

EPA Road-testing of Animal Waste Digesters

Carrie Lee, Michael Lazarus
Stockholm Environment Institute

Gordon Smith
Ecofor LLC

Kimberly Todd, Melissa Weitz
U.S. Environmental Protection Agency

Manure Management

- 14% of U.S. agriculture GHG emissions
- 0.2% of total U.S. GHG emissions
- Methane reductions through biogas control systems
- No known current federal, state or local regulation requiring installation



Road-test of Animal Waste Digester Protocols

	Protocol Version	Year	Number of Projects Listed
Climate Leaders	Version 1.3	2008	None
RGGI	Revised RGGI Model Rule	2008	None
CCX	Chapter 9: Rulebook	2004	>35 registered
Climate Action Reserve (CAR)	Version 2.1	2008	2 registered 12 listed
Clean Development Mechanism (CDM)	ACM0010: Version 05	2008	186 registered 330 at validation or registration request

Eligibility Requirements

Key Differences	Climate Leaders	RGGI	CCX	CAR	CDM
Livestock types specified	✓				✓
Prior manure management practice specified		✓	✓		✓
Emission reductions from fossil fuel displacement	(✓)				✓
Regulatory surplus specifications	Must exceed regulation	Not eligible	Not specified	Not eligible	Not eligible
Steps taken if regulation changes after project is approved	Not specified	No renewal	Not specified	No renewal	Baseline adjustment required
Air and water quality standards				✓	✓

Project Boundary

Key Differences	Climate Leaders	RGGI	CCX	CAR	CDM
N ₂ O	√				√
On-site energy use	√			√	√
Transportation	√	(√)		√	
Baseline aerobic management	√			√	√
Project non-digester management	√			√	√
Project digester effluent				√	(√)
Project flare destruction/collection efficiency	√			√	√

Leakage

	Climate Leaders	RGGI	CCX	CAR	CDM
Leakage	Project fossil fuel emissions				Land application of manure

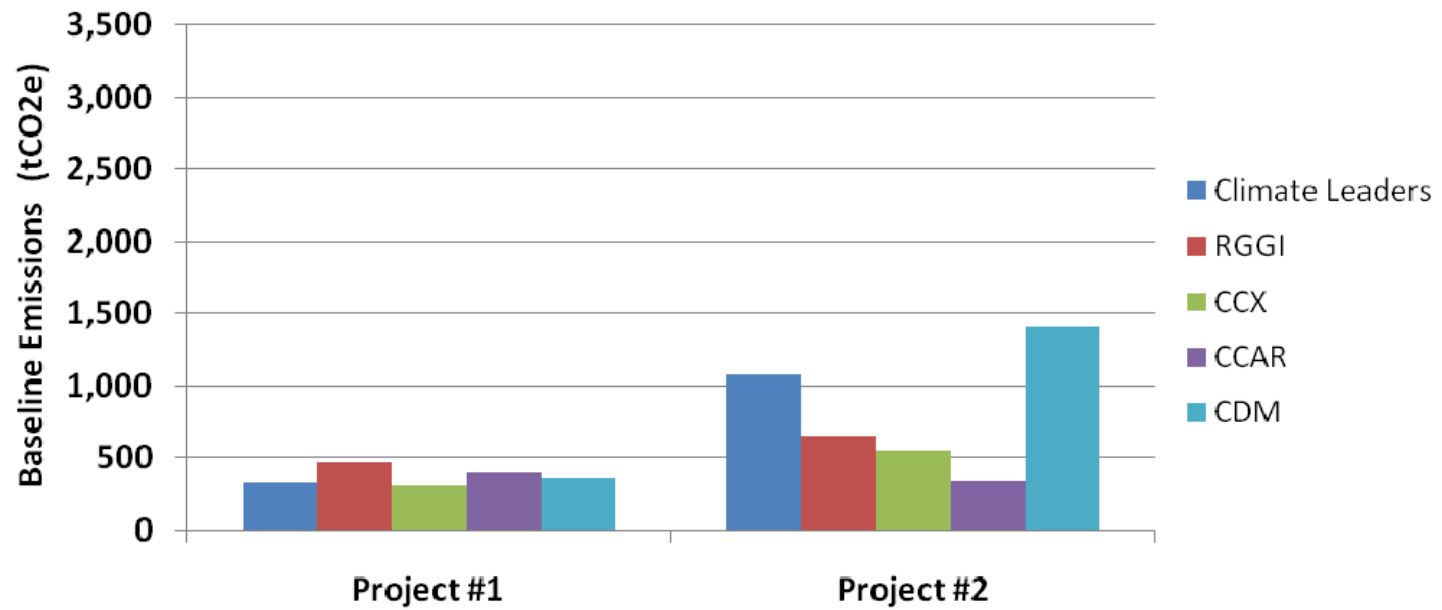
Baseline and Project Emissions Quantification

