# Challenges with SMUD's Community Renewable Energy Project Deployment

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Webinar

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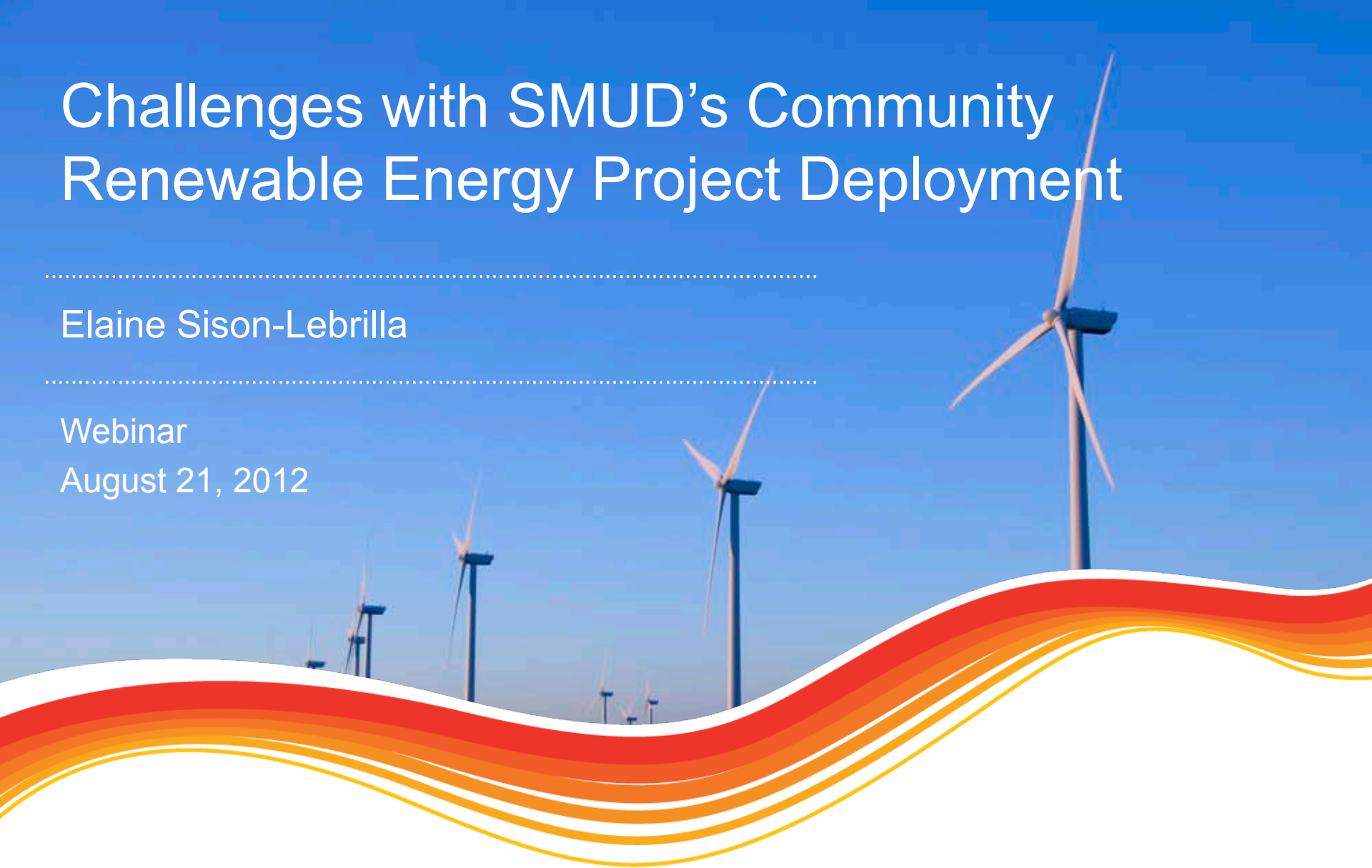

