

What's the connection between carbon offsets and organics diversion?

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Rewarding Sustainability

Introduction

- Opportunities and challenges involved in creating and selling offsets.
- How can a compost producer create and bring offsets to market?
- Two composting projects on this path
- Quantifying GHG reductions
- Economic viability of offsets as business opportunity

About AgRefresh

- Environmental Accountants
- Majority owned by two Vermont dairies
- Mission is to drive revenue from environmental credit markets to farm gate
- Carbon Credit Maximization Services
 - Anaerobic Digesters, Forest Conservation
- Advanced Biofuels
- Consulting; 25x'25, USDA, State Agencies, Trade Associations

Background: Purpose of offsets

- Buyer's perspective...cheap option to “offset your GHG footprint”
- Cap and Trade...economic efficiency...reduces costs
- Cap and Trade...incentivizes reductions that would not have happened otherwise
- Ag and Forestry would be hard to regulate...practically, politically, scientifically..but also major sources and sinks

Background: Additionality

- A carbon offset is only effective if it creates new “additional” emissions reductions that *would not have happened otherwise*.
- Therefore only projects that are *better than business as usual* are allowed to create offsets.
- Composting livestock manure?
- Mandates for organics diversion?
- Ban on yard waste to landfill?
- How long has the project been operating?

Background: Carbon Market Programs and Standards

	International	U.S.	Regional	State
Regulatory	Clean Development Mechanism (CDM)	Kerry, Lieberman, Graham (????)	RGGI, WCI, MGGRA	California's AB32
Voluntary	<ul style="list-style-type: none"> •Gold Standard • Voluntary Carbon Standard 	<ul style="list-style-type: none"> •Climate Action Reserve •Chicago Climate Exchange •American Carbon Registry 		

- Variety of options...
- timing...
- market value...
- accepted protocols?

Today's Focus: Compost Related Carbon Offset Protocols

Standard	Gold Standard (GS)	Voluntary Carbon Standard (VCS)	American Carbon Registry (ACR)	Chicago Climate Exchange (CCX)	Climate Action Reserve (CAR)
Protocol(s)	Clean Development Mechanism (SSC.III.E, SSC.III.F, AM0025)			Draft published June 2009	Expected June 2010

- Methane avoidance from landfills
- None include soil carbon sequestration
- Each of the regulatory programs could develop a protocol, or adopt one of the existing
- Climate Action Reserve is expected to be an accepted program in Federal Climate Legislation as well as AB32.

GHG emissions from composting

- CH₄...anaerobic decomposition...GWP of 21 (IPCC SAR, 100 years)
- CO₂...biogenic emissions from organics decomposition...nonbiogenic emissions from transportation of organics and compost management...GWP of 1
- N₂O...high moisture...high C:N ratio...GWP of 310 (IPCC SAR, 100 years)

GHG emissions reductions from organics diversion

- $\text{EMS Reductions} = \text{Avoided Baseline}_{\text{EMS}} - \text{Project}_{\text{EMS}}$
- $\text{Baseline}_{\text{EMS}} = \text{Organics Decomposition in Landfill} - \text{Methane Collection/ Destruction}$
- $\text{Project}_{\text{EMS}} = \text{Organics Transportation} + \text{Facility Operation} + \text{Material Treatment} + (\text{Decomposition} - \text{Methane Collection/ Destruction})$

A viable composting carbon offset project

- No mandate for organics diversion
- No landfill gas collection
- Well managed aerobic process
- Short transportation distances, efficient windrows (saves costs and emissions)
- Critical Mass...how much?
- Bonus: An innovative technology...i.e. heat capture and utilization

Example 1: Waste Options Nantucket

- Food residuals, biosolids
- Yard waste prohibited from landfills in MA
- CCX Draft Protocol: .9mtCO₂eq/ton food residuals, .17mtCO₂eq/ton biosolids (over 10 years)
- 30,000 mtCO₂eq over 6 years

Source: Subler, Biocycle, June 2009, pg.18

CCX Guideline for Methane Avoidance projects (Draft 4.17.09)

Table 2
Default Projected Yields of Waste Streams Diverted from Landfilling
(CO₂e/wet ton waste diverted)

	BE _{CH4SWDSy}										
Waste Type	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Food Waste	0.278	0.231	0.192	0.040	0.033	0.028	0.023	0.019	0.016	0.013	0.872
Yard Waste	0.108	0.098	0.088	0.020	0.018	0.016	0.015	0.013	0.012	0.011	0.400
Biosolids	0.048	0.040	0.033	0.007	0.006	0.005	0.004	0.003	0.003	0.002	0.150

Year 1: .326 mtCO₂e/ton Year 2: .271 mtCO₂e/ton
 Year 3: .225 mtCO₂e/ton Year 4: .047 mtCO₂e/ton

Example 1: Waste Options Nantucket

- 30,000 mtCO₂eq over 6 years
- \$4.43/mtCO₂eq on CCX (2009 average)
- Equals \$132,900 revenue
- \$2.00/ton organics
- Equals 66,450 tons
- **\$1.25/ton of organics after transaction costs**
- **\$83,062 profit**
- **Value of CCX offsets crashed**

Source: Subler, Biocycle, June 2009, pg.18

Example 2: NY Dairy Farm

- Solids separation, divert manure from lagoon, negative aeration, capture heat for hot water
- Composting manure is business as usual
- Innovative technology is costly...need financial incentive
- Feasibility study....# of offsets? Which program?

Economic Viability

- # of offsets?
- Costs of compliance...verification, registration, monitoring equipment, for an average dairy AD project about \$10K to \$14K (capital and again annual)
- Maybe less for compost project...Nantucket project was \$.75/ton, about \$50K total
- CCX compliance costs low
- Price of carbon?

Status of Federal Climate Legislation

- Kerry, Lieberman, Graham..Cap and Trade for electricity sector.
- Price Collar...\$10-\$30/mtCO₂eq
- Carbon markets...dynamic and risky.
- USDA/EPA compliance protocol?
- CAR as “pre-compliance”

Projected Carbon Offset Prices for Climate Action Reserve Offsets

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Current Price	\$7.50	\$7.75	\$8.00	\$8.25	\$8.50	\$12	\$12	\$12	\$15	\$15
Optimistic Scenario (Current +20%)	\$9.00	\$9.25	\$9.50	\$9.75	\$10.00	\$18	\$18	\$23	\$23	\$23

- Assumes current price of \$7.50/mt CO₂eq for CAR offsets
- Assumes 5-year strip with incremental increase of \$.25/year
- Years 5-10 assume federal carbon market— standard projections
- Opportunity to negotiate a contract that shares the upside when value of carbon increases

Climate Action Reserve Compost Protocol

- Food wastes, Biosolids likely.
- Manure and Yard waste unlikely.
- Emissions factors?
- Verification and monitoring requirements?

Thank you

Questions?



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