Recent Results from California's Industrial and Financial Energy Efficiency Programs

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Workshop on Financing Energy Efficiency in the Manufacturing Sector

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California's Energy Efficiency Obligation

- Guiding document is the California Long Term Energy Efficiency Strategic Plan:
  - State's integrated framework of goals and strategies for saving energy
  - Covers government, utility, and private sector actions
  - Holds **energy efficiency** to its role as the **highest priority resource** in meeting California's energy needs

2013-2015 Energy Efficiency Programs

- California Public Utilities Commission (CPUC) provides direction and oversight for the programs
- Programs implemented and administered by program administrators (PAs) – 4 major investor-owned utilities (IOUs), 2 regional energy networks, and 1 community choice aggregator - $2.6 billion spent
- Measured energy savings
  - More than 100 evaluation studies conducted across more than 400 programs

Key IOU Program Design Requirements / Incentives

"Sticks": Legislative Requirements

- Portfolio budgets must be reviewed and approved by Commission
- IOUs must meet energy savings goals
- Portfolio must be cost effective
- Programs must meet the requirements of the portfolio guidance decision and pursue Strategic Plan objectives
- 20% of budget must be competitively bid by third party implementers

"Carrots": Utility Benefits

- Efficiency Savings and Performance Incentive (ESPI)
- IOUs get other "passive" benefits from EE programs (e.g., GHG, corporate "green-washing," customer satisfaction, etc.)

Sectors

- Residential homes
- Commercial buildings
- Large and small appliances
- Lighting and HVAC end uses
- Industrial customers
- Manufacturers
- Agriculture

Tools

- Financial incentives and rebates
- R&D for EE technologies
- Financing mechanisms
- Building codes and appliance standards development
- Education and public outreach

Evaluation Studies

- Impact evaluations
  - Measure program's energy and behavioral impacts
- Process evaluations
  - Systematic assessments
  - Identify and recommend program improvements
- Market studies
  - Inform savings baselines, identify and track baseline metrics of market change & inform EE goals and savings potential

Savings

- Evaluated and verified savings
  - Differ from reported savings
    - EE measures not installed properly, incorrect hours of operation used, incorrect baseline assumptions for reported values
- Gross and net savings
  - Differences are due to Free Ridership (savings that would have occurred without program intervention)
- First year savings (first year after installation)
- Lifecycle savings (over lifetime of equipment)
  - Only used for cost-effectiveness calculations

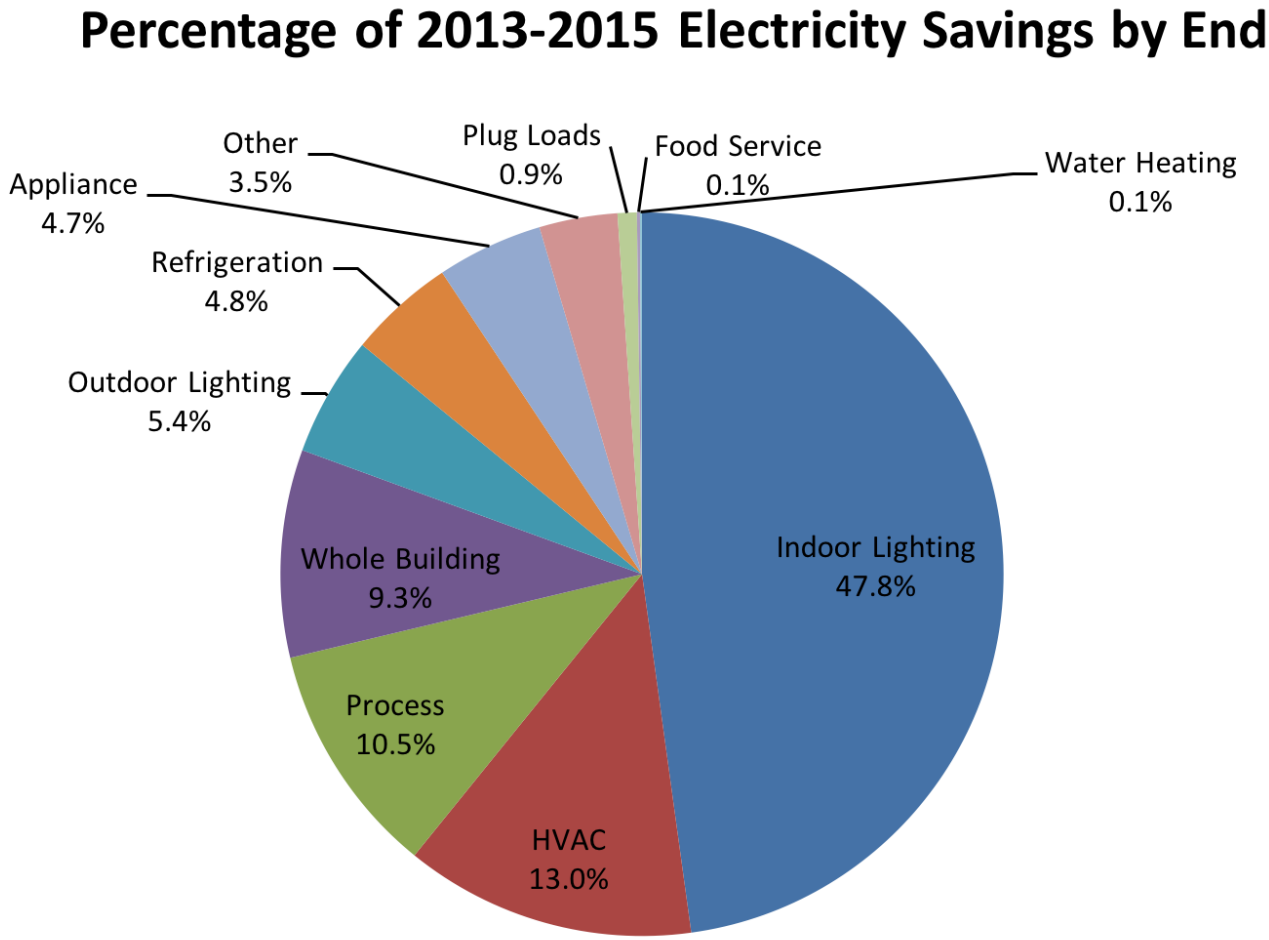
2013-2015 Energy Efficiency Programs Energy and Emissions Savings