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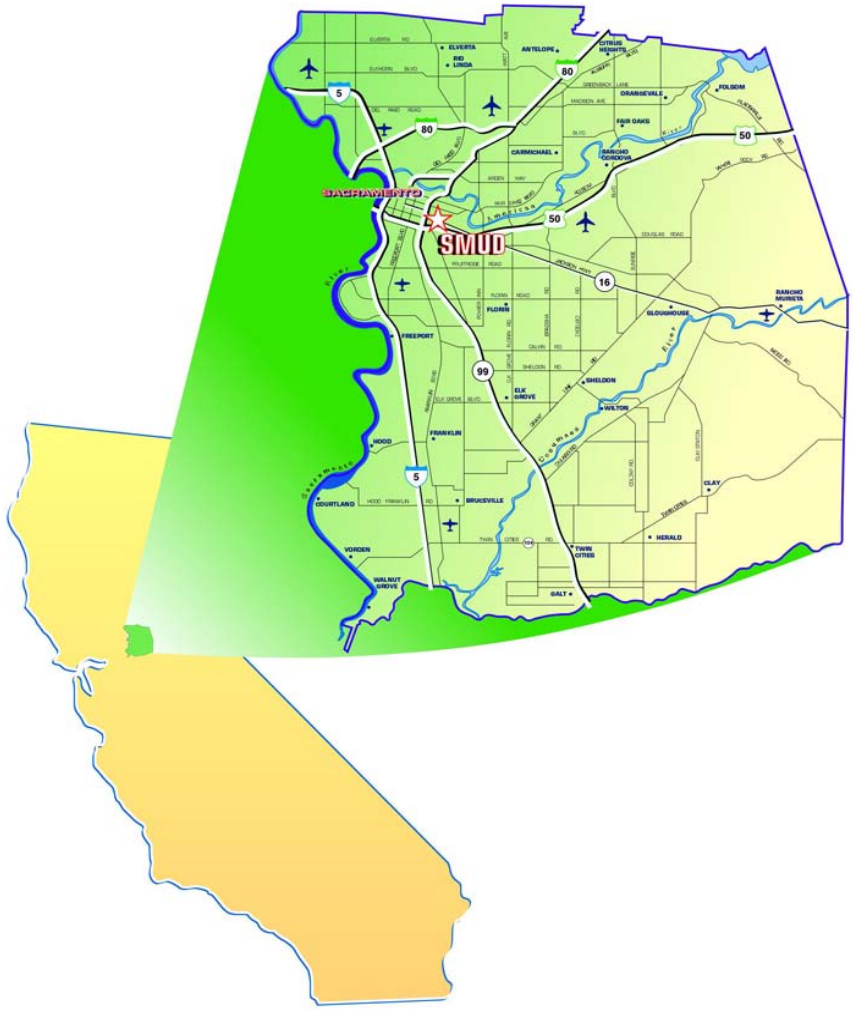
# Overview

- SMUD
- Policy Drivers
- Renewable Mix
- Project Description
- Challenges & Status
- Lessons Learned

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STATE OF CALIFORNIA ENERGY COMMISSION



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# Sacramento Municipal Utility District

- Publicly Owned Utility, elected Board of Directors
- Sacramento County (and Placer County), almost 600,000 customers, 1.4 million population
- Aggressive 23.9% Renewable supply by 2010; 37% by 2020
- GHG Reductions by 2050 (10% of 1990 levels, <350,000 metric tonnes/year)
- California Solar Initiative-125 MW
- Feed-In Tariff (100MW in Contracts)



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# Renewable Goals

- Aggressive renewable energy goals

| Program | 2010 Production | 2011 Production | 2020 Goal |
|---|---|---|---|
| RPS | 21.0% | 21.5% | 33.0% |
| Greenergy | 3.9% | 3.9% | 4.4% |
| Total | 24.9% | 25.4% | 37.4% |


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# Community Renewable Energy Deployment

Grants: $5,050,000(DOE) & $500,000 (CEC)

- Solar Highways
- Co-Digestion of Fat, Oil, Grease Waste and liquid food wastes at County Wastewater Treatment Plant
- Anaerobic Digester at New Hope Dairy
- Anaerobic Digester at Warmerdam Dariy
- Anaerobic Digester at Sacramento Recycling and Transfer Station (BLT Enterprises)

