Retrocommissioning for Compressed Air Systems: A Case Study for Customer Commitment-Based Assessment Incentives

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2/9/2012

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Agenda

1. Background
2. Definition of the Problem – The Study Dilemma
3. Solving the Dilemma
4. Specific features of Focus on Energy Pilot
5. Results
6. Lessons Learned

Background

Drivers

- Commercial sector had a successful building retrocommissioning (RCx) program with customer commitment
- Industrial customers inquired about an RCx incentive

Why compressed air?

- Current compressed air audit incentive was not meeting objective

Objectives

- Move market to include low/no cost demand-side opportunities
- Expand thinking on retrocommissioning
- Cost-effective savings

Typical Study Incentive Dilemma

- Typical study incentive is a gamble
- Resulting in low incentives and few projects
- Tempting to require project implementation

Typical Study Incentive Dilemma

Customer Type	Needs Study for Project Decision?	Needs Incentive For Study?	Likelihood of Participation	Project Implemented ?	Savings Achieved	Attribution of Savings	Impact of Study Incentive
A	Yes	Yes	Low	?	?	High	N/A
B	Yes	No	High	?	?	Med	None
C	No	No	High	Yes	Yes	Low	None

Solving the Dilemma

Customer	Needs Study for Project Decision?	Needs Incentive For Study?	Likelihood of Participation	Project Implemented ?	Savings Achieved	Attribution of Savings	Impact of Study Incentive
A	Yes	Yes	Low	?	?	High	N/A
B	Yes	No	High	?	?	Med	None
~~C~~	~~No~~	~~No~~	~~High~~	~~Yes~~	~~Yes~~	~~Low~~	~~None~~

1) Design the incentive to fund studies that uncover unknown opportunities
2) Require customer to commit to implementing measures that fall within some type of criteria

Solving the Dilemma

Customer	Needs Study for Project Decision?	Needs Incentive For Study?	Likelihood of Participation	Project Implemented ?	Savings Achieved	Attribution of Savings	Impact of Study Incentive
A	Yes	Yes	Low	~~?~~ Likely	? Likely	High	N/A
B	Yes	No	High	~~?~~ Likely	? Likely	Med	None
~~C~~	~~No~~	~~No~~	~~High~~	~~Yes~~	~~Yes~~	~~Low~~	~~None~~

1) Design the incentive to fund studies that uncover unknown opportunities
2) Require customer to commit to implementing measures that fall within some type of criteria
3) Program still pays incentive if no measures are identified

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Solving the Dilemma

Customer	Needs Study for Project Decision?	Needs Incentive For Study?	Likelihood of Participation	Project Implemented ?	Savings Achieved	Attribution of Savings	Impact of Study Incentive
A	Yes	Yes	~~Low~~ High	~~?~~ Likely	~~?~~ Likely	High	N/A
B	Yes	No	High	~~?~~ Likely	~~?~~ Likely	Med	None
~~C~~	~~No~~	~~No~~	~~High~~	~~Yes~~	~~Yes~~	~~Low~~	~~None~~

1) Design the incentive to fund studies that uncover <u>unknown</u> opportunities
2) Require customer to commit to implementing measures that fall within some type of criteria
3) Program still pays incentive if no measures are identified (program risk!)

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Focus on Energy Pilot

- Design the incentive to fund studies that uncover unknown opportunities
  - Retrocommissioning model
- Require customer to commit to implementing measures that fall within some type of criteria
  - Measures with less than 1.5-year payback
- Program still pays incentive if no measures are identified
  - Systems greater than $200 per horsepower (hp)
  - Application required that the assessment provider make the case for project site appropriateness
  - Required leak detection and repair for all participants
  - Design assessment requirements to find common opportunities

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Performance Verification Form Air Dryer

Dryer Name:	Location:	
Name Plate Capacity (CFM):	Minimum Dew Point:	
Dryer Type (Refrigerated, Cycling, Purge Air etc)		
Performance Criteria		
Customer Required Performance. List the critical performance parameters that the customer requires of the dryer	Required Dew Point	
	Max Dryer CFM Capacity Required	
Manufacturer's Specified Performance. List the manufacturer's specifications for the following parameters	Minimum Dew Point	
	Max CFM Treatment Capacity	
	CFM Consumed for Media Regeneration	
	Expected Regeneration Cycles per Hour	
	KW Draw	
Actual Measured Performance. List the actual performance of the compressor based on data gathered during the study.	Dew Point of Delivered Air	
	CFM Consumed for Media Regeneration	
	kW Draw (can be estimated from amps)	
	Actual Regeneration Cycles per Hour	
Recommendations. List low/no-cost measures that the customer should consider to optimize the dryer's performance while meeting the customer's needs.		