		Energy Savings			Emissions	
		Electric (GWh)	Demand (MW)	Natural Gas (MM Therms)	CO_2 (Million Tons)	NOx (1000 Pounds)
CPUC-Set Goals	Gross	4,410	830	130		
Evaluated Portfolio Savings	Gross	5,070	954	100	7,053	2,607
	Net	3,230	624	67	4,102	1,568
Realization Rate (Evaluated/Reported)	Gross	93%	94%	76%		
	Net	83%	87%	75%		
Codes & Standards Savings	Gross	12,282	2,267	93		
	Net	3,597	546	39		

Key Findings

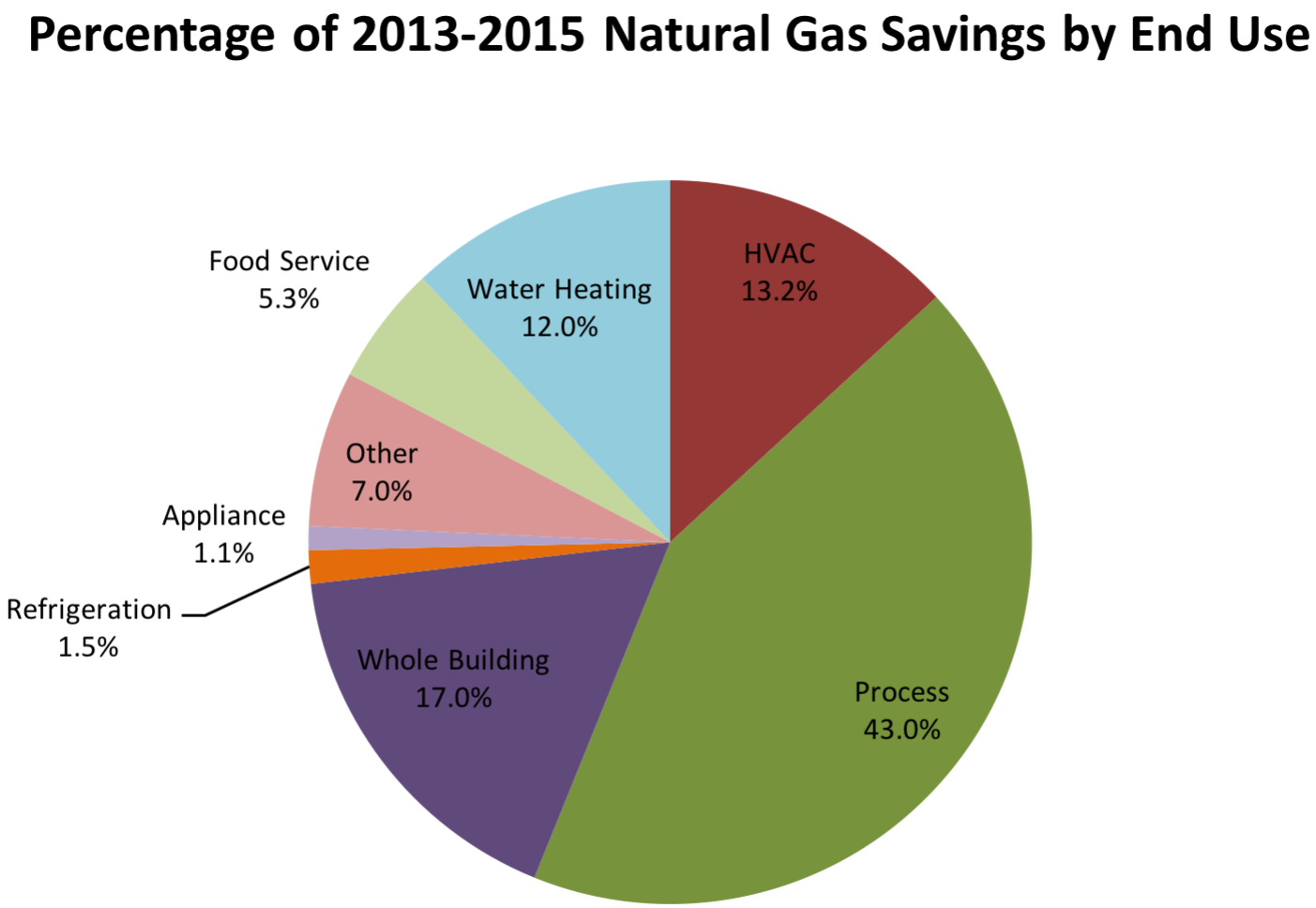
- Commercial sector surpassed Residential sector: largest share of electric savings – 48% vs 38%
  - Due to successful market adoption of efficient lighting in the Residential sector
- Industrial sector: largest share of natural gas savings (52%) [Commercial: 40%]
- 2/3 energy savings tied directly to EE programs
- Evaluated portfolio not cost effective
  - Total Resource Cost (TRC) test: 0.87
- CA moved to a 10-yr rolling EE portfolio after 2015

Percentage of Electricity Savings by End Use



*Evaluated Gross Savings, excludes Codes & Standards

Percentage of Natural Gas Savings by End Use



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Today's Presentation

- Focus (subset of 400 programs):
  - Industrial
  - Finance
- NOT talking:
  - Residential, commercial, institutional partnerships, agriculture, HVAC, lighting, zero net energy/new construction, codes & standards, integrated demand-side management, workforce education and training, marketing, education and outreach, emerging technologies, local government partnerships, regional energy networks & community choice aggregators

I. Industrial Programs

- 38 programs
  - Targeting refineries, wastewater treatment facilities, etc.
  - Focusing on manufacturing process improvements or retrofitting opportunities, plus new construction projects
  - Energy savings generally calculated on a custom basis: incentives were calculated based on energy saved/project

