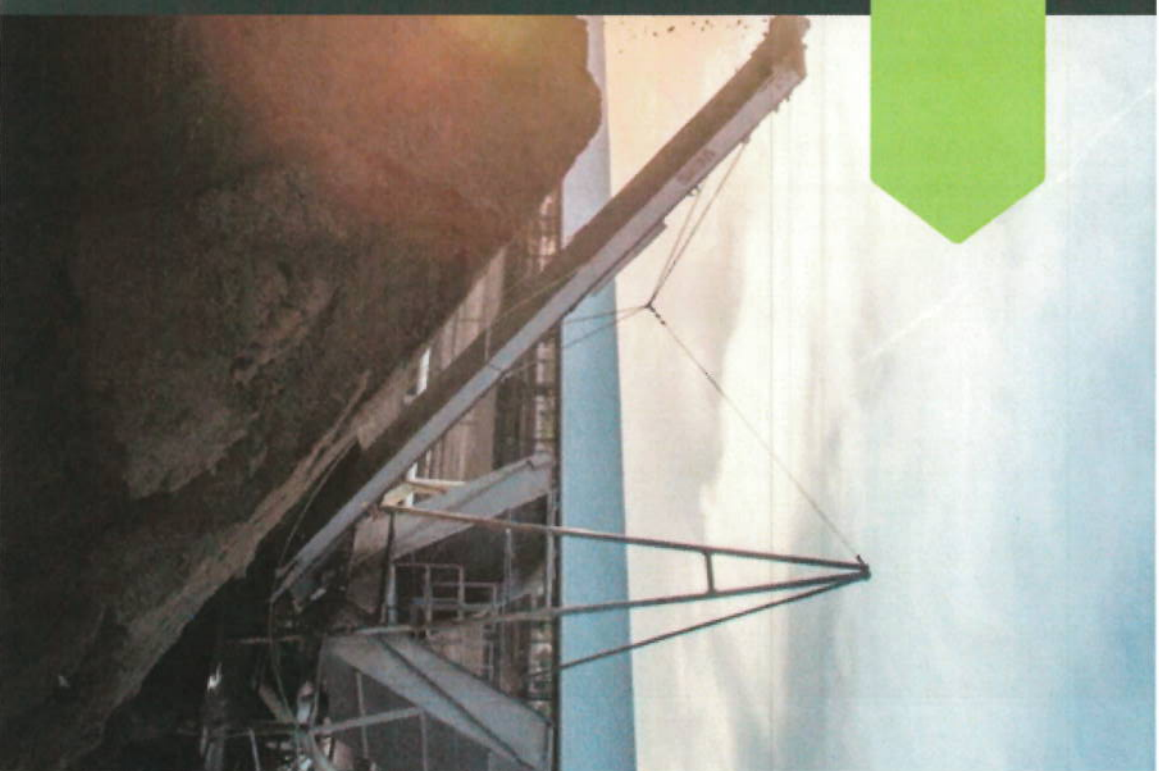


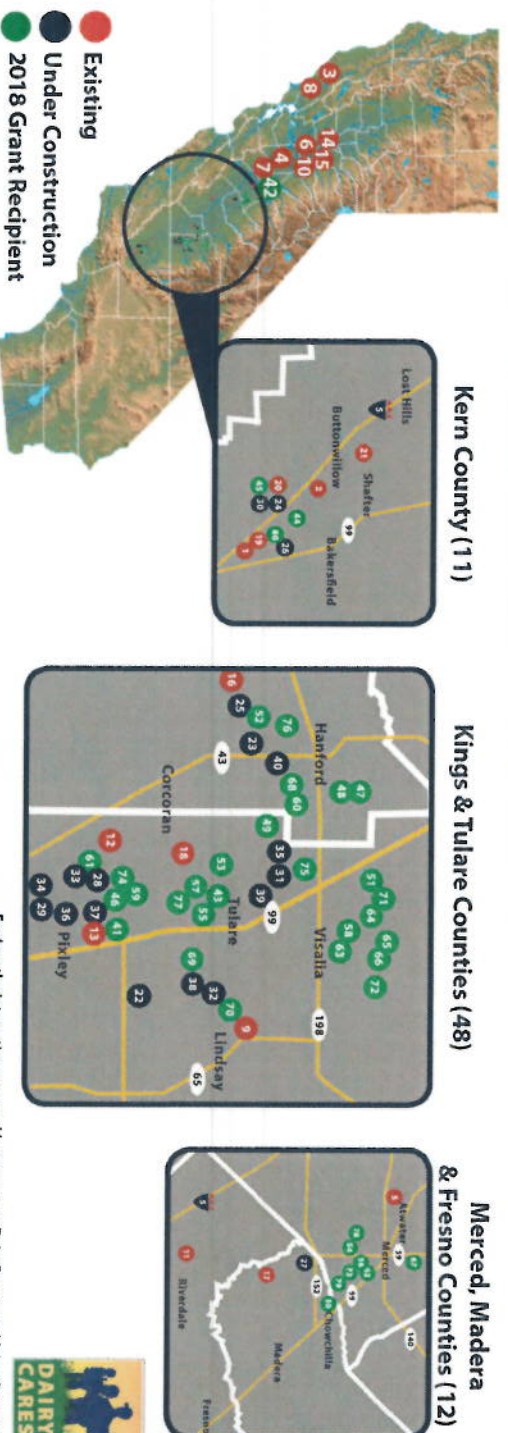
# Tremendous Progress

- Dairy Digester Research and Development Program (DDRDP)
  - 6 new projects came online in 2017
  - 18 more projects in various stages of development
  - 40 additional projects recently awarded grants by CDFA
  - New round of funding available in "18-'19 fiscal year
  - Conceivable to have 100-120 projects funded and operating in next 4-5 years





# California Dairy Digester Development



1. Bidart Old River	16. Verwey Dairy- Hanford	33. Pixley Dairy	50. Double D Dairy (South)	67. Red Rock Dairy
2. Bidart Stockdale	17. Verwey Dairy- Madera	34. Legacy Ranch	51. Double J Dairy	68. River Ranch Dairy
3. Blakes Landing Farms/ Straus Family Creamery	18. GJ Lovelie Ranch	35. Moonlight Dairy	52. Double L Dairy	69. Riverbend Dairy
4. Castelanelli Brothers Dairy	19. Carlos Echeverria & Sons	36. Robert Vander Eyk Dairy	53. Dykstra Dairy	70. Riverview Dairy
5. Cottonwood Dairy/ Joseph Gallo Farms	20. Lakeview Dairy	37. Circle A Dairy	54. SH Dairy	71. Rob Van Grouw Dairy
6. Denton Dairy*	21. West Star Dairy	38. Bos Farms	55. FM Jerseys Dairy	72. Rocking Horse Dairy
7. Fiscalini Farms	22. Van Beek Dairy	39. Hamstra Dairy	56. Hoogendam Dairy	73. Rockstar Dairy
8. Giacconi Dairy	23. Weedon Ranch	40. Hollanda Farms	57. Horizon Jersey Dairy	74. Sousa & Sousa Dairy
9. Hlandes Dairy	24. Trilogy Dairy	41. 4K Dairy	58. Jacobus De Groot #2 Dairy	75. Udder Dairy
