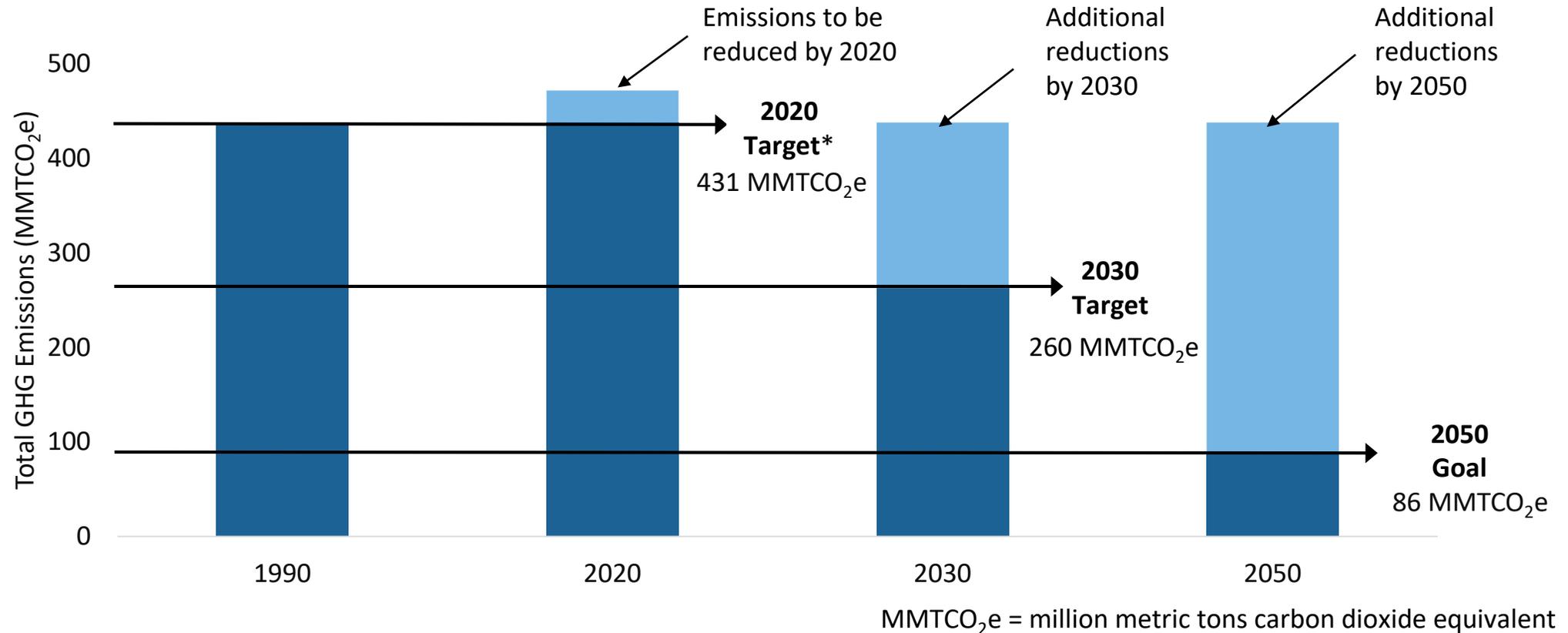


# Webinar on CARB's Analysis of Progress Toward Achieving Methane Emissions Target from Dairy and Livestock Sector



MAY 21, 2020

# California GHG Emissions Targets



*\*2016–2018 emissions below 2020 target*

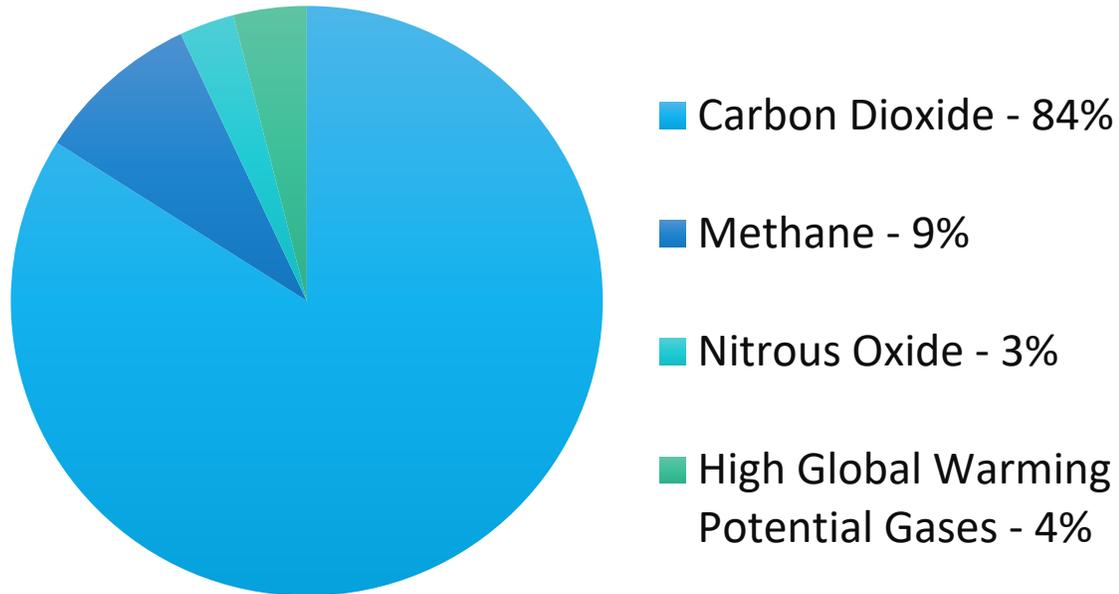
# Short-Lived Climate Pollutant Reductions: Critical to Achieving 2030 Target

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- CARB's Short-Lived Climate Pollutant (SLCP) Reduction Strategy is California's plan to reduce SLCP emissions in a way that provides environmental & economic benefits
    - SLCP Reduction Strategy was required pursuant to Senate Bills (SB) 605 & 1383
    - Measures in the strategy are a key part of the State's Climate Change Scoping Plan, with SLCP measures providing over a third of the cumulative GHG reductions needed to reach the 2030 GHG target
    - SLCP sources not regulated by Cap-and-Trade Program
  - Strategy establishes a dairy and livestock sector methane emissions target
    - 40 percent reduction in emissions by 2030 = 9 million metric tons CO<sub>2</sub>e\*
    - Strategy outlines the dairy and livestock measures needed to meet this target
- \*100-year global warming potential*

