FY 2009 Secretary of Defense Environmental Awards

Letterkenny Army Depot

Sustainability, Industrial Installation

INTRODUCTION

As the Center of Industrial and Technical Excellence for Air Defense and Tactical Missile Systems, Letterkenny Army Depot's (LEAD) primary mission is providing the U.S. Army and other services with worldwide, reliable, responsive and cost-effective depot-level maintenance. LEAD also provides field support, systems integration, and product support integration for weapon systems, components and ancillary equipment to ensure the readiness, sustainability and safety of these military forces in the full spectrum of operational environments.

The approximate total depot population is 3,400, including a LEAD population of approximately 2,000 civilian and 100 military personnel. Tenants and contractor support at the depot employ an additional 1,300 people. The depot covers 17,793 acres, a large portion of which is used to conduct maintenance, modification, storage and demilitarization operations on tactical missiles and ammunition.

Located in south central Pennsylvania, LEAD is situated in the Cumberland Valley in Franklin County, five miles north of Chambersburg, the county seat. The depot is surrounded by lightly populated residential areas, agricultural land and the Broad Mountain to the west. The depot's location provides easy access to seaports, air travel and major highways.

LEAD remains among the top three employers in Franklin County, fueling an economic engine which propels more than $250 million annually into the region through payroll, contracts and retiree annuities. LEAD has frequently partnered with industry, leveraging its unique capabilities and skills. LEAD supports the growth and development of the local community through its active participation in community planning. Local community planning groups include the Chambersburg Area Development Corporation, Franklin County Area Development Corporation, Chambersburg 2000 Partnership, the Letterkenny Industrial Development Authority, Council of Governments, Greater Chambersburg 21st Century Partnership and the Franklin Science Council.

JUDGING CRITERIA

- PM Program Management
- OM Orientation to Mission
- TM Technical Merit
- T Transferability
- SI Stakeholder Interaction

On this page: Lines of refurbished high-mobility multipurpose wheeled vehicles await shipment. LEAD's primary mission is to provide the U.S. Army and other services with worldwide, reliable, responsive and cost-effective depot-level maintenance.

BACKGROUND

The U.S. Army, and in particular LEAD, currently faces the significant challenge of finding sustainable sources of energy. With each transformation at LEAD comes an increasing demand for energy to fuel new missions and operations. In response, LEAD recognizes energy independence as a foundation of its future.

Significant environmental aspects and impacts have been evaluated as part of the depot's International Organization for Standardization (ISO) 14001 Environmental Management System (EMS) implementation to include hazardous waste generation, air emissions, industrial wastewater treatment and solid waste management. Another environmental challenge is the effect of more restrictive environmental regulations.

Developed in FY 2008, LEAD's Sustainability Plan guides LEAD's environmental goals for the next 25 years and beyond. LEAD's Sustainability Plan consists of three overarching goals: water conservation, energy conservation and solid waste reduction. Under the plan, by the year 2033, the depot will subsist solely on renewable energy and self-sustaining water and other natural resources with no waste discharge into the local landfill.

The Sustainability Plan is an integral part of the Commander's Strategic Plan objective to become the Army's premier "Sustainable Green Depot." Progress on sustainability goals and objectives is tracked through quarterly Environmental Quality Control Committee meetings, attended by top management.

PROGRAM SUMMARY

LEAD has more than 69 years of service to our nation's Soldiers. While it has sustained a record of distinction across multiple mission changes, the depot's Chambersburg location has been constant. Commands change, programs come and go, and buildings are constructed, repaired and replaced, but the environment remains the foundation on which the depot depends. The depot has been transformed from its roots as a munitions storage facility into a modern, multi-capable provider of manufacturing and technological products and services. Maturing with each mission has afforded the depot the wisdom needed to sustain operations well into the 21st century.

