

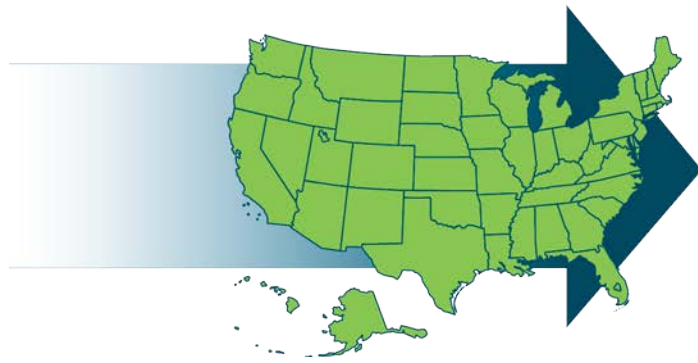
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STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector

May 15, 2014

Sandy Glatt, DOE AMO



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SEE Action

- Facilitated by DOE and EPA; builds upon the National Action Plan for Energy Efficiency
- Network of 200+, led by state and local policymakers, bringing EE to scale
- Provides best practices and recommended approaches on key EE policy/program areas based on state/local experience
 - Guidance Documents
 - Trainings
 - Dialogues and Events
 - Technical Assistance
- Goal: achieve all cost-effective EE by 2020
 - EE, not RE
 - Built environment, not transportation
 - State/local policy, not federal policy



8 working groups focus on largest areas of opportunity/challenge for greater investment in EE at state & local levels

SEE Action IEE & CHP Working Group Overview

Industrial EE & CHP Working Group

- Co-chairs:
 - Todd Carrier, Washington State University Extension Energy Office
 - Vacant
- 2 DOE staff leads and 2 EPA staff leads
- ~21 Working Group Members
 - State Programs, Coordinating Organizations, Utilities, Research/Academia, Industry

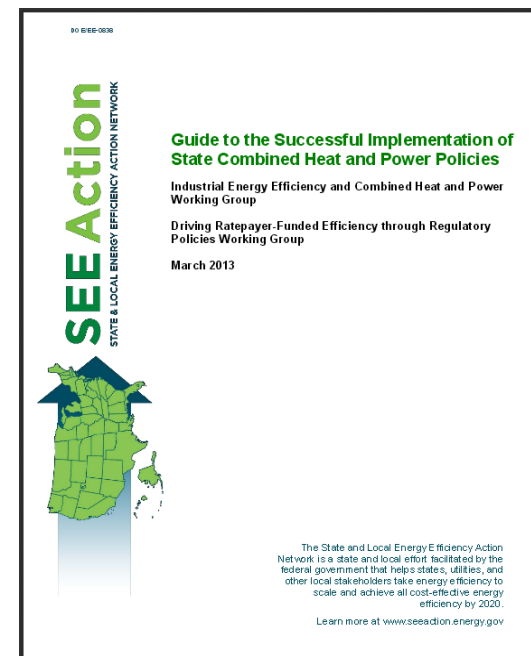
Industrial EE & CHP Working Group Goals

- Achieve a 2.5% average annual reduction in industrial energy intensity through 2020
- Install 40 gigawatts (GW) of new, cost-effective CHP by 2020



IEE& CHP Resources & Activities

- IEE & CHP Working Group Blueprint
- IEE/CHP Webinar Series
 - FY12: 3 webinars with over 300 participants
 - Discussed advancing IEE & CHP policies & programs
 - Future webinars on IEE & CHP targeting specific stakeholder groups (e.g. policymakers, regulators, utilities)
- *Guide to the Successful Implementation of State CHP Policies*
 - Completed March 2013
 - Targeted State CHP Workshops in 2014
- *Industrial Energy Efficiency: Designing State Programs for the Industrial Sector*
 - Completed March 2014
 - Target Regulators and Program Designers



Industrial Energy Efficiency: Designing Effective State Programs for the Industrial Sector

Report prepared for the SEE Action Network

Bruce Hedman, Institute for Industrial Productivity
IIP, SEE Action Network & Clean Energy Solutions webinar
May 15, 2014



Outline

- Purpose of the report
- Importance of Industrial Energy Efficiency Programs
- Ongoing and Useful Types of State Programs
- Programs profiled in the report
- Lessons in Designing and Delivering Programs
 - Industrial and program examples
- Self-Direct Programs
- Emerging New Directions

Designing Effective State Programs for the Industrial Sector

Scope and Purpose

- Provide guidance on successful design & implementation of state IEE programs
- Focus on utility ratepayer-funded EE programs; Does not address issues of institutional planning and utility regulations

Objectives

- Demonstrate the significant benefits of IEE programs
- Explore how all states can promote IEE, even in diverse policy and local contexts
- Outline program features that respond to industry needs
 - Supported by numerous examples and case studies

Audience

- State regulators, utilities and other program administrators



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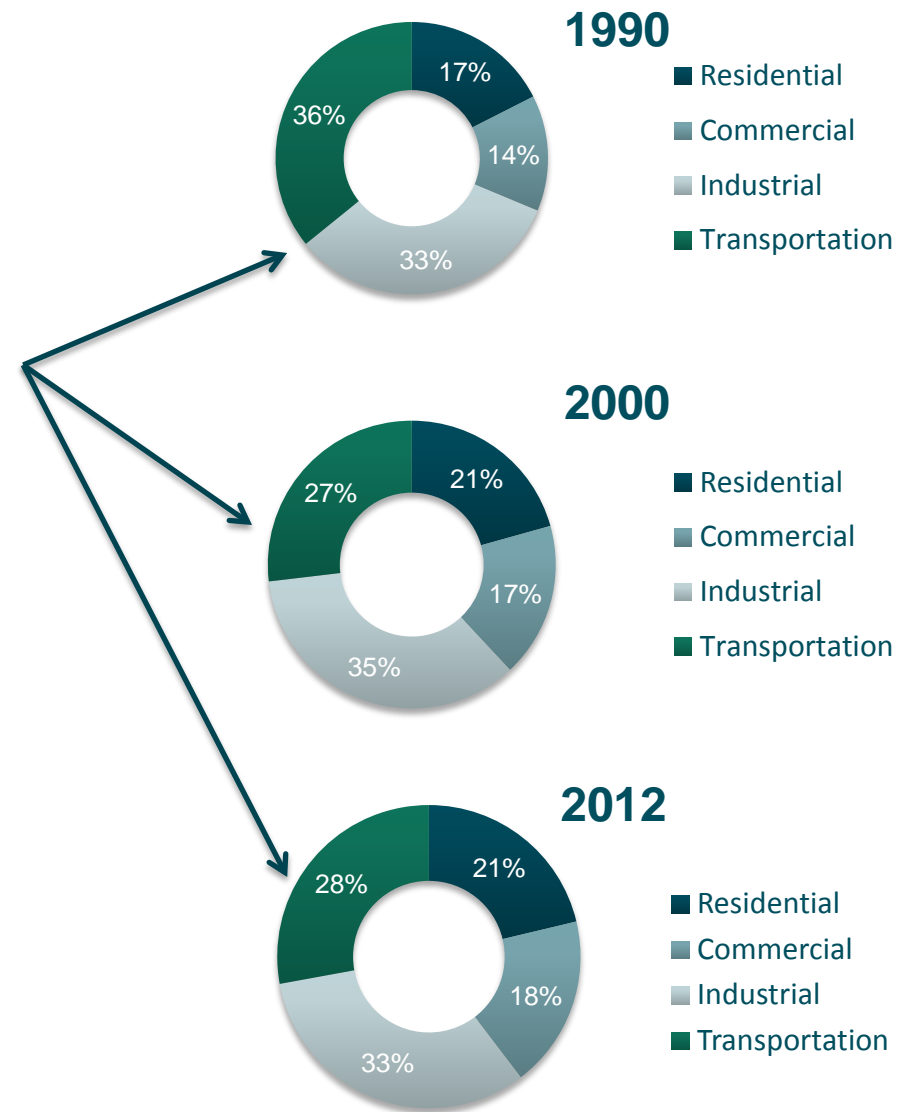
Industry is a Significant Portion of the U.S. Economy

