Macro U.S. Perspectives on Agricultural Anaerobic Digestion (AD) and Its Methane Reduction Potential

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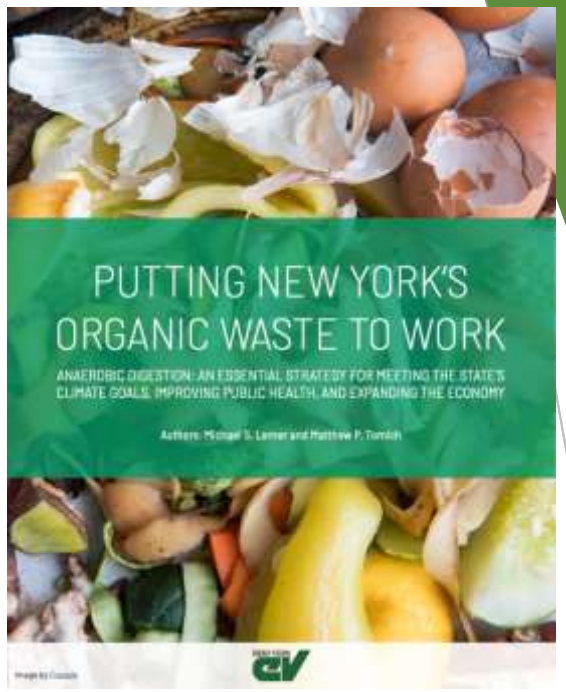
Energy Vision

Energy Vision – What We Do

- An independent NGO exploring environmental solutions: to advance low-carbon strategies viable today and essential for a sustainable future.

- Research technologies, policies, & market developments: publish reports, hold workshops, and educate the public through talks, op-eds, & media.



(Photo credits: Cover Slide: Generate Upcycle's Buffalo Digester (L); Alex Pope/Flickr (R); This slide: Energy Vision)

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The methane problem

A large and growing climate threat

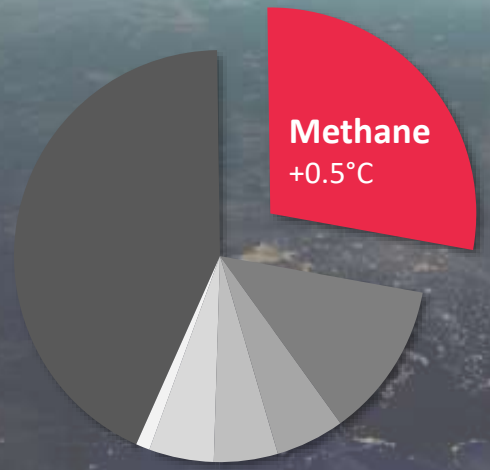
PAST

Amount of methane in atmosphere **2.6x** higher than preindustrial levels

Etheridge et al., 2002; NOAA ESRL

PRESENT

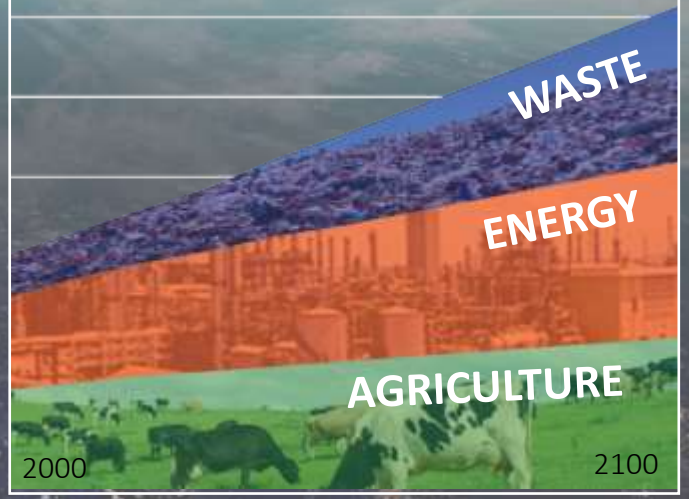
Human-emitted methane accounts for **30%** of today's warming