The depot found success by institutionalizing sustainability planning into its regular maintenance and capital budgeting processes. Because they are planned and funded by the Directorate of Public Works, sustainability projects are the first priority of all of the depot's infrastructure upgrades. Over the past two years, the depot upgraded and enhanced its infrastructure, incorporating a comprehensive energy conservation strategy, and completed numerous projects, such as installing high-efficiency lighting, air conditioning units, boilers, updated operation controls and additional advanced monitoring systems.

ACCOMPLISHMENTS

Material Substitution

As part of their ISO 14001 EMS, LEAD established an objective to "reduce the quantity and toxicity of hazardous chemicals used at LEAD." LEAD has been targeting and replacing hazardous materials which contain the following chemicals: Methylene Chloride, 1,1,1-Trichloroethane, Trichloroethylene and Tetrachloroethylene. Additionally, LEAD reduced the use of paint thinner as a cleanup solvent for paint guns by replacing it with gun cleaning systems which use a safer solvent that is recirculated within the machine. This reduces hazardous waste disposal as well as fugitive emissions of volatile organic compounds (VOC).

LEAD purchased electric vehicles to replace gasoline vehicles on the depot. They are used to support LEAD's mission by transporting parts and personnel, reducing CO_2 emission and saving fuel costs.

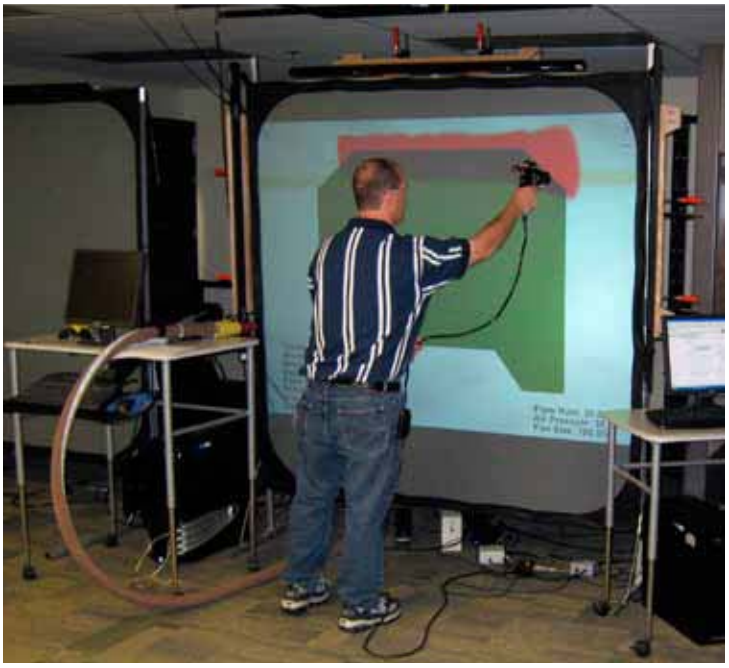
As part of a pilot program, the depot procured two electric passenger vans and three electric pickup trucks in FY 2009 to replace the previous gasoline trucks used to transport parts and personnel within the depot. The conversion to these vehicles will reduce CO2 emissions by 3.5 tons and save $9,400 in fuel costs annually. As a collateral benefit, because the vehicles are electric, they can enter enclosed buildings and transport people and parts directly to work areas, saving time and increasing production. Upon performance and cost/benefit evaluation of the vehicles, LEAD will decide how best to use additional vehicles throughout the depot and document lessons learned for transferability of the program to other installations.

As of September 2009, 55 of the depot's 237 General Services Administration (GSA) vehicles had been replaced with ethanol-based, or E85, fueled vehicles. The depot's fleet of non-military GSA vehicles presents an ideal opportunity for conversion to E85 fuel. The depot plans to convert all of its gasoline-fueled GSA vehicles to dual fuel E85 or gas/electric hybrids by FY 2015.

