

MEMORANDUM

October 28, 2014

TO: Transportation, Infrastructure, Energy & Environment Committee

FROM: *KL* Keith Levchenko, Senior Legislative Analyst

SUBJECT: **WSSC FY15-20 CIP Follow-up: Anaerobic Digestion/Combined Heat & Power**

Council Staff Recommendation:

Council Staff recommends approval of the Draft Resolution to allow WSSC to proceed into design with its Anaerobic Digestion/Combined Heat & Power project.

Attachments to this Memorandum

Draft Council Resolution (©1)

FY15-20 CIP Approved Project Description Form: Anaerobic Digestion/Combined Heat & Power (©2-3)

Prince George's County Council Resolution CR-85-2014 (©4-5)

Executive Summary Excerpt: Anaerobic Digestion and Combined Heat & Power Study (©6-9)

Presentation Slides: WSSC's BioEnergy Project, August 2014 (©10-27) *NOTE: WSSC will provide updated slides to the T&E Committee prior to the October 30 meeting.*

Question and Answer Summary Document (©28-37)

The following officials and staff are expected to attend this worksession:

WSSC

Commissioner Adrienne Mandel

Jerry Johnson, General Manager/CEO

Gary Gumm, Chief Engineer

Chris Cullinan, Acting Chief Financial Officer

Mark Brackett, Budget Unit Coordinator

Rob Taylor, Energy Manager

Gary Grey, Operations Support Manager, Production Team

County Government

Dave Lake, Manager, Water and Wastewater Management, Department of Environmental Protection

Matthew Schaeffer, Office of Management and Budget

Background

At the Bi-County meeting this past May, the Montgomery and Prince George's County Councils agreed to language in WSSC's Anaerobic Digestion/Combined Heat and Power capital project (project description form attached on ©2-3) that requires that both councils:

"...must be briefed on the project and approve by resolution before the project can move into design."

This language was included because both counties wanted to more fully consider the project's estimated costs and potential benefits compared to potential alternatives (such as utilizing the Blue Plains Wastewater Treatment Plant's (WWTP) newly completed anaerobic digestion facilities) and to give Prince George's County an opportunity to consider any concerns regarding specific community impacts in the Piscataway WWTP area (where WSSC's new facility would be located) if this project were to move forward as transmitted by WSSC.

On September 9, the Prince George's County Council approved a resolution supporting the project moving into design (see ©4-5).

Montgomery County action on a resolution introduced on October 28 (see ©1) is tentatively scheduled for November 25, 2014.

Project Summary

WSSC's Anaerobic Digestion/Combined Heat and Power project provides for the design and construction of systems to produce biogas from biosolids. While the project description form does not specifically identify the location of the facility, WSSC's planning work to date presumes the facility would be located at the Piscataway WWTP. The total project cost is estimated at \$144 million. The project is included in the "Bi-County Sewer" section of WSSC's Approved FY15-20 CIP, since the project would receive biosolids from WSSC's other wastewater treatment plants (including the Seneca and Damascus wastewater treatment plants in Montgomery County).¹ Fats, oils, and grease collected by WSSC would also be sent through this process.

This process would reduce the volume of biosolids by about 50 percent, with the resulting product being class A biosolids (compared to the current class B biosolids generated under current processes). Additionally, the methane produced from this process would be used to generate electricity and heat to be used at the Piscataway WWTP. This technology has been implemented elsewhere, most notably at the Blue Plains Wastewater Treatment Plant.

WSSC has identified a number of advantages to this approach:

- Improvements in Current Biosolids Processing
 - Reduction in volume of biosolids by 50% or more

¹ Biosolids at the Western Branch WWTP in Prince George's County would continue to be incinerated at Western Branch, although capacity would be available at the new Piscataway facility if those biosolids were to be sent in the future.

- Production of Class A biosolids (instead of Class B biosolids as currently done)
 - Fewer restrictions on distribution and application
 - Higher value product (i.e., marketing and cost recovery opportunities)
- Electricity and Heat generation
 - Tier 1 on-site clean energy generation
 - Provides important backup power generation capability at the Piscataway WWTP
 - Excess energy generation can be sold back to the grid
- Avoidance of costs associated with renovation/upgrade of existing biosolids treatment facilities at the various wastewater treatment plants. With the exception of the Western Branch wastewater treatment plant, with the AD/CHP process at Piscataway, only the dewatering of biosolids would still occur at the other wastewater treatment plants.

For background on the project, Council Staff has attached an excerpt of the Executive Summary of a feasibility study done by a consultant for WSSC (see ©6-9). Staff has also attached presentation slides (beginning on ©10) which WSSC presented in August to Prince George's County Councilmembers. An updated set of slides will be provided to Councilmembers prior to the October 30 meeting.

County Executive Position

Council Staff asked Executive Branch staff for the Executive's position on this issue. On October 22, Office of Management and Budget (OMB) staff forwarded the following comments:

"The County Executive understands and supports the use of Anaerobic Digestion technology as a step forward in the treatment of biosolids. However, from a fiscal perspective, based on the information provided by WSSC and DC Water regarding the Anaerobic Digesters to date, the County Executive maintains his position that WSSC should not proceed with this project at this time due to WSSC's present investment in Anaerobic Digestion facilities at the Blue Plains WWTP as a part of the Intermunicipal Agreement (IMA) of 2012 and the possible available capacity in these existing facilities in Washington D.C."

Council Staff has prepared a fiscal comparison of WSSC's project with existing processes, and the Blue Plains option is provided later in this memorandum.

Community Impacts

One of the concerns raised by OMB and Council Staff at discussions earlier this year is that Prince George's County had not weighed in with regard to any community concerns about locating an AD/CHP facility at the Piscataway WWTP.

WSSC subsequently briefed Prince George's County Councilmembers on the impacts. WSSC has indicated that the new AD/CHP facility would be located on existing WSSC property at the Piscataway WWTP site and that increased truck traffic is estimated at five additional trucks coming and going per day.

As noted earlier, on September 9, the Prince George's County Council approved moving the project into design. **Based on this action, Council Staff believes the community impacts have been sufficiently vetted with Prince George's County to allow the project to move into design.**

Alternatives

Over the past year, staff from DEP and OMB have raised a number of questions regarding this project. The primary thrust of these questions has been whether WSSC should build its own AD/CHP process or whether WSSC should utilize Blue Plains' new biosolids facilities instead. There have also been questions about what would be needed if the existing processes are continued.

Based on the consultant study commissioned by WSSC a couple of years ago, and WSSC's additional conversations with DC Water staff, below is a summary of two alternatives (with major assumptions) to the Piscataway option:

Existing Processes

- Existing processes at WSSC would remain in place.
- Upgrades/improvements (including emergency generators at the Piscataway WWTP) totaling \$59.2 million would be needed over the next six years
- Biosolids would continue to be treated at each WWTP and trucked out for land application as Class B biosolids.

Use of Blue Plains Digesters

- WSSC would send its biosolids to Blue Plains.
- A new biosolids receiving facility at Blue Plains would be constructed and a 5th treatment train would likely be needed if WSSC were to send all of its biosolids to Blue Plains.² It is not clear what the cost share would be for the 5th treatment train, but it would presumably be at least a 46% share in cost for WSSC and possibly as high as 100% cost. *NOTE: The 46% and 100% costs are shown as "a" and "b" for this option in the fiscal analysis.*
- WSSC would pay a tipping fee to DC Water (estimated at approximately \$70 per ton).
- WSSC feels a backup system for biosolids treatment would still be needed under this option. This assumption is not factored into the costs reflected in this memorandum, since Executive and Council Staff suggested that WSSC could explore other less expensive emergency backup alternatives if the Blue Plains option were pursued.

Fiscal Analysis

Council Staff has worked with WSSC to develop a fiscal analysis comparing the existing biosolids process, the Piscataway facility approach, and the Blue Plains option. There are uncertainties regarding the Blue Plains option, since DC Water staff have indicated that they want to give their new biosolids system a couple of years of operating experience with Blue Plains

² Blue Plains may have some excess capacity to take some of WSSC's biosolids without a 5th treatment train. However, based on WSSC's discussions with DC Water staff, to accommodate most or all of WSSC's biosolids and/or to accept inputs from other sources (beyond WSSC), a fifth treatment train would be needed. If one were to assume a fifth treatment train could be avoided while still processing WSSC's biosolids, the Piscataway option would still provide a "payback" (albeit longer) of 31 years.

biosolids treatment before considering other options (such as WSSC's biosolids). The following chart summarizes the annual operating and total capital costs under the three options.

Fiscal Comparison of Each Biosolids Options					
		1	2	3a	3b
		Existing Process	Piscataway	Blue Plains	Blue Plains
1	Energy	394,901	(1,039,554)	99,335	99,335
2	Electrical	108,027	(1,689,607)	99,335	99,335
3	Aeration (Electrical)	-	68,285		
4	Heating (natural gas)	286,874	581,768		
5	Transportation (fuel)	698,164	493,367	3,020,479	3,020,479
6	Land Application (contract)	3,860,094	2,387,955	-	-
7	Chemical Demand	1,176,271	501,848	644,044	644,044
8	Lime	532,227	-		
9	Polymer	644,044	501,848	644,044	644,044
10	Labor	2,928,180	3,210,300	-	-
11	Tipping Fee	-	-	5,696,361	5,696,361
12	Total Operating and Maintenance (O&M)*	9,057,610	5,553,916	9,460,219	9,460,219
13	Capital Project Costs**	37,300,000	143,980,000	41,760,000	92,014,000
14	Piscataway WWTP Backup Generators	21,900,000	-	21,900,000	21,900,000
15	Total Capital Cost***	59,200,000	143,980,000	63,660,000	113,914,000
16	Annual Incremental O&M Savings - Piscataway vs. Existing Process		3,503,694		
17	Capital Payback in Years (Capital Cost Difference/O&M Savings)		24.2 years		
18	Annual Incremental O&M Savings - Piscataway vs. Blue Plains Option		3,906,303		
19	Capital Payback in Years (Capital Cost Difference with Blue Plains 3a/O&M Savings)		20.6 years		
20	Capital Payback in Years (Capital Cost Difference with Blue Plains 3b/O&M Savings)		7.7 years		
21	*Under the Blue Plains option, Total O&M does not include an estimate for treating biosolids under an emergency contract.				
22	**Ongoing and future Western Branch WWTP improvements (\$42 million) are assumed under all options and therefore not included in the above comparison numbers.				
23					
24	*** Under the Blue Plains Option 3a, WSSC pays 46% for a 5th treatment train. Option 3b assumes WSSC pays 100%.				
25	Note: Any Federal Aid received or energy performance contract could shorten the payback periods above.				