10. New Hope Dairy*	25. Cloverdale Dairy	42. Ackerman Dairy	59. Little Rock Centralized Dairy	76. Valdeho Dairy
11. Open Sky Ranch	26. T & W Farms	43. Aukerman Farms	60. Lone Oak #1 Dairy	77. Vander Poel Dairy
12. Pacific Rim Dairy	27. Red Top Jerseys Dairy	44. Belenave Dairy	61. Meadowlake Dairy	78. Vander Woude Dairy
13. Pixley Biogas	28. Williams Family Dairy	45. BV Dairy	62. Meunio Dairy	79. Vista Verde Dairy
14. Van Steyn Dairy	29. K & M Visser	46. Cornestone Dairy	63. Medema Dairy	80. Western Sky Dairy
15. Van Warmerdam Dairy	30. Maple Dairy	47. De Groot Dairy (North)	64. Milky Way Dairy	
	31. S & S Dairy	48. De Groot Dairy (South)	65. Mineral King Dairy	
	32. Rancho Teresta Dairy	49. Decade Centralized Dairy	66. Rancho Sierra Vista Dairy	

Updated July 11, 2018

\*Temporarily Offline

# Digester Program Summary

- 24 projects funded to date achieving estimated reductions of 5.7 million MTCO<sub>2</sub>e over 10 years
- Average cost of reduction is \$27.12/MTCO<sub>2</sub>e
- Average cost to state is just \$8.15/MTCO<sub>2</sub>e
- #3 most cost effective GHG investment program in state portfolio
- #1 most effective program in achieving total GHG reductions in state climate investment portfolio
- 40 new projects expected to achieve 7.3 million MTCO<sub>2</sub>e over 10 years
- All total digesters are achieving over 1.5 million MTCO<sub>2</sub>e reduction annually or about 15% of manure methane by 2022



