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ASSESSMENT OF COST SAVINGS OF DOE'S RETURN-ON-INVESTMENT PROGRAM

Katherine L. Yuracko, Bruce Tonn, Mike Morris

e-mail: yurackokl@ornl.gov

Tel: (865) 241-2290

Prepared by the
Center for Life Cycle Analysis
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831
managed by Lockheed Martin Energy Research Corporation
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ABSTRACT

The DOE Office of Pollution Prevention (EM-77) created a successful internally competed program to fund innovative projects based on projected returns. This is called the Return-on-Investment (ROI) program. EM-77 conducted a successful ROI pilot, developed and implemented sound management practices, and successfully transferred the program to several Operations Offices. Over the past 4 years sites have completed 262 ROI projects (costing \$18.8 million) with claimed first-year savings of \$88 million and claimed life cycle savings exceeding \$300 million. EM-77 requested that Oak Ridge National Laboratory perform an independent evaluation of the program to assist the Department in determining whether claimed savings are real.

This study found that P2 projects yield high returns. The 13 P2 projects evaluated saved 50 times the initial P2 investment. The implementation cost of \$606,000 for the 13 projects is estimated to produce life cycle savings of \$30 million. In addition to significant cost savings, DOE realized environmental, health and safety, and programmatic benefits from the projects (e.g., eliminating 260,000 gallons per year of mixed low-level waste, reducing release of tritium into groundwater, reducing exposure to toxic materials, and making it possible to meet Tri-Party Agreement milestones).

These P2 cost savings are diffused across the DOE, not returned to the implementing project. The majority of life cycle savings occur as avoided costs to DOE (primarily in the area of waste management), not as direct savings to the implementing project. Of the \$30 million life cycle savings, only 10% represent direct savings to the implementing project.

EM-77's ROI program serves a key role in enabling the Department to achieve the significant financial, health and safety, environmental, and programmatic benefits of P2 investments. For example, the ROI program looks past organizational stovepipes to fund projects that are cost-effective from the standpoint of DOE and taxpayers. It is recommended that DOE aggressively capture the documented benefits of pollution prevention by continuing to fund the ROI program.

INTRODUCTION

The U.S. Department of Energy (DOE) Office of Pollution Prevention (EM-77) created a successful internally competed program to fund innovative projects based on projected returns. This is called the Return-on-Investment (ROI) program. EM-77 conducted a successful ROI pilot, developed and implemented sound management practices, and successfully transferred the program to several Operations Offices. Over the past 4 years sites have completed 262 ROI projects (costing \$18.8 million) with claimed first-year savings of \$88 million and claimed life cycle savings exceeding \$300 million. EM-77 requested that Oak Ridge National Laboratory perform an independent evaluation of the site-led, DOE-HQ-funded pollution prevention (P2) ROI program to assist the Department in determining whether claimed savings are real. This paper summarizes the results of this evaluation (1).

APPROACH

The approach for conducting this evaluation was to analyze a sample of P2 projects to identify actual project cost savings and other actual benefits — e.g., amount of waste avoided. To determine the projects for review, EM-77 provided a list of EM-funded projects at two Operations Offices: Oak Ridge and Richland. Sixteen projects (eight from each Operations Office) were selected at random from this list for review. Project documentation was requested from the sites, and this was followed by face-to-face interviews with project personnel. Of the 16 projects selected at random, two are still awaiting implementation, and no project interview was conducted for one project. Because the purpose of this study was to review projects after they have been implemented, the two uncompleted projects were eliminated from further consideration. The remainder of this report addresses the 13 completed projects for which we received documentation and performed interviews with project personnel. Both Oak Ridge and Richland staff pointed out that because of the selection approach used, this study did not review the most successful projects at their sites.

RESULTS

P2 projects perform better than expected. For 8 of the 11 projects that estimated the ROI in the project proposal, the ROI as determined through our interviews exceeded the ROI in the project proposal. In some cases, the improvement was due to increased throughput (e.g., analyzing more samples than anticipated) or finding additional uses for the new equipment. In other cases, the financial benefits of the P2 projects had been understated because the project managers had not taken credit for benefits accruing to organizations other than their own.