IPCC AR6 Fig SPM.2

FUTURE

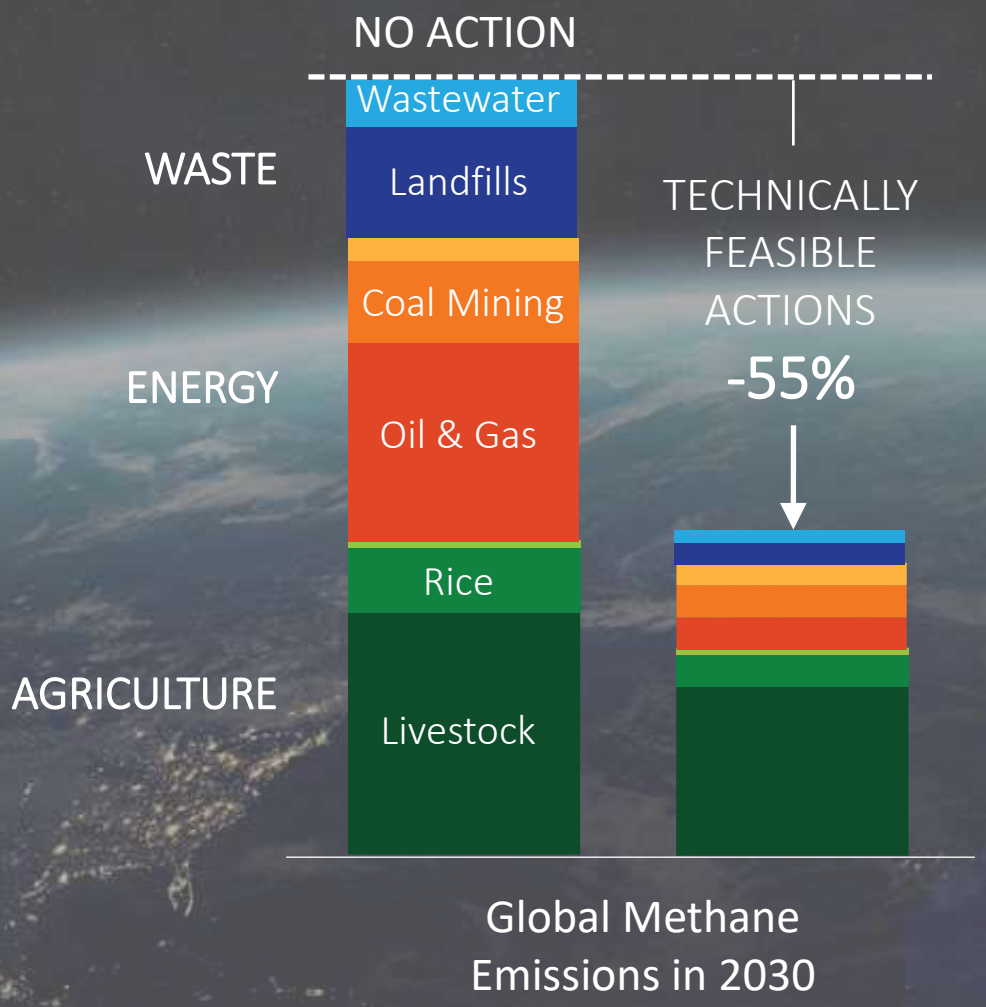
Methane could nearly **double** by end of century in absence of action