The industrial sector:

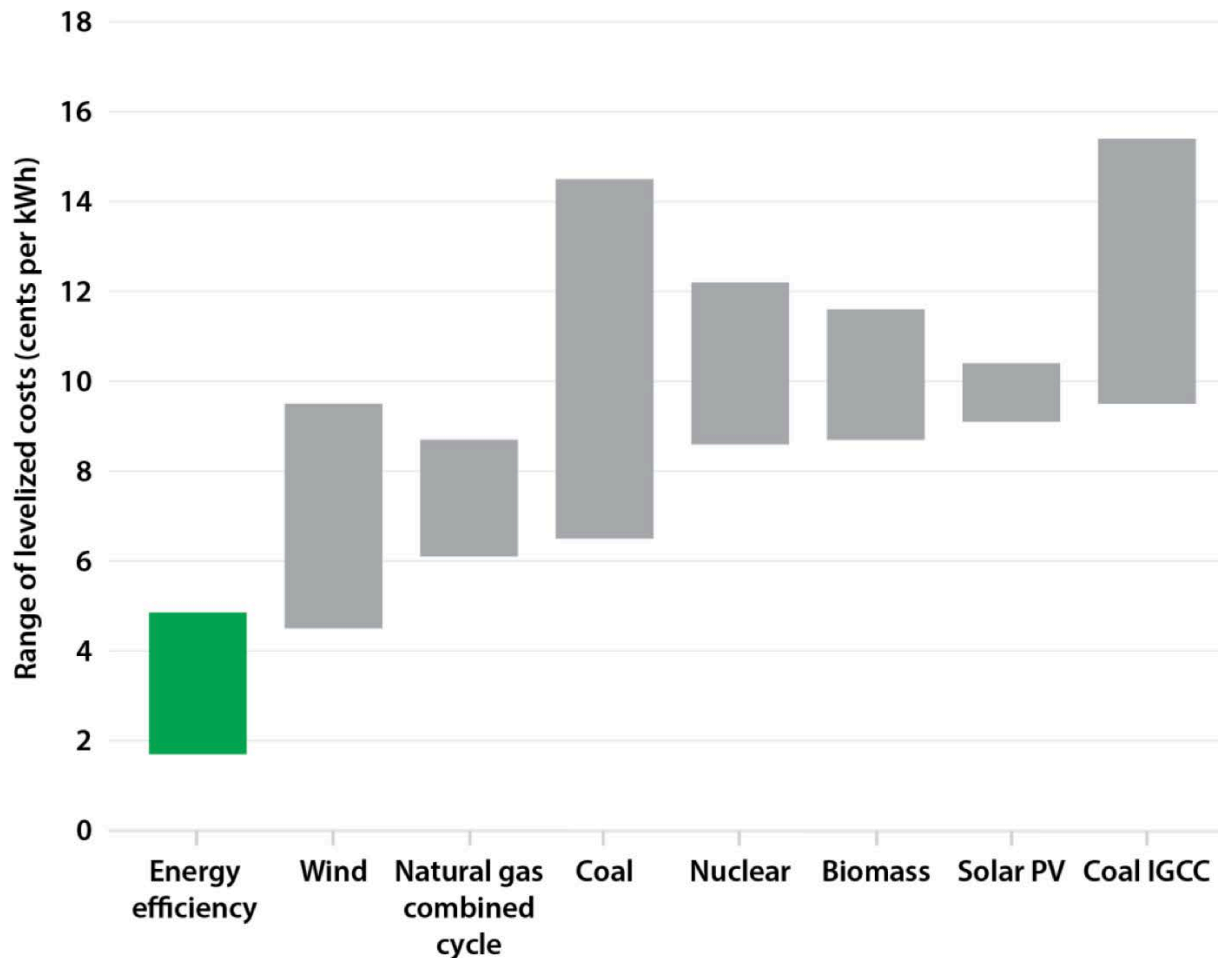
- Consumes more energy than any other sector and accounts for **~1/3 of all end-use energy**
- Remains the largest energy user even though industrial efficiency continues to improve
- Will consume 34.8 quads of primary energy in 2020*
- Has the **potential to reduce energy consumption by ~20% by 2020****

* Energy Information Administration (2013). Annual Energy Outlook

**The McKinsey non-transportation industrial estimates were used to calculate the potential for the full industrial sector.



Energy Efficiency is a Low Cost Resource



Levelized costs of electricity resources (utility program costs over 2009-2012)

Source: ACEEE/Molina (2014). Energy supply data from Lazard (2013)

Electric energy resources:

Cost of energy efficiency is cheaper than conventional supply side resources: EE program administrator costs average \$0.028 per kWh (Molina, 2014), compared to \$0.07-0.15 per kWh for supply resources (Nowak et al. 2013).

Natural gas resources:

Natural gas EE resources cost program administrators on average \$0.35/therm across 10 states (Molina 2014). This value is lower than the average citygate price of natural gas of \$0.49/therm nationally in 2013 (EIA 2014).



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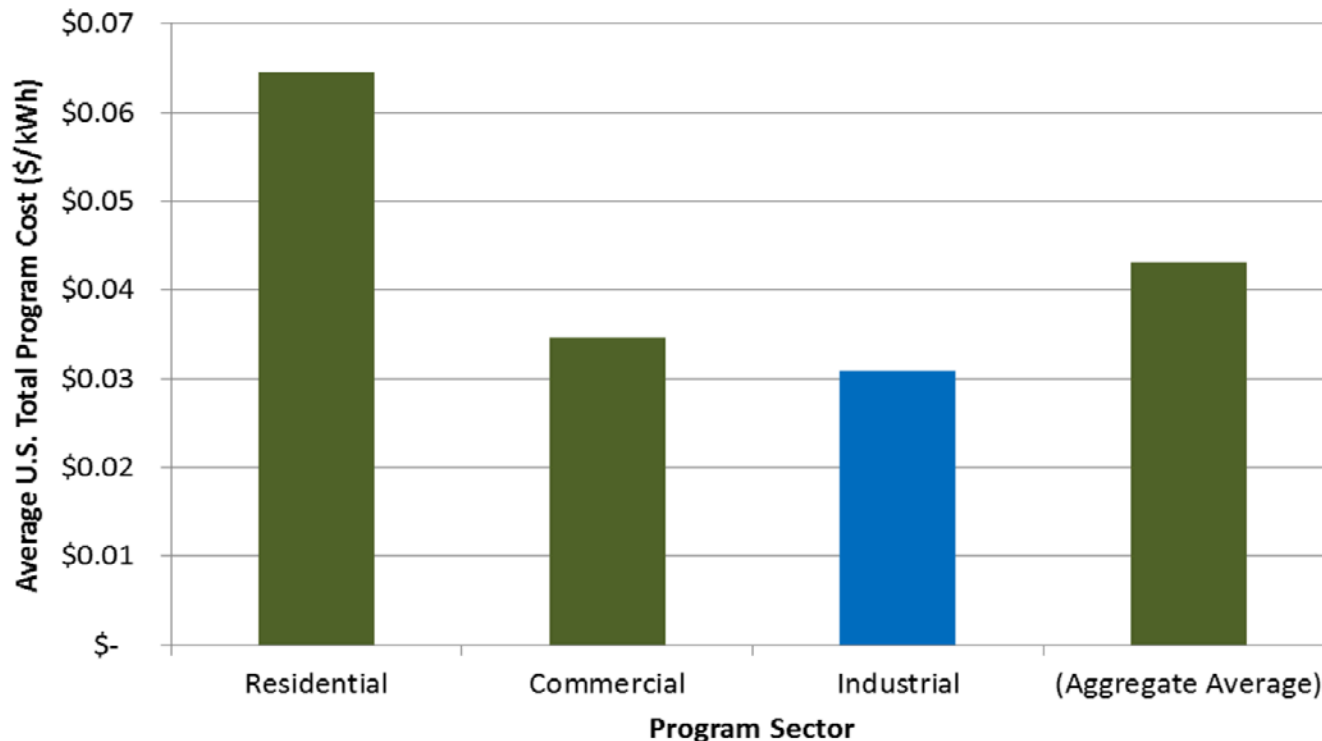
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Industrial Energy Efficiency is Cost Effective