Industrial Program Findings #1

- Evaluated savings substantially less (44-80%) than PA-reported savings for gas and electricity, due to:
  - Observed changes in operating conditions
  - Baseline specifications misspecified
  - IOU calculations
  - Incorrect equipment specifications
  - Ineligible equipment
  - Incorrect measure counts
  - Free ridership was high for custom projects (based on customer interviews)

Industrial Program Findings #2

- Ex-ante review process initiated to reduce the gap & provide immediate feedback to utilities regarding savings calculation methodologies
  - Early collaborative process to review and approve projects savings estimates prior to implementing projects
  - Challenging => Stakeholder Working Group developed different approaches to the early review process

Industrial – Going Forward

- Strategic Energy Management initiated
  - Training, technical support & incentives
  - Designed to promote persistent operational, organizational and behavioral changes that yield greater efficiency gains
  - Central feature of USDOE's Industrial Program
- Pay for performance
- Increased use of data analytics

Side Note #1: ISO 50001 Certification

- Provides a rigorous, ongoing and independently verified management system to be applied to site energy use
- Assures customers, providers and other stakeholders of a firm's expertise in managing energy
- Organizations are required to:
  - Obtain Senior Management support of a policy to use energy more efficiently
  - Set energy targets and objectives to meet the policy
  - Use data to better understand and make decisions to improve energy use
  - Measure the results
  - Review how well the policy works, and
  - Continually improve energy management
- As of 2017: over 21,000 company sites are ISO 50001 certified in 93 countries – about ½ are industrial