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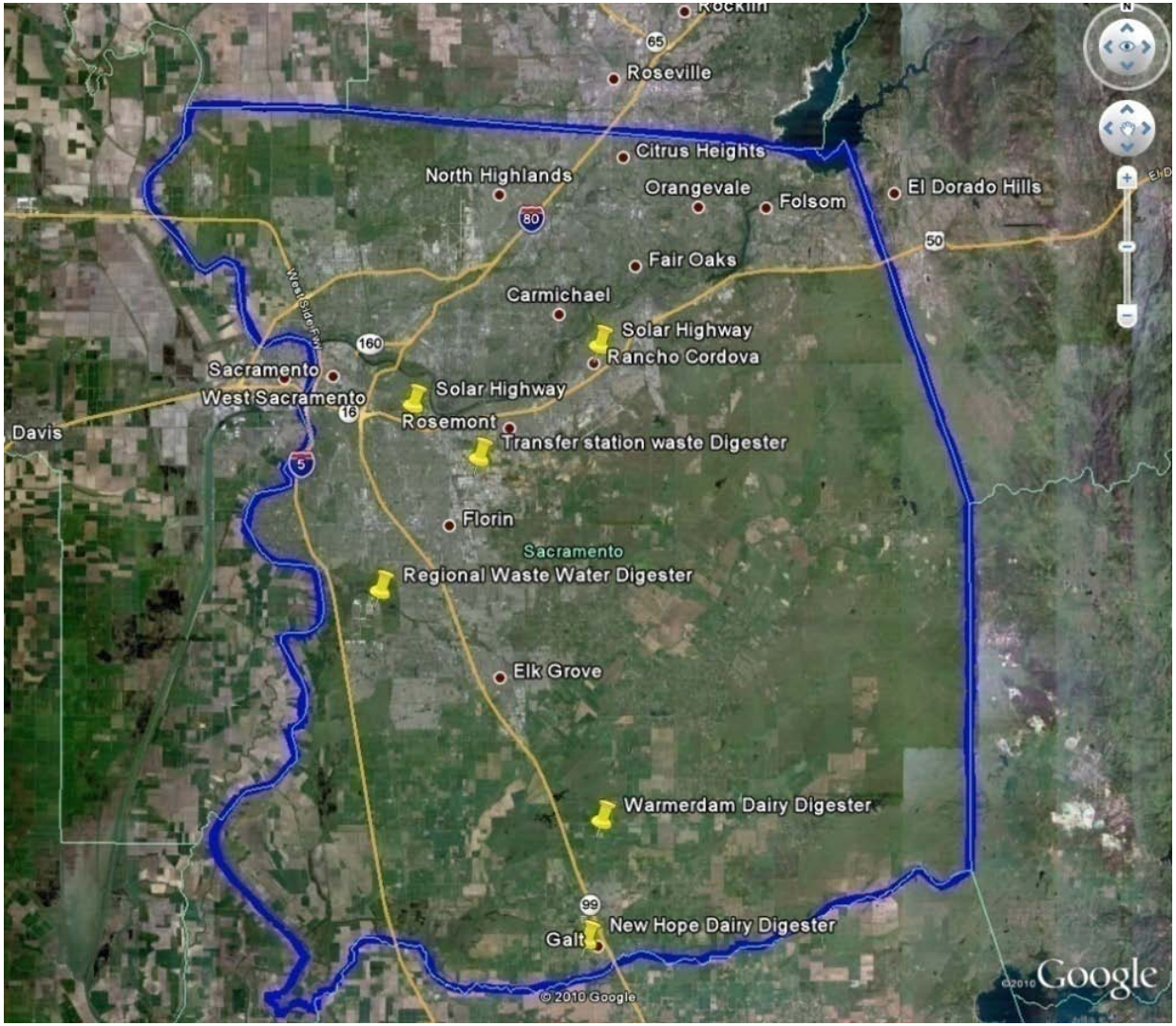
# SMUD CRED Locations

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# Background

- Transmission Constraints
- Focus on local renewable resources
  - Solar
  - Biomass/Biogas
- Local benefits to customer-owners
- Power Purchase Agreements (Feed-In Tariff like Terms)