## Methane Reduction Summary

### Tremendous momentum

- ▶ California recently became the nation's leader in dairy methane reduction
- ▶ Critical piece of California Climate Investment Program
- ▶ Just getting started in showing the entire world how dairy can be part of a global sustainable food system
- ▶ On path to achieve 40% state manure management goal





# DRAFT Dairy Digester Emissions Matrix

May 23, 2018

		A	B	C	D	E	F	G	H
		CO <sub>2</sub> e (20-yr GWP)	CO <sub>2</sub> e (100-yr GWP)	NOx	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	SOx	VOCs
1	Uncovered Lagoon	Baseline Totals (Local + Remote)	70,581	24,519	<0.1	<0.1	<0.1	<0.1	3.0
2	Onsite Reciprocating Engine to Grid and EVs	Local	17,491	7,474	0.5	0.2	0.2	<0.1	0.6
3		Remote	765	318	0.1	<0.1	<0.1	0.1	<0.1
4		Subtotal (Row 2 + Row 3)	18,256	7,792	0.6	0.2	0.2	0.1	0.6
5		Diesel Displaced	8,609	7,629	5.5	1.1	0.6	2.4	1.0
6		Pathway Emissions (Row 4 - Row 5)	9,647	163	-4.9	-0.9	-0.4	-2.3	-0.4
7		Net Benefit vs. uncovered lagoon (Row 6 - Row 1)	-60,934	-24,356	-4.9	-0.9	-0.4	-2.3	-3.4
8	Pipeline Injection to NG Vehicles	Local	15,448	5,268	0.1	<0.1	<0.1	<0.1	0.3
9		Remote	4,839	3,568	4.6	0.2	0.2	0.2	0.6
10		Subtotal (Row 8 + Row 9)	20,287	8,837	4.7	0.2	0.2	0.2	0.9
11		Diesel Displaced	4,197	3,720	8.8	0.4	0.2	1.2	12.0
12		Pathway Emissions (Row 10 - Row 11)	16,090	5,117	-4.1	-0.2	<0.1	-1.0	-11.1
13		Net Benefit vs. uncovered lagoon (Row 12 - Row 1)	-54,491	-19,402	-4.1	-0.2	<0.1	-1.0	-14.1
14	Pipeline Injection to Power Plant, Grid and EVs	Local	15,448	5,268	0.1	<0.1	<0.1	<0.1	0.3
15		Remote	3,860	2,957	0.4	0.1	0.1	0.2	0.1
16		Subtotal (Row 12 + Row 13)	19,307	8,226	0.5	0.1	0.1	0.2	0.4
17		Diesel Displaced	11,916	10,560	7.6	1.6	0.9	3.3	1.4
18		Pathway Emissions (Row 16 - Row 17)	7,391	-2,334	-7.1	-1.5	-0.8	-3.1	-1.0
19		Net Benefit vs. uncovered lagoon (Row 18 - Row 1)	-63,190	-26,853	-7.1	-1.5	-0.8	-3.1	-4.0
17	Pipeline Injection to Hydrogen Vehicles (H <sub>2</sub> from SMR)	Local	15,448	5,268	0.1	<0.1	<0.1	<0.1	0.3
18		Remote	6,140	5,017	3.5	0.6	0.6	2.4	0.4
19		Subtotal (Row 17 + Row 18)	21,588	10,285	3.6	0.6	0.6	2.4	0.7
20		Diesel Displaced	7,709	6,832	4.9	1.0	0.6	2.1	0.9
21		Pathway Emissions (Row 19 - Row 20)	13,879	3,453	-1.3	-0.4	<0.1	0.3	-0.2
22		Net Benefit vs. uncovered lagoon (Row 21 - Row 1)	-56,702	-21,066	-1.3	-0.4	<0.1	0.3	-3.2
23	Pipeline Injection to Fuel Cell, Grid and EVs (Solid Oxide Fuel Cell)	Local	15,448	5,268	0.1	<0.1	<0.1	<0.1	0.3
24		Remote	3,860	2,957	0.6	<0.1	<0.1	0.1	0.1
25		Subtotal (Row 23 + Row 24)	19,308	8,225	0.7	0.1	0.1	0.1	0.3
26		Diesel Displaced	13,292	11,779	8.5	1.8	1.0	3.7	1.5
27		Pathway Emissions (Row 25 - Row 26)	6,016	-3,554	-7.8	-1.7	-0.9	-3.6	-1.2
28		Net Benefit vs. uncovered lagoon (Row 27 - Row 1)	-64,565	-28,073	-7.8	-1.7	-0.9	-3.6	-4.2

Note: Units are metric tons per year (MT/yr.) for all numerical values.