

Identifying, Financing, and Implementing an 80% Cut in Energy Use: The Coeur d'Alene Tree Nursery Project



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The Bonneville Power Administration (BPA)

- Established in 1937, by the Bonneville Project Act, to transmit and market power generated by the Federal Columbia River Power System.
- BPA began working in Energy Efficiency in 1979. In 1981, the Regional Power Act required that BPA give priority to energy efficiency as a source of its new needed power supply.
- BPA's Energy Efficiency Program operates program in the following sectors:
 - Agriculture
 - Commercial/Federal/Public Buildings/Facilities
 - Industry
 - Residential
- While BPA focuses most of its energy efficiency efforts on programs with customer utilities, BPA also works directly with Federal Agencies in the Pacific Northwest and West.



BPA's Energy Efficiency Program

- Since 1982, BPA's energy efficiency programs have delivered 1,000 aMW of savings for the region at a cost of about \$2.3 billion.
- These savings are equivalent to the generation of the region's nuclear plant (Energy NW). Only two Federal dams produce more power (Grand Coulee and Chief Joseph Dams). The savings produced served more than half of all BPA system 1982 – 2007 load growth.
- For the 2007 – 2009 rate period, BPA expects to achieve 156 aMW in savings, at an average cost of \$0.16/ first year kWh of savings
- Total annual Pacific Northwest (PNW) savings by BPA and the region's private utilities from 1982-2007 now equals 3,300 aMW of energy, enough to serve all of Idaho and Western Montana! PNW consumers paid \$1.3 billion less for power in 2005 because of utility energy conservation. The PNW annual carbon footprint was also reduced by 13.5 million tons of carbon in 2005 by this conservation.



The Federal Agency Energy Efficiency Program

- The Federal Agency Program started in 1996.
- The purpose of the Federal Agency Program is to help federal agencies overcome barriers to energy efficiency project implementation.
- The Federal Program has worked with over two dozen federal agencies throughout the Western U.S. since 1996.
- From 1996 to the present, the Federal Program has implemented over \$100 Million of completed energy efficiency projects throughout the West. BPA provided a variety of support to accomplish this, including:
 - BPA engineering and project development support
 - Direct BPA implementation
 - BPA incentives and cost sharing
 - BPA-arranged third party financing



The U.S. Forest Service Coeur d'Alene Tree Nursery Project

- The US Forest Service (USFS) Coeur d'Alene (Idaho) Tree Nursery was constructed in 1962. It includes 3,330 ft² of office buildings, 15 greenhouses, a long shelter house and 12 tree coolers, with more than 21,000 square feet of refrigerated space.



Identifying Energy Efficiency Measures

- In 2001, the Nursery's inefficient systems were beginning to fail. The USFS could only provide capital funds to meet emergency repairs.
- In 2002, the USFS contacted BPA about its problem. A BPA energy efficiency engineer completed a full audit of the Nursery and recommended several potential energy efficiency projects, including:
 - Lighting Retrofits
 - Water Conservation Measures
 - HVAC System Retrofits
 - Replacing the Refrigeration System
 - Installing Building Envelope Measures



Energy Efficiency Measures

- The USFS chose to pursue 2 projects:
 - 1) Completely replacing the refrigeration system, and
 - 2) Retrofitting the lighting throughout the Nursery
- The inefficient Freon™-based refrigeration system was replaced by an efficient ammonia to glycol chiller system that includes screw compressors with variable frequency drives. The old evaporators and fans were replaced with efficient evaporators, and warm “waste” water produced by the condenser was used to defrost the evaporators coils. The entire system was designed to be computer-controlled.
- For lighting, BPA and the Forest Service replaced all existing ballasts and lamps with more efficient models.



Funding and Financing

- The installation cost of these two measures exceeded \$2.3 million. BPA could only provide a \$250,000 incentive for the savings produced by the measures.
- In order to cover the remaining cost of the projects, BPA arranged a ten- year \$1.5 million third party financing with a private finance company.
- After the USFS received appropriated funds to use for the remaining project costs, both measures were implemented.



Implementation

- Using a scope of work developed by BPA, the USFS issued a design/building contract to Cisneros Construction of Portland, OR, for the refrigeration renovation. The contractors were able to work with the nursery to limit disruptions to nursery operations.
- Construction on the refrigeration system was completed in November 2004. The system was put into service in March 2005.
- The lighting upgrades at the Nursery were completed by Northwest Edison, a BPA contractor.
- Installation of the new lighting began in October 2003. The lighting retrofit was completed in November 2004.



Savings

- In 2005-2006, the Forest Service funded an independent Measurement and Verification analysis of the project.
- The verification report concluded that electric energy use had been reduced by 80%

Historic Averag Energy Use	~ 2,100,00 kwh/year
Post Measure Installation Use	~380,000 kwh/year
Total Savings Produced	~1,800,000 kwh/year

- The new refrigeration system eliminated the previous maintenance problems at the Nursery, greatly reducing O&M costs. The higher lighting quality was found to provide a safer and more productive work environment at the Nursery.



Future Energy Efficiency Measures

- BPA continues to develop and implement additional measures at the Nursery. Pump and drive, and water conservation measures have been implemented. Several HVAC measures will be implemented in 2008 – 2009.
- The collaboration with the USFS on the Coeur d'Alene Nursery project is a great example of a successful financed project completed by the BPA Federal Agency Program.
- The savings produced at the Nursery reduced BPA energy loads, which provided energy for other BPA customers, and helped the USFS and BPA meet national and regional energy savings goals.



Questions?

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