

Efficiency Upgrades for Southeastern Pennsylvania Transit Authority Facilities

Energy Conservation Measures for SEPTA's train and bus facilities to yield significant savings



Challenge

To avoid service disruptions to the transit routes, highly skilled mechanics work around the clock to upkeep trains and buses for the Southeastern Pennsylvania Transportation Authority (SEPTA). Mechanics maneuver heavy engine parts in cars that weigh up to 65,000 lbs. The work is challenging and requires a combination of skill, dexterity and heavy manual labor.

Similar in size to airplane hangars, SEPTA's train and bus repair shops are housed in large open bays. The massive spaces were difficult to heat. Air warmed by boilers rose to the ceiling, leaving workers on the floor feeling cold in winter. The wide garage doors that admit trains and buses were left open, allowing the cold outside air to also push warm air to the ceilings.

SEPTA needed workspaces with steady temperatures not subject to winter air gusts and wide fluctuations for the safety, productivity and comfort of the mechanics.

Solution

SEPTA worked with Constellation to develop an energy performance contract (EPC) to finance the upgrades required for the workspaces for two projects under 17-year and 10-year contracts. The first project entails over \$1,000,000 in expected annual savings for its 17-year term, and the second over \$500,000 in expected annual savings for the 10-year term. Total cost of the projects was approximately \$18.2 million, which also was eligible for almost \$300,000 in local utility rebates.

Improving existing lighting usually provides the best return on investment, so focus was placed on upgrading the existing lighting technology with state of the art retrofits or replacements. Constellation's goals were to maintain or increase lumens, generate substantial energy savings and reduce maintenance costs. Annual savings from lighting upgrades include an expected \$200,000 for train cars and \$360,000 for all buildings over the 17 years, as well as an anticipated \$527,000 for additional train cars over 10 years.

Prior to the efficiency project, the repair shops had been heated by boilers, whose convection heat, while effective at warming air, is typically ineffective for spaces with high ceilings. To address the problem of the convection heat rising and leaving the lower portion of a room cold, Constellation used an innovative approach that involved replacing aging boilers with infrared heaters mounted to the ceiling. Infrared heaters act like the sun, sending heat rays to the surfaces beneath them. Heat absorbed by the surfaces is then transferred to people on the floor.

Garage doors left open when trains and buses entered the bays exacerbated the problem of cold workspaces in winter. Constellation installed insulated speed doors with sensors that enable them to open and close automatically. This will help greatly reduce the amount of hot and cold air admitted to the bays during summer and winter, respectively.



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Highlights

Project

- Total cost of \$18.2 million
- Over \$1,000,000 in annual savings expected for the 17-year term project
- Over \$500,000 in annual savings expected for the 10-year term project
- Eligible for more than \$285,000 in rebates
- Total reduction of 8,636 tons of CO₂ per year

Technical

- Building and exterior LED lighting retrofit kits
- Natural gas-fired infrared heaters
- HVAC building automation controls (all buildings)
- Building envelope improvements (including window replacements)
- Steam system improvements
- Water conservation (all buildings)

In addition to providing major improvements to HVAC systems and lighting, other energy conservation measures included water conservation, steam valves, steam traps, envelope improvements, window replacements, duct cleaning, HVAC building controls, retro-commissioning and plasma cutter.

These upgrades will provide improved workspace environments for the SEPTA employees, as well as significant savings to SEPTA over the life of the contract.

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