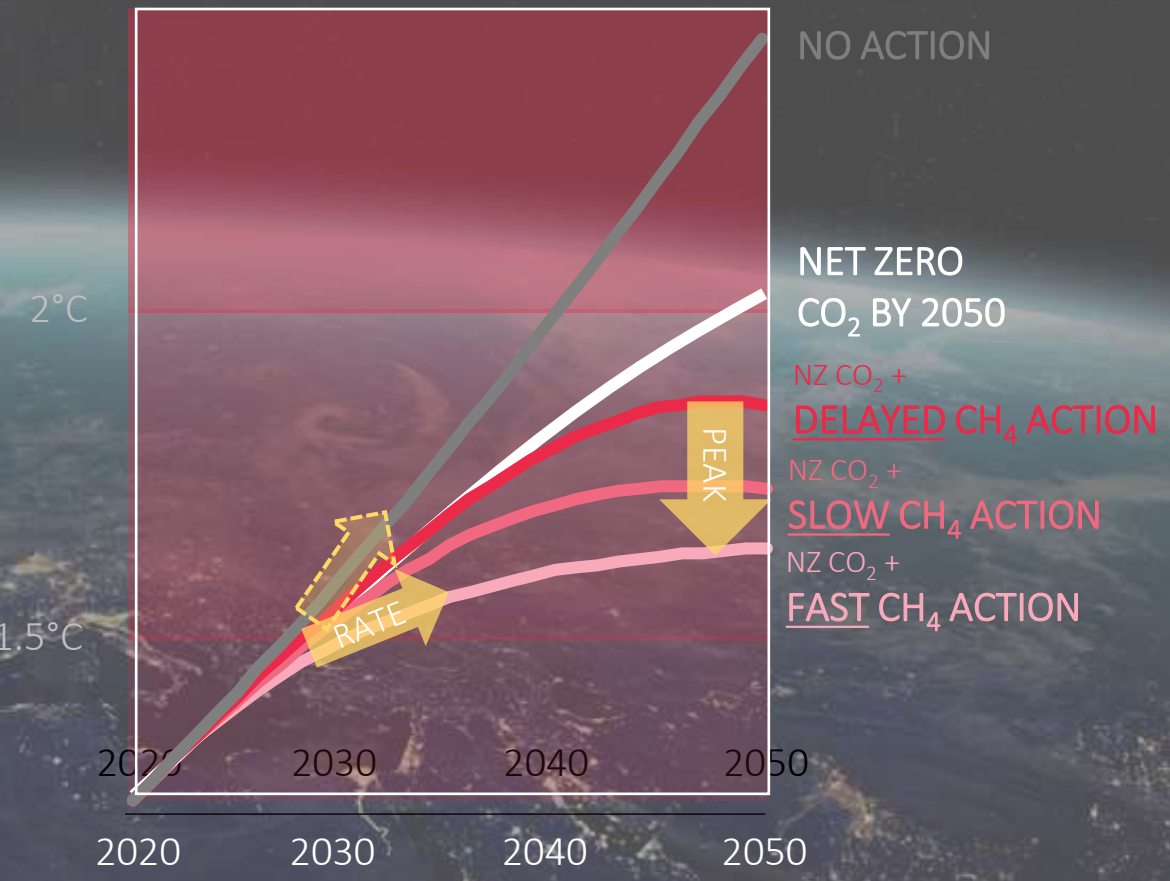
Ocko et al. 2021

The methane solutions

Serious but solvable



Global average temperature responses to different emissions pathways



Ocko et al. ERL 2021 & Sun et al. Sci. Reports 2021

The methane opportunity

Benefits beyond climate

The state of global methane action

Tremendous progress in recent years but more to be done

1. Mobilizing global awareness and support
2. Determining plans and pathways for mitigation
3. Implementing measures and ratcheting ambition

3 Implementing measures and ratcheting ambition

Ingredients to implementation

Finance – e.g. funding for programs, research

Technology – e.g. capture systems, detecting emissions

Capacity – e.g. institutions, systems

Assistance – e.g. technical, partnerships

Menu of methane mitigation mechanisms

Policies – e.g. oil and gas standards, landfill regulations

Programs – e.g. food loss and waste reductions, large emission events detection and response

