

Manufacturing Energy Technical Assistance

Summary:

This initiative looks to ensure that each year, 125 energy assessments are conducted at qualifying small and medium-sized manufacturing facilities in Pennsylvania. The energy assessment criteria will be primarily designed by the Pennsylvania Department of Environmental Protection's (PA DEP) Energy Office, and will also include assessments performed through the Pennsylvania Technical Assistance Program (PennTAP), the Department of Energy Industrial Assessment Centers (IAC) program, and/or other similar governmental-sponsored endeavors.

Background:

The PA DEP currently provides discretionary funding to PennTAP to administer technical assistance via energy efficiency assessments for manufacturers within the Commonwealth. A second program, for a more limited group of manufacturers based on size and location, is the IAC program, which is funded directly by the federal DOE. Between these two programs, there are currently approximately 30 energy assessments completed each year in Pennsylvania.

This initiative would dedicate sufficient state funding to perform an average of 125 energy assessments per year at qualifying Pennsylvania manufacturers. The assessments will be completed by PennTAP and other similar assessment centers. The cost of implementing the measures identified in the assessment will remain the sole responsibility of the manufacturing company. These energy assessments will model the assessments completed by IAC. The energy assessments will be designed and monitored through DEP. These assessments will focus on both electricity and other forms of energy consumption. The criteria for determining a manufacturer's eligibility for the assessments will be completed by DEP.

PennTAP Energy Efficiency Assessments

The purpose of the **PennTAP Program** is to assist Pennsylvania companies improve their competitiveness by providing technical assistance and information to help resolve specific technical questions or needs. An Outreach program of the Pennsylvania State University, PennTAP is a federal-state-university partnership for economic development. The program focuses on helping smaller manufacturers that normally do not have the in-house expertise or resources to resolve specific technology needs. PennTAP serves the entire state of Pennsylvania through a network of Technical Advisors, each of whom has specific areas of technical expertise and are located throughout the state. PennTAP offers several different services, and has been performing energy efficiency assessments for PA small and medium-sized manufacturers for over 15 years.

Energy efficiency assessments are conducted at no cost to the manufacturer, and consist of a detailed examination of how the facility uses energy for targeted facility operations, followed up with a detailed report documenting specific energy efficiency related projects that provide a positive economic payback. If applicable, the report may document funding opportunities to the manufacturer to assist in implementation. After sufficient implementation steps have been completed by the manufacturer, PennTAP conducts follow-up activities to determine the environmental and economic benefits resulting from implementation of energy solutions.

Engineering students are educated about Energy Efficiency (E2) opportunities by participating in on-site assessments.

Department of Energy's Industrial Assessment Centers

Independent of the PennTAP program, the DOE, via their Advanced Manufacturing Office, provides no-cost assessments to eligible small and medium sized manufacturers provided through DOE Industrial Assessment Centers. Lehigh University, University of Delaware, and West Virginia University are DOE IACs and are the three currently designated providers for assessments conducted in PA. The scope of the energy audits includes identifying opportunities to improve productivity, reduce waste, and save energy. The typical IAC assessment conducted in Pennsylvania identifies more than \$120,000 in potential annual savings opportunities, with an average one-time implementation cost of approximately \$150,000. DOE bears the entire cost of the assessment; manufacturers bear the entire cost of implementing any of the recommendations in the assessment. Although manufacturers are under no obligation to implement any of the recommendations made in the IAC assessment, the DOE's experience is that a significant percentage of recommendations are implemented because they have positive economic paybacks. Manufacturers qualify for an IAC assessment if they meet these criteria:

- Located less than 150 miles of a participating IAC university
- Gross annual sales below \$100 million
- Fewer than 500 employees at the plant site
- Annual energy bills more than \$100,000 and less than \$2.5 million
- No professional in-house staff to perform the assessment

Table 1 below depicts the projected average annual energy savings, implementation costs, payback period, and CO2 reductions per company, as calculated from all of the recommendations included in the 47 IAC assessments completed in Pennsylvania since 2012. Source: DOE IAC database.

Table 1 - Identified Cost / Savings with 100% Implementation	
Avg. Cost of Implementation (not including assessment)	\$152,519
Avg. annual Savings due to Elec.	\$77,929
Avg. annual Savings due to NG	\$34,892
Total avg. annual savings due to Elec. and NG	\$112,821
Avg. Payback Period in years	1.352
Avg. CO2 Reduction due to Elec. (tons)	16,118
Avg. CO2 Reduction due to NG (tons)	316

Implementation Steps:

- Energy Office staff will work with PennTAP and the DOE staff of the IAC program to identify a prioritized list of opportunities and barriers achieving energy reductions and a strategy to overcome those barriers.
- Energy Office staff will work with PennTAP, community colleges and trade schools to educate and train students and staff to be able to perform resource assessments.
- PennTAP staff will coordinate with the Pennsylvania Public Utility Commission (PUC) and utilities to share and develop cost-effective energy use reduction programs for small, medium and large manufacturers.
- Energy Office staff will seek additional funding for assessments.
- Once additional funding is obtained, select and contract with additional technical assistance providers.
- PennTAP and Energy Office staff will conduct additional outreach to potentially eligible manufacturers.

