Appendix R

Green Project Business Case Example

GREEN PROJECT RESERVE – BUSINESS CASE REQUIREMENTS

The proposed Georgetown WWTF Phase II Improvements Project includes 14 components that are eligible for ARRA *Green Project Reserve* funds. Table 1 presents the Classification of each component in accordance with the four (4) categories listed in EPA's Attachment 7, as well as the Associated Costs of each component and the total project. The sections following Table 1 present the required justifications for each component and the confirmations required for the Environmentally Innovative Project Components. Further information on the proposed green components can also be found in Section 7 and Appendix E of the March 2009 Preliminary Engineering Report.

Table 1. Green Project Reserve Component Classifications and Costs

CLASSIFICATIONS:		JUSTIFICATION	TOTAL COST	COST NOTES
Water Efficiency				
1	Plant-wide non-potable water (NPW) system using reclaimed effluent	Categorical	$28,600	See Note 1
2	Site landscaping/ xeriscaping	Categorical	$28,600	See Note 1
		Sub-total	$57,200	
Energy Efficiency				
3	On-site wind power generation system	Categorical	$552,900	See Note 1
4	Engineering feasibility analysis for on-site hydroelectric power generation	Categorical	$30,000	Engineering Costs only
5	Automated air delivery control using variable speed high efficiency blowers, online process instruments, air flow meters, actuated valves, and air control panel	Categorical	$353,067	See Note 1
6	Treatment process upgrade to biological denitrification process (anoxic reactors), including additional excavation and concrete	Categorical	$328,900	See Note 1
7	Passive solar building lighting and heating	Categorical	$14,300	See Note 1
8	Treatment process concrete covers, aluminum access hatches, and FRP dome for new secondary clarifier	Categorical	$302,946	See Note 1
9	Variable Frequency Drives for RAS and Recirculation Pumps	Categorical	$25,025	See Note 1
10	Advanced System Process Control Equipment, Programming, Data Acquisition/ Trending, and Operator Interface	Categorical	$114,400	See Note 1
		Sub-total	$1,721,538	

CLASSIFICATIONS:		JUSTIFICATION	TOTAL COST	COST NOTES
Environmentally Innovative				
11	Mobile biosolids dewatering system	Categorical w/ Business Case	$107,250	See Note 1
12	Upflow reactive sand filters for phosphorus and zinc removal with reduced chemical use (filters, controls, filter feed pumps, pH adjustment, chemical dosing equipment, flow monitoring equipment)	Categorical w/ Business Case	$457,243	See Note 1
13	Advanced Nitrification Removal Process (IFAS), not including denitrification related items	Categorical w/ Business Case	$693,550	See Note 1
14	On-site sodium hypochlorite disinfectant generation (including dosing pumps)	Categorical w/ Business Case	$94,380	See Note 1
		Sub-total	$1,352,423	
		Green Project Reserve Total	$3,121,161	
		Wastewater Treatment Facility Improvements Project Total	$5,850,000	
		Green Percent of Total Project Cost	53%	

Note 1: Total line item costs include engineering and contractor prorates, "Buy American" provisions, Davis-Bacon prorates, and equipment costs. No concrete, excavation, or building costs have been associated with any of the items listed above with the exception of Item 6. Upon request, these additional costs could be added.

Justifications and Confirmations

CLASSIFICATION: Water Efficiency
Definition: *"...use of improved technologies and practices to deliver equal or better services with less water."*

Item 1 – Plant-wide non-potable water (NPW) system

Description: Reclaimed, filtered effluent for plant water demands such as landscape irrigation, washdown and polymer make-up water, seal water, chlorine makeup water, and toilet flushing.

Justification: Categorical, matches the definition and cited examples.

Reference: Reclamation/recycling of wastewater streams are cited as examples of water efficiency projects in Attachment 7, Page 43.

Discussion: Specific planned uses include landscape irrigation, washdown water, polymer make-up water, seal water, chlorine makeup water, and toilet flushing. Replacement of potable water with filtered effluent will reduce the plant's potable water demand and associated costs to provide potable water to the plant, as well as to avoid the additional cost of chlorination and de-chlorination of the non-potable water to be used. The estimated water usage by the reuse system is expected to range between 300 and 1,500 gallons per day.

Item 5 – High-efficiency Blowers with Automated Controls

Description: Upgrade/ replace existing conventional positive displacement blowers with variable frequency (speed), ultra-high efficiency blowers, new stainless steel piping, actuated butterfly valves, thermal mass flow meters, online process monitoring probes (such as dissolved oxygen) and air blower control panel.

Justification: Categorical, matches the definition and cited examples.

Reference: Attachment 7, pg 44; and EPA SFR Webcast Training Series Presentation, March 12, 2009, Slide # 50 specifically cite "*Retrofits and upgrades to pumps and treatment processes*" as "energy efficiency" project examples.

Discussion: The proposed WWTF Phase II Improvements include upgrading the aeration blower system from a typical positive displacement (PD) blower to a high-speed, turbo-compressor (HST). Turbo-compressors are relatively new innovations that are being applied to WWTF process aeration systems due to the considerable improvement in efficiency they provide over typical blowers. Aeration of a WWTF is the biggest power draw for a WWTF by far, so improving the efficiency of this process has a large impact on the power usage and carbon footprint of a WWTF. Refer to literature on turbo-compressor blowers in the March 2009 PER Appendix E for more information.

Based on a detailed analysis, upgrading to three (3) turbo-compressor blower systems will reduce the aeration energy usage by the WWTF upgrade by 17 to 30 percent, depending on the air required by the WWTF process. For example, during typical, day-to-day operations (350 scfm), a reduction of 30 percent in the operating motor horsepower is expected with turbo-compressors instead of positive displacement blowers. During peak day operations (oxygen demand of 650 scfm), the energy savings is somewhat less, at a 16 percent reduction. The following tables summarize the total energy savings expected when using HST blowers instead of PD blowers.

Air Flow Rate (scfm)	Operating Motor BHP		% Reduction with HST
	HST	PD	
350	18.93	26.9	30%
450	24	32.8	27%
650	37	44.4	17%

Air Flow Rate (scfm)	Operating Energy Use				Annual kW-hr		kW-hr Savings with HST	Annual Value of Savings
	HST kW	PD kW	# Operating	Op Hrs/Yr	HST	PD		
350	14.15964	20.1212	3	6570	279,087	396,589	117,502	$8,225.16
450	17.952	24.5344	3	6570	353,834	483,573	129,739	$9,081.74
650	27.676	33.2112	3	6570	545,494	654,593	109,099	$7,636.92