Side Note #2: Manufacturing Sector

- California manufacturers are required to comply with energy-focused standards
  - California Title 24 – building energy performance
  - California AB 1103 – reduce GHG emissions
  - Green Building Initiative (Executive Order S-20-04) – requirements for improved EE and water conservation for all new buildings
- Smart (strategic) energy management prepares them for regulatory compliance
- Non-compliance may mean potential penalties and legal problems

Side Note #3: Manufacturing Sector

- Next 10 Report (2015):
  - California electricity and energy productivity in manufacturing is outpacing the rest of the nation
    - Manufacturing GDP relative to energy costs
  - Electricity bills are lower in California
    - Despite average electricity rates higher than national average
  - California manufacturers spend a smaller share of total operating costs on electricity
    - 0.9% of operating costs on electricity versus 1.1% avg
  - California is still the top state for manufacturing
    - Led by chemicals, and computer and electronics products

II. Financing

- Finance plays a crucial role in increasing energy savings, especially in residential sector
  - 54%: High upfront cost barrier to make EE upgrade
  - 33%: Loan could help overcome costs
- Pilot programs explore how to expand access to financing for consumers investing in EE
  - Primarily designed to provide credit enhancements to lenders mitigating their risk, thus supporting lower interest rates and better terms for consumers

Financing Programs

- On-bill financing
- American Recovery and Reinvestment Act (ARRA)-originated financing
- Financing pilots for SF & MF residential customers and small business and non-residential customers
- Support all DSM investments: EE, DR, DG, storage
- Total funding: $300M
- Treated as non-resource programs [no savings attribution]

On-Bill Financing (OBF)

- Eligible customers applying for EE program rebates or incentives can finance the balance of their project costs using on OBF loan at zero percent interest
- Loan installments: line item on utility bill
- Minimum loan: $5K; maximum loan varies by customer type and IOU
- OBF loans are designed to be bill neutral: Monthly payments do not exceed projected monthly energy savings
- Loan term: Max of 5 yrs (C/I/A) or 10 yrs (taxpayer-funded institutions)

OBF Findings

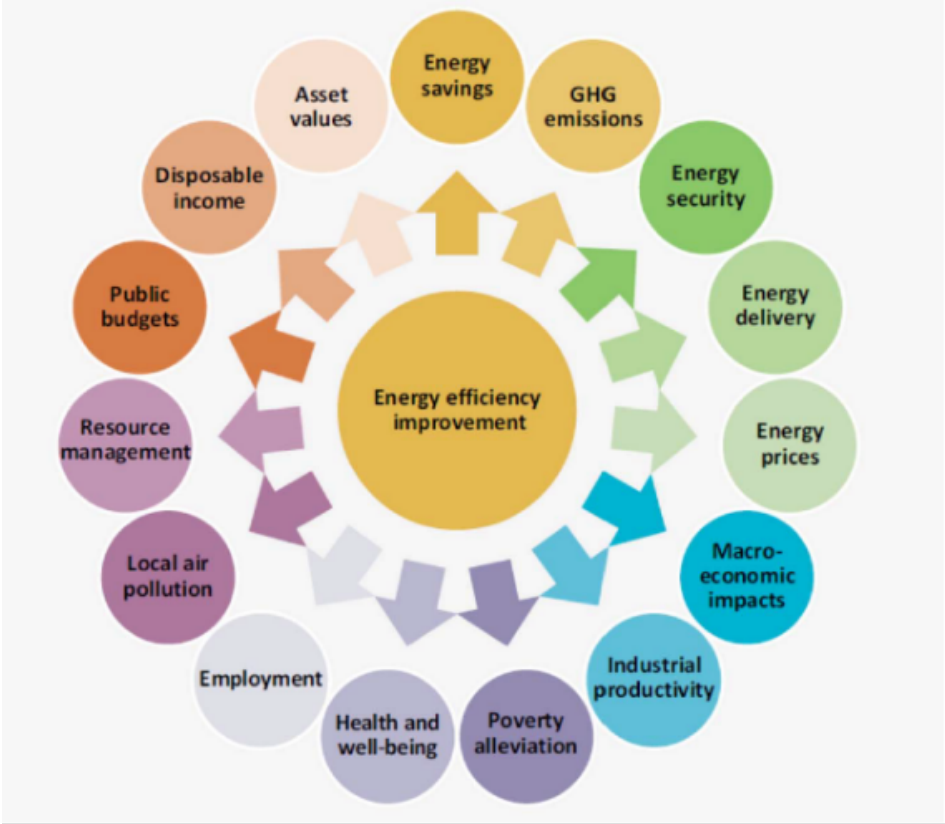
- Revolving loan pool: loans are paid on a monthly basis, and IOUs are able to commit to and make additional loans using the loan pool
- Statewide loan pool: $159M by end of 2015
- Most (54%) loans (% of total amount) went to commercial sector, followed by institutional sector (39%)
- Average loan size: $38K
- More than 50% of measures were lighting only, and another 29% were lighting+

