



Behavior Based / Operations & Maintenance Energy Efficiency

Presented to CEE Winter Program
Industrial Program Planning 2 breakout session

January 25, 2012



Energy Trust of Oregon

Production Efficiency program

- **Our Mission: Resource Acquisition**
 - ✓ Procure cost-effective energy savings on behalf of Oregon ratepayers served by PGE, Pacific Power, Northwest Natural Gas and Cascade Natural Gas.
- **2011 Production Efficiency Budget and Goals**
 - ✓ \$27million total, \$18 million for incentives
 - ✓ 145 million kWh and 900,000 therms



2012 Goals & Budget

- **Goals**

- ✓ 160 million kWh – 10% higher than 2011
- ✓ 1.25 million therms – 40% higher than 2011

- **Budget for Industrial Efficiency: \$32.7 million**

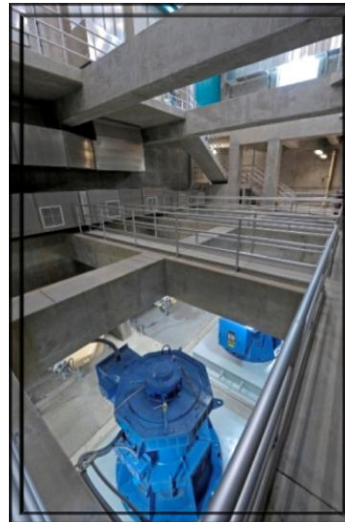
- ✓ Electric incentives: \$19.3 million
- ✓ Gas incentives: \$2.0 million



Energy Efficiency for Industry & Agriculture

We serve:

- Industrial Manufacturing
- Water and Wastewater
- Agriculture: Nurseries, Dairies, Irrigators





Source of Savings - Traditional

Custom Capital

- Includes major retrofits, process reconfigurations, replacement equipment, new construction, facility expansions, etc.

Calculated: Small Industrial & Lighting

- Provide Trade Allies (vendors) with training, calculation tools, collateral, simplified incentive process

Prescriptive

- No pre-approval required, submit receipts for rebates on smaller measures like insulation, small HVAC, lighting, small air compressors, small VFD's, motors and drives



Source of Savings – Leading Edge

Custom O&M

- Operational improvements, equipment power-off scheduling, pressurized system leak repairs, system balancing, sequencing, operational tuning, flow control changes, etc.
 - ❑ Trial Offering in 2009, Regular Offering since 2010

Targeted O&M Services

- **RCx Plus**
 - ❑ Retro-commissioning targeted to specific system or systems
 - ❑ New service in 2011, Completed 6 projects
- **Boiler Tune-up**
 - ❑ Boiler System tuning and operational training
 - ❑ New service in 2011, Completed 8 projects



Source of Savings – Leading Edge

Strategic Energy Management (SEM) Services

- **Kaizen Blitz**
 - ❑ Targeted to specific system or systems (pilot in 2008/2009)
- **Operator Peer Group Coaching**
 - ❑ Cohort style system equipment operation training
 - ❑ New service in 2011, inaugural 5-company cohort complete
- **Industrial Energy Improvement (IEI) Initiative**
 - ❑ Cohort style comprehensive energy management engagement
 - ❑ Pilot in 2008/2009, 27 projects now complete, 10 in process
- **Corporate SEM**
 - ❑ Single or multi-site comprehensive energy management engagement (new in 2011), 2 projects in process