Source: Focus on Energy, "Performance Verification and Optimization Compressed Air Pilot Program Participant Manual," September 2009.

CFM = cubic feet per minute; KW = kilowatt

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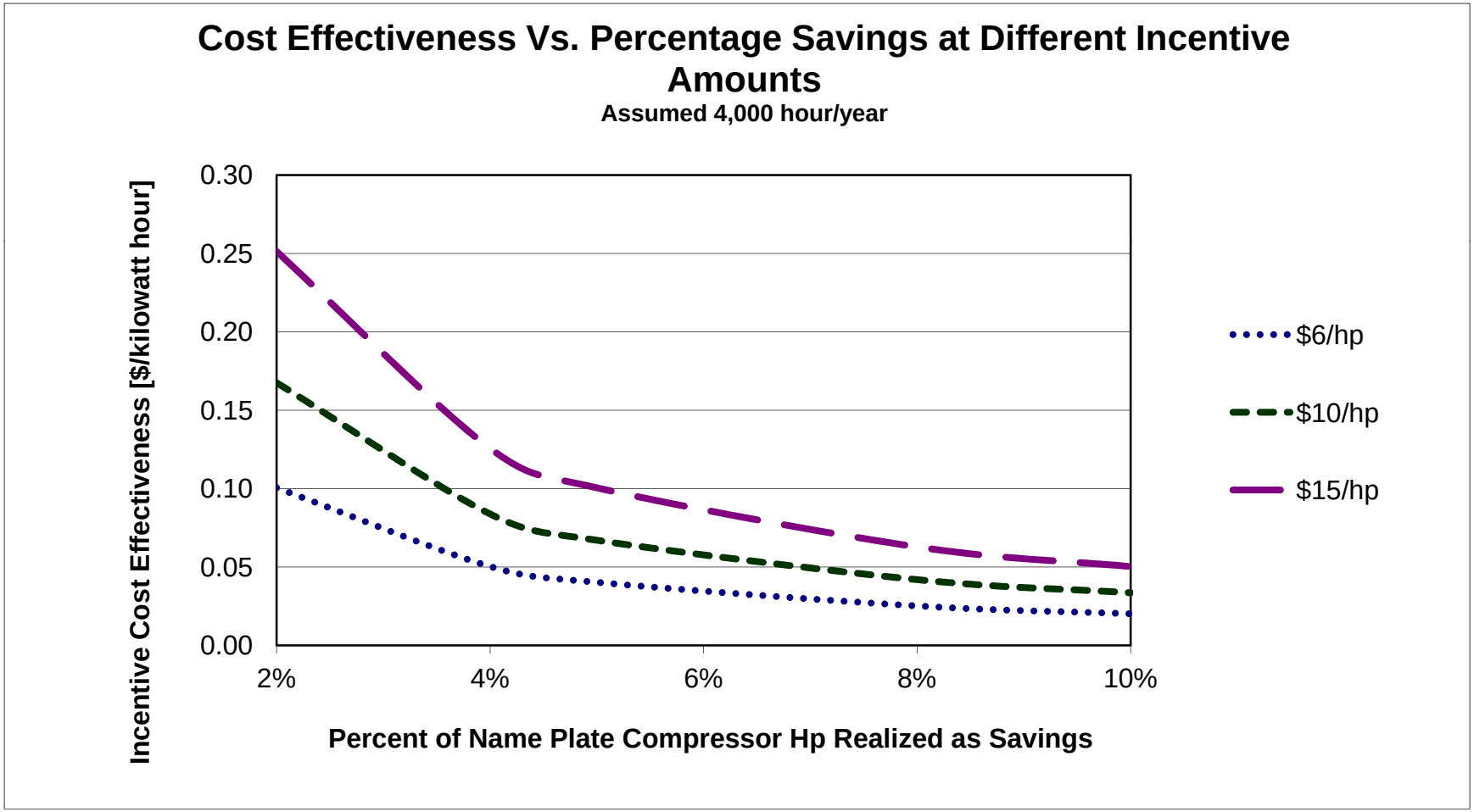
Incentive Rate Development



/ = per hp = horsepower

Unique Features

- Allow customer to use remaining study incentive toward implementation obligation
  - Keeps pressure on the assessment provider to keep study cost low
- The 1.5-year payback was the lower threshold of custom incentive eligibility for Focus on Energy at the time of the pilot

Results

Customer	System Hp	Total Customer Cost [Assessment + Repairs]	Kilowatts Saved	Kilowatt Hours Saved	Incentive
A	1,000	$41,500	79	573,161	$16,125
B	800	$25,294	66	507,769	$12,000
C	500	$14,500	48	423,320	$7,500
D	500	$7,500	35	305,549	$7,500
E	-	DNF	NA	NA	NA
F	1,200	$25,000	41	553,601	$22,500
G	-	DNF	NA	NA	NA
Totals	4,000	$113,794	269	2,363,400	$65,625