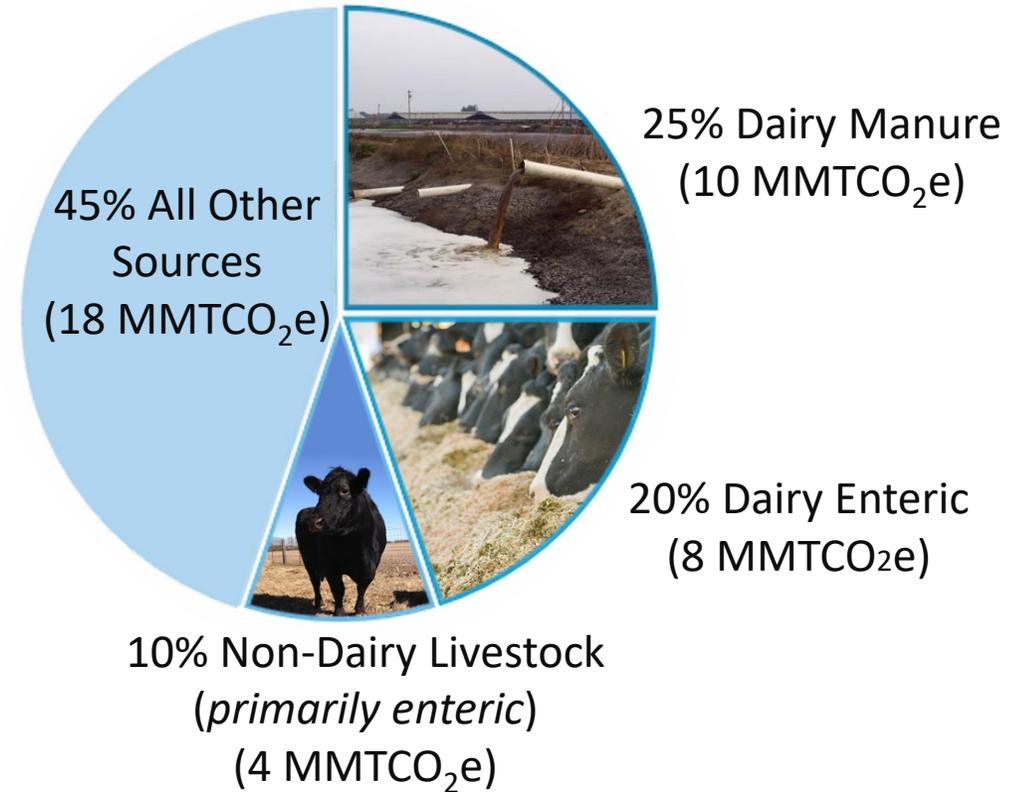
# California GHG and Methane Emissions

## 2013 Emissions\* by Greenhouse Gas



2013 Total GHG Emissions: ~460 MMTCO<sub>2</sub>e

## 2013 Methane\* Emissions



\*100-yr global warming potential

# Analysis Approach and Stakeholder Information Request

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- SB 1383 analysis requirements:
  - Evaluate the progress the dairy and livestock sector has made toward achieving the 2030 methane emissions reduction target
  - Evaluate the progress made on overcoming technical and market barriers to dairy and livestock methane emissions reductions projects
- Webinar purpose: explain CARB staff's approach to the analysis and request your assistance in identifying information we may be missing

# Methane Emissions Reduction Options

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- Manure management