It is important to note that the above capital numbers for Blue Plains Option 3a may be low, since the numbers assume that WSSC pays 46 percent (WSSC's capital share for IMA related projects) for bringing a 5th biosolids treatment train online. However, since treatment of WSSC's biosolids falls outside the parameters of the IMA and since DC Water staff indicated that they do not see the need to bring the 5th treatment train on-line anytime soon for Blue Plains generated biosolids, it is possible WSSC would have to pay up to 100 percent of the cost (Blue Plains Option 3b)

The Piscataway option has the lowest operating and maintenance (O&M) costs of the three options. By comparison, the Blue Plains option, while potentially having the lowest up-front capital cost (option 3a), has the highest O&M cost and no payback opportunity over time. The higher capital costs for the Piscataway option are "paid back" over time through these lower net O&M costs. The actual payback period depends on which alternative the Piscataway option is compared to and whether one takes into account the capital costs avoided by pursuing the Piscataway option. The paybacks shown range from 7.7 years (compared to Blue Plains Option 3b) to 24.2 years (compared to the existing process).

One interesting point is that WSSC is pursuing a number of substantial biosolids process improvements at the Western Branch WWTP (including \$19.9 million in incinerator emissions control improvements). If at least a portion of these improvements could be avoided through the Piscataway and Blue Plains options, both of those options would fiscally improve relative to the

“existing process” option. However, the relative comparison between the Piscataway and Blue Plains options would not change.

While not assumed in the above analysis, WSSC may pursue a power purchase agreement or similar type approach for its Piscataway AD/CHP project that could offset a portion of the upfront capital costs and reduce a future payback period.

WSSC also plans to seek federal aid for the Piscataway AD/CHP project. The consultant study for the project was funded with federal grant dollars. The approved project assumes a 50/50 federal aid match, although for purposes of Council Staff’s fiscal analysis, no federal aid is assumed since it is too speculative at this time.³ Any federal dollars received would reduce the payback period shown.

Council Staff Recommendation

The feasibility study raised a number of concerns with the Blue Plains option, as has WSSC in its follow-up answers to questions from Council and Executive branch staff (see ©10-19). WSSC can elaborate on these points during its presentation before the Committee. WSSC staff indicated that they have worked with DC Water to understand the potential opportunities and costs associated with sending biosolids to Blue Plains. WSSC feels there are some key points favoring an “in house” solution for WSSC, including system redundancy, uncertainty as to facility capacity at Blue Plains (DC Water has indicated that it needs to establish an operating profile for a couple of years before it could answer this question), and the lack of a payback potential for the Blue Plains option (unlike the Piscataway option, where WSSC would achieve a payback through reduced O&M expenses).

Council Staff believes that the current fiscal assumptions noted earlier, as well as the other advantages of WSSC having an in-house system, make a compelling case for the AD/CHP facility at the Piscataway WWTP.

The key issue for Council Staff is that the Piscataway option provides an O&M payback that the existing process and Blue Plains options do not. Therefore, while the Piscataway option has the highest up-front capital cost, these costs will be offset over time.

Over time, if WSSC were to utilize Blue Plains’ anaerobic digestion facilities, there would be no future O&M payback to WSSC but, rather, permanent annual costs in the form of tipping fees. While the Blue Plains option may benefit DC Water (by enabling DC Water to maximize the use of its new biosolids facilities) and might preclude WSSC from having to make a large up-front investment in new AD/CHP facilities, Council Staff does not see the long-term benefit to WSSC, given the payback calculations noted earlier. **In this regard, the Executive’s concern about maximizing the use of present investments in Blue Plains’ facilities is not a relevant point in looking at future operating and capital costs under each option.**

³ The County generally does not reflect outside funding in projects until a commitment is received or there is at least a strong likelihood of securing the outside funds. However, in this case, WSSC is taking a similar approach here as it took with its enhanced nutrient removal (ENR) projects (showing 100% state aid initially while still in negotiations with the State).

There are also a number of other benefits to the Piscataway option, including:

- Increased clean energy production by WSSC (and the resulting clean energy credits would accrue to WSSC rather than to DC Water).
- The region would have additional biosolids treatment capacity in place that could be utilized for various initiatives in the future (such as food waste; fats, oils, and grease; etc.) as well as for emergency regional biosolids treatment if needed (i.e., Blue Plains could back up Piscataway and vice versa).

Council Staff recommends approval of the Draft Resolution to allow WSSC to proceed into design with its Anaerobic Digestion/Combined Heat & Power project.

Attachments

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Resolution No.: _____
Introduced: _____
Adopted: _____

**COUNTY COUNCIL
FOR MONTGOMERY COUNTY, MARYLAND**

By: County Council

SUBJECT: Approval for Washington Suburban Sanitary Commission project S-103.02 “Anaerobic Digestion/Combined Heat & Power” in the FY15-20 Capital Improvements Program to Proceed into Design

Background

1. As part of the Montgomery County Council and Prince George’s County Council action on the Washington Suburban Sanitary Commission’s FY15-20 Capital Improvements Program, language was approved in the project description form for S-103.02 Anaerobic Digestion/Combined Heat & Power requiring that both Councils “must be briefed on the project and approve by resolution before the project can move into design.”
2. On September 9, 2014, the Prince George’s County Council approved Resolution CR-85-2014, which approved moving S-103.02 Anaerobic Digestion/Combined Heat & Power into design.
3. On October 30, 2014, the Montgomery County Council’s Transportation, Infrastructure, Energy & Environment Committee received a briefing from the Washington Suburban Sanitary Commission on the project and the Committee recommended approving the project to move into design.

Action

The County Council for Montgomery County, Maryland approves the following resolution:

The Montgomery County Council approves Washington Suburban Sanitary Commission Capital Project S-103.02 Anaerobic Digestion/Combined Heat & Power moving into design.

This is a correct copy of Council action.

Linda M. Lauer, Clerk of the Council

A. Identification and Coding Information

1. Project Number: 153802 Agency Number: S-103.02 Update Code: Add

2. Date: October 1, 2013 Revised: May 8, 2014

3. Project Name: Anaerobic Digestion/Combined Heat & Power

4. Program: Sanitation 5. Agency: WSSC 6. Planning Area: Bi-County

7. Pre PDF Pg.No.: 8. Req. Adeq. Pub. Fac.:

B. Expenditure Schedule (000's)

Cost Elements	(8) Total	(9) Thru FY '13	(10) Estimate FY '14	(11) Total 6 Years	(12) Year 1 FY '15	(13) Year 2 FY '16	(14) Year 3 FY '17	(15) Year 4 FY '18	(16) Year 5 FY '19	(17) Year 6 FY '20	(18) Beyond 6 Years
Planning, Design & Supervision	23,878	1,218	4,532	18,128	6,798	618	3,708	3,708	3,296		
Land											
Site Improvements & Utilities											
Construction	113,300			113,300		6,180	37,080	37,080	32,960		
Other	6,802		228	6,574	340	340	2,040	2,040	1,814		
Total	143,980	1,218	4,760	138,002	7,138	7,138	42,828	42,828	38,070		

C. Funding Schedule (000's)

WSSC Bonds	72,028	647	2,380	69,001	3,569	3,569	21,414	21,414	19,035		
Federal Aid	71,952	571	2,380	69,001	3,569	3,569	21,414	21,414	19,035		

D. Description & Justification

DESCRIPTION

This project will develop a comprehensive program for the engineering, design, construction, maintenance, and monitoring and verification necessary to add sustainable energy equipment and systems to produce biogas at a location(s) to be determined. The program will provide a reduction in energy and energy-related costs (electricity, natural gas, transportation, and disposal of biosolids) which may in part be guaranteed by the contractor. The potential guaranteed reduction component includes annual avoided energy costs as well as operations and maintenance, chemicals, and biosolids transportation and disposal costs. The program will enhance existing operating conditions and reliability while continuing to meet all permit requirements, and ensure a continued commitment to environmental stewardship at WSSC sites. The scope of work will include, but is not limited to, the addition of anaerobic digestion equipment, thermal hydrolysis pretreatment equipment, gas cleaning systems, hydrogen sulfide and siloxane removal, tanks, piping, valves, pumps, sludge dewatering/thickening equipment, grit removal, effluent disinfection systems, instrumentation, flow metering, power measurement, and combined heat and power generation systems.

In March 2009, the WSSC received approval for a federal Department of Energy grant of \$570,900 for the feasibility study/conceptual design phase. On June 16, 2010, the WSSC awarded the study contract to AECOM Technical Services, Inc., of Laurel, Maryland. The study was completed in December 2011, and the Thermal Hydrolysis/Mesophilic Anaerobic Digestion/Combined Heat & Power facility was recommended to be constructed and was presented to the Commission in April 2012. The WSSC will continue to pursue federal capital funding as a source of cost sharing as the project develops.