Process Modification or Improvement

LEAD recently launched a painter training program in cooperation with the University of Northern Iowa based upon the latter's Spray Technique Analysis and Research for Defense (STAR4D) methodology. The STAR4D program is focused on enhancing a painter's ability to improve the overall quality and effectiveness of military coatings systems. Improving painter efficiency allows LEAD to reduce material and labor costs associated with excessive paint utilization and all associated wastes, including reduction of VOCs via air emissions, reduction of paint and solvent waste disposal, and reduction of material costs related to poor transfer efficiency (coveralls, booth maintenance and filter replacement). STAR4D training will be implemented depot-wide, with all painters to be processed through the program. Analysis of past trainee performance indicated:

- 16.61 percent increase in transfer efficiency
- 13.33 percent savings in coatings
- 9.52 percent reduction in VOC emissions



Painters at LEAD are trained on the Spray Technique Analysis and Research for Defense system. This program will reduce volatile organic compound emissions and improve the quality and effectiveness of military coating systems.

Another minor process modification resulted in additional unexpected benefits to LEAD. To reduce heat loss from open overhead doors during the winter, the depot retrofitted 16 industrial doors with high-speed doors at two high-traffic buildings. Originally planned as an energy saving effort, the rapidly opening and closing doors also produced labor savings. Workers no longer have to wait significant times for the old doors to open and close. Between labor and energy costs, the depot will save an estimated $19,000 annually.

Improved Material Management

In the past two years, to reduce water use and discharges, the depot used three closed-looped vehicle cleaning systems, preventing thousands of gallons of oil-contaminated water from being discharged to the industrial wastewater treatment plant. Additionally, water is cleaned and recycled, reducing the annual demand on current water supplies. Water conservation is the first leg of LEAD's Sustainability Plan. By 2018, the depot will use 50 percent less water than is currently being consumed, and by 2033, the depot will be self-sustaining, with all water usage coming from sustainable resources.

Compliance with Executive Order (E.O.) 13423 "Strengthening Federal Environmental, Energy, and Transportation Management"

LEAD has several systems and programs currently in place, as well as planned projects, to achieve compliance with E.O. 13423.

- Purchase and use of electric vehicles
- Qualified Recycling Program (QRP)
- Wind turbine project
- Bio-mass boiler project
- New constructions to achieve Leadership in Energy and Environmental Design (LEED) certification
- Geothermal heating and cooling systems
- Municipal waste-to-energy project
- Heating, venting and air conditioning chiller replacements

An employee is shown cleaning a vehicle with a high-pressure closed looped system. This system conserves water and minimizes discharge to the industrial wastewater plant.

Recycling Program

LEAD has a very mature and robust QRP. It operates with a dedicated staff of three full-time and six part-time employees.

The depot actively recycles scrap metal, cardboard, paper, used oil, aluminum cans, steel cans, #1 and #2 plastic bottles, scrap wooden pallets, empty plastic drums, nonhazardous antifreeze and batteries. Their recycling rate for FY 2008 was 73 percent and for FY 2009 was 72 percent.

Green Procurement

LEAD conducts and maintains a healthy green procurement program. It has many initiatives in place to become "greener" and more environmentally conscious in day-to-day activities, as well as to make green purchases the norm rather than the exception. For example, all LEAD contract solicitations specify Energy Star rated equipment in the statement of work. This ensures any new equipment purchased will meet Environmental Protection Agency energy saving standards. Additionally, the depot requires all contractors working demolition projects to recycle as much material as possible through its Recycling Center. LEAD also requires all office copy paper to have a minimum of 30 percent recycled content. These small, easy to implement actions result in considerable progress towards LEAD's sustainability goals and help sustain the environment.

Education, Outreach, and Partnering

Originally developed during the energy crises of the 1970s, Energy Savings Performance Contracts (ESPC) provide an additional source of "off-balance-sheet" financing to help the depot become energy self-sufficient.