Market – e.g., capturing methane and using as a fuel

Research & Development – e.g. enteric fermentation

Methane meal plan

Pledges – Global Methane Pledge

Targets – national or company methane targets

NDCs – including all greenhouse gases in ambitious targets

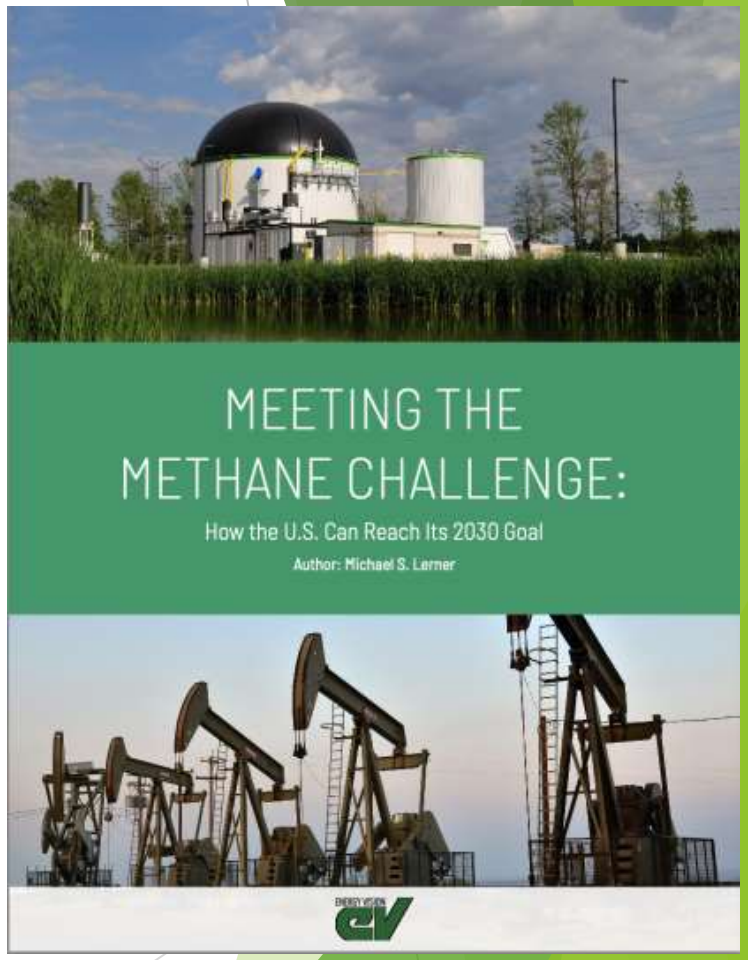
Net zero – including all greenhouse gases in ambitious targets

EV's New Report – *Meeting the Methane Challenge*

- Comprehensive analysis of the U.S. potential for cutting methane from two of the biggest sources: organic waste and the oil and gas industry

- Calculated defensible, conservative estimates for how many anaerobic digestion (AD) facilities, capital cost involved, timeline, amount of methane avoided, and cost-effectiveness of all options

- **Bottom line: there is a clear path to achieving "30x30" but it requires swift action**



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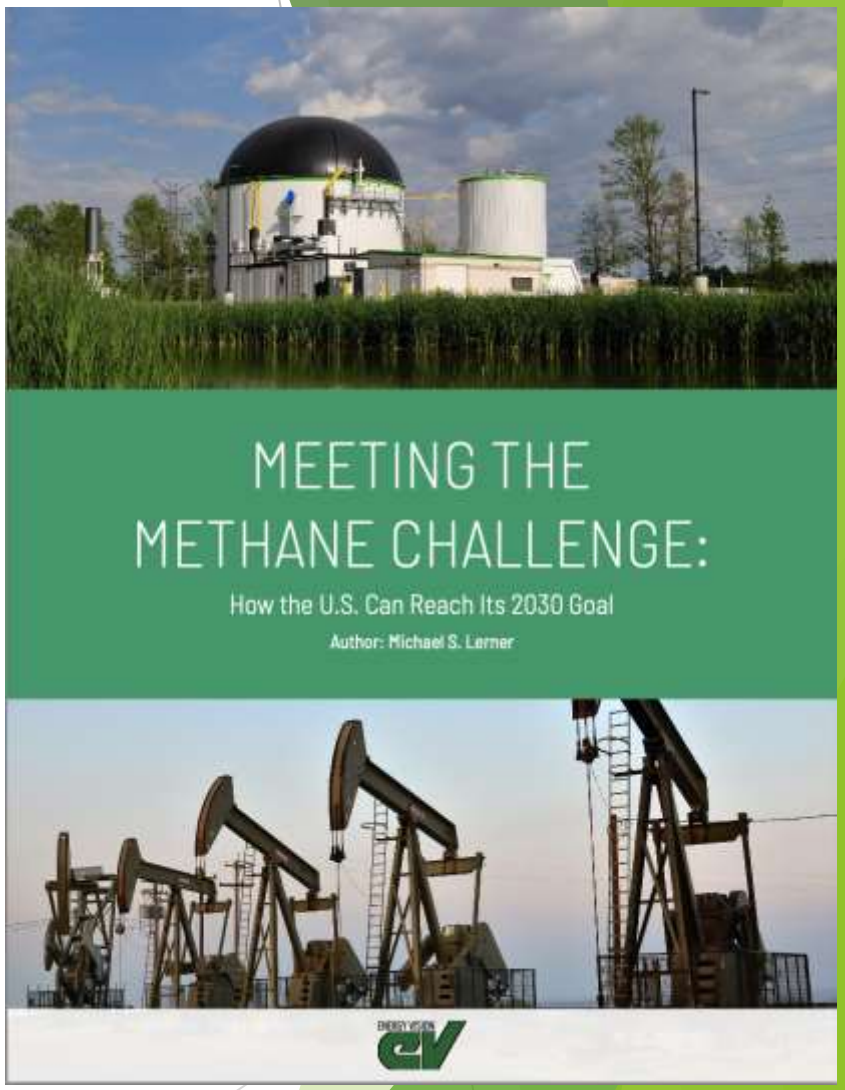
Summary of Key AD Findings