III. Concluding Comments #1

- Varied response of manufacturing sector to EE programs
  - Very large manufacturers are more interested than smaller ones (too busy)
  - Must align offerings with their business time tables for their review of O&M and capital spending
- Financing alone does not work
  - Financing PLUS Education is critical
- Behavior is critical
  - Not just EE technology and cost-effectiveness (IRR, B/C, or simple payback)

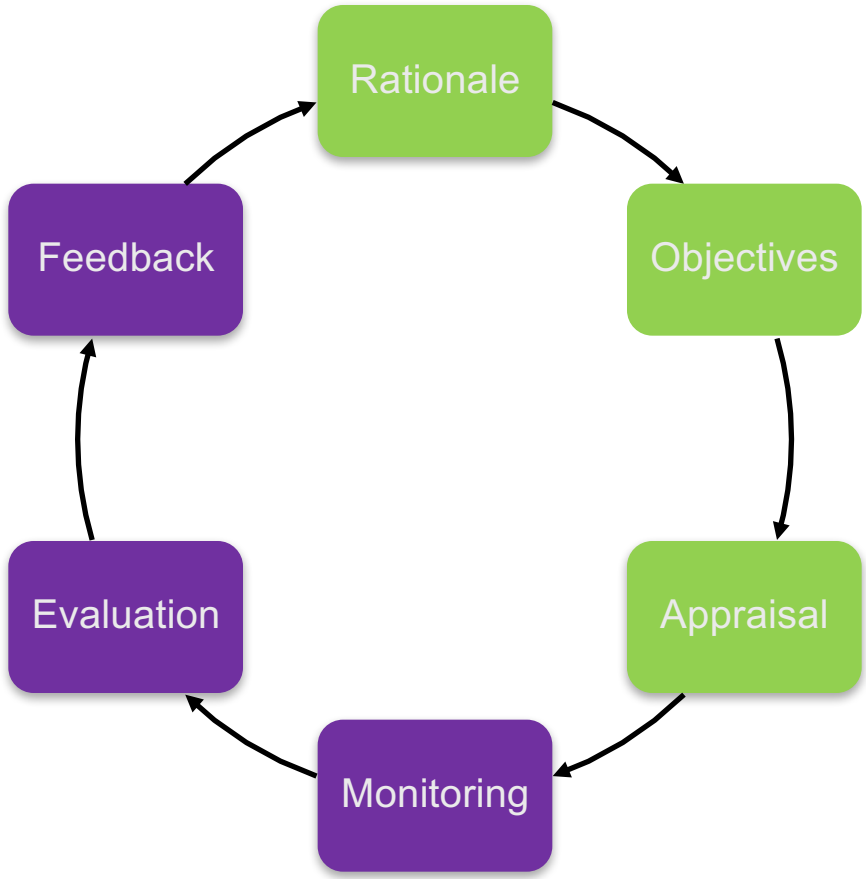
Concluding Comments #2

- **Non-energy impacts**
  - Assess broader productivity or quality gains
  - Can be as high as or higher than the energy cost saving benefits achieved by the projects
  - If programs employed systematic ways to assess non-energy impacts earlier in the project cycle, the resulting total returns and shorter payback could tip the scale on a variety of projects from “wait and see” to implementation



Concluding Comments #4

- **Evaluate!**
  - Conduct:
    - Process Evaluation
    - Impact Evaluation
    - Market Evaluation
  - Include evaluators (especially women) on team early on – when designing projects & programs
  - Build up evaluation capabilities: EEAP



2nd Energy Evaluation Asia Pacific Conference

30–31 October 2019

Amari Watergate Hotel Bangkok, Thailand

Abstracts Due May 6

Conference topics include:

- Evaluating energy policies and programs for the energy transition
- Assessing energy efficiency technologies and practices
- Monitoring Nationally Determined Contributions (NDCs)
- Measuring progress towards Sustainable Development Goals
- Evaluating renewable energy potential and results
- Evaluating non-energy impacts (multiple benefits)

Who should attend?

- Energy evaluators
- Policy makers
- Program managers
- Academics
- Energy professionals

For more information and to register your interest visit
www.energy-evaluation.org

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Time for Questions