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# Sacramento Solar Highways Objectives

- Objectives:
  - Promoting public awareness and support of solar technology and local renewable energy
  - Creating a highly-visible demonstration of the region's commitment to sustainability and the development of "green" technology
  - Assisting SMUD in meeting carbon reduction and renewable energy goals
  - Establishing a blueprint for utility-scale solar power installations on CalTrans public rights-of-way in California.
- Project Partners:

SolFocus
Innovation Inspired by Nature

Caltrans

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# Sacramento Solar Highways Overview

- Plan, design and construct two grid-connected solar photovoltaic systems “on the freeway” (in the Caltrans right-of-way)
- Planned system capacity is 1.4 MW
  - Could power 250 homes
  - Avoids 800 metric tons of greenhouse gas emissions per year
- Collect data on system performance and establish a “blueprint” for future highway solar installations in California

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# Sacramento Solar Highways Challenges

- RFP released for Developers last year. Received only one bid, high cost to build
- Cancelled the solar highways project
- Changed to Simply Solar. Released Statement of Interests (SOI). Received 11 proposals, awarded to Conergy

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# SRCSD Co-Digestion of FOG & Liquid Wastes

- Desired Outcome:
  - Implement full scale co-digestion of fats, oil and grease (FOG) and liquid food processing waste with sewage at the Sacramento Regional Wastewater Treatment facility (estimated power recovery of 1 - 3 MW).

- Partners:
  - Sacramento Regional County Sanitation District
  - Contractor- TBD



# SRCSD/SMUD Partnership

- The Sacramento Municipal Utilities District (SMUD) currently generates energy at the Carson Energy Cogeneration Plant located in the SRWTP property
  - Biogas Produced in SRWTPs Digesters is used as fuel for the gas turbine duct burner at the Carson Plant; in return, the Carson Plant provides steam to SRWTP to meet their heating needs.
- The biogas enhancement project provides an opportunity to:
  - increase biogas production at SRWTP
  - provide O & M benefits at SRWTP
  - reduce amount of select waste streams from entering the collection system

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# Pilot Study
## (Dec 2008-Sept 2009)

- To pump food processing waste and brown grease directly into the digester instead of going through the collection system.
- To increase gas production in the digesters.
- Monitor Biosolids characteristics in the digester, monitor any potential operational issues for a full scale system
- Obtain data on the economic factors to better assess the economic feasibility of a full scale project
- Test and control digester maintained with the same process parameters, only change was adding grease or food processing waste to the test digester

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# Pilot Study - Conclusions

- Biogas enhancement is feasible at SRWTP
- No adverse effects observed in test digester
- Energy content remained constant
- No issues noted with Siloxane concentration
- Biogas production increased rapidly
- % of TS for FOG varied greatly (<1 to 23%)
- Pre-screening material improves O&M
- Good mixing of material is key

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# Pilot Study - Results

Strong Community Support

- 2009 recipient of a Sacramento Sustainable Business award, along with other pilot participants
- Many interested processors at the California League of Food Processors Expo in February 2010
- Local Waste Haulers would not need to travel to EBMUD in Oakland, CA

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# Project Status & Financing

Construction: 2012

- Started early 2012
- Expected completion by December 2012

Financing

- $1.5 M grant requirements, functional project by Sept 2013
- Balance provided by SRCSD

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# New Hope Dairy AD Project

- Desired Outcome:
  - Implement above ground digester and 450 kW engine genset for combined heat and power (CHP) application at New Hope Dairy Farm in Galt, California which has over 1200 dairy cows.