Cost of industrial EE resources vs. other customer classes



Source: Aden (2013) based on EIA 2012 DSM, energy efficiency and load management programs data for more than 1,000 utilities
www.eia.gov/electricity/data/eia861

- Industry has the lowest cost of saved energy on a national level, although it is important to note that cost structures vary by program and sector at the state level
- Possible factors that may influence program costs: 1) program administrator experience 2) Scale of program, 3) Labor costs, 4) State policy environment, 5) Retail rates
(LBNL/Billingsley et al. 2014)

Inclusion of Industrial Programs is Important

- IEE resources are cost-effective
- IEE creates value for companies and society
- Industry programs will be needed to meet overall state-level energy efficiency goals in many states

Benefits for manufacturers

- Hedge against energy price spikes & volatility
- Increased productivity & competitiveness
- Improved product quality, reduced waste

Benefits for society

- Economic development and job retention/creation
- Environmental & health benefits
- Reduced local and regional strain on energy infrastructure

The Spectrum of Industrial Energy Efficiency Programs

KNOWLEDGE SHARING

- Low-cost or no-cost technical assistance
- Workshops and other outreach
- Peer exchange between industrial clusters or groups of companies
- Success story dissemination

PRESCRIPTIVE INCENTIVES

- Explicit incentives or rebates for specific eligible energy efficient equipment and technologies

CUSTOM INCENTIVES

- Specific EE projects tailored to individual customers
- May be a mix of technologies
- Incentives or rebates often based on entire energy savings

MARKET TRANSFORMATION

- Streamlined path for introduction of new EE products to market
- Address structural barriers to EE

ENERGY MANAGEMENT

- Operational, organizational and behavioral changes through strategic energy management
- Continuous energy improvement (e.g. embedded energy manager to provide leadership and continuity for implementing change)

SELF-DIRECT

- Customer fees directed into EE investments in their own facilities instead of an aggregated pool of funds
- Eligibility for participation often based on threshold amount of energy use capacity
- Verified energy savings

Programs Profiled in the Guide

- AEP Ohio Continuous Energy Improvement Program
- AlabamaSAVES*
- BC Hydro Power Smart
- Bonneville Power Administration Energy Smart Industrial and Energy Project Manager
- Centerpoint Energy Custom Process Rebate Program
- Efficiency Vermont
- Energy Trust of Oregon Production Efficiency and energy management
- Michigan Public Service Commission Self-Direct Energy Optimization Program
- NEEA Market Transformation
- New York State Energy Research and Development Authority (NYSERDA) FlexTech and Industrial Process Efficiency (IPE)
- Puget Sound Energy Large Power User Self-Direct Program
- Rocky Mountain Power (RMP) Energy Wattsmart Business (formerly FinAnswer and FinAnswer Express)
- SWEEP's Colorado Industrial Energy Challenge*
- West Virginia Industries of the Future*
- Wisconsin Focus on Energy
- Xcel Energy (Colorado and Minnesota): Process Efficiency Program and Self-Direct

*non-ratepayer program



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Characteristics of Industrial Energy Users

- Energy use is complex and larger industrials are sophisticated energy consumers
- Heterogeneous segments and sub-sectors
- Energy Efficiency often not integrated into a company's decision-making process, and can be split across business units
- Energy Efficiency competes with core business investments
- Energy Efficiency investments can be heavily dependent on a plant's operational cycles
- Co-benefits often not included in the cost-benefit analysis of Energy Efficiency
- Industrials are not fluent in the EM&V world of utilities and other program administrators (free riders, spillover, etc.)

Ten Program Features that Contribute to Success

1. Clearly demonstrate the value proposition of energy efficiency projects to companies
2. Develop long-term relationships with industrial customers that include continual joint efforts to identify energy efficiency projects
3. Ensure program administrators have industrial sector credibility and offer quality technical expertise
4. Offer a combination of prescriptive and custom offerings to best support diverse customer needs
5. Accommodate scheduling concerns
6. Streamline and expedite application processes
7. Conduct continual and targeted program outreach
8. Leverage partnerships
9. Set medium to long term goals as an investment signal for industrial customers
10. Undertake proper project M&V and complete program evaluations



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1 - Demonstrate the Value Proposition of EE to Companies

- Document and communicate operating cost savings and other benefits
- Use case studies of companies within the service territory, state or region that have participated in IEE programs
 - Bonneville Power Administration (NORPAC)
 - Rocky Mountain Power (BD Medical)

Industry Example - NORPAC

Company:

- NORPAC, located in Washington, is the largest newsprint and specialty paper mill in North America
- The 33-year-old mill produces 750,000 tons of paper per year
- Uses 200 MW annually; largest industrial electricity consumer in WA



Project:

- Bonneville Power Administration and Cowlitz County PUD funded \$25 million of a \$60 million project for installation of new screening equipment between refiners to reduce electricity and chemical use

Benefits:

- Estimated to save 100 million kWh per year
 - Equivalent to ~12% reduction in power use
 - Equivalent to enough energy to power 8,000 Northwest homes
- Construction phase of project created 64 full-time family-wage jobs



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Industry Example – BD Medical

Company:

- BD Medical, located in Utah, is a medical technology company that manufactures medical supplies, devices, laboratory equipment and diagnostic products



Project:

- Rocky Mountain Power provided \$712,900 in incentives for a \$1,880,500 project
- Completed 62 energy efficiency projects since 2001, including 29 lighting projects, as well as compressed air upgrades/replacements

Benefits:

- Totaling 10.4 million kWh per year in electricity savings
- Resulting in \$580,000 in annual energy cost savings
- Projects have facilitated maintenance of ISO certifications



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2 - Build Relationships

3 - Industrial Sector Credibility & Technical Expertise

- Develop long-term relationships with industrial customers that include continual joint efforts to identify energy efficiency projects
- Stability in program personnel and savvy account managers can help build trust between program administrator and customers
 - ETO's customer support has encouraged more cost-effective savings
- Addressing industrial companies' core needs requires understanding a plant's production processes, operating issues, and the market context the plant operates within.
- Employing staff/contractor experts that understand the industrial segment and have the technical expertise to provide quality technical advice and support issues specific to that industry and customer
 - Wisconsin Focus on Energy's "cluster approach"



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4 - Address Diverse Industrial Customer Needs

- Manufacturers use energy differently than the commercial sector, typically having significant process-related consumption.
 - Focusing on simple common technology fixes alone will miss many of the opportunities.
- A combination of both prescriptive offerings for common crosscutting technology and customized project offerings for larger, more unique projects can best meet diverse customer needs and provide flexible choices to industries.
- Energy management programs can help mature customers get continued savings
 - Xcel Energy's programs have been lauded by industrial customers for offering simple incentive applications for providing a full suite of programs – prescriptive, custom, self-direct and process efficiency.



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5 - Project Scheduling

- Scheduling of energy efficiency investments can be heavily dependent on a plant's operational and capital cycle
 - Equipment changes must be guided through rigorous, competitive, and time-consuming approval processes
- Programs with multi-year operational planning can best accommodate company scheduling requirements, as
 - Scheduling of capital project implementation must consider both operational schedules that dictate when production lines may be taken out of operation as well as capital investment cycles and decision-making processes

➤ NYSERDA



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Additional Program Features

6. Streamline and expedite application processes
7. Conduct continual and targeted program outreach
8. Leverage partnerships
9. Set medium to long term goals as an investment signal for industrial customers
10. Undertake proper project M&V and complete program evaluations

➤ More details in the report!