Potential Overlap:

- Act 129 Phases IV, & V
- Energy Efficiency Financing

Additional Information:

According to the Pennsylvania Manufacturing Register and industrial database profile, there are 18,666 manufacturing companies in Pennsylvania (2-digit NAICs codes 31 to 33). Some, but not all, of these facilities would either qualify for either of the existing programs—PennTAP or IAC—or would qualify for the expanded programs under the auspices of the DEP Energy Office. According to EPA (2012) data, combustion of fossil fuels in the industrial sector accounted for 41.3 MMTCO₂e of GHG emissions in Pennsylvania.

The initiative is limited to manufacturing operations, and would therefore not include assessments at other large energy users such as facilities in the following industries: Mining, Quarrying, and Oil and Gas Extraction (NAICs Code 21), Utilities (22), Wholesale or Retail Trade (42, 44-45), 48-49 Transportation and Warehousing (48-49), Waste Management Facilities (56), or Hospitals and other health care facilities (62).

Quantification approach and Assumptions:

The additional costs associated with this initiative will be covered by a combination of public funds (assessment costs) and private funds (implementation costs). The average kWh savings from table 1 will be used for each manufacturer projected to have an assessment. The average cost of the assessment and the implementation costs are also taken from table 1 and assume an annual 2.5% increase. Historical data from the IAC suggests an approximately 50% implementation rate three years after the assessment. The total annual costs, energy savings, and GHG reductions have been adjusted in table two to account for the implementation rate.

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- Projected cost of electricity and natural gas from the Energy Information Administration Annual Energy Outlook 2014
- Projected Greenhouse Gas (GHG) Emission in Natural Gas assumes an emission factor of 117 lb/mmBtu.
- Projected GHG Emissions in Electricity assumes 0.5% annual reduction from 2013 Pennsylvania value (1112 lb/MWh)
- Companies will continue to have steady energy savings and GHG reductions annually for each year after implementing measures suggested in the assessment.
- Future assessment costs and results are assumed equal to past DOE IAC costs and results.
- Assumes that 50% each identified energy project is implemented.
- Assumes that each energy project remains 100% effective from its implementation through 2030 (i.e. no plant closures, etc.)
- Assumes that energy projects identified for future participants will have the same energy savings, costs, etc. as those identified for past participants.
- Assumes all implementation costs will be incurred to the manufacturer in the same year as the assessment is completed. Historical IAC data suggests that implementation typically takes place over multiple years.

Table 2 - Summary of Program	2015	2020	2030
Total # of Companies	125	750	2000
Total kWh saved per company	1,143,000	1,143,000	1,143,000
Total mMBTU saved per company	5,435	5,435	5,435
Projected cost of electricity (\$/kWh - EIA 2014 AEO)	0.089	0.090	0.099
Projected cost of NG (\$/mmBtu - EIA 2014 AEO)	5.225	5.671	8.692
Projected savings due to electricity per company	\$101,186	\$102,445	\$112,663
Projected savings due to Natural Gas per company	\$28,398	\$30,822	\$47,241
Total Projected energy savings per company	\$129,584	\$133,267	\$159,904
Average cost of assessment per company (2.5% annual increase)	\$16,667	\$18,857	\$24,139
Average cost of implementation per company (2.5 % annual increase)	\$152,519	\$172,561	\$220,893
Total cost of assessment + implementation per company	\$169,186	\$191,418	\$245,032
Implementation Rate	50%	50%	50%
Total annual cost (\$ million)	\$10.57	\$11.96	\$15.31
Total annual savings (\$ million)	\$8.10	\$49.98	\$159.90
Net annual cost (\$ million)	\$2.48	-\$38.01	-\$144.59
CO2 Emission Rate (lb/MWh)	1,101	1,074	1,021
CO2 Emission Reduction from electricity (MMtCO2e)	0.0357	0.2087	0.5293
CO2 Emission Rate (lb/mmBTU)	117	117	117
CO2 Emission Reduction from Natural Gas (MMtCO2e)	0.0180	0.1081	0.2884
Total CO2 Emission Reduction (MMtCO2e)	0.0537	0.3168	0.8177
Cost Effectiveness (\$ / MtCO2e)	46.1	-120.0	-176.8
Cumulative CO2 Emission Reduction (MMtCO2e)	0.05	1.12	7.07

	2030 Annual			2030 Cumulative		
	Reductions (MMtCO2e)	Cost (\$MM)	Cost-Effectiveness (\$/MtCO2e)	Reductions (MMtCO2e)	Total NPV (\$MM)	Cost-Effectiveness (\$/MtCO2e)
Manufacturing Energy Technical Assistance	.82	-144.59	-176.8	7.07	-587	-83.05