- Partners: ABEC New Hope LLC

MT-ENERGIE USA Biogas Technology

CALIFORNIA BIOENERGY

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# Site Features

Free Stalls

Water Beds

Lane with rubber mat

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# New Hope Site Facility Layout

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# Project Status & Financing

- Construction to be started shortly
- Financing – not fully secured yet
  - Funding Agreement for Grant signed
  - Treasury 1603 (filed)
  - Carbon Offset MOU
  - Natural Resources Conservation Service grant (equipment)
  - PPA and IA Agreements signed
  - Loan with New Resource Bank in underwriting process

# Warmerdam Dairy AD Project

- Desired Outcome:
  - Implement a covered lagoon digester and genset that will generate an electrical output of 600 kW for CHP application which has about 1200 dairy cows at Warmerdam Dairy farm in Elk Grove, California.
- Partners:
  - Van Warmerdam Dairy Farm,
  - Maas Energy Works


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# Project Description

- Covered Lagoon anaerobic digester
  - Manure
- $H_2S$ & water removal from biogas
- 600kW CHP GenSet
  - Electricity to SMUD grid
  - Soil amendment
  - BACT emissions, recycle water
- Business model: design, build, own, operate and finance (New Resource Bank)



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# Project Challenges, Status & Financing

- Funding Agreement-Executed with Innate Energy LLC.
  - Obtained Air Permit
  - Developer (Innate) did not secure financing.
  - SMUD & Innate mutually terminated agreement
- Released Statement of Interests for other developer on Nov 30, 2011. Awarded to Maas Energy Works
- Maas Energy Works agreement signed, Dec 2011.
  - Filed Treasury 1603.
  - Completed Preliminary Design for covered lagoon.
  - Filed permit application.
  - Signed Lease with Dairy Owner
  - Construction starts this year



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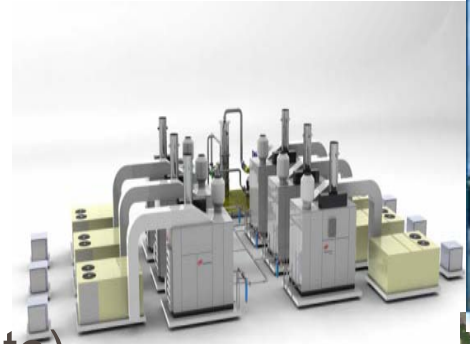
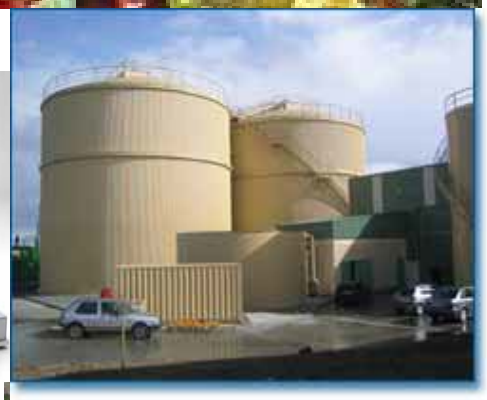
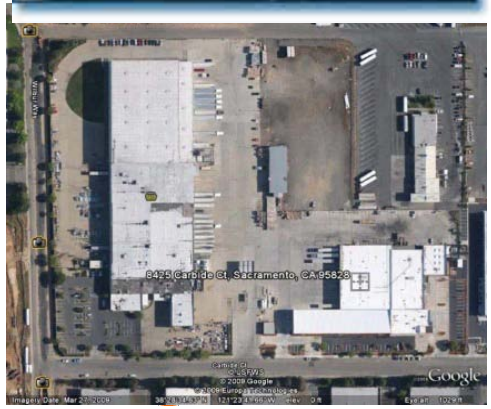
# Food Wastes AD Project

## Desired Outcome:

- Install above ground and complete mix digester that will utilize fruits and vegetables wastes and other food processing wastes, generate up to 1.5 MW.








## Partners:

- Real Energy, Sacramento Recycling & Transfer Station (site)

# Challenges & Status of Food Wastes AD Project

- Real Energy did not secure the site control
- Decided to cancel the project
- Reallocated the grant allocation to other 4 projects

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# Lessons Learned

- Financing can be challenging
- Grant Funding is a two-edged sword
  - Funding
  - Requirements - compliance
- Permitting takes time
- Everything takes longer than you expect.
- Cancelled project or changed developer if needed

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# Conclusion

- GHG/RPS goals/regulation driving SMUD to more renewables
- Utilization of local renewable resources provide benefits/challenges
- SMUD is committed to sustainable and environmentally beneficial energy solutions for our customer-owners



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# *Thank You*

## Questions/Comments??

For more information please contact:

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Special Thanks to SMUD CRED Team:
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