  - Anaerobic digestion
  - Alternative manure management practices
    - Solid-liquid separation
    - Conversion from a flush to scrape system
    - Pasture-based management
    - Alternative manure treatment and storage
- Enteric fermentation
  - Diet modification
  - Breeding for increased efficiency and decreased emissions
  - Feed additives



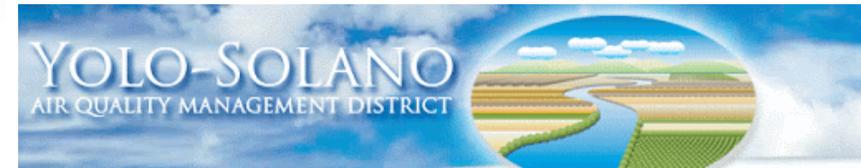
# Analysis Outreach Efforts



**San Joaquin Valley**  
AIR POLLUTION CONTROL DISTRICT



**BAY AREA AIR QUALITY**  
MANAGEMENT DISTRICT



**Sustainable Conservation**



**United States Department of Agriculture**  
Natural Resources Conservation Service



**CalCAN**  
CALIFORNIA CLIMATE &  
AGRICULTURE NETWORK

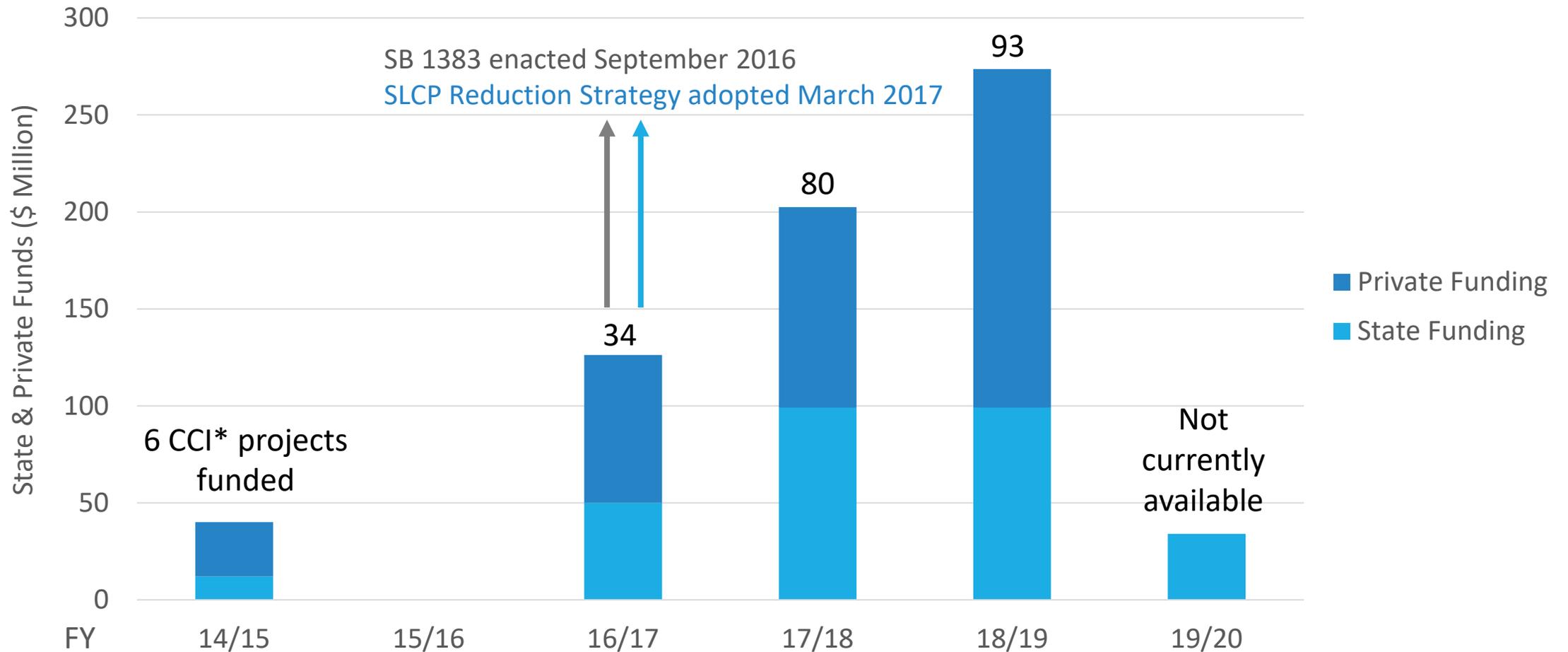
# Quantifying Dairy and Livestock Emissions Reductions

