



The SlurryCarb™ Process

CWEA Specialty Workshop
Biosolids Management in California
Whittier & San Francisco, CA

January 26 & 27, 2010

Discussion

- ▶ The SlurryCarb™ process
- ▶ Rialto SlurryCarb™ facility update
- ▶ New opportunities

The SlurryCarb™ Process

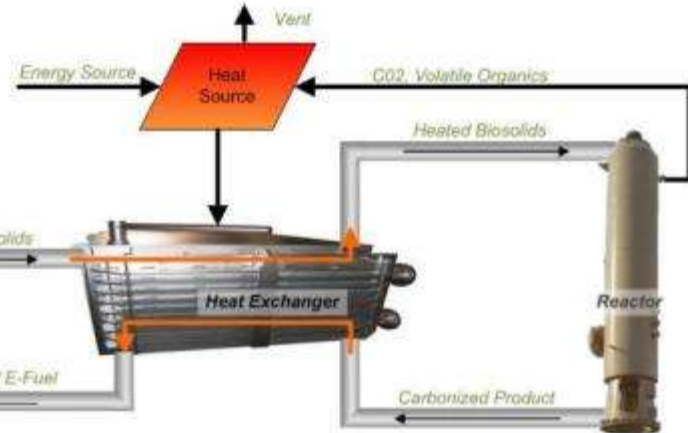
Step 1 - Biosolids Receiving



Step 2 - Biosolids Pressurization



Step 3 - Slurry Heating



Step 4 - Reaction

Step 6 - Centrate Recycle



Step 5 - Dewatering/Drying



Step 7 - Utilization



Rialto SlurryCarb™ Facility Update



The Rialto SlurryCarb™ Facility



Biosolids from the region



The Rialto Facility



~170 TPD E-Fuel to cement kiln



Current stakeholders include five agencies:

▪ LACSD	208 wtpd
▪ OCSD	225 wtpd
▪ City of Riverside	150 wtpd
▪ City of San Bernardino	75 wtpd
▪ City of Rialto	25 wtpd

683 wtpd

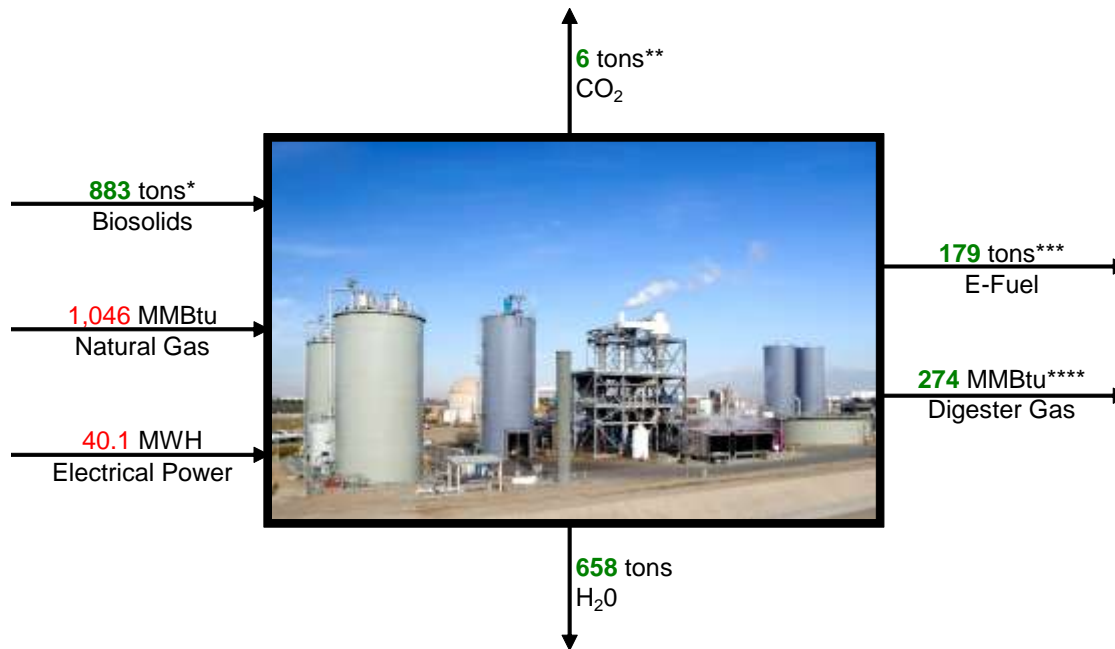
SlurryCarb™ Area

Sept 5, 2008



Rialto Mass & Energy Balance (1/30/08)

The SlurryCarb™ process is a net energy producer, generating 98% more thermal energy than it consumes.