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Self-Direct Programs

- Industrial customers often raise concerns about the extent to which ratepayer-funded programs will be able to meet their specific needs
 - Some states allow industrials to “opt out” of paying fees collected for energy efficiency programs
 - Rather than allowing industrial customers to opt out, some states have designed effective “self-direct” programs:
 - Fees from larger customers can be directed into energy efficiency investments in their own facilities instead of a broader aggregated pool of funds
 - If designed and implemented well, self-direct programs can produce cost-effective energy savings equal to what would have been realized in a traditional, administrator-directed program, ensuring EE public policy goals are met
 - Clear self-direct obligations and M&V of results are necessary to ensure least-cost electricity or gas service at a level on par with the contributions of other customers.
 - Consider escrow-like accounts to structure a “use it-or-lose-it” fund base that encourages greater participation.
- Puget Sound Self-Direct Program

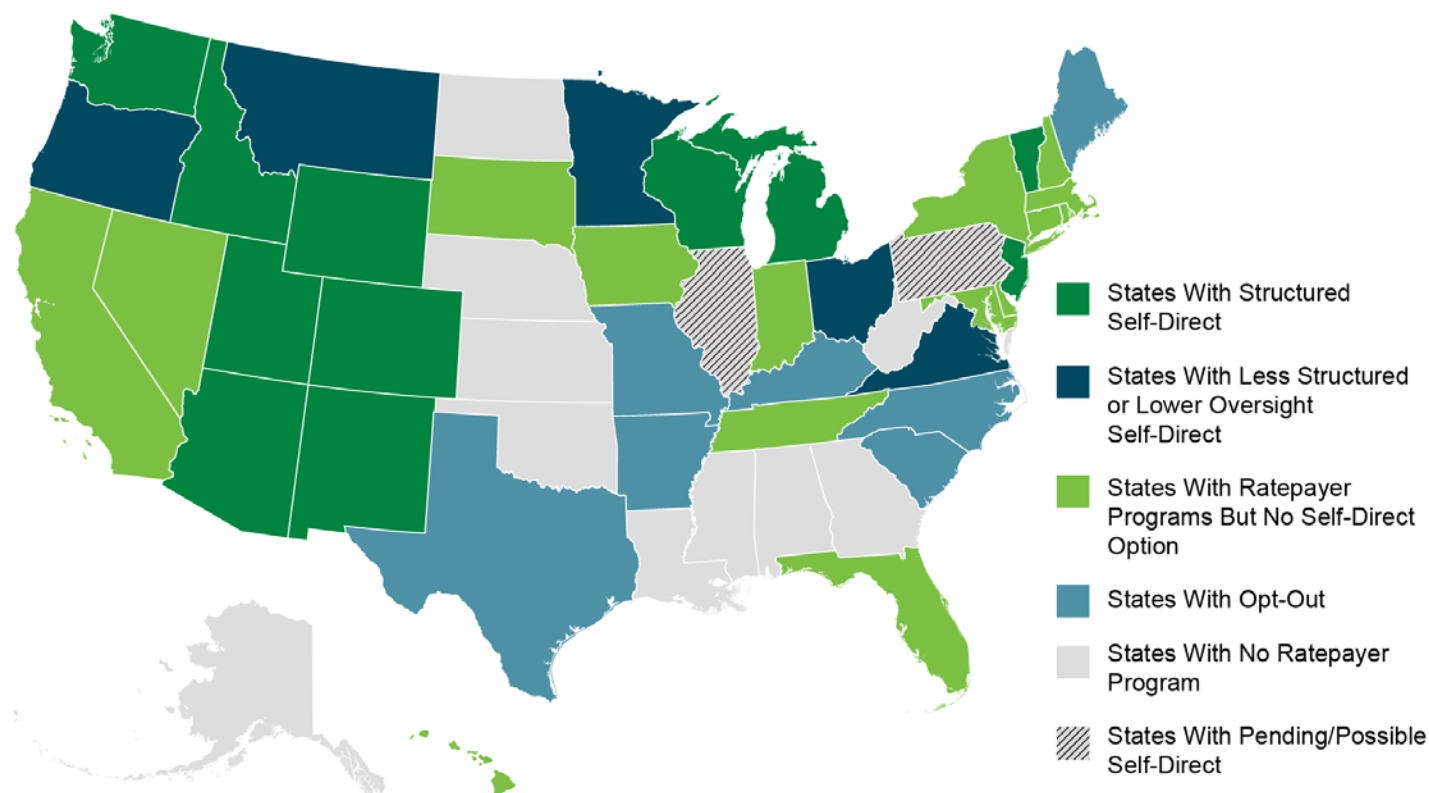


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Self-Direct Programs

A snapshot of self-direct programs among the states as of January 2014:



Source: ACEEE, R.N. Elliott, Presentation to the ACEEE Energy Efficiency as a Resource Conference, September 2013

Emerging New Directions

Four key areas of interest for further program evolution:

1. Increasing support for Strategic Energy Management/ Energy Manager programs
 - Established programs: ETO, WFE, BPA, Efficiency Vermont
 - New programs and pilots emerging: RMP (UT), AEP Ohio, ETO for SMEs, Minnesota, NEEA SEM Cohorts
2. Developing approaches for providing energy efficiency incentives for whole-facility performance
3. Capturing more energy efficiency projects by expanding quantification and recognition of project non-energy benefits
4. Continuing efforts to expand industrial natural gas efficiency programs



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For more information on the IEE report, visit:

http://www1.eere.energy.gov/seeaction/pdfs/industrial_energy_efficiency.pdf

http://www.iipnetwork.org/US_IEEprograms

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Production Efficiency

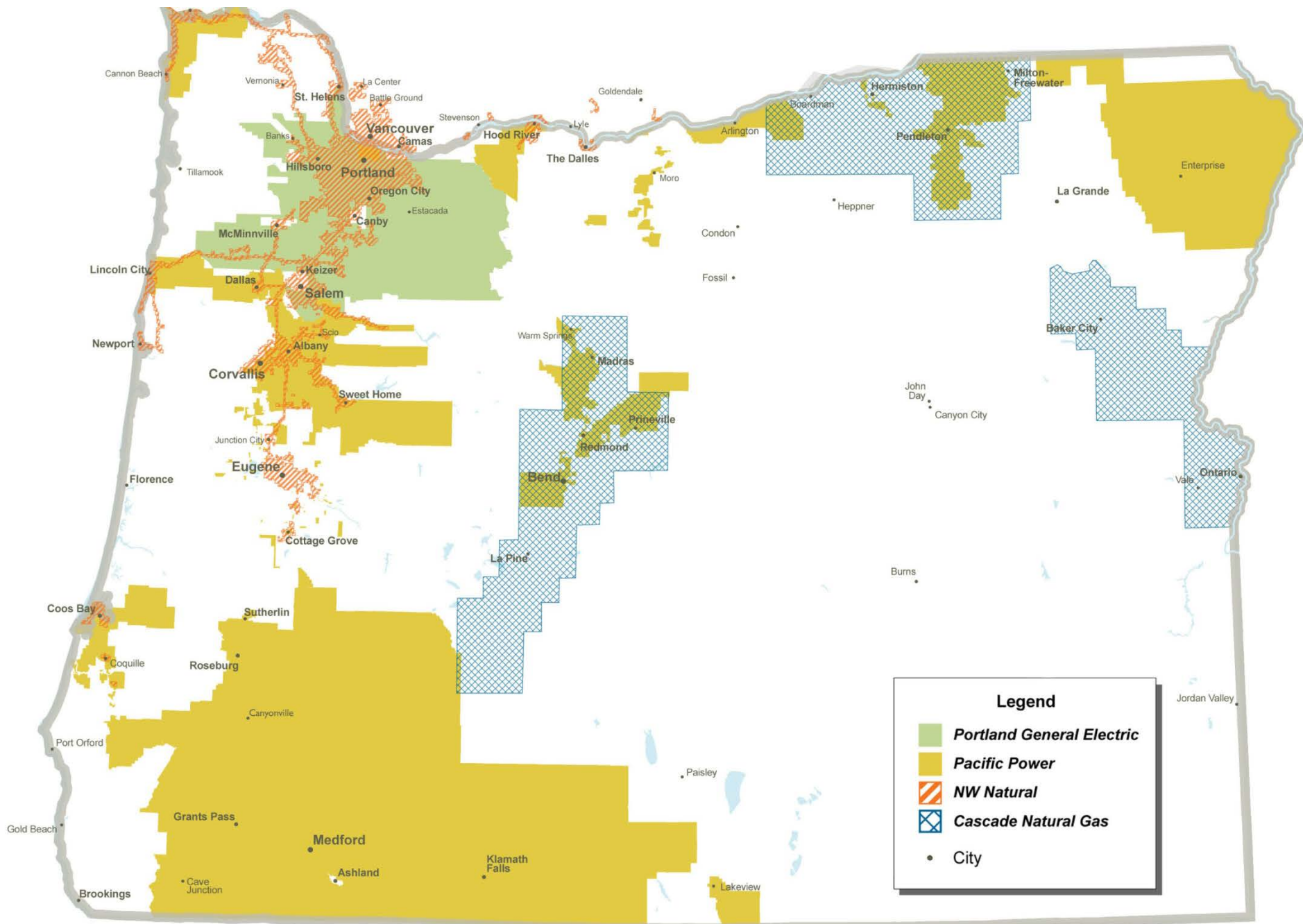
Harvesting energy savings
from Industries in Oregon