- Estimated emissions reductions from animal population changes calculated using trends observed between 2012 and 2017 USDA Ag Census
- Estimated emissions reductions from privately funded projects calculated from average reductions resulting from State-funded reduction projects

Estimated Expected Annual Reductions by 2022		
Reduction Type	Number of Projects Funded through FY 2019-20	Expected Reductions (MMT <sub>CO<sub>2</sub>e</sub> )
Population Change	Not applicable	1.3
Anaerobic Digester	State-funded (DDRDP)	108
	Privately funded	5
Alternative Manure Management Projects	State-funded (AMMP)	105
	Privately funded	40
<b>Total</b>	<b>258</b>	<b>3.4</b>

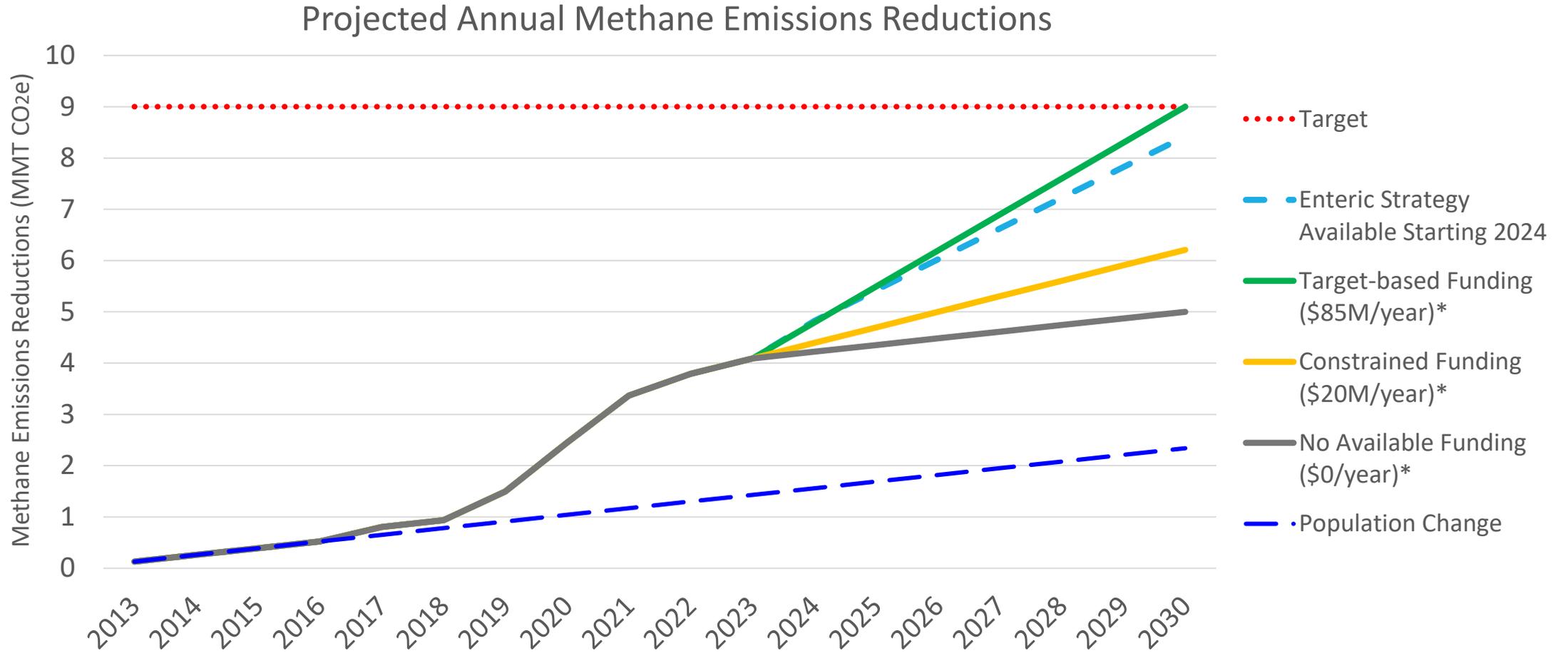
\*Emissions reductions from Aliso Canyon Mitigation not included