Energy Consumed	(mmBtu)
Net natural gas	772
Electrical power [†]	401
Total	1,173

Energy Produced	(mmBtu)
E-Fuel ^{††}	2,327
Net Energy	1,154

[†]Assumes 10,000 Btu natural gas to produce 1 KWH

^{††}Assumes 6,500 Btu/lb dry E-Fuel

*883 wet tons at ~22.2% solids = 197 dry tons (solids) + 686 tons H₂O

**6 tons CO₂ + 14 tons H₂O as steam

***Dry Basis: 179 dry tons + 14 tons H₂O = 193 tons E-Fuel at 93% solids

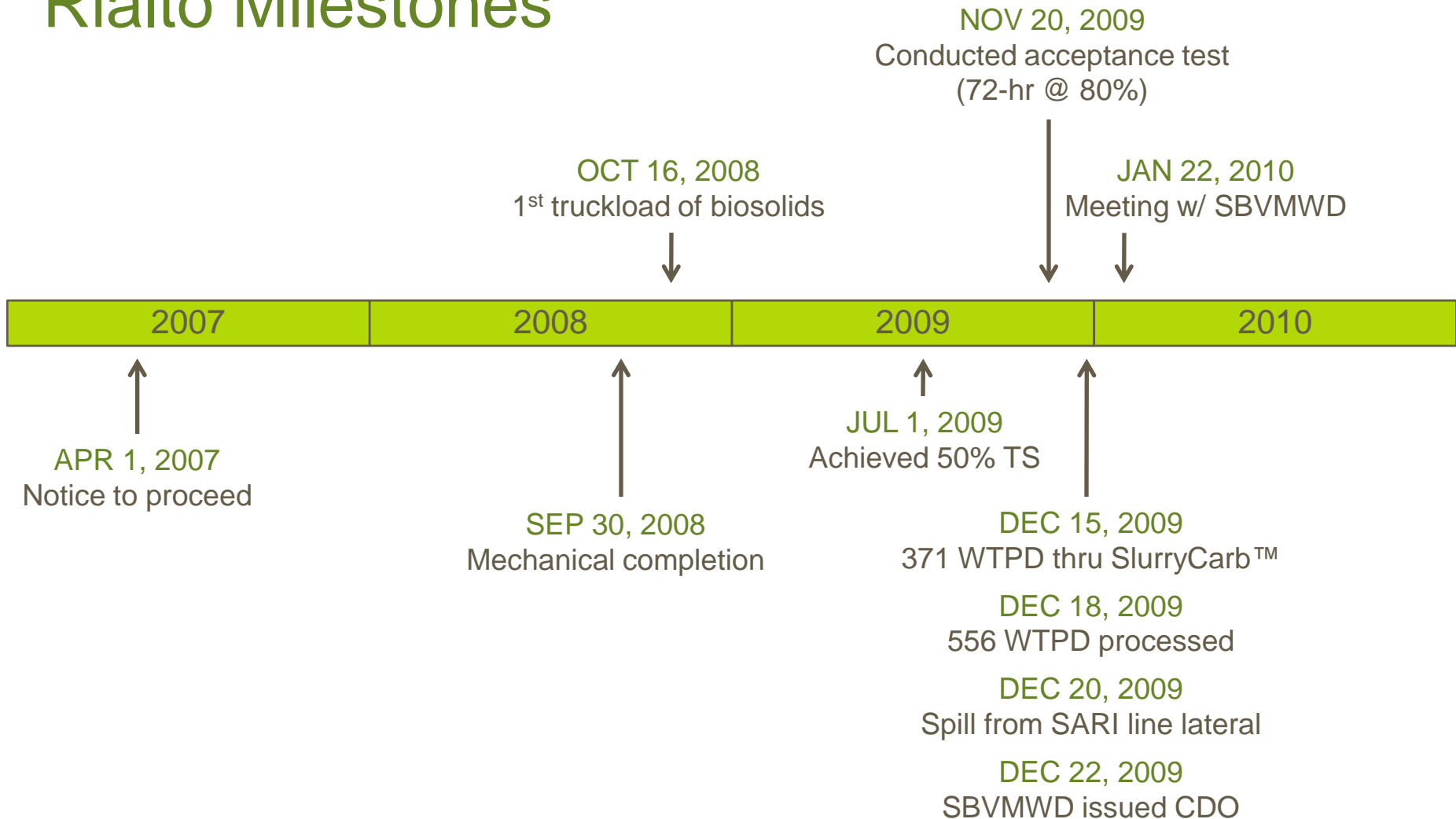
****Accounts for 12 dry tons from the 197 dry tons of solids

ERM Report

Compare SlurryCarb™ + E-Fuel to a Kiln to:

	Tons CO₂e/yr
Drying + land application	101,600
Landfill wet cake	101,100
Incineration	69,200-91,500
Land apply wet cake	71,300
Composting	58,500
Drying + pellets to kiln	12,800