Key Differences	Climate Leaders	RGGI	CCX	CAR	CDM
Quantification of baseline methane emissions	MCF	Van't Hoff-Arrhenius factor	MCF	Van't Hoff-Arrhenius factor	MCF
Volatile solids production	Per animal	Per month	Per animal	Per animal	Per animal
Multiple management systems	Per animal units	%	%	%	%
Methane GWP	21	23	21	21	21
Methane density	>3% variation				
Biogas collection efficiency	99% (varies)	100% (implicit)	100%	85% or as verified	85% or as verified
Biogas destruction efficiency	99%	100% (implicit)	100%	98% or as verified	90% or as verified

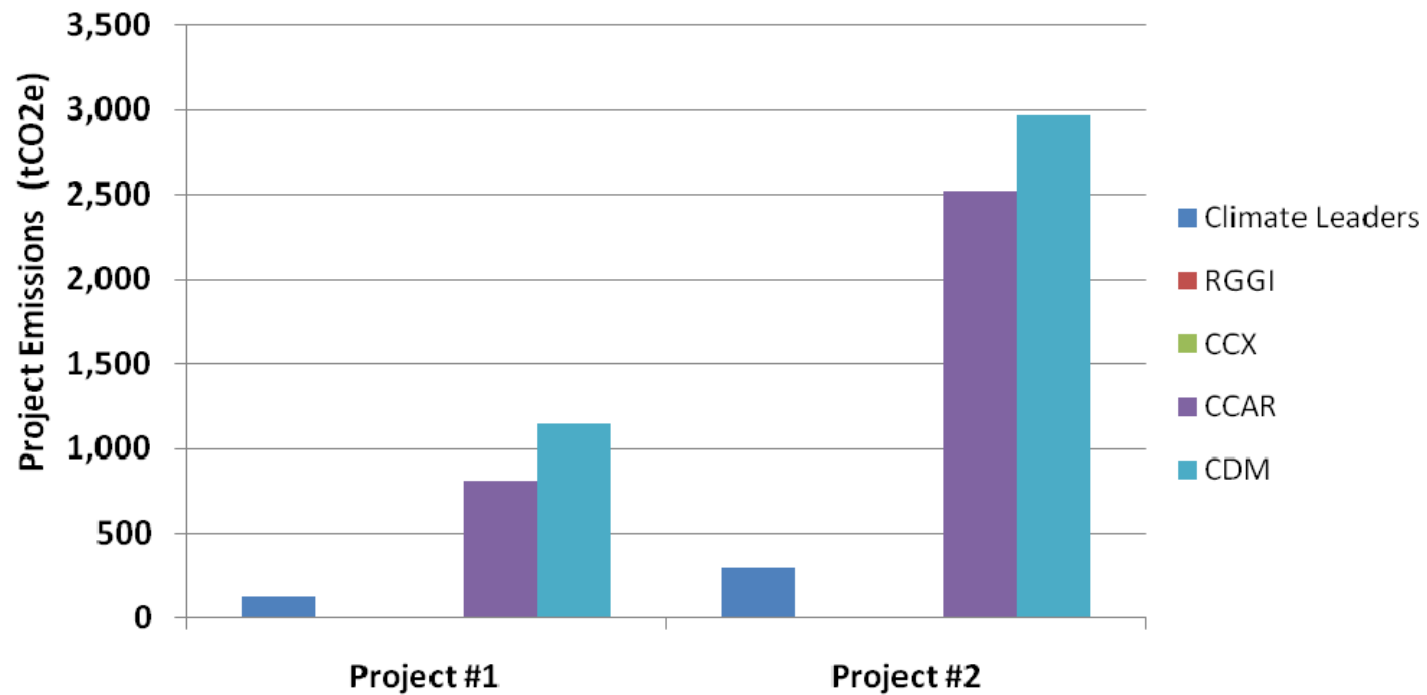
Sample Projects

	Type	Size	State	Baseline Activity		Project Activity	
				Winter	Summer	Control System	Effluent
Project #1	Dairy	550	NY	Liquid/slurry	Daily spread	Anaerobic digester	Composted/Irrigated
Project #2	Dairy	695	WA	Lagoon	Daily spread	Anaerobic digester	Composted/Lagoon