# State Funding of Manure Methane Emissions Reduction Projects Leverages Private Funding



CCI = California Climate Investments

# Projected Annual Emissions Reduction Progress Through 2030



\* Funding scenarios are differentiated by CCI funding levels starting FY 21/22

# Potential Enteric Methane Emissions Reduction Technologies

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- Staff evaluated available information on potentially effective feed additives and enteric methane reduction potentials. If these additives were fed to all the ruminants in the State, enteric methane emissions will be reduced by:
  - 3-nitrooxypropanol (3-NOP):  $20\text{--}40\% * 12 \text{ MMTCO}_2\text{e} = 2.4\text{--}4.8 \text{ MMTCO}_2\text{e}$  (Jayanegara et al., 2017)
  - Nitrate:  $10\text{--}20\% * 12 \text{ MMTCO}_2\text{e} = 1.2\text{--}2.4 \text{ MMTCO}_2\text{e}$  (Leng, 2008)
- Costs currently unknown
- Neither of the feed additives is currently available for commercial use in the United States

# Paths to Achieve the 2030 Target

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- Determine emissions reductions shortfall
- Consider potential options to eliminate shortfall through:
  - Manure methane reduction projects
  - Enteric methane reduction technologies
- Evaluate multiple scenarios to achieve total required emissions reductions
- Estimate potential costs to implement each scenario

# Barriers to Achieving 2030 Target

	Technical Barriers	Market Barriers
<b>Manure Management</b>	Alternative manure management projects ✗ Inconsistent reductions ✗ Difficulties quantifying reductions Anaerobic digesters ✓ Grid and pipeline interconnection ✓ Biomethane quality standards	✓ Project development costs and financing ✓ Environmental credit certainty ✗ Sector economics ✗ Insufficient public funds ✗ Undeveloped markets for value-added manure products
<b>Enteric Fermentation</b>	✗ Transient effect/rumen adaptation ✗ Potential animal health impacts Limited availability ✗ 3-5 years before commercial availability ✗ Seasonal products	? Consumer acceptance ? Cost-effectiveness

✓ = Progress made

✗ = Persistent barrier

? = Currently Unknown

# CARB Dairy Methane Emissions Research

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- Dairy biogas constituents research (UC Davis) – examines pipeline chemical constituents before and after upgrading to biomethane
- California dairy emissions model (UC Davis) – develops a comprehensive model for evaluating dairy emissions holistically
- Feed and lagoon additive research – examines strategies to reduce emissions from enteric and lagoon sources

# Next Steps on Analysis

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- Review comments received during post-webinar comment period
- CARB staff writes a draft of the analysis
- CARB staff posts draft analysis for a 30-day public comment period
- Review comments received during comment period and incorporate where feasible
- Post final analysis online

# Request for Information

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- CARB is requesting information on:
  - Methane emissions reductions projects implemented 2013 or later
  - Progress made in overcoming technical and market barriers
- To submit comments on the information from this presentation:  
[https://www.arb.ca.gov/lispub/comm2/bcsubform.php?listname=2020analysis-ws&comm\\_period=1](https://www.arb.ca.gov/lispub/comm2/bcsubform.php?listname=2020analysis-ws&comm_period=1)
- To submit clarifying questions and information for consideration in this analysis, email [SLCP@arb.ca.gov](mailto:SLCP@arb.ca.gov)
- All comments due by **June 5, 2020**.