JUSTIFICATION

Plans & Studies

Appel Consultants, Urban Waste Grease Resource Assessment-NREL (November 1998); Environmental Protection Agency (EPA), Opportunities For and Benefits Of Combined Heat and Power at Wastewater Treatment Facilities (December 2006); Brown & Caldwell, Anaerobic Digestion and Electric Generation Options for WSSC (November 2007); Metcalf & Eddy, WSSC Sludge Digestion Study for Piscataway and Seneca (December 2007); Black & Veatch, WSSC Digester Scope and Analysis (December 2007); JMT, Prince George's County Septage (FOG) Discharge Facility Study (February 2008); JMT, Western Research Institute (WRI) Biogas Feasibility Study Scope of Work - WSSC (April 2008); JMT, Montgomery County Septage (FOG) Discharge Facility Study (January 2010); Facility Plan for the Rock Creek Wastewater Treatment Plant (January 2010); AECOM Technical Services, Inc., Anaerobic Digestion/Combined Heat & Power Study (December 2011).

E. Annual Operating Budget Impact (000's)

		FY of Impact
Program Costs	Staff
	Other
Facility Costs	Maintenance
	Debt Service	3425 20
Total Costs		3425 20
Impact on Water or Sewer Rate	8¢	20

F. Approval and Expenditure Data (000's)

Date First in Capital Program	FY 15
Date First Approved	FY 10
Initial Cost Estimate	345
Cost Estimate Last FY	146,399
Present Cost Estimate	143,980
Approved Request, Last FY	4,840
Total Expenditures & Encumbrances	1,218
Approval Request FY 15	7,138
Supplemental Approval Request Current FY (14)	

G. Status Information

Land Status: No land or R/W required
 % Project Completion: P-99%
 Est. Completion Date: (See "Specific Data" for details)

H. Map Map Reference Code:

MAP NOT AVAILABLE

D. DESCRIPTION & JUSTIFICATION (CONT.)

Agency Number: S - 103.02

Project Name: Anaerobic Digestion/Combined Heat & Power

Specific Data

The EPA is urging wastewater utilities to utilize this commercially available technology (anaerobic digestion) to produce power at a cost below retail electricity, displace purchased fuels for thermal needs, produce renewable fuel for green power programs, enhance power reliability for the wastewater treatment plant to prevent sanitary sewer overflows, reduce biosolids production and improve the health of the Chesapeake Bay, and to reduce greenhouse gas (GHG) and other air pollutants. In April 2009, the EPA announced that greenhouse gases contributed to air pollution that may endanger public health or welfare, and began proceedings to regulate CO2 under the Clean Air Act.

Based on AECOM's feasibility study work as of May 2011, the capital cost (detail design + construction) estimate for a regional/centralized plant at a location to be determined based on a Thermal Hydrolysis/Mesophilic Anaerobic Digestion/Combined Heat & Power (TH/MAD/CHP) process supplemented by restaurant grease fuel design is \$110 million, with a 36 month construction period. The environmental benefits and expected outcomes determined from the feasibility study are estimated as follows:

1. Recover 2-3 MW of renewable energy from biomass
2. Reduce Greenhouse Gas production by 11,800 tons/year
3. Reduce biosolids output by more than 50,500 tons/year
4. Reduce lime demand by 4,100 tons/year
5. Reduce nutrient load to the Chesapeake Bay
6. Reduce 5 million gallons/year of grease discharge to sewers
7. Produce Class A Biosolids

The economic benefits determined from the feasibility study are estimated as follows:

1. Recover more than \$1.5 million of renewable energy costs/year
2. Reduce biosolids disposal costs by ~ \$1.7 million/year
3. Reduce chemical costs by ~ \$400,000/year
4. Hedge against rising costs of power, fuel, and chemicals
5. Net Payback of 15 to 18 years (net based on capital cost of TH/MAD/CHP minus capital cost of lime stabilization upgrade of WSSC WWTP facilities through 2030) (Any Federal Aid received would shorten the payback period.)

Cost Change

Order of Magnitude cost estimates were adjusted for inflation and to reflect the reduction in the "Other" calculated cost percentage from 10% to 5%.

STATUS Planning

OTHER

The project scope has remained the same. Now that the feasibility study has been completed, the Commission has a defined scope, capital cost, and energy and energy-related cost savings estimates to be able to proceed with the detailed design and construction of the anaerobic digestion, biomass, and combined heat and power generation system facilities.

The Montgomery and Prince George's Councils must be briefed on the project and approve by resolution before the project can move into design.

It is envisioned that either the entire project, or only portions of the project that include the thermal hydrolysis, anaerobic digestion or combined heat and power, include a guarantee by the contractor that the capital cost will be paid back 100% from energy and energy-related cost savings with the payback period not exceeding 15 years. The energy savings for other completed WSSC Energy Performance projects have surpassed the contracts' guaranteed amount every year of the monitoring and verification period. Any Federal Aid received would shorten the payback period. Previous expenditures reflect the planning phase of this project which was completed under the Information Only project A-103.01, Anaerobic Digestion/Combined Heat & Power.

COORDINATION

Montgomery County Government, Prince George's County Government, Maryland-National Capital Park & Planning Commission (Mandatory Referral Process), Montgomery County Department of Environmental Protection, Maryland Department of the Environment and WSSC Project S-96.14, Piscataway WWTP Facility Upgrades.

NOTE This project supports 100% System Improvement.

(3)

COUNTY COUNCIL OF PRINCE GEORGE'S COUNTY, MARYLAND

2014 Legislative Session

Resolution No. CR-85-2014

Proposed by The Chairman (by request -WSSC)

Introduced by Council Member Franklin

Date of Introduction September 9, 2014

RESOLUTION

1 A RESOLUTION concerning

2 The Washington Suburban Sanitary Commission Fiscal Years 2015-2020

3 Capital Improvement Program for Prince George's County for Water and Sewerage

4 For the purpose of moving the approved Washington Suburban Sanitary Commission Capital
5 Improvement Project S-103.02, Anaerobic Digestion/Combined Heat & Power, into the design
6 stage.

7 WHEREAS, the Washington Suburban Sanitary Commission (WSSC) has included
8 Project S-103.02, Anaerobic Digestion/Combined Heat & Power, in the Capital Improvements
9 Program submitted to the two counties since October 1, 2008; and,

10 WHEREAS, the Prince George's County Council adopted CR-34-2014 approving the
11 WSSC Fiscal Years 2015 – 2020 Capital Improvement Program, which included Project S-
12 103.02, Anaerobic Digestion/Combined Heat & Power; and

13 WHEREAS, the WSSC has completed a study, which included the participation of
14 representatives of both County Councils, to determine best alternative for implementing an
15 Anaerobic Digestion/Combined Heat & Power project for handling bio-solids in a cost effective
16 and sustainable manner; and,

17 WHEREAS, the project has been the subject of numerous meetings and work-sessions
18 where information was provided to the Prince George's and Montgomery County Councils and
19 County Executive staffs to further validate the findings of the study.

20 BE IT RESOLVED by the County Council of Prince George's County, Maryland, that
21 Washington Suburban Sanitary Commission project S-103.02, Anaerobic Digestion/Combined
22 Heat & Power is approved to move into the design stage.

1 AND BE IT FURTHER RESOLVED that copies of this Resolution be sent by the Clerk
2 of the Council to the Chair of the Washington Suburban Sanitary Commission, the Montgomery
3 County Executive and President of the Montgomery County Council.

Adopted this 9th day of September, 2014.

COUNTY COUNCIL OF PRINCE
GEORGE'S COUNTY, MARYLAND

BY: _____
Mel Franklin
Chairman

ATTEST:

Redis C. Floyd
Clerk of the Council

APPROVED:

DATE: _____ BY: _____
Rushern L. Baker, III
County Executive

Note: Attachment available as an Inclusion File in LIS

Anaerobic Digestion and Combined Heat & Power Study

Overall Executive Summary

Background

The Washington Suburban Sanitary Commission (WSSC) is the 8th largest water and wastewater utility in the United States, managing the stabilization and land application/disposal of over 55 dry tons of biosolids each day. As part of its leadership role within the water and wastewater industry, WSSC is at the forefront of tracking potential national and local issues that may impact the efficacy or efficiency of its biosolids management strategy or may impose an increased cost burden on its stakeholders. The biosolids industry has been the subject of increasing debate in recent years as energy, chemical and transportation costs escalate; community concerns about traditional and emerging contaminants in land applied biosolids have become more prevalent; awareness of carbon footprint, greenhouse gas and other air emissions is the subject of pending regulation especially from incinerators; and technology alternatives have advanced dramatically so as to elevate awareness of the real and perceived benefits of recovery and reuse of biosolids in multiple valuable end forms including the production of electricity and fertilizer materials.

Throughout these ongoing debates, WSSC has remained engaged in the discussions to assess potential risk and cost impacts to their biosolids management strategy. The majority of the biosolids from the Seneca, Damascus, Piscataway and Parkway Wastewater Treatment Plants (WWTPs) are lime stabilized and beneficially reused via local land application in the states of Maryland and Virginia. The Western Branch WWTP is the only plant that incinerates the majority of its biosolids using two multiple hearth furnaces (MHFs) that were originally constructed in the 1970s and have recently undergone some refurbishment.

While WSSC's facilities are well maintained and in good operating condition, they will require increasing capital and O&M investment in the coming years to meet existing performance requirements but more importantly to address new or pending regulatory requirements, most immediately the air emissions from the MHFs to meet the new Maximum Achievable Control Technology (MACT) regulations.

Given the many regulatory, market and technological changes taking place in the biosolids industry, coupled with elevated community concerns and participation in local policy development, WSSC has undertaken this project to comprehensively assess its current practices and management plan and to evaluate alternative biosolids management strategies that may offer some advantages to the commission and its stakeholders in the coming years.