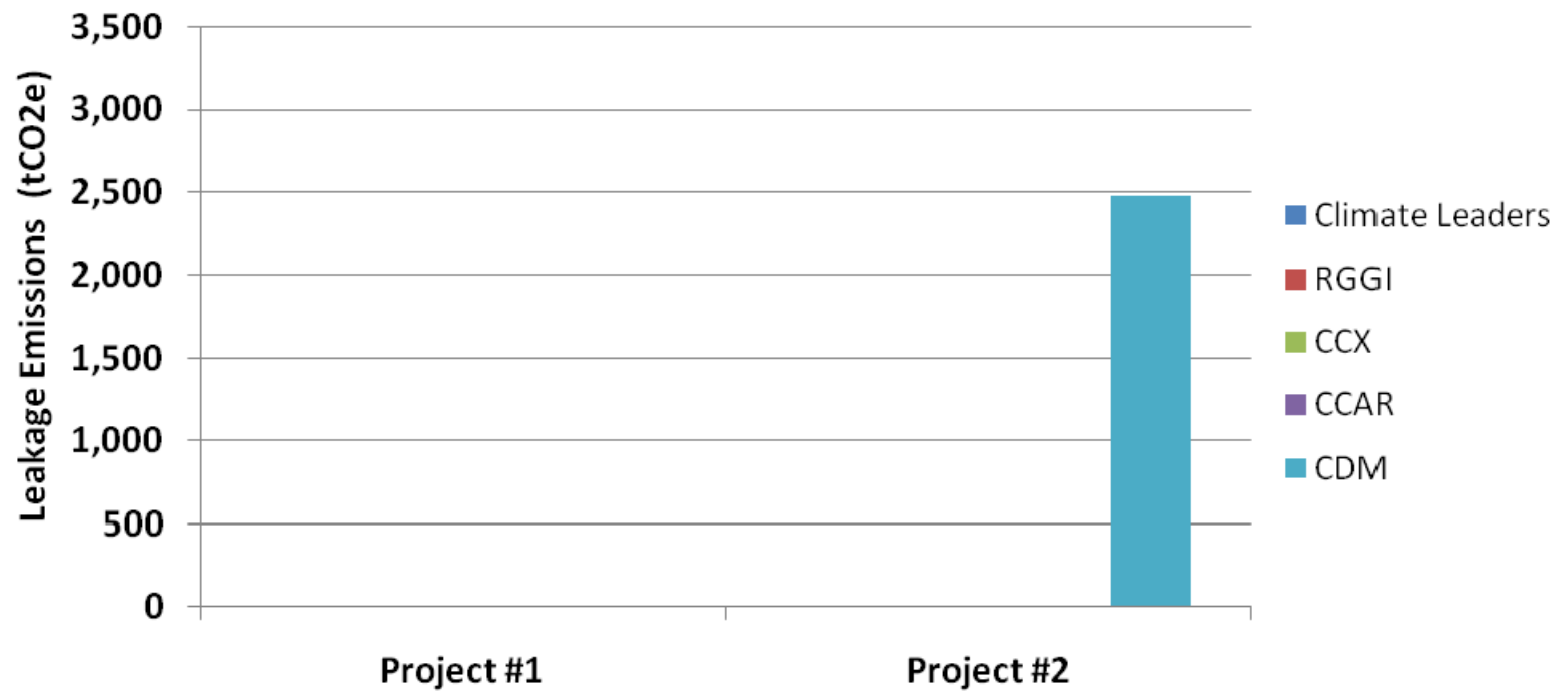
Baseline Emissions



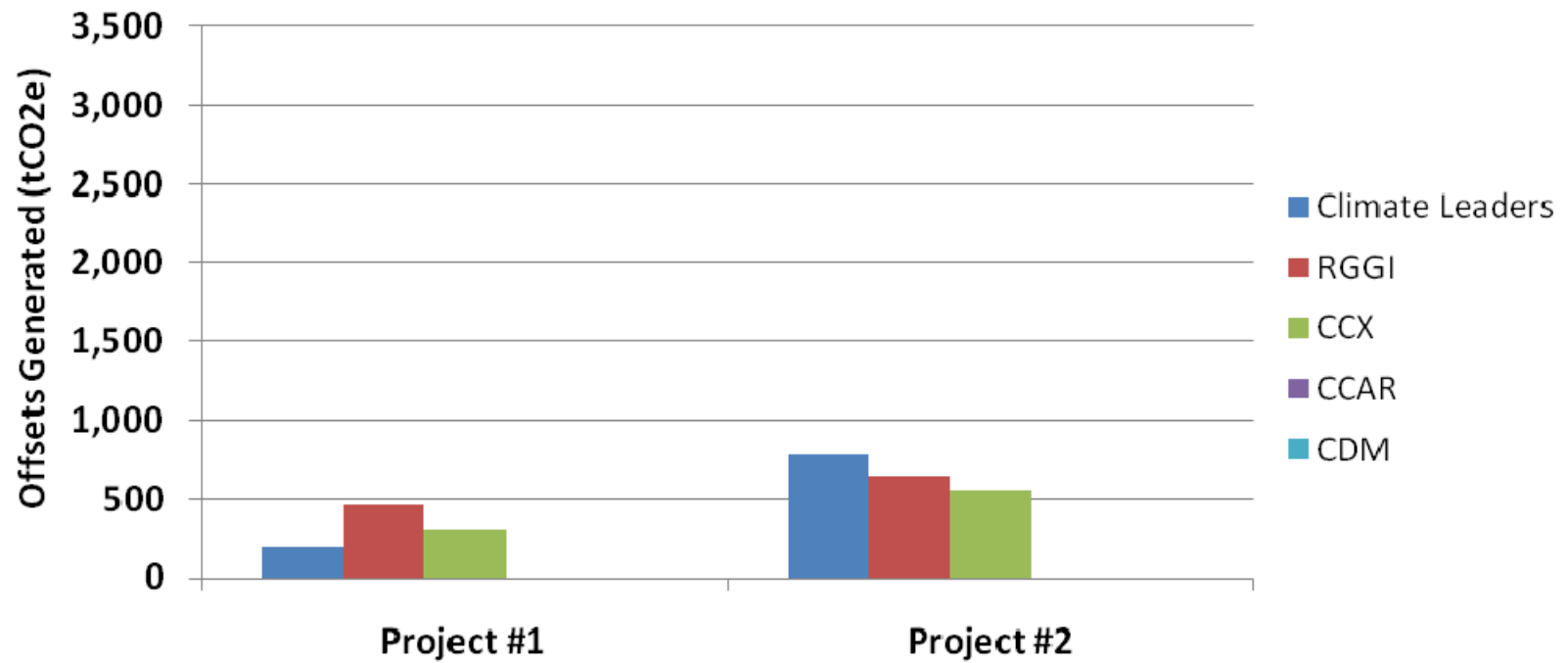
Project Emissions



Leakage Emissions



Estimated Offsets



Conclusions: Key Differences

- Approach to calculating total emission reductions
- Quantification approach to baseline methane emissions: MCF vs. Van't Hoff-Arrhenius factor
- Digester effluent
- Biogas collection and destruction efficiency
- N₂O emissions

SEI Recommendations

- Further specification of regulatory surplus requirements
- Additional research to validate methods to quantify baseline methane emissions
- Comprehensive inclusion of project emissions
- Further assessment of N₂O emissions from field spreading and digester effluent
- Provision that baseline emissions cannot exceed quantity of CH₄ captured and destroyed
- Further specification and consistency across monitoring requirements



Stockholm Environment Institute

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