Behavior Based Service Offerings

Energy Trust of Oregon - Behavioral Service Offering Matrix



	MEASURE ANALYSIS	RESOURCE	IMPLEMENTED BY:	EIS? (2 yr)	Project Length	VERIFICATION METHOD	*CASH INCENTIVES	TARGET	1st Year Acq
Custom O&M	Technical Study Data Monitoring	ATAC	Customer	No	Weeks to Months	pre/post monitoring	\$.08 kWh up to 90% \$.40 per Therm 90x90 Special Offer	Any med to large industrial company	\$.038/kWh gas new in 2011
Boiler Tune-up	Flue Gas Analysis	ITSP	ITSP & Customer	No	1 or 2 Days	Flue Gas Analysis	100% of tune-up cost	<50,000 therms/yr	\$.62/therm new in 2011
RCx Plus	Technical Study System Based	ITSP	ITSP & Vendor	No	2-to-4 Months	pre/post monitoring	Up to 100% (\$8000 max implementation cost)	>300 Tons HVAC or similar energy use for other system types	\$.027/kWh \$.021/therm new in 2011
Operator Coaching (cohort workshops)	Regression Model	ITSP	ITSP & Customer	YES	6-to-8 Months	Top-down EIS Based	\$.02 kWh/yr 50% max \$.20 therm/yr max	>3,000,000 kWh/yr systems (ex. Refrig)	\$.02/kWh new in 2011
Kaizen Blitz	Regression Model	ITSP	ITSP & Customer	YES	1 Year +	Top-down EIS Based	\$.08 kWh/yr 50% max \$.40 therm 50% max	>5,000,000 kWh/yr systems (ex. Refrig)	0.041/kWh
IEI (SEM - cohort workshops)	Regression Model(s)	ITSP	ITSP & Customer	No	1 Year	Top-down Submetering	\$.02 per kWh/yr \$.20 per therm/yr	>10,000,000 kWh/yr >500,000 therms/yr	\$.020/kWh
IEIm (SEM - support)	Regression Model(s)	ITSP	ITSP & Customer	No	6-to-12 Months	Top-down Submetering	\$.01 per kWh/yr \$.10 per therm/yr	Graduate of IEI follow-on support	new in 2011
cSEM (SEM - Individual)	Regression Model(s)	ITSP	ITSP & Customer	Maybe	8-to-15 Months	Top-down Submetering	\$.02 per kWh/yr \$.20 per therm/yr	>3,000,000 kWh/yr >300,000 therms/yr	new in 2011

The type of service offering is identified and scoped by Program Delivery Contractor (PDC)

* Cash incentives paid after implementation, 100% of technical study and service delivery covered by Energy Trust (2012 rates shown)

ATAC: Allied Technical Assistance Contractor (engineering consultant) perform technical studies, savings verification

ITSP: Industrial Technical Service Provider (consultant) provide Strategic Energy Management services or other direct technical services





Why did Energy Trust target behavioral / O&M energy efficiency?

1. Program Diversification

- ✓ When primary source of savings comes from capital investment projects, year to year savings can swing too dramatically and make forecasting very difficult.

2. Down Economy

- ✓ 2008/2009 economic decline was fast and furious!