One of the underlying objectives of this study is to recover the untapped energy in wastewater biomass. Some national statistics worth considering include:

- 3% of the electrical energy demand in the US is used to treat municipal wastewater
- This carbon rich wastewater is an untapped energy resource

Anaerobic Digestion/Combined Heat and Power Feasibility Study Overall Executive Summary

- Only 10% of wastewater treatment plants (>5mgd) recover energy
- Wastewater treatment plants have the potential to produce > 575 MW of energy nationwide
- Wastewater treatment plants have the potential to capture an additional 175 MW of energy from waste Fats, Oils & Grease

The WSSC conducted this study to determine the feasibility of utilizing anaerobic digestion and combined heat and power (AD/CHP) to produce and utilize renewable digester biogas and/or biosolids gasification and drying facilities. Digester gas is considered a renewable energy source and can be used in place of fossil fuels to reduce greenhouse gas emissions. The project focus includes:

- Converting wastewater Biomass to Electricity
- Using innovative technologies to Maximize Energy Recovery
- Enhancing the Environment by reducing nutrient load to waterways (Chesapeake Bay), Sanitary Sewer Overflows (by reducing FOG in sewers) and Greenhouse Gas Emissions

Recommended Solution

The recommended solution, Regional Piscataway Biosolids Facility (treating solids from Seneca, Damascus, Parkway, Piscataway) + Western Branch as a stand-alone facility, provides WSSC with the flexibility to continue operation of the Western Branch MHFs as long as practical. The Regional Piscataway Biosolids Facility is sized to accommodate excess Western Branch solids beyond the capacity of the MHFs to avoid landfill disposal. The Regional Piscataway Facility that can be later expanded to a Centralized Piscataway Facility provides flexibility to WSSC for moving into the future while also being more cost effective than the individual plant solutions. By moving forward with a regional approach that continues to utilize the existing assets and infrastructure at Western Branch, WSSC can continue to maximize the useful life out of the existing MHFs. The Regional Piscataway Biosolids Facility was compared to the Blue Plains alternative (hauling dewatered biosolids from each WSSC WWTP to Blue Plains for treatment) and resulted in the following economic and non-economic advantages:

- Unit cost savings of \$89/DT - \$108/DT for the Regional Piscataway alternative compared to the Blue Plains alternative based on initial average tipping fee
- Capacity of Blue Plains Phase 1 TH/MAD process to accommodate WSSC solids would not be determined until 2017. Blue Plains' solids production estimates indicate peak loading (excluding hauled biosolids) would exceed Phase 1 processing capacity requiring lime stabilization. DC Water indicated that a surcharge would apply to hauled solids when processing at Blue Plains exceeds capacity of TH/MAD facility and would require operation of the lime stabilization system.
- The need for expansion of Blue Plains Phase 1 facilities would be determined in 2017 and a Phase 2 expansion involving a 5th TH/MAD train is estimated by DC Water to be available for operation in 2021. A WSSC Regional Piscataway Biosolids Facility could be operational in 2017.

Anaerobic Digestion/Combined Heat and Power Feasibility Study Overall Executive Summary

- Green power production of net 1.7 MW (with 2 MW CHP system operating at capacity with supplemental natural gas less parasitic loads) and the associated utility power offset with a Regional Piscataway Biosolids Facility would be realized by WSSC vs. DC Water with the Blue Plains alternative.
- Carbon credits from a Regional Piscataway Biosolids Facility would remain with WSSC instead of transferred to DC Water with the Blue Plains alternative.
- GHG emissions reduction in excess of 4,000 tons CO₂/year from a Regional Piscataway Biosolids Facility would be realized by WSSC instead of DC Water with the Blue Plains alternative.

The estimated capital cost of the recommended Piscataway solution is \$107 - \$117 million, depending on whether the Exelys or Cambi thermal hydrolysis (TH) pretreatment process is utilized. Estimated annual savings (reduction in biosolids hauling and electricity production) is \$3.65 - \$3.72 million depending on whether the Exelys or Cambi TH pretreatment process is utilized. Deducting the anticipated \$50 million capital cost of the baseline during the next 20 years (upgrades necessary to Western Branch incinerators, Seneca, Piscataway, Parkway, and Damascus dewatering facilities) from the capital cost estimate of the recommended solution, the net AD/CHP cost estimate is **\$57 - \$67 million**, depending on whether the Exelys or Cambi TH process is implemented.

A separate Septage Discharge Facility Study (Contract no. CM4363A06) was completed by Johnson Mirmiran & Thompson with Final Reports (one for each county) dated July, 2012 that recommend FOG and septage receiving facilities in each county. Considering the value that FOG has in the anaerobic digestion process and enhancing digester gas production, the AD/CHP study recommends co-locating a FOG receiving facility at the Piscataway plant adjacent to the anaerobic digestion process. Understanding that FOG and septage receiving facilities are necessary in each county to accommodate haulers, it is recommended to design and construct septage and FOG receiving facilities at the abandoned Rock Creek WWTP in Montgomery County, septage and FOG receiving facilities at Piscataway as part of the WSSC Regional Piscataway Biosolids Facility and a septage receiving facility at the Anacostia WWPS in Prince George's County.

Benefits of the Recommended Solution

Environmental Benefits

- Recover net 1.7 MW of renewable energy from biomass if a 2 MW CHP system implemented (with potential to recover 2.6 MW if 3 MW CHP system implemented)
- Reduce Greenhouse Gas production by 11,800 tons/yr (15%)
- Reduce biosolids output by more than 50,500 wet tons/yr (66%)
- Reduce lime demand by 4,100 tons/yr (100% used in wastewater treatment)
- Reduce nutrient load to Chesapeake Bay
- Reduce 5 MG/yr Grease discharge to sewers
- Produce Class A Biosolids

Anaerobic Digestion/Combined Heat and Power Feasibility Study Overall Executive Summary

Economic Benefits

- Recover > \$1.5 Million/yr of renewable energy costs
- Reduce biosolids disposal costs by \$1.7 Million/yr
- Reduce chemical (lime) cost by \$0.5 Million/yr
- Payback of 15 - 18 years (compared to baseline)

Project Delivery Method

Several project delivery methods could be considered for the Recommended Solution at Piscataway from traditional design/bid/build to design/build for the entire project, or breaking distinct pieces into performance based contracts. For example, the TH process vendor could furnish and install their system - \$12.8 million for Exelys and \$22.8 million for Cambi- at no capital cost to WSSC and be paid back by the additional gas produced beyond that of conventional MAD (typically 30% increase in gas production).

Energy performance contracting could be used to separate the CHP system - \$11.2 million - from the remainder of the TH/AD facility. In this manner, a third party would design, construct and operate the CHP system and sell energy produced back to WSSC at a fixed (reduced) rate over a fixed period of time. This method would reduce the overall capital cost of the project and also eliminate the associated O&M costs that would all be rolled into the cost of energy buy back from the CHP facility. A version of this method was used by the City of Baltimore at the Back River WWTP for their CHP facility.

Study Approach

The AD/CHP study was comprised of three main tasks:

- Task I included evaluations of the existing and future conditions of the plants and analyzing various alternative technologies to determine the most viable and cost effective technical approaches by which to recover and reuse energy from biosolids while reducing disposal volume.
- Task II included evaluations of short listed alternatives for more detailed economic and noneconomic analyses.
- Task III included development of Preliminary Engineering Reports for Seneca (Volume I), Piscataway (Volume II), and the Additional Alternatives, as well as a concept design for the recommended alternative (Volume III).

Task I Summary

The evaluation conducted under Task 1 resulted in the following Final Technical Memoranda briefly summarized below and contained in **Volume IV**:

TM 1B: Documenting Existing Treatment Plant Conditions

TM 1B focused on the Seneca and Piscataway WWTPs as per the original scope. This TM included development of baseline assumptions, flows and loads and evaluations of existing treatment plant conditions used for subsequent analyses. The flows and loads are summarized together with those of the other three WWTPs in the summary of TM A1.



WSSC

Where Water Matters

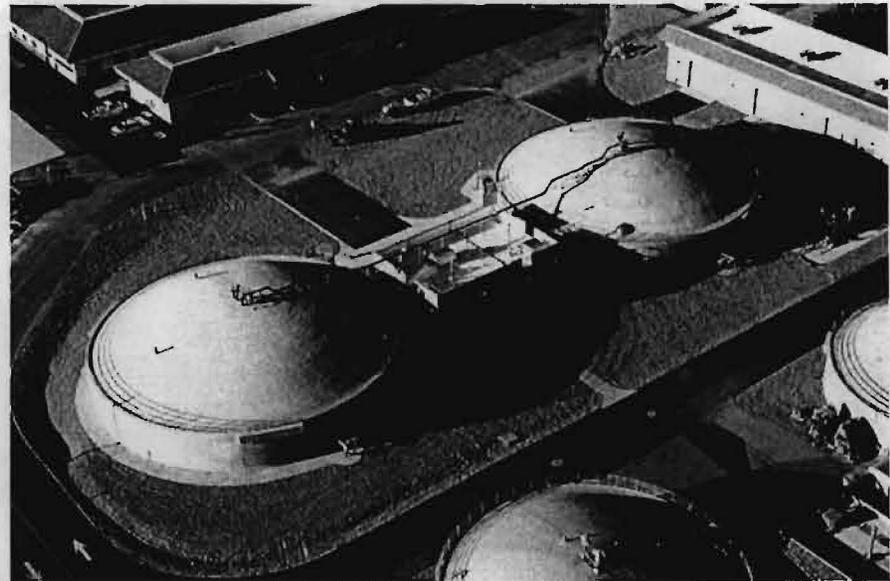
WSSC's Bio-Energy Project

World Class Technology = Economic and Environmental Good Sense

August 2014

Anaerobic Digestion

- Increasing Regulations
- About the Bio-Energy Project
- Benefits
- Community Concerns
- Alternatives
- Costs of Delay



