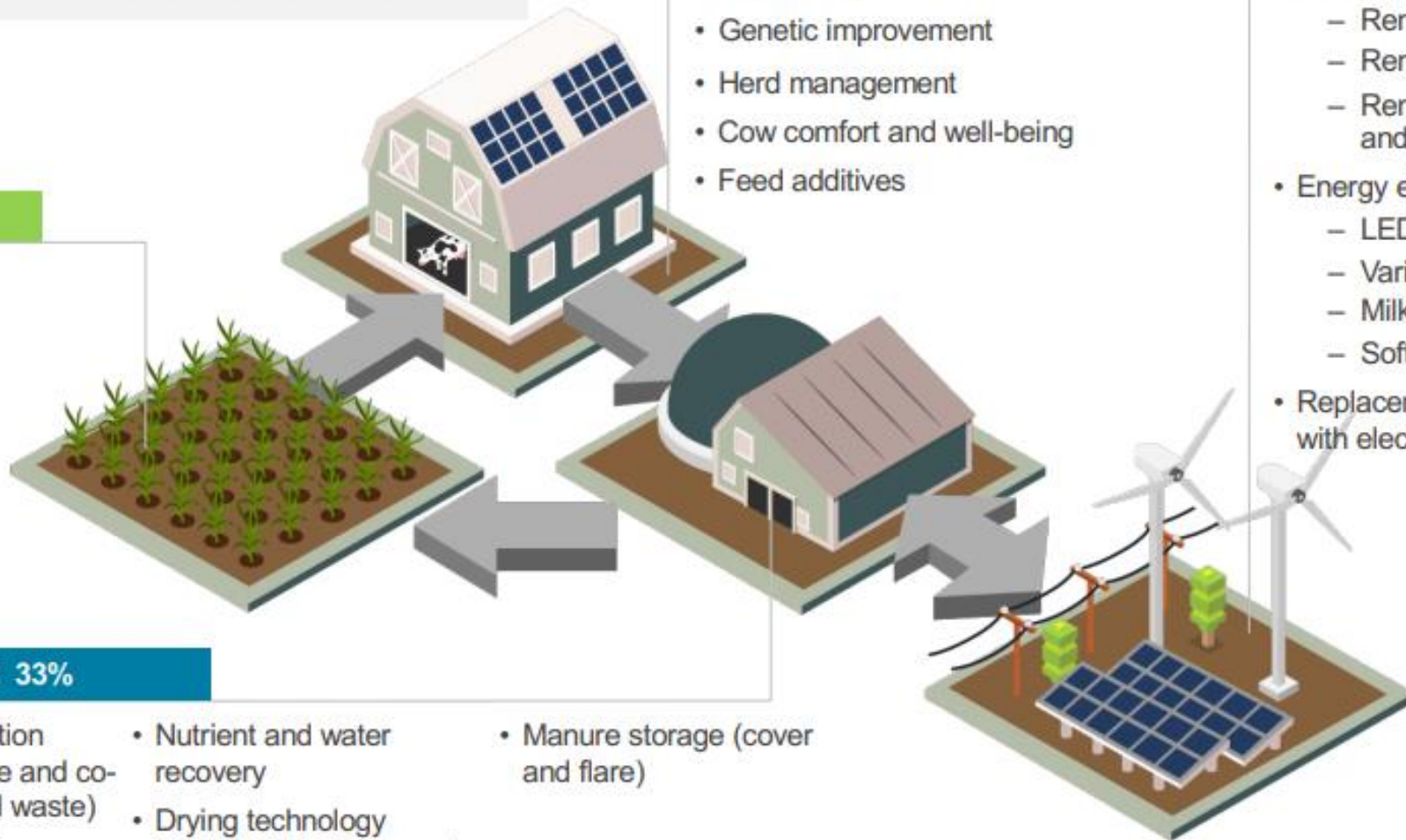
- Renewable energy:
 - Renewable electricity
 - Renewable natural gas
 - Renewable energy from wind and solar sources
- Energy efficiency:
 - LED lighting
 - Variable speed pumps
 - Milk pre-cooling technology
 - Soft start motors
- Replacement of fossil-fueled engines with electric motors

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)



A Few Additional 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





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