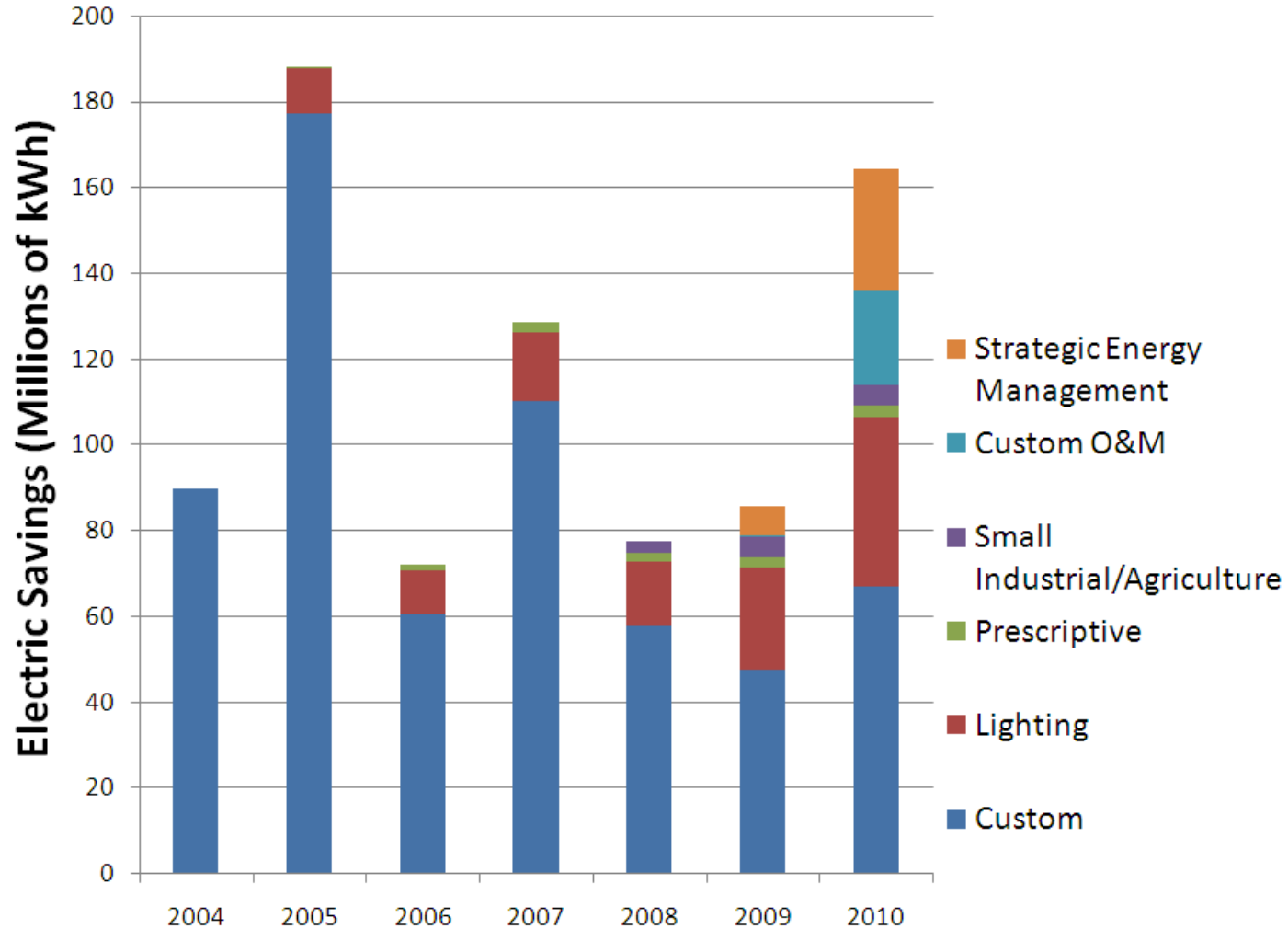
3. Expand Customer Base

- ✓ Hundreds of area businesses unable to make capital investments benefit from lower cost behavioral / O&M offerings.