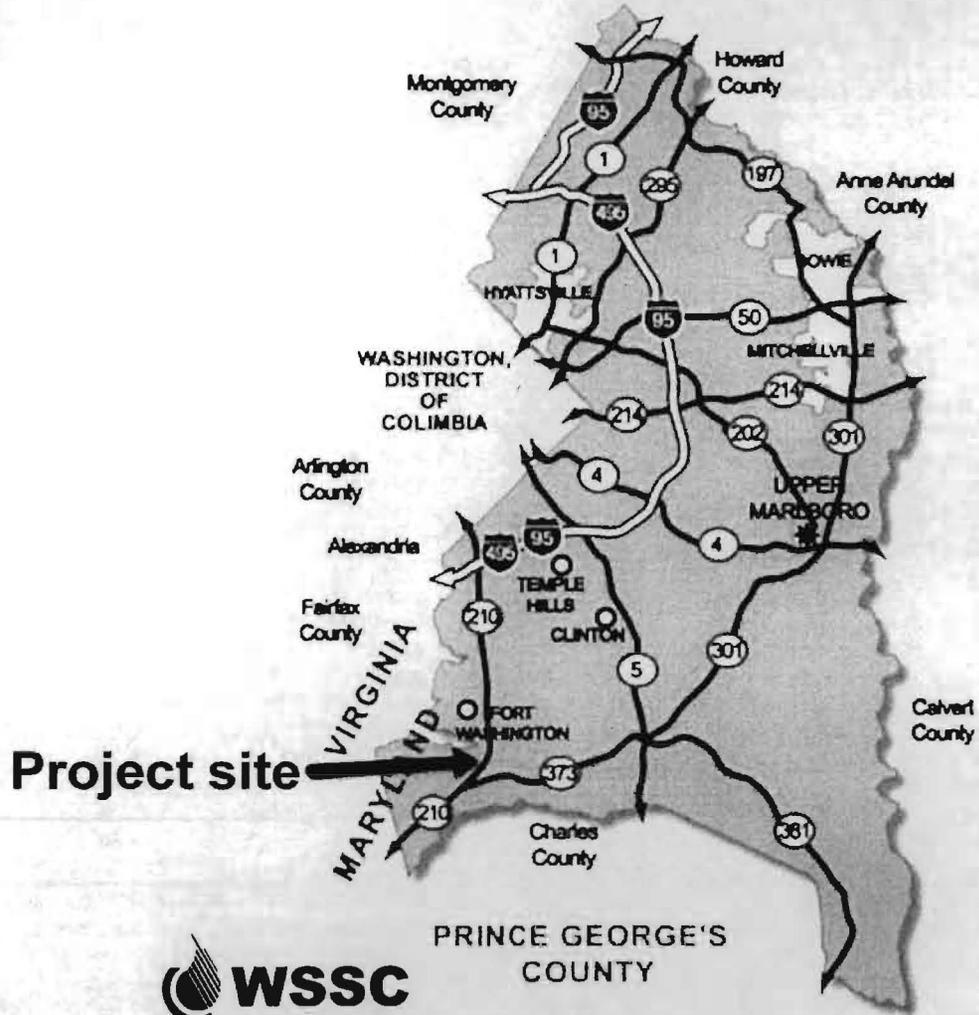
The Problem

- **Biosolids Disposal- New Tough State Regulations**
 - Land application banned in winter starting 2016
 - Restricted during the fall
 - Additional regulatory actions underway (Phosphorus Index)
- **Pennsylvania, Virginia, and other nearby States:**
 - Expected to toughen land application regulations due to growing influx of biosolids from Maryland
 - Increased hauling costs
- **Current facilities aging, need major overhauls**

The Problem

**Long Term outlook:
Land application will become more
expensive due to longer hauling
distances and possible winter
storage costs.**

Location



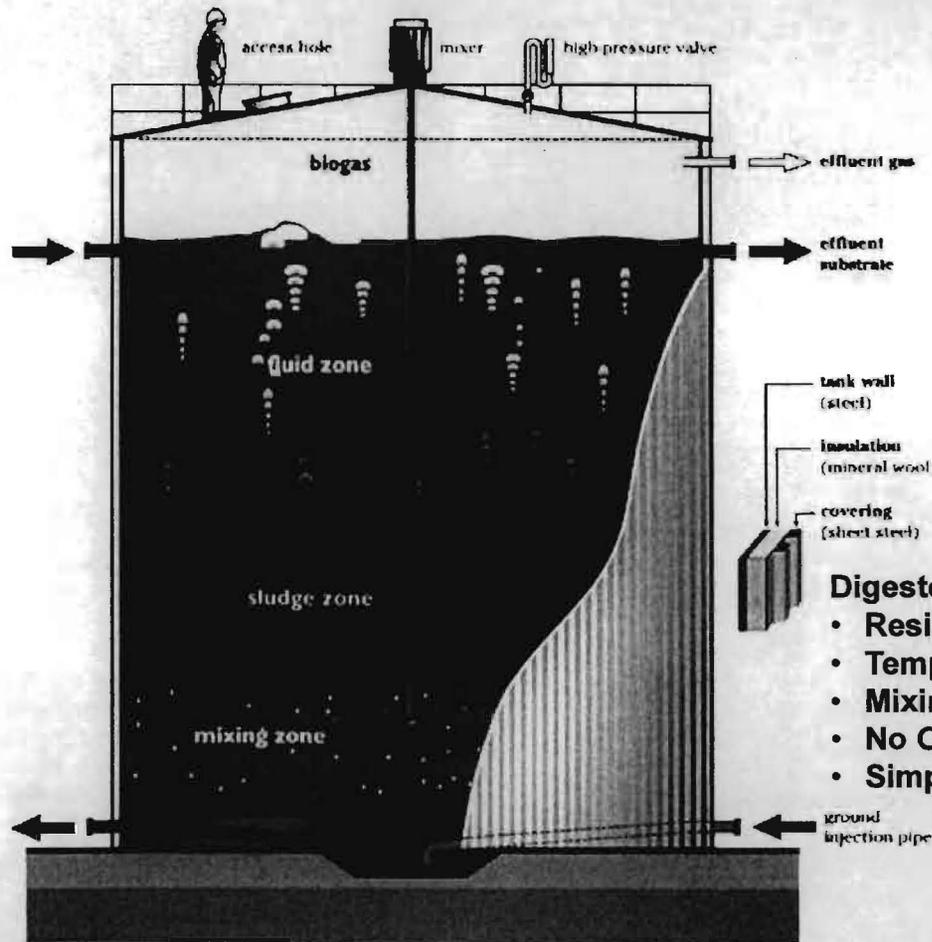
Aerial view of site

About the Project

- Anaerobic Digestion will process all biosolids transported from Seneca, Damascus and Parkway to the Piscataway wastewater treatment plant
- Anaerobic Digestion converts the biosolids, other biodegradables and grease into methane gas, reduces the volume by half, and produces better end product
- The methane is used as the fuel to power clean-burning engines, producing electricity and heat needed for wastewater treatment plant operations and for sale back to the grid

Anaerobic Digestion

- Pre-Treated Sludge
- Fats, Oils & Grease

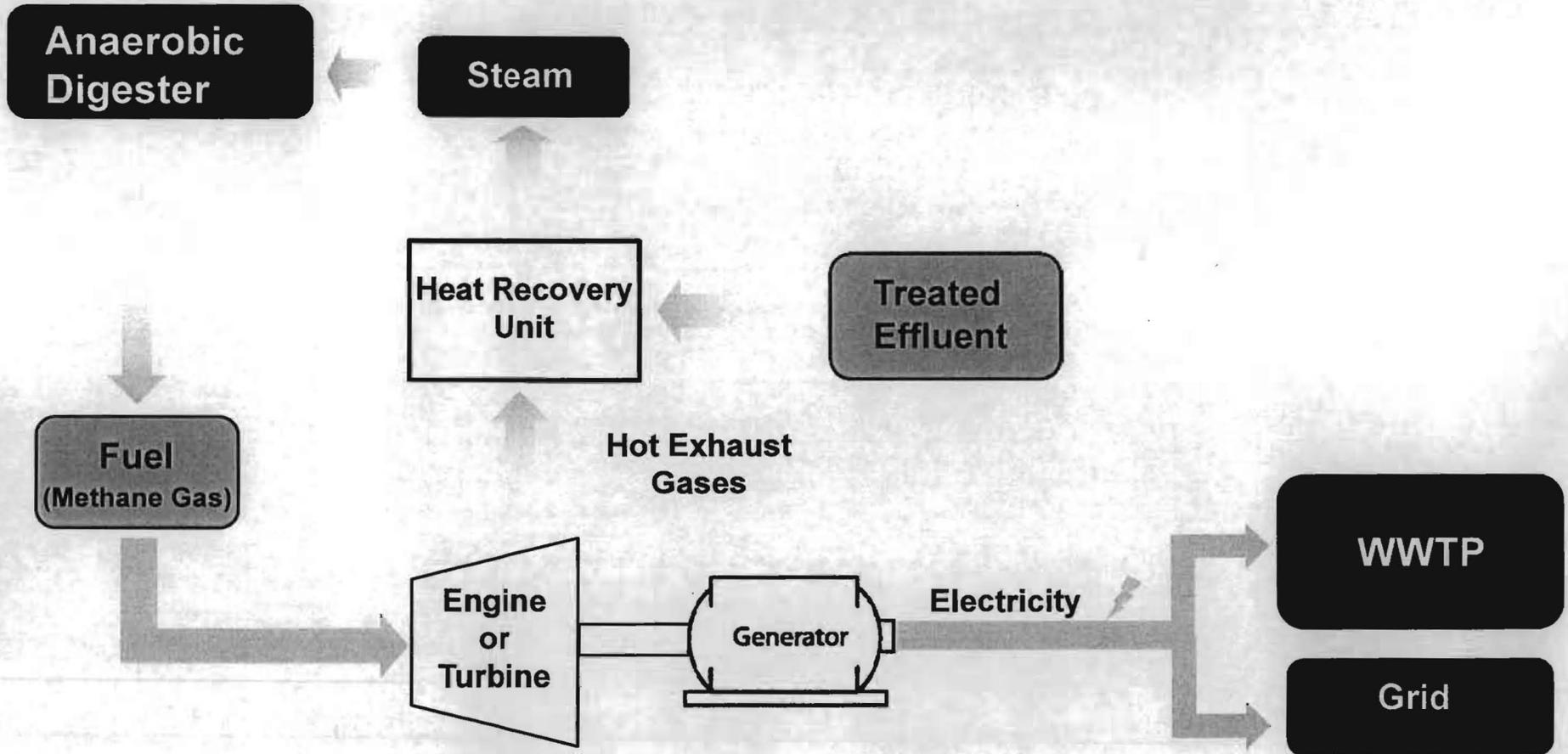


Class A Biosolids for
Beneficial Reuse

Digester Operation:

- Residence Time 15 to 20 days
- Temperature 95° F
- Mixing
- No Oxygen
- Simple & Robust

Combined Heat and Power



Result: Better Biosolids

CLASS "A" Biosolids

- * Volume reduced by half
- * Greater reductions in pathogens
- * Fewer restrictions on distribution and application.
- * Essentially: "Home Depot" Fertilizer

Potential to market & recover costs!