(Energy Vision Research)

- **4,700 new ADs could reduce U.S. methane emissions by 13.6%**
- **Estimated capital cost: $74.2 billion** (predominantly private sector dollars)
- Many new ADs could be operational by 2030 (ADs typically take 2-6 years to build)

- Gets the U.S. almost halfway to the 2030 Global Methane Pledge target!



https://energy-vision.org/wp-content/uploads/2024/06/EV-National-AD-Report.pdf

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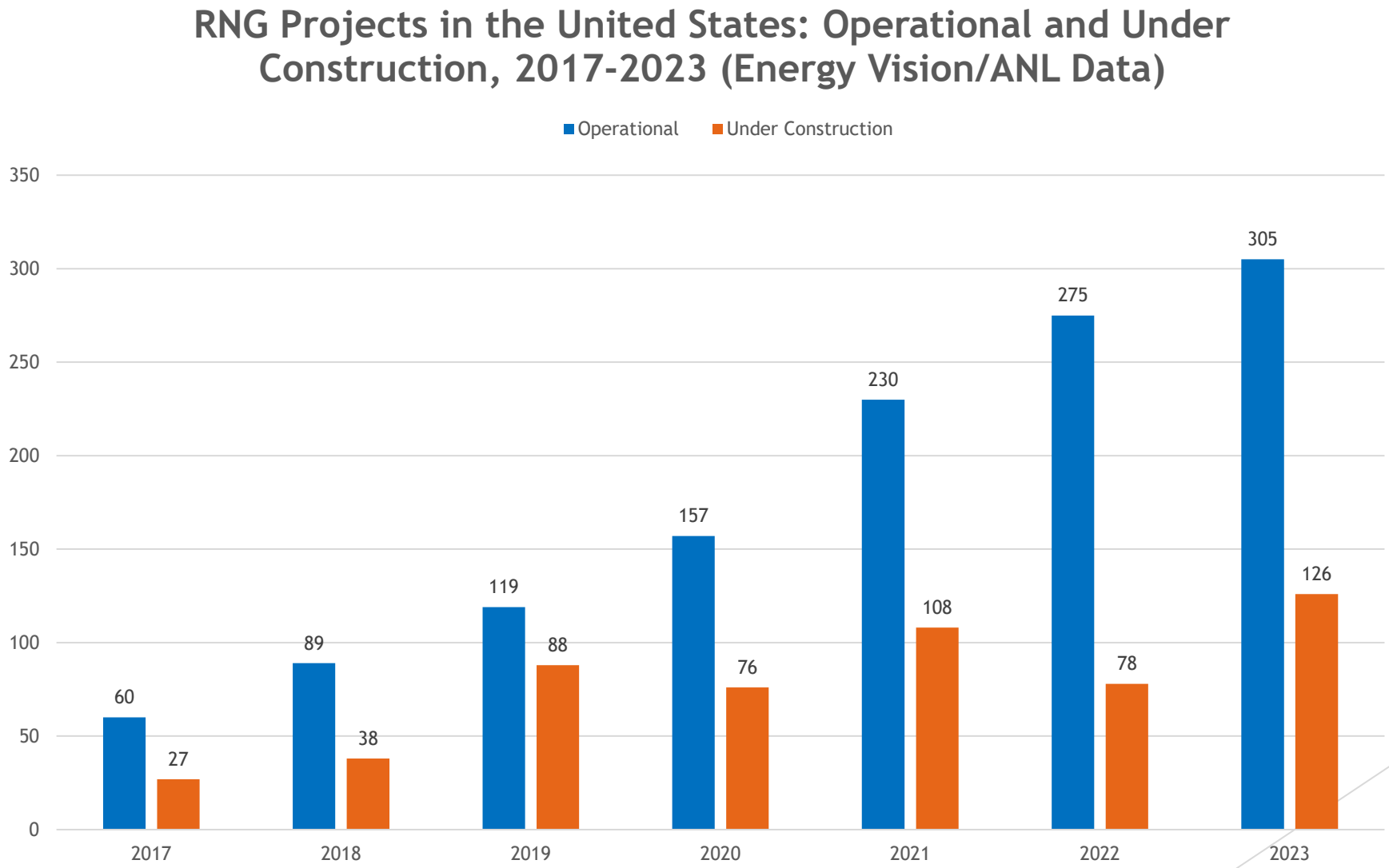
Current AD/RNG Market Landscape



