

Energy Efficiency Opportunities Agriculture & Food Processing Industries

California BioEnergy Workshop: The Path To Market Transformation

April 18, 2007

Napa, CA

Ricardo Amón

California Energy Commission
Energy in Agriculture Program



Energy in Agriculture Program

Working with California's food & fiber industries to achieve energy efficiency (EE).

Products and Services:

- Industrial BestPractice technology training workshops throughout the state
- Free plant assessments - conducted by US DOE qualified, energy-expert engineers
- Link with manufacturers and utilities to promote adoption of system assessment energy saving opportunities



The Business Case to Invest in Energy Efficiency

Adopting Best Practices Always Makes Business Sense!

- Agricultural Production Best Practices
 - To Reduce Irrigation Energy Intensity -- test water pumps every 2-3 years; repair pumps/wells when needed; when buying or upgrading irrigation equipment insist on best design to achieve optimal distribution uniformity; adopt scientific water management practices for optimal yield;
 - To reduce Diesel Fuel Use -- Regularly test tractor tires to ensure proper inflation, leading to reduced fuel use, increased traction productivity; design crop rotation and land preparation practices to reduce field activities; adopt reduced/conservation tillage practices; use GPS guided systems.

- Dairy Production Best Practices
 - Schedule IOU audit, review results with agent, commit to adopt no-cost BP's, low-cost upgrades and consider budgeting more expensive replacements, i.e., install VFD vacuum and milk pumps; replacing old lighting; adopt refrigeration system assessment recommendations; compressed air; motors.

- Winery Best Practices
 - Benchmark against BEST available technology; adopt commitment to resource conservation and energy efficiency; conduct system assessments, procure adoption; re-evaluate benchmark.

- Food Processing Best Practices
 - Assess energy assets system performance; adopt measures to optimize-- steam, process heat, compressed air, pumps; look for bio-energy opportunities.



Taking Advantage of Available Resources to Establish EE Culture

- **Tapping IOU's Energy Efficiency Funds Makes Business Sense!**

Agricultural Production – pump test and pump repair incentives, motors, irrigation

Dairy Farms, Greenhouses, Wineries – audits, equipment incentives

Food Processing Facilities – audits, system assessments, equipment incentives

Set a baseline, do the numbers, adopt continuous improvement

- **Learning Best Practices Makes Business Sense!**

Support staff attending training opportunities; encourage and reward company personnel to reduce waste; establish benchmarks to challenge performance.

Improve worker skill set, promote local work force trade learning

- **Adopting Distributed Generation May Make Business Sense!**

Install solar photo voltaic powered pumps with or without net metering, use diesel back-up

Install biogas systems to process animal and food waste, with net metering or direct delivery

Think long-term investment with commitment to the environment



The Business Case to Invest in Energy Efficiency Industrial Plant Assessments

- Conduct energy system assessments, commit to identify and do no-cost and low cost measures; prepare energy management (EM) plan and budget to adopt medium-term investment recommendations
- IOU customer representatives working with client to design and install system assessment recommendations
- One or two plant staff will have more knowledge about system; how to monitor, collect and interpret data; establish maintenance protocols
- Collect data to prove that EE investments increased operating efficiency, reduced energy costs, lowered emissions and improved worker productivity



2005/06 Assessments Identified \$7,390,396 in Potential Energy Savings !