May 15, 2014



About

- Independent nonprofit
- Serving 1.5 million customers of Portland General Electric, Pacific Power, NW Natural and Cascade Natural Gas
- Providing access to affordable energy
- Generating homegrown, renewable power
- Building a stronger Oregon and SW Washington





The Production Efficiency program serves:

- Industrial + manufacturing facilities of all sizes
- Agriculture: nurseries, dairies, irrigators
- Water + wastewater treatment facilities

How We Go to Market



Easy to work with...one-stop shop

Industrial energy efficiency experts assigned to your facility work with you to reduce energy costs and optimize use



Long-term perspective with incentives and services for capital projects, O&M and strategic energy management

Implementation: the PE Team

1

Energy Trust

2

**Program
Delivery
Contractors**

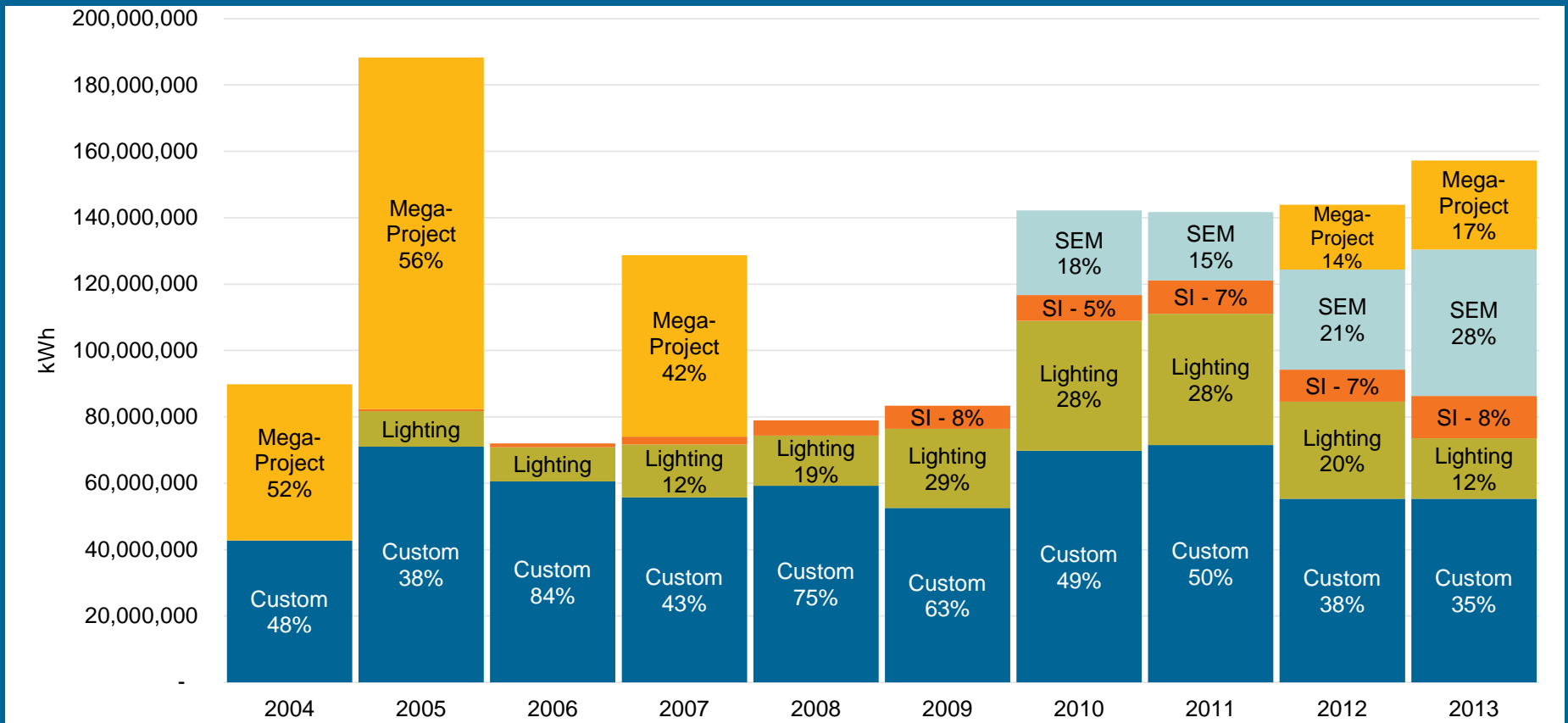
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**Technical
contractors**

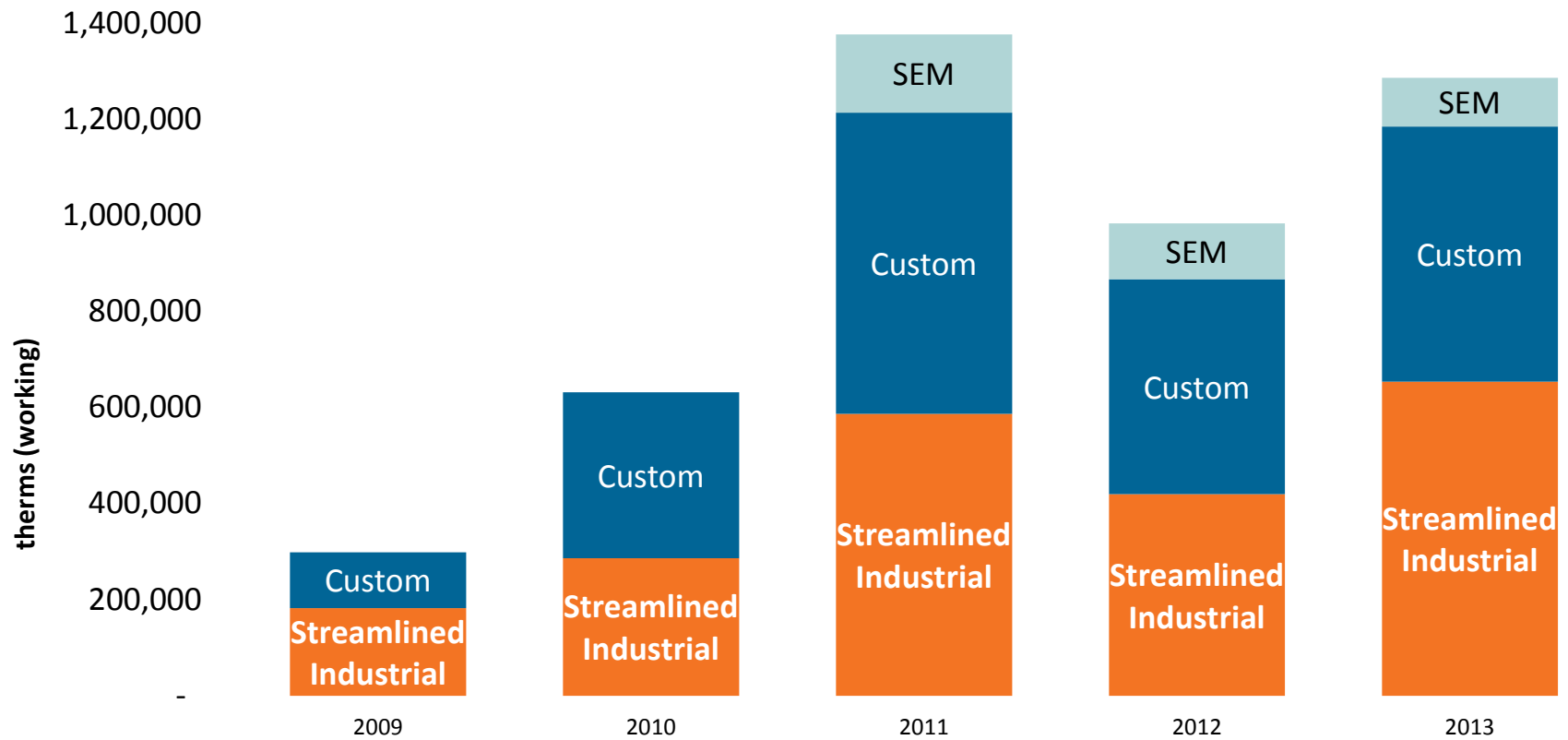
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**Vendors/Trade
Allies**