Source: Energy Vision and Argonne National Laboratory

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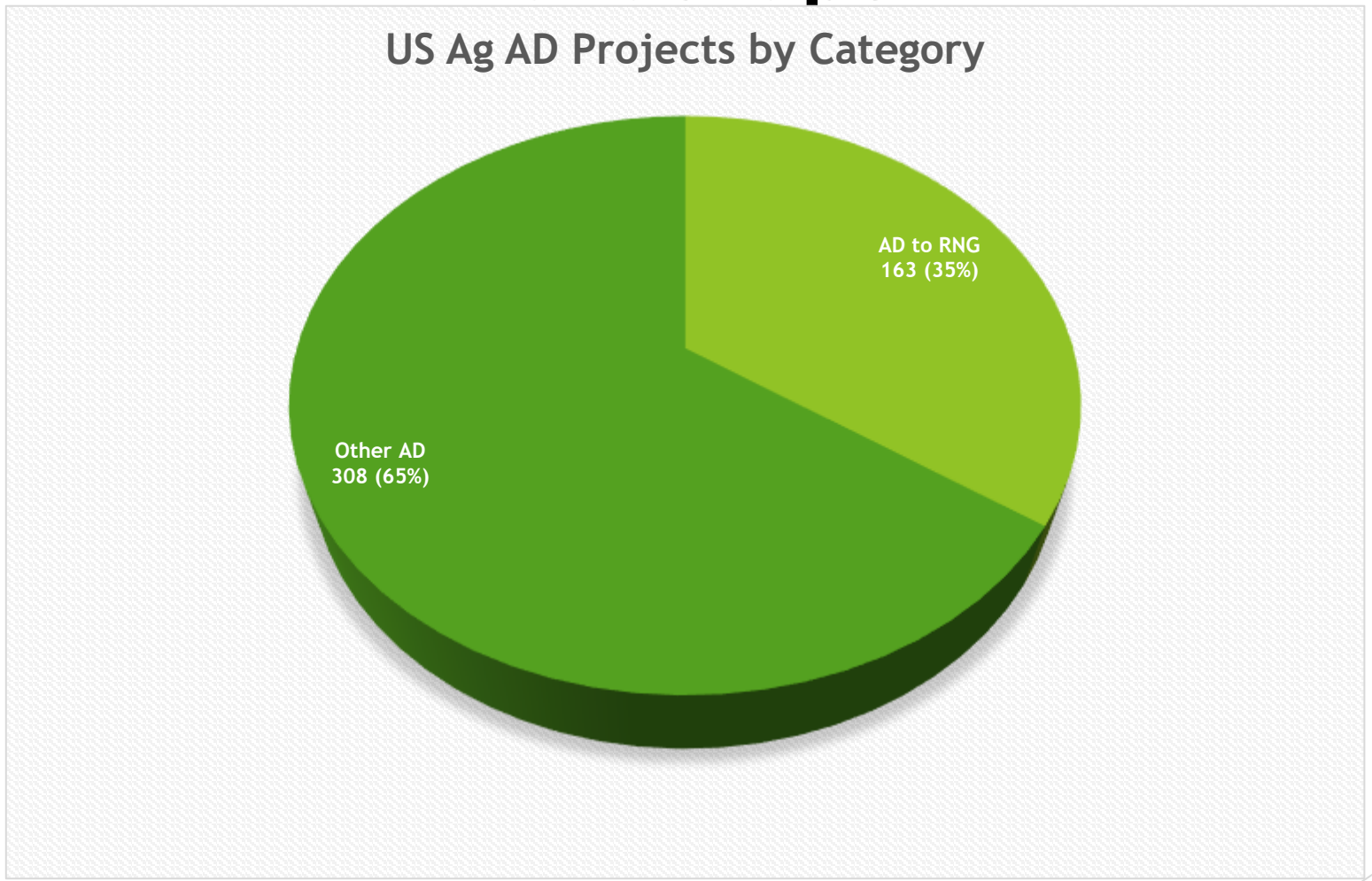
US Agricultural (Livestock) Digester Landscape