Under an ESPC, to fund a project's initial capital costs, the utility company or equipment supplier shares future energy cost savings associated with those capital investments. Currently, the depot is partnering with Northeast Energy Services Company,

Inc. (NORESCO) on two shared energy projects: the construction of a 4.5 megawatt (MW) wind farm and the installation of a 300 boiler horsepower (BHP) bio-mass boiler.

Through an ESPC, the depot has teamed with NORESCO to install several wind turbines and create a 4.5 MW wind farm which could provide the depot with 100 percent of its current energy use. NORESCO has completed its initial wind studies and identified a preferred spot for the turbines just outside of the depot. Plans are in development to conduct stakeholder meetings for the wind turbine initiative, with the objective of gaining community support and ensuring smooth project development. The depot will next study the project's economic feasibility. If it deems the project is viable, the depot will partner with NORESCO and the Pennsylvania Department of Conservation and Natural Resources to erect the turbines. Cost savings would be shared between NORESCO and LEAD.

As part of a second shared ESPC, also with NORESCO, the depot will install a 300 BHP bio-mass boiler to convert waste wood to steam for heating. The boiler will go in Building 349, in the space formerly used for a coal-fired boiler, and will provide high-pressure steam to the existing boiler plant header, allowing a natural gas boiler to be taken offline during the summer. This $5.5 million project will use waste wood generated at LEAD and from surrounding businesses to generate heat in the winter. Benefits include landfill cost avoidance (transportation and tipping fees), extending the life of the municipal landfill and offsetting the costs of natural gas for heating. Total annual savings are estimated at $670,000, with a remuneration timetable of 15 years. Additionally, the bio-mass boiler is expected to reduce CO2 emissions by 9,027,430 tons per year.

Reductions Achieved

To achieve its sustainability goals, the depot must uncover and track what had previously been hidden energy and water use, as well as their associated costs. The depot has metered water use at all of its buildings since the 1990s, and all new construction has also been metered. Additionally, the depot installed an additional 26 electric meters and five gas meters in 12 buildings, with a monitoring system to track and shift the demand for electricity to off-peak, lower cost hours. As of September 2009, the depot had 88 meters tracking 90 percent of electric costs. It is on track to meet the Army's goal of having all buildings metered by the end of FY 2013.

In the past two years, the depot removed aged chillers totaling more than 300 tons in cooling capacity at Building 370 and installed 270 tons of new high-efficiency chillers to serve more than 120,000 sq. ft. of space, reducing electric costs by more than $3,000. It also replaced four large steam boilers, totaling more than 11 million British thermal units (BTU), with new energy-efficient boilers, saving $40,000 in natural gas and fuel oil costs annually.

As part of LEAD's Qualified Recycling Program, employees use equipment on site to compact material.

LEAD made the changes through its regular capital reinvestment planning, through which it replaces and upgrades equipment as it reaches the end of its economic life. The depot estimates the average equipment efficiency has increased by more than 15 percent, saving both energy and maintenance costs.

Additionally, over the past two years, LEAD installed 80,000 sq. ft. of new lighting in Buildings 41 and 51, replacing the existing lighting with high-efficiency fluorescent bulbs and occupancy sensors, which saved an estimated $17,000 in electric costs. By replacing old ballasts and T-12 fluorescent bulbs with electronic ballasts and high-efficiency T-8 fluorescent bulbs, the depot reduced both the energy used as well as the number of bulbs required. Three of the new high-efficiency bulbs produce the same light output as four of the old bulbs. In Building 41, where open areas use High Intensity Discharge lighting, efficient T-5 conversions were made, and motion detectors and timers were installed in product work cells. The original lighting consumed approximately 240 kilowatt hours (KWH) per day. By operating the new energy-efficient fixtures and motion detectors, the depot reduced consumption in Building 41 by an estimated 90 KWH per day.