Electric Savings by Track, Historical



Gas Savings by Track, Historical

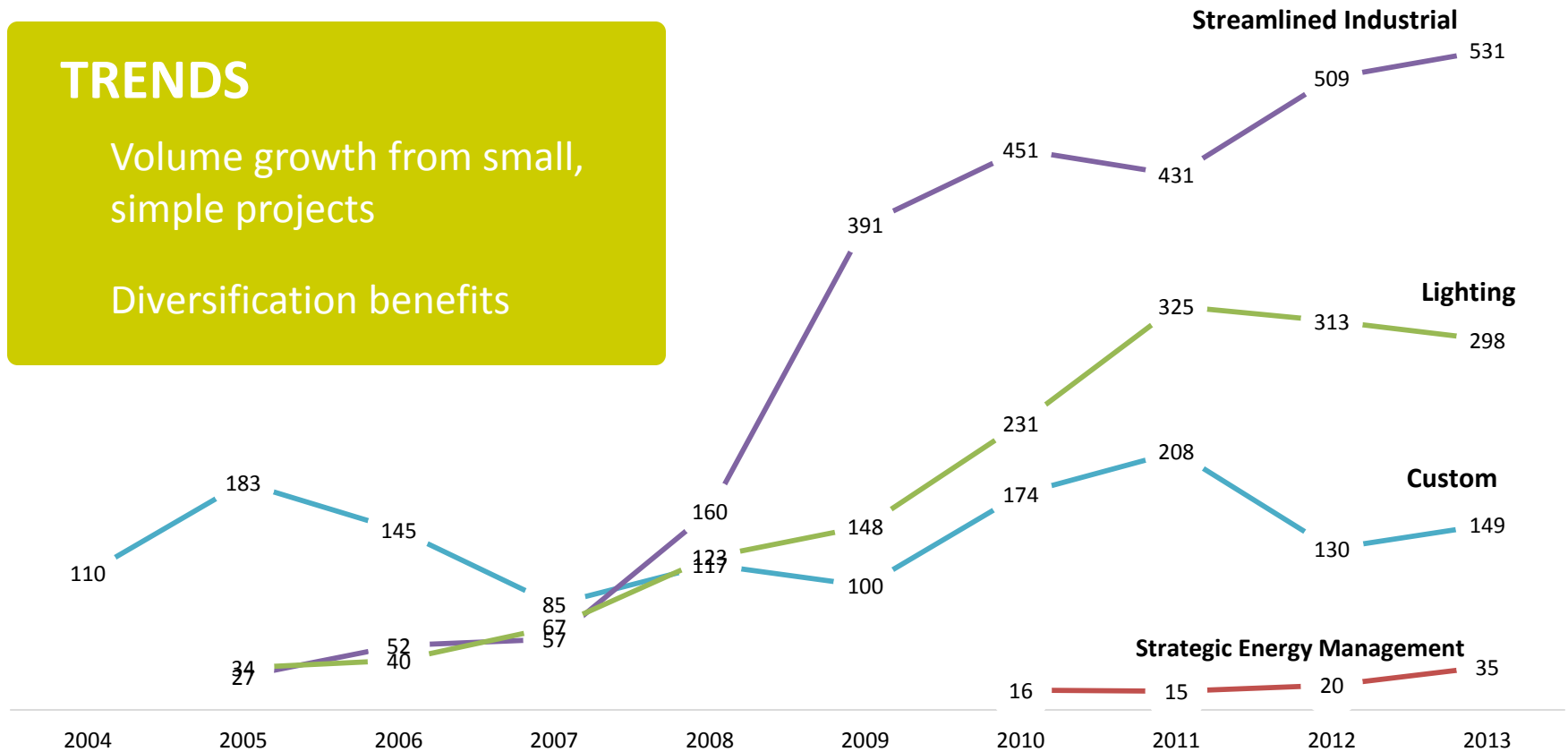


Projects Completed (*track*)

TRENDS

Volume growth from small, simple projects

Diversification benefits



Unified Grocers


High Speed Door Installation

\$13,000 Project cost

\$ 6,500 Energy Trust incentive

74,000 Annual kWh savings

\$4,800 estimated annual savings



“The information and training we get from Energy Trust provides us with ideas and options that help us improve efficiency and save money.”

-Joe Gomez, manager of plant services, Unified Grocers



DPI Lighting Upgrade

- LED Fixtures and lamps
- High-performance T8 fluorescent fixtures and lamps
- Bi-level ballast and fixture controls

\$194,000 Project cost

\$113,881 Energy Trust incentive

536,319 Annual kWh savings

\$37,000 estimated yearly savings

“Workers are telling us the lighting is better inside and out. They can see better and we’ve noticed that accuracy has improved.”



Roseburg Urban Sanitary Authority

- ACWA's Sustainable Energy Management Systems Training
- Created Energy Team
- Development of energy management plan
- Implemented energy projects (no-cost and lighting)
- Tracked and reported on progress
- \$29,000 annual savings

“Today, our staff members are much more aware of the plant’s energy use. At the end of day, it means lower fixed costs, which is better for our

Strategic Energy Management (SEM) Program Objectives

Increase awareness of energy use and efficiency opportunities; Increase commitment and capacity to manage energy

Energy Savings

- Direct energy savings from low and no cost actions (behavioral, O&M) to reduce energy waste.
- Increased ability to implement capital efficiency projects in the future

Persistence of SEM practices in the organization and persistence of savings

SEM: An Emerging Source of Savings

NW region programs leading in this area
past 7 years

- Northwest Energy Efficiency Alliance (NEEA), Energy Trust, Bonneville Power Administration (BPA), BC Hydro

National and International

- Superior Energy Performance – US DOE
- ISO 50001
- CEE and a growing number of its members

How Can SEM be a Game-changer?

Enables/ equips customers to take a deep, comprehensive approach to energy use now.

Improves their ability to tackle complex process efficiency projects, emerging technologies, DR, CHP in the future.

Energy models/ SEM could change how programs are designed or savings evaluated in the future – performance based vs measures



A scenic view of a river flowing through a forested area. In the foreground, there is a small dam or weir made of logs, with white water cascading over it. The river is surrounded by dense green trees and foliage. The background shows a rocky shoreline with some dry grass and shrubs.

