Chevron Energy Solutions

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Overview of Chevron Energy Solutions (CES)

A unit of Chevron that develops, engineers and constructs holistic energy efficiency, conservation and power system projects for institutions and businesses, including Chevron



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Overview of CES

A profitable $250 million energy services company (ESCO)

- Among the top five of a $4 billion U.S. industry
- 300+ professionals in two dozen locations across the U.S.
- Unique in the oil industry
- Technology-neutral, product-neutral

Overview of CES

CES customers generally enter into “performance contracts”

- Project costs are paid from savings that result from high-efficiency equipment installed (e.g., lighting, HVAC, controls)
- Other funding sources include government rebates, bond funds

Projects are often bundled with renewable or alternative power solutions (solar, biomass, fuel cells)

CASE STUDY:

Millbrae Wastewater Treatment Plant

"Grease-to-Power" (Biomass) Project, Millbrae, CA

Project Scope

- Expanded 200 kW microturbine cogenerator fueled by digester gas (methane)
- Grease receiving station that provides city revenues plus free raw material to produce digester gas for on-site power
- Digester mixing improvements
- Compressed natural gas (CNG) storage

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CASE STUDY:

Millbrae Wastewater Treatment Plant

Economics

- $5.5MM cost before rebates (~$200,000)
- 11 year payback on efficiency measures (initial projections)

Benefits

- Energy savings pay for entire project at no new cost to ratepayers
- $264,000 annually in combined energy savings and revenues for city
- On-site power provides reliability, reduces grid power purchases and thus air emissions

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CASE STUDY:

Millbrae Wastewater Treatment Plant

“Grease-to-Power”
Biomass Project
Video

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Anaerobic Digestion

- Multiphase biochemical process involving groups of organisms
- Converts organic compounds to methane and CO2
- Effective with carbohydrates, fats, oils, acids; much less so with cellulose

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Wastewater Digestion Process

- Used in most treatment plants to decompose sewage solids (sludge) and reduce landfill fees
- Gas typically flared or used for digester heating
- Cogeneration common in larger plants in areas with high electric rate

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Opportunity

Expand existing bioenergy infrastructure at wastewater plants to produce biofuels from organic waste

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Wastewater Biogas

Leverage existing infrastructure

- Digesters
- Wastewater treatment
- Solids disposal
- Land use/permitting (odors, truck traffic, noise)
- Native load/electrical interconnect
- Municipal CNG vehicle fleet

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Wastewater Biogas

Economics

- Stable facility; long-term investments make sense
- Public sector cost of capital

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Project Challenges

General

- Effective grease receiving/handling
- Digester performance/ capacity – danger of upset conditions
- Biogas cleanup (H2S, siloxanes)
- Biogas heating value (600 BTU/ft)

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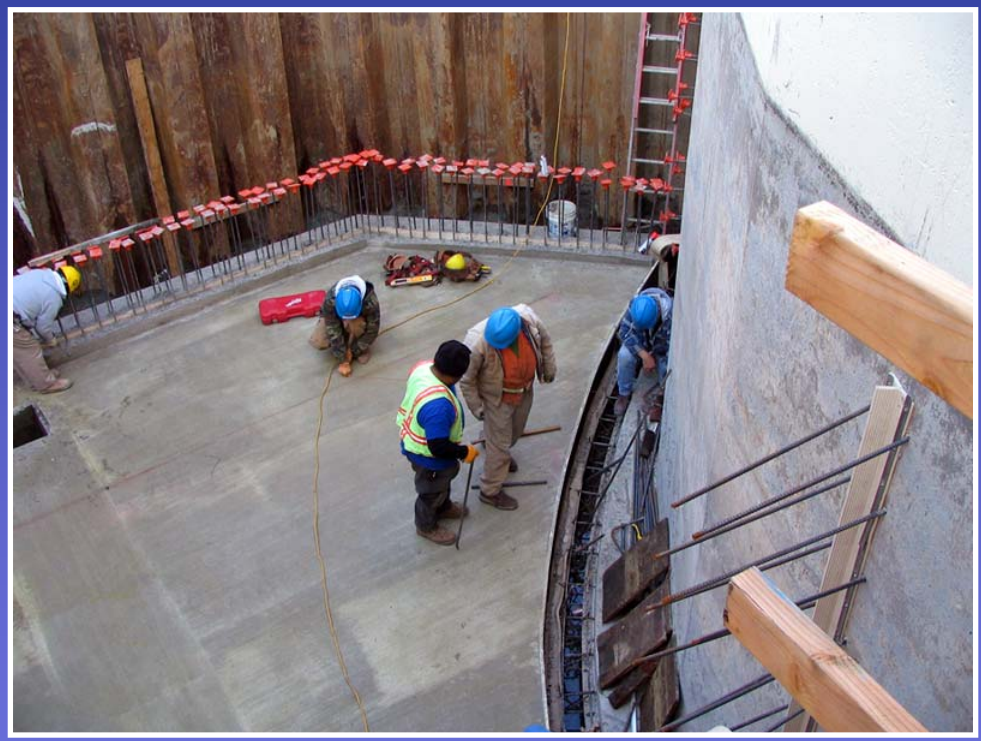
Project Challenges

Specific

- Limited economies of scale
- Retrofit project in cramped facility
- California air quality regulations
- Hotels within 100 yards



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Project Results: *Overperformance*

- Improved volatile solids destruction
- 6000 – 9000 gal/day grease digestion capacity vs. 3000 gpd initial assumption
- Disposal oversub-scribed by haulers; tipping fees exceed initial projections
- Nominal electricity import
- Excess biogas production
- Second phase under way to investigate uses of excess biogas:
  - Gas sale to utility
  - Electricity export
  - Vehicle fuel

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Future

Most municipal wastewater plants can be net generators of renewable energy

Interest from larger plants nationwide

- Economies of scale

Receive other organic waste

- Municipal green waste (home/restaurant)
- Food processor waste

Dedicated food waste digesters

- No pathogens or metals in digestate; source of organic fertilizer

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