Source: EPA AgStar + Energy Vision Data

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CA Perspective: Incentives-Based Programs are Working

- CA dairy farmers reduce more than **2.4 million metric tons per year** of CO2e or **24 million metric tons** over 10 years.
- CA dairy farms power more than 15,000 vehicles daily and CA digesters have the equivalent impact of **removing over 500,000 gasoline cars**.
- CA's dairy digester program achieves **20%** of the GHG reductions from **all climate programs** invested in by the state, with just **1.5% of total funds awarded**.
  - ***Dairy digesters are one of the most effective and efficient GHG reduction initiatives in America.***

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COWS POWERING HEAVY-DUTY TRUCKS

Goshen, CA Station

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COWS POWERING CARS

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COWS POWERING PORTS

COWS POWERING HOMES

COWS POWERING HYDROGEN FUEL

Multiple CA Policies Supporting Methane Reduction

Grant Funding

CA Dept. of Food & Agriculture, CA Energy Commission, and Public Utilities Commission

<u>Historic programs decreasing</u>

+

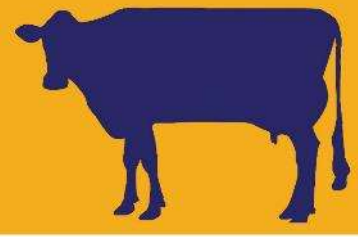
Procurement/ Program Support

Low Carbon Fuel Standard
RNG Procurement
Cap-and-Trade Offsets
BioMAT

<u>LCFS prices have fallen substantially</u>

+

Dairy Farm / Private Investment



Hundreds of millions of dollars of private capital are available in CA and <u>billions nationally</u> – but need program certainty providing sufficient economics

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Federal Initiatives Critical for Future Development

Construction Incentives

Investment Tax Credit (ITC) 48(c)(7) provides 30%, 40% with domestic content. But projects need to start construction by 12/31/2024

Program extension by 24-36 months would spur untold add'l development

+

Ongoing Incentives

EPA's Renewable Fuel Standard

2 IRA programs have the potential to provide needed longer-term incentives:

45V – Dairy participation in H2 production
45Z – Production Tax Credit

+

Dairy Farm / Private Investment

<u>Billions of dollars of private capital is available nationally</u> for dairy AD. Implementation of ITC extension, 45V and 45Z would provide needed program certainty and economics

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Dairy AD Opportunities for the PNW: Addressing Ongoing Market Uncertainty(s)

The focus of the (rest) of this panel….

- Programs/Incentives/Markets
  - Past and Present
  - Future?

- Key feedback from investors/developers/farmers:
  - Significant private sector capital and expertise exists
  - Grants/incentives help but often not “scalable”
  - NEED FOR GREATER MARKET CERTAINTY TO MAKE FINAL INVESTMENT DECISIONS

(Photo credit: Wikimedia Commons)

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