Thank You

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EnergyTrust
of Oregon

Back-up Slides

PE Cash Incentives

Custom Capital

\$0.25/kWh

\$2/therm

Capped at 50%
project cost

Custom O+M

\$.08/kWh

\$.40/therm

Capped at 90%
project cost if
complete in 90 days

Strategic Energy Management

\$.02/kWh

\$.20/therm

Equipment Rebates

Custom Lighting

\$.25/kWh

Capped at 50%
project cost

Calculated equipment incentives



Top Trends from Industry & Ag

Predictability yields consistent savings

Volume growth from small, simple projects

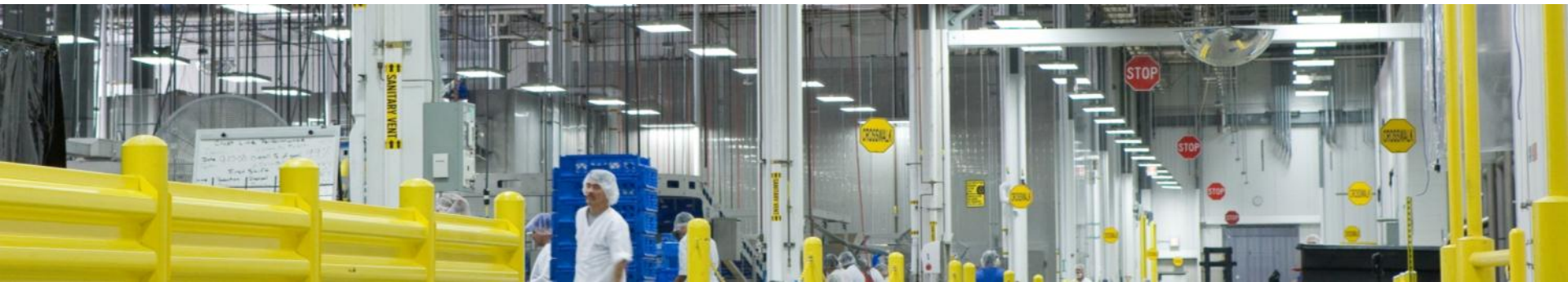
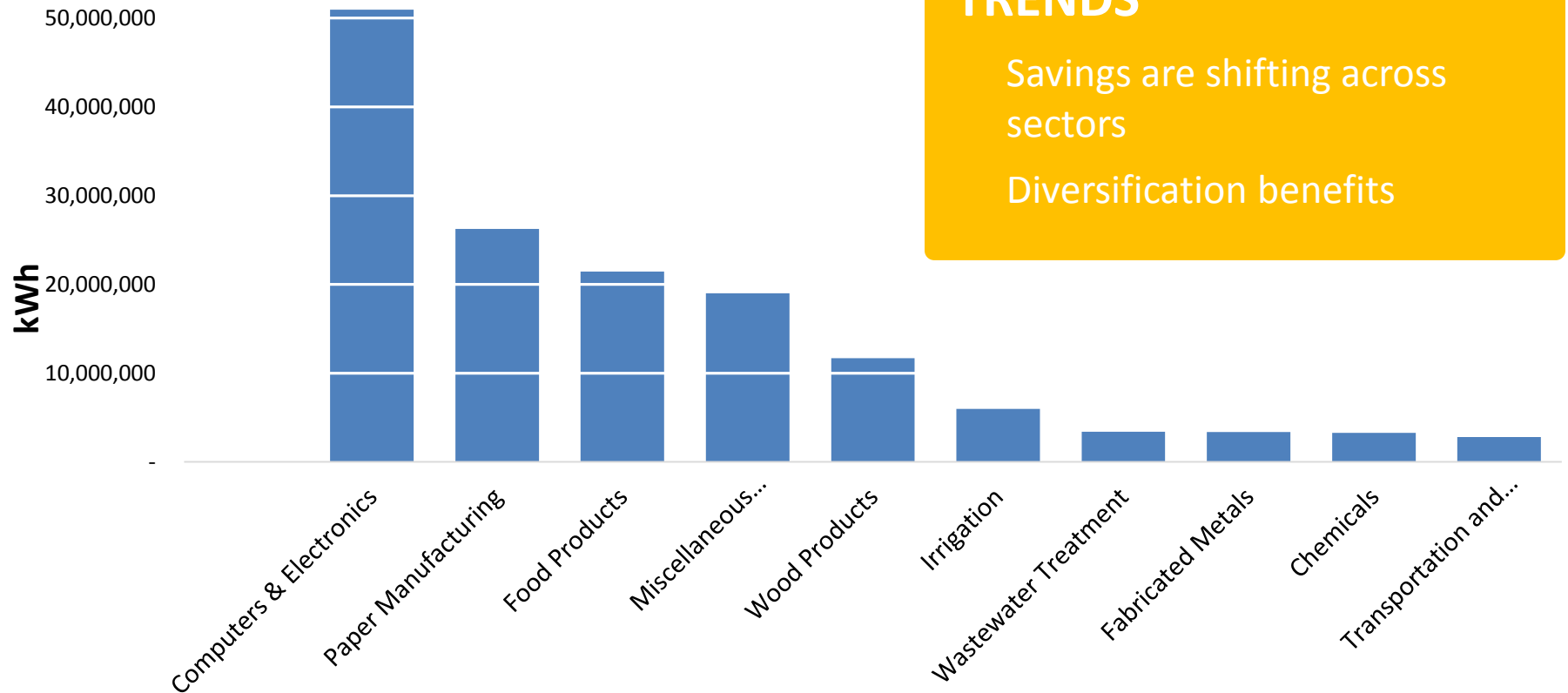
Savings growth from large, complex projects