Savings Identified

| <u>Company</u> | <u>Product</u> | <u>Gas</u> <u>(MMBtu / yr)</u> | <u>Electricity</u> <u>(kWh / yr)</u> | <u>Potential</u> <u>\$ / yr</u> | <u>Simple Payback</u> <u>in Years</u> <u>(w/o rebate)</u> |
|--|--------------------|-----------------------------------|---|------------------------------------|---|
| Aluminum Wheel Manufacturer (Southern CA) | Cast Aluminum | 83,111 | n/a | \$553,500 | 1 |
| Juice Bottler (Southern CA) | Juice Packaging | 16,500 | 1,400,000 | \$400,000 | 1 |
| Solafide (Irvine) | Noodles | 7,000 | 750,000 | \$180,000 | 2 |
| Aluminum Precision Products | Aluminum Forging | 841 | n/a | \$63,123 | 1 |
| Smurfit-Stone (Santa Clara) | Boxboard Stock | 159,775 | 3,509,184 | \$1,570,000 | 2 |
| CA Portland Cement Co. (Mojave) | Cement | 584,100 | 20,992,450 | \$2,099,200 | 2 |
| Meat Packaging (Southern CA) | Pork Meat Packing | 103,300 | n/a | \$910,500 | 2 |
| Del Monte Foods (Modesto) | Food Canning | n/a | 1,042,018 | \$57,311 | 2 |
| Amcor PET Packaging (Lathrop) | Pepsi PET Bottles | n/a | 117,739 | \$15,000 | 1 |
| Glass Bottle Manufacturer (Central CA) | Bottle Manufacture | n/a | 7,272,727 | \$400,000 | .25 |
| Cheese Manufacturer (Central CA) | Pizza Cheese | 8,042 | 897,010 | \$155,467 | 1.5 |
| Cheese Manufacturer (Central CA) | Pizza Cheese | 60,115 | n/a | \$531,295 | 2 |
| Steel Rebar Manufacturer (Southern CA) | Steel Rebar | 50,000 | n/a | \$455,000 | 1 |
| Total CO2 reduced/yr 79,783 Tons | | 1,027,784 | 35,981,128 | \$7,390,396 | |



The Business Case to Invest in Energy Efficiency

Case Study: Steam System Assessments

- Lessons learned and results of assessments.
 - Most plants do not meter steam, feed-water or condensate return flow rates.
- Most energy saving opportunities identified are in the following areas:
 - Insulation: insulate steam pipe, steam valves and dearator tank
 - Condensate: increase condensate return
 - Boiler Blow-down: reduce blow-down rate and recover heat from blow-down
 - Boiler Efficiency: reduce flue gas temperature and oxygen level
 - Pressure Reducing Valve (PRV): install back-pressure turbine to replace PRV

Annual savings for food processing plants assessed ranges from:
\$180,000 (7,000 MMBtu NG) to \$910,500 (103,000 MMBtu NG)

“The major barrier to better results is lack of awareness of the opportunity. Managers do not always realize that their plants are not cost-optimized for energy efficiency. For many industrial systems, the data required to manage and to improve energy use are neither collected nor analyzed” Alliance to Save Energy



The Business Case to Invest in Energy Efficiency

Facts:

- Fuels and electric power are catalysts to process raw materials into products, heat and power optimization are the value added behind EE
- Energy Efficiency is part of an energy management plan – considering both demand and supply options; direct access, distributed generation, demand response, EE, conservation
- Technology is key to EE; people have to make efficiency work by integrating EM into daily operations; need advocates, leaders, champions!
- EE are the practices, standards and technologies included in the EM plan



The Business Case to Invest in Energy Efficiency

Benefits:

- EM contributes to the outcome of improved business performance
 - Lower energy costs, greater capacity utilization, reduced waste, lower emissions, safety compliance and enhanced risk management

“A well developed EM program is a work plan for continuous improvement. This plan engages human, technical and financial resources. The progress is monitored for attainment of goals. Criteria for action reflects input from engineers, maintenance, financial and utility staff. Staff is held accountable for outcomes. Energy improvements undertaken are those that provide business value to the company” Alliance to Save Energy, 2005



Contact Information

California Energy Commission
Industrial Energy Efficiency MS-42
Sacramento, CA 95814

Ricardo Amón

916.654.4019

ramon@energy.state.ca.us

-or-

Don Kazama, P.E., C.E.M.

916.654.5072

dkazama@energy.state.ca.us