4. “Bushels of fruit” available for the picking

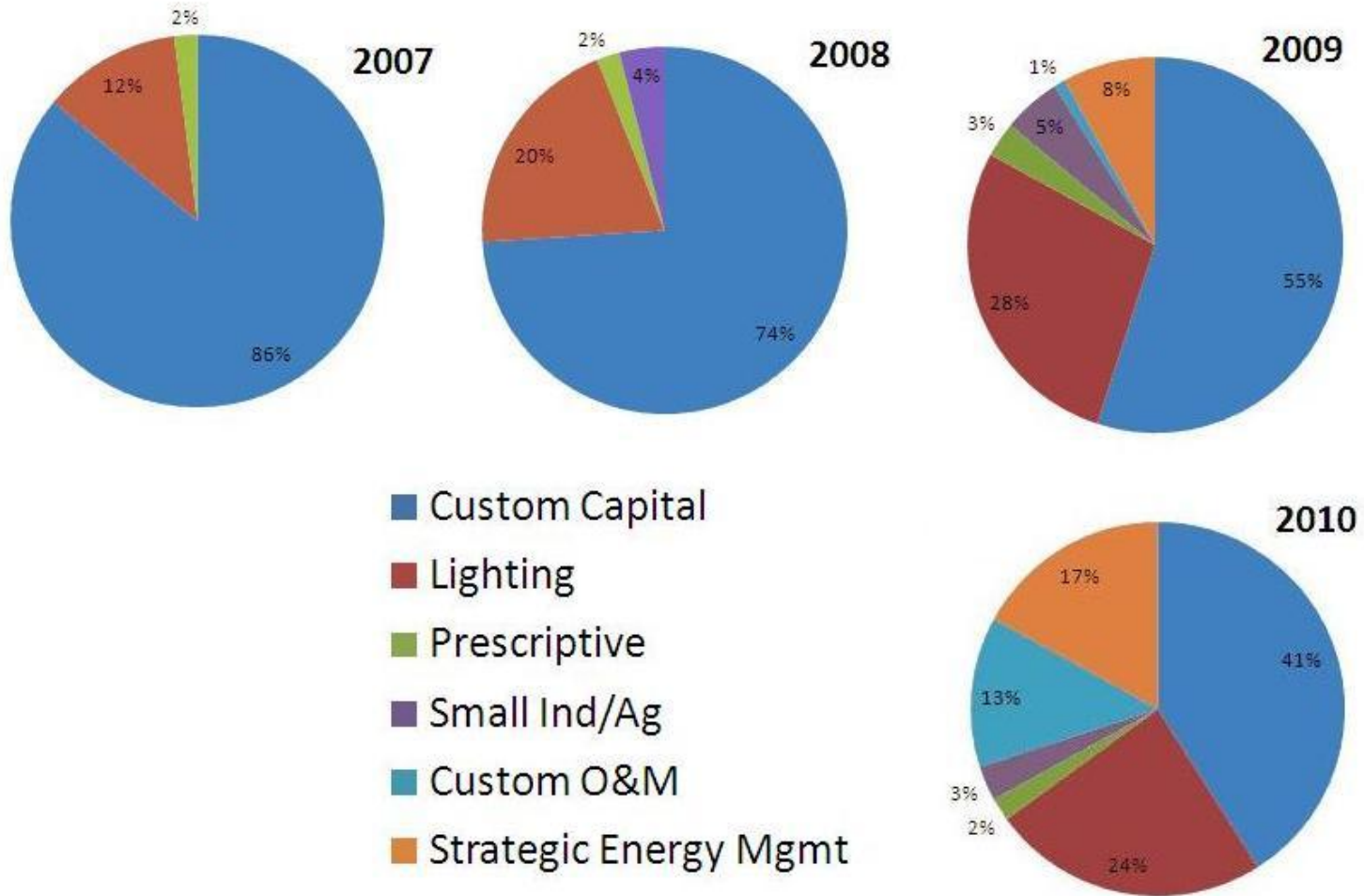
- ✓ Everyone knows that energy inefficiency exists but due to the behavioral nature behind the inefficiencies, few have felt confident in trying to secure savings that must persist year after year in spite of the human element.

Diversification: Net Savings by Year/Track





Program Diversification: 2007 thru 2010





Down Economy - “Cheap” Savings Needed Fast!

- **Early 2010: pipeline short more than 20 million kWh to meet stretch goals, even with substantial estimated SEM savings**
 - ❑ Only 10 months to find and implement new projects – too tight for typical capital projects.
- **90x90 Custom O&M special incentive offer launched March 2010 to influence additional projects and faster cycle times**
 - ❑ Used experience with O&M scoping, implementation, measurement & persistence to target stand alone O&M measures.
 - ❑ Sites that implemented a recommended measure with persistence strategy within 90 days received up to 90% of implementation costs – hugely successful offering.



Expanding Our Customer Base

- **Offering to pay up to 90% of project costs really worked**
 - ❑ Many projects that were identified but implementation was never started were reinvigorated - completed project list grew quickly.
- **90x90 “buzz” spread quickly amongst industrial companies**
 - ❑ Numerous “non-participants” suddenly wanted to take part in this new, exciting, “how can we say no” program offering.
- **Targeted O&M offerings with zero out-of-pocket costs**
 - ❑ Regardless of how quick payback was, some companies simply would not work on energy efficiency projects – until we had a path for them to follow that did not require funding or in-house resources.