P2 projects produce significant cost savings

Average ROI from project proposal	558%
Average actual ROI	611%

Number of projects reviewed	13
Total implementation cost	\$606,000
Total life cycle savings	\$30,000,000

P2 projects yield high returns. The 13 P2 projects saved 50 times the initial P2 investment. The

implementation cost of \$606,000 for the 13 projects will result in life cycle savings of \$30 million. Only one of the projects did not realize any cost savings. In addition to significant cost savings, DOE realized environmental, health and safety, and programmatic benefits from the projects (e.g., eliminating 260,000 gallons per year of mixed low-level waste, reducing release of tritium into groundwater, reducing exposure to toxic materials, and making it possible to meet Tri-Party Agreement milestones). The analysis is summarized in Fig. 1 and Table 1. Cost estimates reported here reflect the total cost of each individual project over the total life of the project. However, they do not include what could prove to be a major benefit of the P2 program: sparing the Department the cost of building additional waste management facilities (e.g., additional disposal cells) in the future. Consequently, the true benefit of P2 investments may be even larger than reported here.

Most cost savings are diffused across the DOE, not returned to the implementing project. As Fig. 1 shows, the majority of life cycle savings occur as avoided costs to DOE (primarily in the area of waste management), not as direct savings to the implementing project. Of the \$30 million life cycle savings, only 10% (\$3 million) represent direct savings to the implementing project. These savings are realized as labor savings (\$2.6 million) and avoided purchases (\$419,000). The remainder of the savings -- \$27 million -- accrues to other projects; the implementing project does not reap these savings.

P2 cost savings are diffused between the implementing project and DOE Headquarters program offices (e.g., Office of Science, Office of Environmental Management, Office of Defense Programs), field offices, and different field organizations (e.g., EM-30, 40, 50, 60, 70). For example, waste management costs are shared among the Office of Waste Management and multiple generator organizations. For the Oak Ridge projects reviewed, generators did not pay for disposal of their waste; therefore, they do not reap the benefits of waste reduction investments. Richland does have a charge-back system in place to charge generators for the operating (not fixed) costs of waste management facilities; however, charges apparently accrue to the larger generator organization and are not always assigned to individual project budgets. As a result, a project engineer would not reap the cost savings resulting from his waste reduction investments.

Of the 13 projects reviewed, one project accounted for 74% of the total savings. This P2 project modified an evaporator at a cost of \$233,000. This action eliminated generation of 370 cubic meters of liquid mixed low-level waste per year and resulted in life cycle savings from avoided waste management of \$22 million. Although the larger organization (the Tank Waste Remediation System) realized both the costs and benefits of the evaporator modification, the

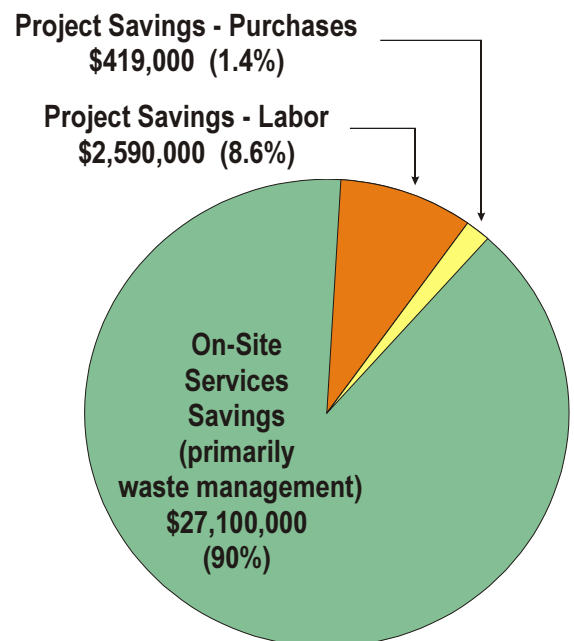


Fig. 1. The majority of P2 cost savings accrue to waste management, rather than to the implementing project.

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implementing project engineer saw only the cost and did not have access to funds within his project to pay that cost.

This example illustrates a key role of the ROI program: bridging the gap when the implementing project does not have access to funds to implement an action that will benefit the Department overall. The ROI program serves to bridge the gap any time there are stovepipes that cause one account to realize a cost and another account to reap the benefits. The most common example is a waste generator incurring the cost of waste reduction while the waste management organization realizes the savings; however, there are other instances as well.