Streamlined still major source of gas savings

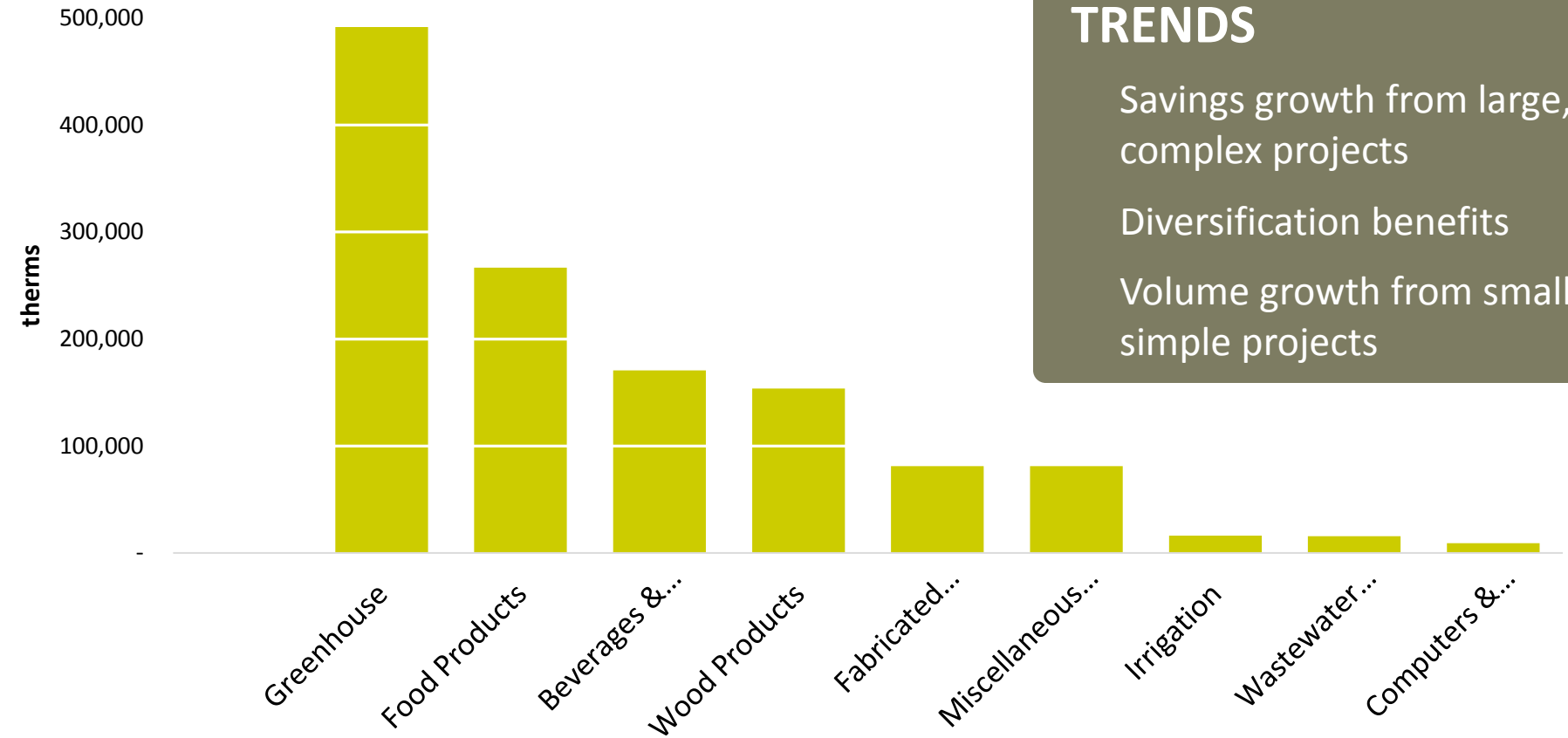
Savings are shifting across sectors

Diversification benefits continue to drive growth and hedge portfolio risk

2013 kWh Savings by Industry Sector



2013 Gas Savings by Industry Sector



TRENDS

Savings growth from large, complex projects

Diversification benefits

Volume growth from small, simple projects



50 HP VFD Air Compressor

Project Cost: \$51,000

Incentive: \$25,500

Payback: 2.8 Years

Energy Savings:

116,000 kWh / year

Estimated Yearly Savings

\$8,000 Utility Bill

+ \$1,200 Maintenance

\$9,200 Estimated Total



CalPortland

Participated in Energy Trust's
Industrial Energy
Improvement SEM training
and tech support

Completed six energy-
efficiency projects

- Received \$28,169 in
Energy Trust incentives

Estimated annual savings

- \$54,676 per year
- 729,014 kilowatt hours
- 277 tons of carbon
dioxide



“

The energy team is now a fixture within the organization. Operational management is performed with energy as a driving factor.

”

Bill Jerald, CEM
Energy Manager

We offer:

Well qualified Program Delivery Contractors (PDCs) make participation easy

- Customer outreach, engagement and long term support
- Facility assessments – identify opportunities and verify savings
- Project application and documentation

No-cost technical assistance

- Technical and economic analysis of potential capital projects
- Enhanced technical services to reduce energy waste in O&M
- Training of site leadership and staff for continuous energy improvement

Cash incentives to buy down costs of energy saving projects



New York State Energy Research and Development Authority



What is NYSERDA?

- **Established in 1975, NYSERDA is a public benefit corporation helping New York State meet its goals to:**
 - Reduce energy consumption and increase energy efficiency
 - Create a clean energy economy
 - Grow diverse, renewable energy supplies
 - Protect the environment
 - Provide experienced leadership in planning and policy

New York State Industrial Programs

- NYS PSC Leadership
- Energy Efficiency Programs
 - FlexTech
 - Industrial and Process Efficiency (IPE)

FlexTech

- Identify opportunities through energy studies
- Objective information about potential energy projects
- Cost-share up to 50%
- Cap of \$1 million on multi-year, multi-building studies

EXAMPLES:

- Feasibility Studies
- Energy Master Planning
- Industrial and Process Efficiency Analysis
- Data Center Efficiency
- Energy Efficiency Retro-Commissioning
- Combined Heat and Power

Industrial and Process Efficiency (IPE)

IPE

Incentives for manufacturers and data centers to enhance energy efficiency and productivity.

Goals	Save 800,000 MWh and 2.9 million MMBTUs by 2015
Outreach Contracts	Industrial Data Centers
Eligibility	Facilities must pay System Benefits Charge
Funding	\$121 million Customer Incentives
Incentive Cap	Electric: \$5 million/facility/year Natural Gas: \$1 million/facility/year

Process Efficiency Measures

New process or improvements to existing process that result in reduced energy/unit production

- Advanced technology installation
- New process line installation
- New or improved process and support systems
- Energy use is embedded in every part
- Every piece of scrap has an energy component
- Lean/6 Sigma/Productivity projects

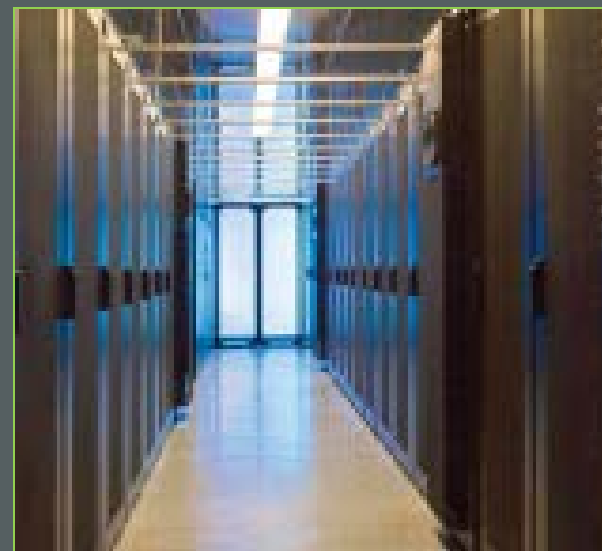


Data Centers

Optimizing infrastructure for ever-increasing information demands

IT Computing Efficiency

- Installation of next-generation servers
- Server virtualization
- Storage consolidation
- Fat to Thin client conversion
- IT capacity management



Support System Improvements

- Cooling systems
- Airflow management
- UPS upgrades

Industrial and Process Efficiency Results

Program Duration: 2012 – 2015

Results as of 12/31/13: 50% through program

Energy Savings	Electric (MWh)	Gas (Dth)
Order	800,000	2,940,000
Actual	480,773	2,202,845
% of Goal	60%	75%

Cost Effectiveness	Electric (\$/MWh)	Gas (\$/Dth)
Order	\$ 177	\$13
Actual	\$156	\$11

Outreach Approach

- Expertise
 - Industry & Data Centers
 - Outreach process
 - Goal driven
- Approach
 - 1-on-1 Customer Interaction
 - Key Decision-Maker Identification
 - Salesforce CRM



Key Account Mgmt

- Key Account identification
 - Estimate best kW for each industrial account
- Key Account Managers
 - Single NYSERDA contact
 - Relationship development
 - Roadmap
- Stratify assignments
 - Industry sector, geography, size
- Salesforce CRM

Outreach Features

- Address specific vertical needs
- Credibility
 - Team w/manufacturing & process experience
 - Speak the customer language
- Customer Driven
 - Understand customer motivation
 - Not afraid of complex, messy projects



Outreach Contractor RFP Selection

Vertical Understanding

- knowledge of sector-specific characteristics, business priorities, and decision making processes
- successful outreach experience

Existing Relationships & Relationship Development

- existing relationships with sub-sector stakeholders, service providers, trade associations or professional societies

Experience & Unique Qualifications

- knowledge of the high-energy user & major energy consuming areas

Irving Tissue

Upgraded Plant, Ft. Edward, NY:

- \$150 million investment by Irving
- New Paper machine
- New pulp processing and support equipment

Objective:

- Improve productivity, Outcompete sister plants
- Energy Savings is a design criteria

Focus: Process Equipment

- Installed more efficient vacuum system
- Installed more efficient pulp agitation systems
- VSDs on large pumping systems (1000s of HP)



Energy Savings: 14,800,000 kWh/year
NYSERDA IPE Incentive: \$1,775,000

World Kitchen

Existing Plant, Corning, NY:

- Multi-step, energy intensive, manufacturing line

Objective:

- Improve productivity and efficiency



Focus: Process Improvements:

- New Rotary Fire Polisher-significantly reduced scrap
- More saleable units for same energy use
- Energy use per unit reduced significantly

Reduced Energy Cost: \$192,000/year

Additional NYSERDA Programs

- Combined Heat & Power (CHP)
 - Acceleration Program <1.3 MW
 - Performance Program >1.3 MW
- Research & Development
 - Transformative Technologies for Energy-Efficient Manufacturing
 - Accelerating Commercialization of Industrial Technologies

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