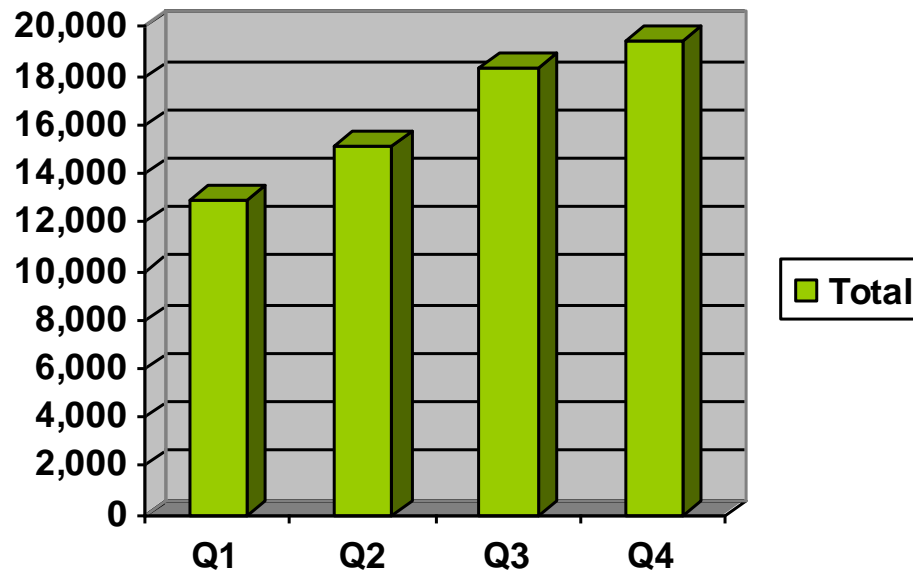
Rialto Milestones



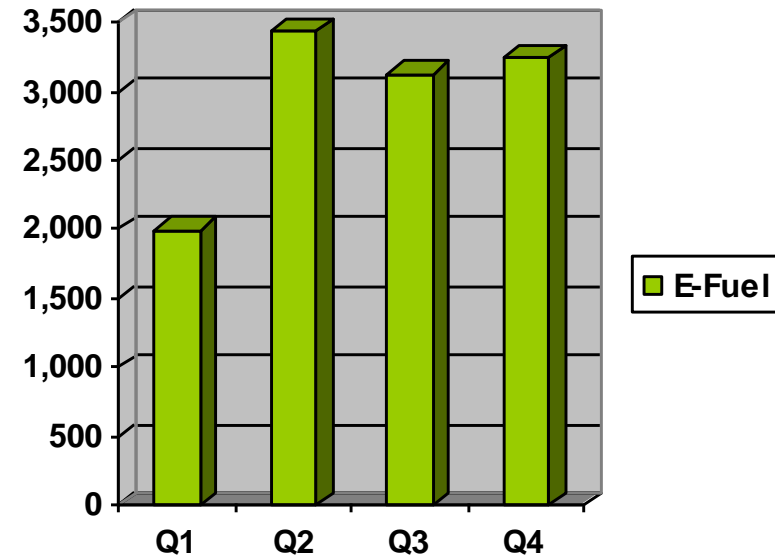
Rialto Production – 2009

Tons

Biosolids Processed
65,879



E-Fuel Produced
12,024



Rialto Start-up Lessons

- ▶ Silo knife gates & conveyor layout
- ▶ Pug mill gearbox-to-shaft bolts
- ▶ Dryer feed conveyors – 18” v. 24” & TS%
- ▶ RTO media fouling
- ▶ Instrumentation compatibility
- ▶ HTF flame detector – UV v. IR
- ▶ SlurryCarb™ circ pump back pressure seals
- ▶ SlurryCarb™ flow meters – mech. v. ultra sonic
- ▶ SlurryCarb™ preheater door flanges
- ▶ SlurryCarb™ carbonization gas release points

Silo w/o Knife Gate

March 10, 2009



Silo w/ Knife Gate



Rialto Modifications

- ▶ Dryer system controls logic upgraded
- ▶ Screw conveyer capacity upgraded
- ▶ RTO media upgraded
- ▶ Disc flow pump casing upgraded
- ▶ Control valve strainers installed
- ▶ Venting system piping modified
- ▶ Wastewater treatment system being upgraded

Dryer System Modifications



Undersized conveyor



Cracked burner nozzle

SlurryCarb™ Modifications



Debris in biosoilds



Discflo pump erosion

SlurryCarb™ Modifications



SlurryCarb strainers



CarbGas venting

Other Issues



RTO



Separating sludges

New Opportunities – Produce Slurry

- ▶ Reduce viscosity from 25,000 to 40 cP
- ▶ Reduce particle size
- ▶ Destroy hair fibers
- ▶ Use in slurry fracture injection
- ▶ Increase capacity of formation by up to 7 Times
- ▶ Increase production of biogas

New Opportunities – Produce Cake

- ▶ Increase cake solids to 50%+
- ▶ Reduce biosolids quantities by 50+%
- ▶ Produce Class A cake for agriculture (or renewable fuel)
- ▶ Increase digester gas production by 20%

Thank You

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