Program Management. Both the Oak Ridge and the Richland Operations Offices have developed successful grassroots programs using streamlined processes, and these programs could serve as examples for the DOE complex. Dedicated teams administer the effort, champion the program, and assist generators in identifying P2 opportunities. The P2 program has identified several elements of a successful DOE P2 ROI program. Some of the key elements are summarized in Fig. 2.

- ❑ Manage the program at the grassroots level in the field. Operate the program as an employee suggestion program.
- ❑ Set aside a separate source of funds from which the winning proposals are funded.
- ❑ Minimize the paperwork burden. Provide simple proposal preparation guidelines and assist employees in preparing proposals. Provide tables that summarize site costs for waste, utilities, labor, materials, etc., to assist in determining life cycle cost savings.
- ❑ Integrate P2 education into the existing work structure (e.g., integrate with the ALARA program, NEPA program, energy efficiency program, training program, chemical management system, etc.)
- ❑ Identify a project champion.
- ❑ Recognize employees for their efforts.
- ❑ Establish a simple, streamlined tracking system to monitor project progress and provide closure by confirming the cost savings.

Fig. 2. Success factors for a successful DOE pollution prevention ROI program

Because financial investments and returns accrue to different entities, projects sometimes do not have sufficient incentive and/or access to funds to implement P2 opportunities if the funding must come from their direct program budgets. In addition, we were informed that lack of regulatory drivers and lack of management discretion contribute to managers' inability to make P2 investments from their project funds — and the consequent need for separate P2 funding. In Richland in particular, all discretionary funds are applied to meet regulatory requirements associated with the Tri-Party Agreement, leaving no funds available for worthwhile projects that lack regulatory drivers.

The ROI Program provides incentives to reap “hidden” benefits

Waste generators may have disincentives to incur the costs of P2 work when

- all or most of the savings accrue to a different organization,
- the savings are diffused among multiple offices and organizations, and
- the benefits are related to health and safety, the environment, or programmatic issues.

By looking past stovepipes and focusing on the overall benefits to DOE, the ROI program encourages projects that are cost-effective from the standpoint of the Department overall.

Furthermore, non-monetary benefits of P2 projects, such as protection of natural resources, are typically not fully considered in P2 decision-making. This, too, may contribute to an under-investment in P2 opportunities. This study found that P2 projects produce significant non-monetary benefits in addition to the documented financial rewards.

CONCLUSIONS

The ROI program serves a key role in optimizing the function of the system within existing constraints to achieve the significant financial, health and safety, environmental, and programmatic benefits of P2 investments. For example, the ROI program looks past organizational “stovepipes” to fund projects that are cost-effective from the standpoint of DOE and taxpayers. It is recommended that DOE aggressively capture the documented benefits of pollution prevention by continuing to fund the ROI program.

Table 1. Life cycle analysis reveals that P2 projects produce significant financial and non-monetary rewards

Project Name	Implementation Cost (\$1000s)	Life Cycle Savings (\$1000s)	Pollution/Waste Prevented	Environmental Impacts	Health and Safety	Programmatic Impacts
ORNL Cyanide by MIDI Distillation Upgrade	49	766				
ORNL Mercury Analyzer Upgrade	23	349				
ETTP Purchase Data Security Degausser	28	274				
ETTP Substitution of Poly Tanks for Drums to Collect Acids	21	105				
Y-12 Source Reduction of Heavy Equipment Oils	37	<0 ^a				
RL Basin Overflow Retention Tank	13	1,450				
RL TWRS Evaporator Modification	233	22,300				
RL Mixed Waste Rain Curtain	149	791				
RL Isolate Diversion Box	18	3,410				
PNNL Microconcentric Nebulizer	2	3.0				
RL Eliminate Solid Waste Stream with Treatment and Recycling	5.6	296				
RL In-Line Solvent Recovery	22	49				
PNNL Metallography Photochemical Reduction	6.7	249				

Key: Project produced:

	Major improvement relative to baseline approach		No change relative to baseline approach		Major decline relative to baseline approach
	Some improvement		Somewhat worse than baseline		

a Not quantified

REFERENCES

1. K.L. YURACKO, B.E. TONN, and M. MORRIS, "Assessment of Cost Savings of DOE's Return-on-Investment Program," ORNL/TM-1999/155, Oak Ridge National Laboratory (1999).