Where is the low-hanging O&M fruit?



If you know where to look - you will find it all around you



Enough about fruit - *It's money that matters!*



There is money wasted every day through inefficient use of energy



It's time to look at things differently

If you know where to look, there are many opportunities to reduce energy consumption for little or no cost.



You do not always have to spend a pile of money to save enough energy to realize a sensible return on your investment.



Looking at Behavior



Behavior is what drives how well a business performs – or not.



Behavior also drives how well a business manages its energy consumption.





Behavioral Problem Statements

1) *Energy is being wasted through inefficient operations as well as through energy consuming systems that are not specifically maintained with energy efficiency in mind.*

2) *There have always been reservations about spending money and time on energy efficiency improvements that are difficult to quantify and that may not persist over time.*

Changing Behavior

- **Education**

- ✓ By providing energy efficiency technical training to industrial company personnel, they become empowered to identify energy efficiency improvement opportunities.



- **Instrumentation**

- ✓ Providing specific instrumentation for observing system operation allows industrial companies to monitor performance and take timely action to maintain energy efficient operation.



- **Measurement Tools**

- ✓ Providing specific measurement tools and training of how to use these tools encourages industrial company personnel to actively manage energy consumption.



- **Technical Support**

- ✓ Supporting the development / updating of Standard Operating Procedures or Maintenance Work Orders provides a solid path for sustained energy savings.





Insistence on Persistence

Keys to maintaining long-term O&M based energy savings:

1. Education

- ✓ Coach personnel how to manage energy consumption

2. Instrumentation

- ✓ Provide flow meters, temperature gauges, pressure gauges, etc.

3. Documented Procedures

- ✓ Help develop new/enhance existing SOP's or Maint. Work Orders

4. Signage

- ✓ Encourage permanent placards with specific guidelines

5. Specialized Tools

- ✓ Provide ultra-sonic leak detector, data logger, gas analyzer, etc.

6. Controlled Access

- ✓ Lockout of system controls, valve positions, regulators, etc.



Results



Custom O&M (90x90): 2010 Actual Results

- **Opportunity**

- ✓ 59 Projects Started
- ✓ Compressed Air, Chillers, HVAC, Pumping, Refrigeration
- ✓ 47 Projects Completed (79%)

- **Savings**

- ✓ 20,933,890 kWh total (445,402 kWh average/project = \$26,724)

- **Incentives**

- ✓ \$448,447 total (\$9541 average/project)

- **Costs**

- ✓ Implemented Project Costs: \$574,119 (\$12,215 average/project)
- ✓ Technical Study Costs: \$229,559 (\$4884 average/project)
- ✓ Acquisition Cost: 2.1 cents/kWh (3.2 cents with study included)



Targeted O&M: 2011 Preliminary Results

- **RCx “Plus”**

- ✓ 6 Projects
- ✓ HVAC, Chillers
- ✓ More than 2,000,000 kWh 1st year savings
- ✓ More than 160,000 therms 1st year savings

- **Boiler Tune-up**

- ✓ 8 Projects
- ✓ Almost 25,000 therms 1st year savings



SEM: 2011 Preliminary + Historical Results

- **Kaizen Blitz**
 - ✓ 17 Projects (5 complete, 7 Yr-2 in process, 5 Yr-1 in process)
 - ✓ Refrigeration Systems (to date)
 - ✓ Almost 13 million kWh 1st year savings
- **Operator Coaching – “ROC”**
 - ✓ 5 Customers completed cohort in 2011
 - ✓ More than 2,500,000 kWh 1st year savings
- **IEI (Industrial Energy Improvement initiative)**
 - ✓ 27 Projects completed since 2009
 - ✓ More than 43,500,000 kWh 1st year savings
 - ✓ More than 160,000 therms 1st year savings (gas was new in 2011)



Questions / Comments

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Thank you for attending!