Environmental Benefits

- Reduce greenhouse gas emissions by using renewable electricity instead of electricity generated from coal-fired power plants
- Contribute to County's Green House Gas reduction goals
- Reduce the amount of pollutants going into Piscataway Creek and the Chesapeake Bay watershed
- Reduce fats, oils and grease (FOG) discharge to sewers, lowering risk of clogs and backups
- Create potential to process commercial food waste, keeping it out of landfills and increasing gas production

Visibility Benefits

- World-class facility brings national / international notoriety
- State-of-the-art technology
- Prestige: This state-of-the-art facility (only the second one in North America) will be located in Prince George's County

The Washington Post

DC Water adopts Norway's Cambi system for making power and fine fertilizer from sewage

By Ashley Halsey III, Published: April 5

This is a topic that one must approach delicately so as not to offend the reader's sensibilities, but since it is a matter of importance for which you may receive a bill for some portion of \$470 million, we start out with an analogy.

You need energy, so you eat. Through the miracle of digestion, your body sorts what you have eaten, say, a pastrami on rye with a glob of coleslaw and a dill pickle, and plucks out the nutrients — proteins, carbohydrates and sugars it needs to generate power. Then it jettisons the rest.

Enhance County's Food Waste Program

- Commercial Food Waste could enhance the Anaerobic Digestion process and increase gas production
- Class A Biosolids could be mixed with yard waste and used in County's composting process
- Biosolids hauling costs could be substantially reduced
- County estimated that 23,000 tons/yr of food waste could be generated and fed to the regional digester

Economic Benefits

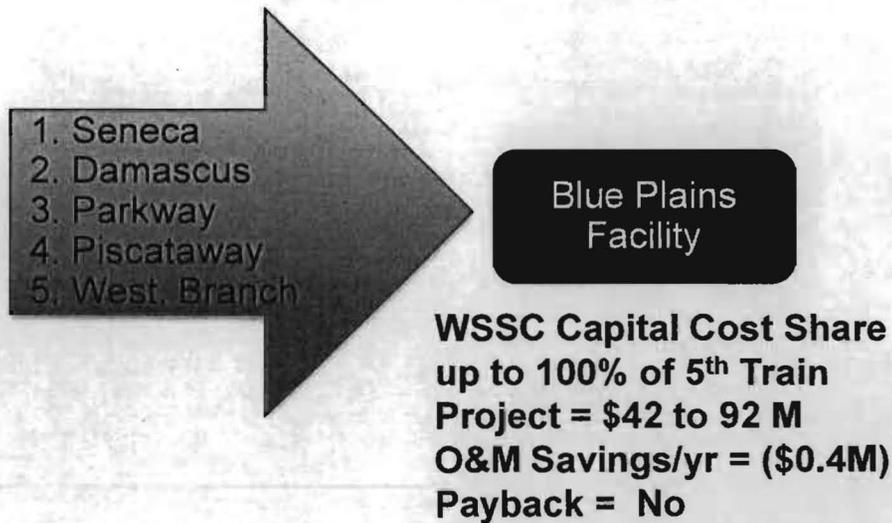
- Save more than \$1.5 million in electrical energy costs per year
- Reduce operations and maintenance costs by \$2.0 million/year through reduced biosolids disposal and chemical lime costs
- Create jobs for the construction and operation of the facility
- Potential to be funded without ratepayer monies (federal grants and/or public/private partnership)
- The savings are part of WSSC's ongoing efforts to lower trajectory of rate increases

Feasibility Study

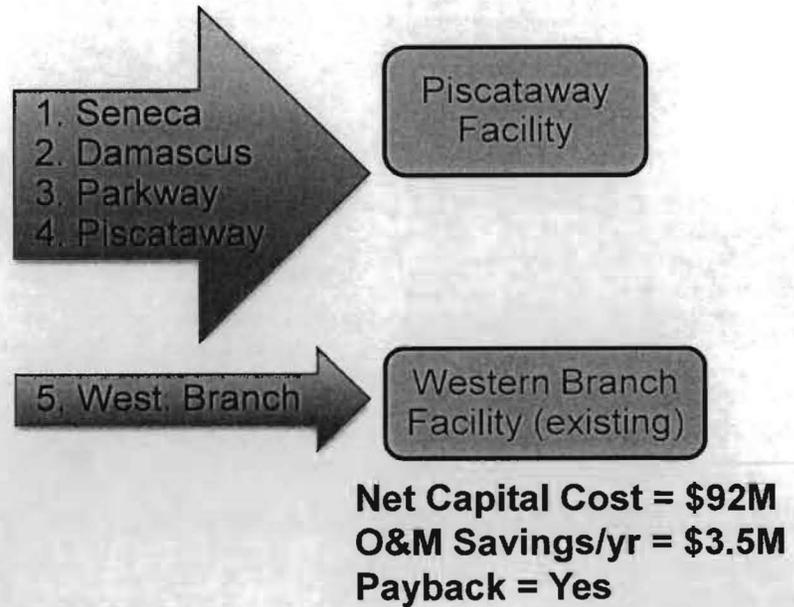
- Financed with a federal grant, the study recommended the treatment of WSSC biosolids at a new facility on the Piscataway site
- The study identified this site as the optimal location due to economic, environmental and logistical factors
- Cited the following costs/savings:
 - Net capital cost = \$60M (\$92 M in FY'15 dollars)
 - O&M savings/year = \$3.7M (\$3.5M in FY'15 dollars)
 - Payback = Project pays for itself over time

Current Discussion of Alternative

Blue Plains Option



Study Recommendation



Delays = Additional Costs

Delay in implementation means loss or delay in the Environmental and Economic Benefits.

- Need to Add \$59.2M to the CIP to continue current operations
 - \$43.0M Projects at Piscataway WWTP
 - \$4.1M Projects at Parkway WWTP
 - \$11.3M at Seneca WWTP
 - \$0.8M at Damascus WWTP
- If Decision is made at a later date to transport to Blue Plains, WSSC will then incur the costs of that option (\$92M) after already investing \$59.2M to continue current operations.

Delays also result in loss of control of determining our own destiny.

Community Concerns

How close will the new plant be to neighborhoods and the surrounding communities?

The plant will be located completely on existing WSSC property, far enough away from residents so that odor and noise will be undetectable.

How will this plant affect traffic in the area?

Minimal impact. Only five additional trucks will come and go from the plant each day.

Will more chemicals be used?

Fewer chemicals will be used. The plant will use anaerobic digestion to stabilize the biosolids. Lime will no longer be needed to stabilize biosolids, reducing the cost of disposal.

WSSC's Bio-Energy Project

Thank You



Anaerobic Digestion/Combined Heat & Power Questions and Answers

Answers Received from WSSC on January 31, 2014
Regarding OMB Issues/Questions and Council Staff Comments

- **OMB Concern: WSSC is already contributing to a digester facility at Blue Plains.**

Council Staff: WSSC's existing investment in Blue Plains is a sunk cost and should not factor into investment decisions going forward, other than how this investment affects the costs DC Water would charge WSSC for disposing of biosolids at Blue Plains. WSSC Response: THIS IS CORRECT.

- **OMB Concern: There is a possibility for the need for an additional train in the facilities at Blue Plains and WSSC would have to invest in this...estimated at \$36 million, regardless of whether the Anaerobic Digester project proceeds.**

Council Staff: Council Staff is not sure how this point is relevant to the discussion as the feasibility study assumes a 5th treatment train is needed to address peak flows from Blue Plains' biosolids generation alone. Therefore, the cost analysis already takes into account the impacts of a 5th treatment train. As with the first point above, any costs WSSC is required to pay to cover Blue Plains' flows are essentially sunk for purposes of this discussion. WSSC Response: THIS IS NOT QUITE CORRECT. THE FEASIBILITY STUDY STATES THAT BLUE PLAINS WILL BE RIGHT UP ON TOP OF THE CAPACITY OF THE ORIGINAL FOUR TRAINS WITH ITS SLUDGE ALONE, AND THAT DUE TO PEAK LOADS, MAY HAVE TO ADD A 5TH TRAIN. STARTING THERE, WITH IT TENUOUS WHETHER THE 5TH TRAIN GETS BUILT WITHOUT ADDITIONAL WSSC BIOSOLIDS, THE STUDY STARTS RIGHT OUT AND SAYS THAT WITH THE ADDITION OF THE NEW, ADDITIONAL WSSC BIOSOLIDS, THE 5TH TRAIN WOULD HAVE TO BE BUILT. THE FEASIBILITY STUDY INCLUDES WSSC PAYING 46% OF THE COST OF ADDING A 5TH TRAIN. THIS VIEW IS OPTIMISTIC, AS IT ASSUMES THE IMA PERCENTAGES APPLY; IT IS ALSO POSSIBLE THAT IF BLUE PLAINS DETERMINES THAT THEY DON'T NEED THE 5TH TRAIN, THAT IF WSSC SLUDGE GOES TO BLUE PLAINS, AND THE 5TH TRAIN IS BUILT, WSSC MAY HAVE TO PAY 100% OF THE COST OF THE 5TH TRAIN.

