-----Original Message-----
From: Ridgik, James
Sent: Thursday, August 12, 2010 4:28 PM
To: Wright, Richard
Cc: 'DHORTON@PENNONI.com'; Fritz, Darryl
Subject: FW: Stroudsburg WWTP GPR Energy Efficiency (Supplemental Information)

R. Wright / DEP Central Office:

I just received this E-Mail from Mr. David Horton of PENNONI Associates. Mr. Evan Andrews is no longer with the firm.

Is there anything else that needs to be done? Is it necessary for me to update the Green Project Checklist?

I can be reached at 570-826-2335.

Jim Ridgik / DEP / NERO

-----Original Message-----
From: Horton, David [mailto:DHorton@Pennoni.com]
Sent: Thursday, August 12, 2010 4:07 PM
To: Ridgik, James
Cc: Pferdehirt, Bradley; 'manager2@ptd.net'; 'prevjohn@ptd.net'; Gallagher, Michael; Gillen, Bridget
Subject: Stroudsburg WWTP GPR Energy Efficiency (Supplemental Information)

Jim:

The purpose of this email is to identify project components for the Stroudsburg WWTP Upgrade and Expansion project that may be eligible for funding through the Green Project Reserve (GPR) of the American Recovery and Reinvestment Act and present the case for these components. The project is identified and described in the PENNVEST Application dated May 18, 2010.

Components of the project that should be considered for GPR Funding relate to Energy Efficiency and include:

1. SCADA Systems that Optimize Process and Electrical Efficiency
2. Process Equipment that Optimize Process and Electrical Efficiency
3. Energy Efficient Equipment and VFDs *(Variable Frequency Drives)*

<u>SCADA Systems that Optimize Process and Electrical Efficiency</u> The treatment process at the Stroudsburg STP will be monitored through a SCADA System to optimize treatment performance, efficiency, and alarm to the operator when necessary. There are

approximately 377 process control points monitored by the SCADA system including water and air flows, dissolved oxygen in the SBRs, pH, tank levels, pump speed, chemical feed, and odor controls.

Process Equipment that Optimize Process and Electrical Efficiency Rather than use less efficient coarse bubble diffusers to supply air to the treatment process, fine bubble diffusers will be used to optimize oxygen transfer in the treatment processes. At Stroudsburg this will include the SBR tanks; post-decant equalization tanks, and sludge tanks.

In addition, the biological treatment system employed at the Stroudsburg WWTP is activated sludge in an SBR configuration. This process includes an energy efficient de-nitrification step rather than filters or strippers.

Lastly, the SBRs will decant by gravity to the post-decant equalization tanks, eliminating the need for additional large horsepower pumping.

Energy Efficient Equipment The Stroudsburg WWTP will incorporate:

- Variable frequency drives will be used for several large horsepower motors that will be controlled to optimize motor speed to the required equipment demand. This will include the four 75 hp influent pumps; three 100 hp SBR feed pumps; three 200 hp SBR blowers; three 50 hp filter feed pumps; and the five 50 hp sludge digester blowers.
- Centrifugal pumps that will have energy efficient mechanical seals including the influent pumps, SBR feed pumps, and filter feed pumps.
- All motors are specified as high-efficiency type.

In order to maintain the energy efficiency designed into the Stroudsburg WWTP, an aggressive preventative maintenance program will be developed for the WWTP intended to, among other things, maximize the operating life and performance of motorized equipment. At the Stroudsburg WWTP this will include inspection of equipment for wear and out-of-tolerance operation such as excessive heat generation from motors, vibration, leaks, and alarm set-points. The program will include such equipment as the influent pumps, coarse screen, fine screens, SBR feed pumps, blowers, filter feed pumps, UV system, sludge pumping equipment, etc.

The estimated reduction in energy usage at the Stroudsburg WWTP is 25% calculated as an average of the components listed below. The total annual savings and the estimated project costs are tabulated as follows *(Please note that the Estimated Annual Electric Savings reflect minor rounding adjustments)*:

Component	Estimated Energy Reduction	Estimated Annual Electric Savings	Estimated Project Cost

Component	Estimated Energy Reduction	Estimated Annual Electric Savings	Estimated Project Cost
Influent Pump Station Motors and VFDs	15%	$8,140	$274,000
SBR Feed Pumps Motors and VFDs	15%	$10,850	$575,000
Fine Bubble Diffusers (Sludge Digester)	30%	$52,720	$107,000
SCADA System & VFDs (SBR Aeration Sys)	25%	$82,010	$864,000
Filter Feed Pump Motors and VFDs	15%	$5,100	$489,000
TOTAL	25% (AVG)	$158,820	$2,309,000

Compliance With Business Case Development Requirements The Brodhead Creek Regional Authority and Stroudsburg WWTP Upgrade and Expansion Project, in accordance with the Attachment 2 of the Green Project Reserve, meets the business case development requirements. The following table compares the Annual Load and Annual Electrical Operating Cost between a Conventional drive and VFD operated systems. The operating times between the two systems are identical because each system is required to operate 24 hours per day; however, the major difference between the systems their operating power draw. A conventional system requires the pump and blower motors to run at 100% of their rated capacity, regardless of the system demands. If demand increases, a second piece of equipment is started (also at its maximum rated capacity). Conversely, a VFD operated system is able to vary the operating power draw, in response to changing system demand. This allows a VFD operated system to use less energy and operate more efficiently.

Component	*Usage Time [hr]*	*Connected Load [kWh]*	*Conventional Annual Load [kWh/yr]*	*Conventional Annual Cost*	*VFD Annual Load [kWh/yr]*	*VFD Annual Cost*
Influent Pump Station Motors and VFDs	*24*	*1,580*	*678,370*	*$54,270*	*576,610*	*$46,130*
SBR Feed Pumps Motors and VFDs	*24*	*2,106*	*904,490*	*$72,360*	*768,820*	*$61,510*
Fine Bubble Diffusers (Sludge Digester)	*24*	*1,053*	*2,196,630*	*$175,730*	*1,537,640*	*$123,010*
SCADA System & VFDs (SBR Aeration Sys)	*24*	*4,213*	*4,100,370*	*$328,030*	*3,075,280*	*$246,020*
Filter Feed Pump Motors and VFDs	*24*	*990*	*425,110*	*$34,010*	*361,340*	*$28,910*
TOTAL		*9,942*	*8,304,970*	*$664,400*	*6,319,690*	*$505,580*

**Assumptions: Power Factor Correction = 0.85, $0.08 $/kWh*

If you have any questions please feel free to contact me.

Evan R. Andrews, P.E.
Senior Engineer

Pennoni Associates Inc.
One Drexel Plaza
3001 Market Street, 2nd Floor
Philadelphia, PA 19104
Office 215-222-3000 x3345
Fax 215-222-0598 | **Mobile** 215-409-5613
http://www.pennoni.com | eandrews@pennoni.com

Original e-mail transmitted on Friday, June 11, 2010 1:55 PM by Andrews, Evan

***NOTE: Supplemental Information is displayed in red text and has been prepared by*:**

David S. Horton, P.E.
Senior Engineer

Pennoni Associates Inc.
2041 Avenue C
Suite 100
Bethlehem, PA 18017
Office 610-231-0600 x5055
Fax 610-231-2033 | **Mobile** 610-216-5520
http://www.pennoni.com | dhorton@pennoni.com