

Why Industrial Customers Don't Implement Cost-Effective Energy Efficiency Opportunities: A Closer Look at California's Cement Industry

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ECEEE 2007 Summer Study

04 -09 June 2007

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Presentation Overview

- Lost energy efficiency opportunities in the industrial sector?
- Barriers to industrial efficiency
 - Industry-wide
 - In California
- Case studies of energy efficiency program implementation in California's cement industry
 - Energy efficiency practices
 - Energy use decision-making structures



A Changing Landscape for United States Industrial Decision-Makers

- Energy efficiency opportunities still exist, but the character of these opportunities has changed
 - 1970s: energy price spikes cause decreasing energy intensity
 - 1980s: Rapid industrial technological innovation
 - 1990s: Low energy prices cause energy use decisions to be separated from productivity
 - EE programs tout "non-energy benefits"
 - Now: Rising energy prices combined with globalization
 - Instead of rapid industrial growth, we may lose energy intensive industries to international competition

Inevitable conclusion? Maybe not...



Costs, Capital and Timing

- It's time for capital investment
 - Most industries are functioning at close to 100% capacity
 - New savings will come from purchase and optimization of more energy efficient technologies, not changing operating/maintenance practices
- Barriers to market penetration:
 - Low energy costs as a fraction of total plant costs
 - Scarce capital
 - High-priority goals not tied directly to EE measures
 - Often no staff dedicated to energy efficiency
 - Payback time on energy efficiency investment (1-3 years)
 - Doubts/misinformation on availability and effectiveness of energy efficient technology



What is happening in the market?

- Jordon and Nadel (1992)
 - Compiled database of 31 US energy efficiency programs
 - Found 12 successful programs with common components:
 - Flexible program package
 - Finanacial incentives
 - Marketing research and program evaluations
- Shipley and Elliott (2006)
 - Compiled energy efficiency potential studies
 - Savings potential: 8-9% for natural gas, 10-35% for electricity
- Megdal et al (2003)
 - Decision-making trends across firms:
 - O&M, motor and pump, production process and design decisions organized differently



Industrial Energy Efficiency Potential in California

- Agressive EE targets → energy efficiency programs must expand to reach industrial customers
- KEMA and LBNL conducted energy efficiency potential analysis for California's industrial sector
 - KEMA developed DSM ASSYST model to produce estimates of:
 - *Technical potential* (complete penetration of all technically feasible measures)
 - *Economic potential* (technical potential for those measures that are cost effective according to the total resource benefit-cost [TRC] test)
 - Achievable potential (Savings with market intervention like specific program funding)
 - Naturally occurring potential (savings occurring as a result of normal market forces)



Potential California Energy Savings by Industry Group



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Summary of Net Achievable Industrial Potential Results for California

Result	Electricity		Natural Gas	
	Base	Max	Base	Max
Program Costs (Mil.)	\$317 (€ 238)	\$779 (€ 584)	\$48 (€ 36)	\$275 (€ 206)
Participant Costs (Mil.)	\$285 (€ 214)	\$247 (€ 185)	\$24 (€ 18)	\$61 (€ 46)
Avoided Cost Benefits (Mil.)	\$1,523 (€ 1,143)	\$2,353 (€ 1,765)	\$497 (€ 373)	\$1,608 (€ 1,206)
Net Benefits (Mil.)	\$921 (€ 691)	\$1,336 (€ 1,002)	\$426 (€ 320)	\$1,271 (€ 953)
Net Savings	1,706 GWh/Yr 216 MW	2,748 GWh/Yr 378 MW	47 Mth/Yr	192 Mth/Yr
Program TRC Ratio	2.5	2.3	7.0	4.8



Case Study: The Cement Industry

• Study goals:

Within the California cement industry,

- Identifying key energy-efficiency opportunities and associated technical potential
- Identifying key barriers to energy efficiency purchases
- Examining how current utility and tax-funded programs can better address these barriers
- Study approach:
 - Secondary data analysis
 - Walk-through surveys of customer facilities and in-depth interviews with customer decision makers
 - Analysis of collected data



Profile of California's Cement Industry

- CA is the largest cement producing state in the US (10-15% of US cement production)
- 31 sites (11 engaged in full-scale cement production)
 - 11 sites account for 90% of CA cement industry electric use and 80% natural gas use
- Technical potential savings for electricity and natural gas of about 20% over 2002 levels.

California Cement Industry Energy Consumption





Customer Interviews

Customer interviews with key plant managers focused on various factors that affect their decision to undertake energy-efficiency investments:

- Importance of Energy Costs
- Energy in Relation to Other Business Factors
- Energy Management Policy
- General Investment Decision-Making Practices
- Energy-Efficiency Decision-Making
- O&M Practices
- Attitudes Towards Energy Efficiency
- Energy Efficiency and Program Awareness/Participation



Barriers

- Barriers to Energy Efficiency
 - Limited Capital
 - Production Concerns
 - Limited Staff Time
 - Information
 - Reliability Concerns
 - Hassle
 - Facility Uncertianty

- Barriers to Program Participation
 - Short Program Period
 - Limited Incentives
 - Measurement and Verification
 - Requirements
 - Program Paperwork



Program Recommendations

- Increase program time limits for project implementation
- Integrate industrial program activities with US Department of Energy and other initiatives
- Provide energy manager funding
- Increase rebate limits
- Make incentives conditional on customer installation of very cost-effective measures
- Provide audits for cross-cutting technologies
- Provide funding for industry-specific education and training



Conclusions

- The energy efficiency decision-making landscape is changing, but cost-effective energy efficiency improvements do exist
 - Capital investment, new EE program emphasis on industrial customers
 - In California's cement industry, there are differences within the region based on money available for EE
 - We have targeted recommendations to firms with the lowest funding for capital investment
 - These recommendations will apply to similar types of large "heavy industry" facilities





Thank you for your attention.

Questions/comments?

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