- **OMB Concern: The Federal Aid assumed in the project funding and expenditure schedule, at this point, is only an estimate and remains speculative. The estimate is also on the high end of the possible aid amounts. Therefore, the project should be evaluated based on its total cost of \$144 million.**

Council Staff: Council Staff agrees with this point. However, WSSC's feasibility study makes no assumption of Federal aid in its calculations. WSSC's project as proposed assumes 50 percent funding in Federal Aid. If this level of Federal funding were received, the noted payback period of 15 to 18 years would be cut in half. THIS IS CORRECT. ALSO, BECAUSE THIS PROJECT HAS A PAYBACK COMPONENT, WSSC WILL ALSO BE SEEKING INNOVATIVE FINANCING ARRANGEMENTS WITH PRIVATE SECTOR ENTITIES IN

ORDER TO MINIMIZE IMPACTS ON RATE PAYERS. THE COMMISSION HAS ALREADY RECEIVED INTEREST FROM SEVERAL COMPANIES AND PRIVATE EQUITY PARTNERSHIPS.

- **OMB Concern: Executive Staff have not received an itemized accounting of the total capital costs of the project. WSSC has indicated the net cost of the project is \$60 million. A clear, itemized accounting detailing how the cost of the project was reduced from \$144 million to \$60 million through various capital cost credits has not been provided by WSSC.**

Council Staff: The feasibility study assumes baseline costs of about \$50 million over the next 20 years for the Western Branch incinerators and the Seneca, Piscataway, Parkway, and Damascus dewatering facilities. However, if any of the anaerobic digestion options are chosen (including the Blue Plains option) the \$50 million in baseline costs goes away as those facilities will not require future investment. If this assumption were to change it would appear to affect all of the options equally and not change the relative differences in the options. THIS IS CORRECT. IT SHOULD ALSO BE ADDED THAT THE LONGER THE DECISION TO PROCEED WITH A WSSC DIGESTER AT PISCATAWAY IS DELAYED, THE MORE CRITICAL THE NEED FOR SOME OF THE REPLACEMENT CAPITAL EQUIPMENT BECOMES (IT CONTINUES TO WEAR OUT WHILE THE DECISION IS HELD UP). THE WORST CASE SCENARIO IS COMING INTO PLAY, WHICH WOULD BE WSSC HAS TO SPEND CAPITAL MONEY ON ITS PLANTS TO KEEP THE CURRENT PROCESSES FUNCTIONING, AND THEN LATER, WHEN THE DIGESTER IS BUILT, THAT EQUIPMENT IS UNNECESSARY.

- **OMB Concern: Taking into account the points raised above, the County Executive concluded it would not be fiscally sound to proceed with a CIP project that is this large without waiting until a final assessment on the Blue Plains option is available. To illustrate this point, on a percentage basis, funds assumed in the Anaerobic Digestion/ Combined Heat and Power project could provide for the following WSSC CIP projects:**
 - 19% of the total Water Reconstruction program; or
 - 34% of the total Sewer Reconstruction program; or
 - 99% of the total budget for the Bi-County water tunnel; or
 - The entirety of the Specialty Valve replacement program.

Council Staff: This is a valid “opportunity cost” argument, in that WSSC has limited capital funds. However, the feasibility study notes a number of benefits to this project, most notably the payback advantage for the Piscataway option. WHILE THERE ARE “OPPORTUNITY COSTS” ASSOCIATED WITH ANY KIND OF EXPENDITURE, THIS ARGUMENT IS SOMEWHAT MISLEADING. THE SCENARIO PORTRAYED ABOVE CONSIDERS THIS PROJECT AS DISCRETIONARY WHILE IGNORING THE LARGER, NON-DISCRETIONARY ISSUE OF BIO-SOLIDS MANAGEMENT. WHETHER VIA WSSC’S AD/CHP PROJECT OR BLUE PLAINS, THE COMMISSION WILL HAVE TO ADDRESS THE ISSUE OF HOW TO DISPOSE OF ITS BIO-SOLIDS. THIS SOLUTION NEEDS TO BE PROACTIVELY PLANNED FOR WHILE MINIMIZING RISKS AND UNCERTAINTIES TO THE

GREATEST DEGREE POSSIBLE. (AND AS WE ALL KNOW – THE BI-COUNTY TUNNEL WAS PAID FOR 100% WITH SDC FUNDS.)

Montgomery County OMB
Follow Up Questions on Digester Project
Part 2 Received February 28, 2014

1. Why are the \$76,598,000 in Capital costs related to the Baseline (current land application procedure) not being applied to the Blue Plains Option?

The study determined that the lime stabilization upgrades would still be required as backup in the event that Blue Plains would not be able to accept WSSC biosolids under peak operating conditions.

2. Why are the transportation/fuel estimates for the Blue Plains option so much higher? [\$3,020,479 for Blue Plains Option; \$698,164 for Baseline; and \$581,768 [\$493,367] for the Digester Option]

The transportation (including fuel) estimate is higher under the Blue Plains option because sludge from all five WWTP (Damascus, Parkway, Seneca, Western Branch and Piscataway) would be hauled to Blue Plains, whereas under the AD/CHP option, only sludge for three WWTP (Damascus, Parkway and Seneca) would need to be hauled to Piscataway. In addition, under the Baseline option, the volume of biosolids to be hauled would be increased by the addition of the lime chemical added from four WWTP (Damascus, Parkway, Seneca, and Piscataway). The transportation and land application costs must be looked at in combination, not separately, for an accurate cost comparison.

3. Why are there still land application costs assumed for the digester option – wouldn't having the digester mean we would not be land applying biosolids? If there are still land application costs with the use of either digester, why are there no land application costs being assumed for the Blue Plains option?

Although the AD/CHP option would reduce biosolids output by 50-60%, it would not eliminate them entirely. No land application costs are included in the Blue Plains option as it was assumed that this component was included in the \$70/wet ton tipping fee quoted by DC Water.

In addition, the biosolids produced would be Class A biosolids. It is assumed that land application costs for Class A biosolids would be lower than what we currently pay for land application of Class B biosolids.

4a OMB's point regarding the fifth treatment train was based on the thought that regardless of what we do, if more capacity is needed at Blue Plains, WSSC would need to contribute to the costs of any expansion under any scenario.

While OMB's current understanding of the flows of biosolids indicates that the total flow of WSSC's biosolids can be handled by the current digester at Blue Plains, this does not rule out the possibility of investment in an additional train based on WSSC's current agreements with DC Water.

OMB agrees with Keith's assessment -- that a confirmation on the following questions from DC Water could clarify any uncertainty or misconception:

- 1) Does DC Water know enough at this point to rule out the possibility of an additional train?
- 2) If an additional train is needed and WSSC has built its own digester, what would be WSSC's responsibility for cost sharing of the capital investment?

Response from Mr. Gary Gumm, Chief Engineer, WSSC:

Before getting into the answers for questions 1) and 2) located above I think it pertinent to discuss the overall premise that is the basis for the questions. The premise is that if there is capacity already paid for at Blue Plains then the decision to take additional WSSC biosolids there is the obvious choice. This is not so clear. This option would have 100% of the current volume of biosolids be trucked to Blue Plains at a tipping fee higher than what WSSC currently pays to dispose of the biosolids through land application. Apparently the cost avoidance associated with not having to continue any capital investment in lime stabilization would be the benefit. However, after a period of years the savings would be negated by the tipping fees.

I would like to address question 2) first:

If the additional train is needed at Blue Plains to handle the flow to Blue Plains covered by the IMA (60+% of our sewage that goes there now, DC, Fairfax, and Loudon Counties) then WSSC would be required to pay for the train based upon our allocated flow (169/370 or 46%). If the additional train is needed for any other purpose that is not directly related to sewage going through the plant then it is not covered by the IMA and costs will not be born by WSSC unless first negotiated with a basis for WSSC participating in the cost.

Regarding question 1):

The following is a summary of a 12 February 2014 discussion I had with Mr. Walter Bailey, Assistant General Manager of Wastewater Treatment, at the Blue Plains WWTP. Upon construction completion of the Anaerobic Digester Project there will be four trains each designed to yield 112.5 dry tons of processed biosolids for a total of 450 dry tons. He stated that 1 MGD of plant flow is approximately equal to 1 dry ton of biosolids produced. The design capacity of the plant is 370 MGD. The average daily flow through the plant is approximately 280 MGD, so the average amount of biosolids produced will be about 280 dry tons per day. WSSC's average daily flow ranges between 120 and 130 MGD. (Of late it has been closer to the lower end of the range.) The reason that there is a total capacity of 450 versus 370 is that there is a need to take a train down for maintenance periodically. When one train is out of service for maintenance, the design capacity drops to 337.5 MGD (and commensurately 337.5 dry tons of biosolids), still greater than the 280 MGD average daily flow. There are times when peak flows may exceed

these numbers (rain events). Should those be of normal duration then the operation is expected to be able to absorb the peaks. If the duration is longer and does not allow for that then the plan is to keep the lime stabilization capability at the plant and use that to handle peaks as necessary. **Mr. Baily sees no need for a fifth train to handle IMA needs anytime soon.**

When asked when he might think that need could change he stated he did not really know but offered the following: Based upon the latest COG forecast through the year 2040 the prediction is that the plant may see average daily flows increase from 280 MGD to 350 MGD. So even then the three trains could just about handle the average daily flow. However, if peaks were large and frequent, the economics might dictate a fifth train versus lime stabilization. COG forecasting historically has overstated the actual amounts realized. If the same is true with the 2040 forecast then the fifth train is not going to be necessary. So while that prediction is not a given, it is safe to say that the fifth train is not likely to be necessary – at least not within any CIP forecast on the horizon.

Mr. Bailey did indicate that the staff at Blue Plains has been approached from several sources about the possibility of taking food wastes into the plant. The Blue Plains response has been that while this may be a good idea for the future, they are not ready to really look into it until the plant has been constructed and operating long enough to truly understand its operating characteristics. Basically they have been told to wait, just like WSSC has been told to wait, until enough is known about the plant to make a sound decision. If the plant were to begin receiving inputs from other sources (like the food waste or WSSC biosolids) then it becomes much more likely that a fifth treatment train will be necessary. This corresponds to what we were told in January 2013 about our biosolids – we would likely be able to begin delivering biosolids using only four trains but the entirety would likely necessitate adding the fifth train (and this would not be covered by the IMA cost sharing).