The depot recently upgraded its compressed air plant and repaired its compressed air distribution system in the main manufacturing/assembly buildings, which comprise more than 500,000 sq. ft. of production space, saving an estimated $11,000 in electric costs. LEAD replaced the low-efficiency air compressors with high-efficiency compressors, which are equipped with variable frequency drives and two air plants featuring sequencers to match compressor output with demand. In addition, the depot repaired and replaced more than 800 feet of 1- to 4-inch-diameter distribution lines and fittings, significantly reducing line losses within the system.

> "Letterkenny developed the most comprehensive sustainability program in the Army by installing meters to monitor electricity consumption, driving electric vehicles, adding solar panels and geothermal heating, replacing inefficient boilers, and making a host of other improvements. Letterkenny is a model for sustainability."
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> **- Tom Lillie, Consulting Fellow, Army Environmental Policy Institute**

Master Planning and Green Buildings

In 2009, LEAD began constructing its first major LEED project: the 40,335 sq. ft. Army Reserve Center, which is designed to the LEED Silver standard. In FY 2009, the depot completed a LEED-certified project with the construction of a 34,630 sq. ft. Tactical Missile building, which houses the operations for PATRIOT and HAWK missiles. The cost will be slightly more to construct the building to LEED standards than to traditional standards; however, the life cycle cost savings from energy efficiency alone are estimated at more than 30 percent. From these two LEED standard buildings, the depot will save $68,000.

Sustainability projects require substantial capital investment and take years of planning. A project begins with a needs assessment followed by project identification, concept development, feasibility studies and engineering designs. The depot continuously feeds its pipeline of long-term sustainability projects. For example, in the last two years the depot initiated steps toward installing passive solar and geothermal heating and cooling using Energy Conservation Investment Program (ECIP) funding. Additionally, the depot has partnered with the National Defense Center for Energy and Environment (NDCEE) to demonstrate emerging technologies in waste-to-energy conversion and methane gas recovery.

LEAD is pursuing ECIP funding to pay for geothermal heating and cooling systems, a proven energy saving technology, for as many as 28 of its buildings. The systems function by capturing the earth's constant temperature of 55 degrees to produce heat in the winter and cooling in the summer. More importantly, geothermal technology represents a truly sustainable energy source. The life cycle cost analysis for the proposed heating systems suggests a savings of approximately

$491,734 per year in heating oil and a decrease of approximately 19.627 million BTU of energy use per year, further reducing carbon emissions by approximately 1,760 tons.

LEAD and NDCEE have partnered to demonstrate a portable waste-to-energy system which could be deployed at forward operating bases to eliminate large amounts of waste and produce energy for deployed troops. LEAD and the NDCEE plan to demonstrate a 10 ton per day gasification furnace which converts low-value waste material to synthesized gas. Preliminary design estimates place costs at $2.9 million, with an annual forecasted savings of $171,000, resulting in a payback period of approximately 17 years.

LEAD has also partnered with the NDCEE to install a demonstration methane gas recovery system, a technology currently employed at Fort Knox, Ky. LEAD sits on top of large deposits of Devonian shale, an organic matter. The shale produces methane gas, which can be recovered and used as fuel. The depot is currently considering the feasibility of installing a pumping and preparation system to tap this abundant supply of natural fuel. Perhaps most importantly, the shale is cleaner for the environment and reduces the depot's reliance on foreign oil suppliers. LEAD expects the system will be operational as early as FY 2012.

CONCLUSION

Over the past several years, in order to support Soldiers, LEAD experienced a steady increase in its production levels and a corresponding increase in energy demand. However, through the efforts outlined above, the depot reduced energy per labor hour by 13 percent compared to the previous two years, reduced costs by $167,400 annually for the past two years and positioned itself to achieve its goal of energy independence.

LEAD will stay mission ready, meet its surging production demands, deploy its core capabilities to the battlefield and earn its title as the Army's premier "Sustainable Green Depot."

This aerial view shows LEAD industrial facilities and surrounding area. LEAD encompasses 17,793 acres, which are used to support the installation's missions. This includes the maintenance, modification and storage of assets and the demilitarization and storage of tactical missiles and ammunition.