$65,625 / 2,363,400 = **$0.027/kWh**

NA = not applicable; kWh = kilowatt hours; DNF = did not finish

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Lessons Learned

Lessons learned

- Cost-effective savings are possible
- Maybe do not need true retrocommissioning
- Program must be involved throughout the projects
- Demand-side expertise lacking in marketplace

Moving forward

- Fewer assessment requirements
- Direct questions regarding desired measures
- Two strikes and you are out

Save the Date

May 15-17, 2012	AESP's Spring Conference Baltimore, MD
Oct. 15-17, 2012	AESP's Fall Conference Long Beach, CA
Jan. 28-31, 2013	AESP's 23rd National Conference Orlando, FL

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The following slides are available to support Q&A if needed or for extra time filler

Customer Case Studies

Customer A is a large fabrication and assembly company, and the assessment results did not contain the low- and no-cost opportunities that the program hoped to uncover.

During the post-assessment interview, the Focus on Energy representative found that the facility had large, open-blowing tubes underneath a stamping machine to blow the stamped part out of the mold.

It was also discovered during the exit interview that, at time, the entire plant remained pressurized over the weekend simply to feed a single electrical discharge machining (EDM) machine. An existing stand-alone compressor for this machine had failed, and the machine was simply hooked to the central compressed air system. Unfortunately, there was not time or budget for the vendor to investigate these opportunities in time for the offering deadline. The savings claimed for this customer were from leak repair only.

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Customer Case Studies

Customer B, a furniture manufacturer, has 925 hp of air compressors. During the assessment it was discovered that a bypass valve on a 300-hp air compressor was stuck open. The repair was authorized immediately on the day of the assessment. The repair cost was **$1,600**, and the resulting energy reduction is expected to save the customer approximately **$32,000** per year.

Customer Case Studies

Customer C, a metal parts manufacturer has five 100-hp compressors. Over the years dozens of open-blowing applications have been installed to facilitate the movement of small parts through the automated machining centers.

These open tubes are estimated to represent more than 500 CFM of air demand. The RCx assessment recommended that customer install nozzles on each of these tubes to reduce the free flow of air. The customer responded that they had already tried a nozzle and it "didn't work." However, because of the RCx structure, they were required to investigate more nozzle types in order to receive the incentive, and they eventually found a nozzle that worked.

Fifty-one nozzles were installed that reduced air flow from each open tube by 50 percent. The cost to purchase the nozzles was **$1,245**. The reduction in CFM should save the customer approximately **$33,000** per year in energy costs. A program representative was included at both the initial sales meeting for the pilot program as well as the exit meeting.

CFM = cubic feet per minute; RCx = retrocommissioning

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Customer Case Studies

Customer D, a PVC pipe manufacturer has six 50-hp compressors and two 100-hp compressors in three different buildings. All of the compressors feed into one system, and piping runs between four buildings on the campus.

The power and flow monitoring during the RCx assessment uncovered the fact that one of the 100-hp compressors was stuck in idle mode. The damaged idle linkage caused the compressor to run 24/7 without compressing any air. There would have been no way for the system owner to know the compressor was not producing air without the detailed monitoring of the RCx assessment. The malfunctioning control was fixed by the assessment provider for **$623** and saved the customer over **$10,000** per year in energy costs. A program representative was included in both the initial proposal meeting as well as the exit meeting after the assessment.

PVC = polyvinyl chloride; RCx = retrocommissioning

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Customer Case Studies

Customer E, a large industrial printer, struggled to install the required metering without interrupting production. Delays in the logistics of carrying out the assessment pushed the project beyond the program deadline, and the program did not pay an incentive or claim any savings from this customer.

Customer Case Studies

Customer F, a plastic bottle manufacturer, has six air compressors totaling more than 1,500 hp worth of capacity. During the RCx assessment it was discovered that one compressor was not tied into the central compressor control system. It was estimated that bringing the compressor into the control scheme would save almost 250,000 kilowatt hours per year. The system owner investigated and found out that actually the compressor was tied into the control system, but the controls simply were not "activated." With the flip of a switch, the customer saved almost **$20,000** per year in electricity costs.

hp = horsepower; RCx = retrocommissioning

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Customer Case Studies

Customer G – Little is known about the assessment for Customer G, as the vendor did not include the program in any of the customer interactions. The assessment report was submitted, but the customer did not act on any of the recommendations and therefore did not receive an incentive.