4b. For each option please provide a cost summary (for as far out as the consultant went for his analysis, 20 years?) that includes:

i. Total capital cost with expenditures shown by fiscal year.

The FY'15 Proposed CIP reflects the planning level estimates for constructing the AD/CHP facilities at the Piscataway WWTP. The attached project description form shows the estimated expenditures by fiscal year.

ii. An itemization of total capital costs avoided with savings shown by fiscal year (WSSC indicated that these avoided costs were included in the chosen scenario and the Blue Plains scenario. However, the capital costs shown for the chosen scenario are reflected as "net" while the capital costs for the Blue Plains scenario are not shown as "net.")

Please see attached file: AD CHP Capital Cost Detail.xls

iii. An itemization of total annual O&M costs (including tipping fees to Blue Plains and costs to operate and maintain any new infrastructure built)

Please see attached file: AD CHP Operating Cost Comparison.xls

iv. An itemization of total annual O&M costs avoided

Please see attached file: AD CHP Operating Cost Comparison.xls

v. Annual amount of revenue from energy generation by fiscal year for each option including electrical generation proceeds from the Blue Plains digester.

Please see attached file: AD CHP Operating Cost Comparison.xls

vi. Payback periods under each option

Please see attached file: AD CHP Operating Cost Comparison.xls

vii. Please provide brief narrative explaining each of the above items.

Baseline:

If AD/CHP were not undertaken, lime stabilization equipment/systems at WSSC's wastewater treatment plants would have to be replaced/upgraded. The most urgent system needed is at Piscataway, requiring replacement of its pre-lime stabilization with a post-lime stabilization system. If the recommended Power Reliability Study Backup Generators are included, the Baseline cost (cost avoided) would be increased from \$77 million to \$94 million, reducing the project payback from 19 years to 14 years. This is before the benefit of any federal or state government financial assistance.

Recommended Option

Regional Piscataway AD/CHP facility (treating solids from Seneca, Damascus, Parkway, & Piscataway) assumes Western Branch remains as a standalone incineration facility. It provides WSSC with the flexibility to continue operation of the Western Branch incinerators. The Regional Piscataway AD/CHP facility will be sized to recover 3MW CHP if natural gas is used as a supplemental fuel, and provide 100% of the energy needs of the Piscataway plant. It will reduce biosolids output by 66%, reduce WSSC's carbon emissions by 15%/yr, and if FOG is used as a supplemental feedstock, has the potential of reducing grease discharge to the WSSC sewer system by 5 million gallon/year. The estimated cost in the CIP is \$144 million.

Blue Plains Option

If WSSC were to abandon its own AD/CHP project and truck solids from Seneca, Damascus, Parkway, & Piscataway to the new Blue Plains digester, a new receiving facility would have to be constructed, as well as solids screening facilities at WSSC's Seneca, Damascus, Parkway, & Piscataway plants to accommodate the operating requirements of the new Blue Plains digesters. In addition, the quantity and reliability of accepting outside (WSSC) biosolids may be limited with Blue Plains' Phase I AD facilities, and it is likely that construction of a 5th thermal hydrolysis, pretreatment train will be necessary. The amortization of these capital costs by WSSC, coupled with an initial tipping fee of \$70/ton (quoted by DCWater) would render the cost of this option not only greater than the recommended (Piscataway Regional Plant) option, but also higher than WSSC is currently paying to haul and land apply its biosolids. Therefore, the

Blue Plains Option results in no because it has no annual savings. In addition WSSC would not generate any green energy credits, greenhouse gas credits, carbon footprint credits, etc, which we are under Montgomery County obligation to meet, as well as any future State or Federal obligations.

viii. A date for when each option can begin processing biosolids (Earliest Date, Possible Delayed date)

Please see attached file: AD CHP Operating Cost Comparison.xls

**WSSC Responses to Council Staff Questions
Answers Received September 24, 2014**

- 1. Per our previous discussions, I know you are working on how WSSC might cost-effectively manage its biosolids in the future in the event of a disruption under either option (i.e. taking either Blue Plains off-line or a Piscataway AD/CHP facility off-line). I recall that WSSC feels it has sufficient redundancies built into the Piscataway option to preclude the need for a backup approach, although I assume under the Piscataway option, WSSC could also potentially send some of its biosolids to Blue Plains as well.**

It is possible that WSSC could potentially send some of its biosolids to Blue Plains in the event of a disruption. In order to do this WSSC would have to negotiate an acceptable agreement with Blue Plains (which would be outside of the IMA agreement) and construct the sending infrastructure required at Piscataway and receiving infrastructure required at Blue Plains. Again, due to the redundancy of the Piscataway design, WSSC considers this an unlikely path.

- 2. What is the total estimated amount of biosolids being treated now (dry tons per day) at each of WSSC's WWTPs?**

<u>WSSC WWTP</u>	<u>CY 2013 DTPD:</u>
Damascus	1.33
Seneca	15.52
Western Branch	16.04
Piscataway	22.10
Parkway	11.76
TOTAL	66.74

- 3. I would like to understand how Piscataway would be sized (i.e. peak and avg flows) and how the facility as built would preclude the need for a backup system.**

Piscataway would be sized based on two Cambi Thermal Hydrolysis pretreatment trains and three mesophilic digesters capable of processing 73 dry tons per day (dtpd) of unstablized biosolids at 20 year maximum month flow conditions (including Western Branch emergency biosolids when the incinerators are down). The 20 year average daily flow conditions would be about 60% of maximum month flow. The two Cambi trains would offer 100% redundancy. If the Western Branch Incinerators would ever in the future be shut down and the plant's

unstablized biosolids sent to the Piscataway AD/CHP plant, a digester could be added to bring the AD/CHP plant capacity up to 97 dtpd. The number of reactors in the Cambi trains could be increased from two to three in the initial design to accommodate future expansion to accommodate the import of 100% of Western Branch unstablized biosolids.

- 4. How does Western Branch’s biosolids fit within the assumptions for the sizing of the Piscataway facility? I know the incinerators are assumed to continue to operate. However, is Piscataway to be sized (or master-planned at least) to accommodate the Western Branch biosolids in the future without the incinerators?**

The initial design of the Piscataway facility will have enough excess capacity to accommodate short term loading increases resulting from short term incinerator shutdowns (such as for annual maintenance). In the longer term, the Piscataway design is of a modular style that will allow adding additional components to increase the overall capacity to accommodate a permanent shutdown of the Western Branch incinerators if needed.

- 5. The original fiscal analysis WSSC provided earlier this year had a fiscal impact for capital work for the existing “baseline” process of \$76.6 million. This included improvements at Western Branch but not the backup generators at Piscataway. More recently, in an August presentation, WSSC noted a fiscal impact of the existing option of \$59.2 million to “continue operations” as detailed below:**

- **\$43.0M Projects at Piscataway WWTP (I assume this includes the post lime project and the backup generators both of which are newly requested for FY16-21. Correct?)**
Correct – both projects are included in the Proposed CIP.
- **•\$4.1M Projects at Parkway WWTP (Is any of this currently in the approved or requested CIP?**
Correct – not included in the Approved or Proposed CIP documents.
- **\$11.3M at Seneca WWTP (Is any of this currently in the approved or requested CIP?**
Correct – not included in the Approved or Proposed CIP documents.
- **•\$0.8M at Damascus WWTP (Is any of this currently in the approved or requested CIP?**
Correct – not included in the Approved or Proposed CIP documents.

The Western Branch improvements were not included in the \$59.2 million. Is this because those improvements will be needed regardless of the outcome of the AD/CHP project? I want to make sure I understand the total avoided costs (both with and without the emergency generators at Piscataway). Also, I would like to understand how urgent each of these improvements (apart from the backup generators for Piscataway which are justified for power reliability reasons) to the core function of the existing biosolids treatment process.

Correct - the Western Branch improvements are not included in the \$59.2M estimate. WSSC has determined that the improvements/upgrades to the Western Branch incinerators will be required

under either option. Although the required improvements at the Seneca, Parkway and Damascus plants are not as “urgent” as the two Piscataway projects, in order to accurately compare the two options, the study evaluated the full life-cycle operating and capital costs over a 20-30 year evaluation period for each option.

6. When is the earliest possible date that DCWater has indicated that it would consider accepting at least some of WSSC’s biosolids?

Blue Plains has consistently said that they want to run the new AD/CHP for two years after starting it up to establish its load profile. As recently as this summer (July 2014) Blue Plains indicated that they anticipated the project coming on line in 2015 and having the load profile established in 2017. The earliest possible date would be sometime in 2017.

7. What is the total estimated capital cost for DCWater to implement its 5th treatment train? How long would it take to construct the 5th treatment train once DCWater decided to do so?

The feasibility study estimated the fifth train would cost WSSC between \$27.6M and \$60M to build (in 2011 dollars). The \$27.6 assumes WSSC only pays 46% (IMA percentage); the \$60M assumes WSSC pays 100%. We do not have an estimate of how long it would take to build.

8. What is the breakout of capital costs required at WSSC facilities under the Blue Plains option? In one WSSC response, new solids screening facilities are noted to be needed at the various WWTPs. Why are these facilities needed under the Blue Plains option but not under the Piscataway option?

Screening facilities are needed for both the Piscataway and Blue Plains option. Under both options, thermal hydrolysis (TH) requires screened biosolids to prevent debris from clogging the TH process. The study recommended screen presses be located at each plant for the biosolids to be screened before transport. The cost of the screening facilities was included in the study analysis and is already included in the project estimate in the CIP.

9. In prior Q&A, WSSC answered the question that a 5th treatment train is not projected to be needed (according to DCWater officials) for Blue Plains flows for the foreseeable future. WSSC also mentioned that some portion of biosolids could be accommodated with just the four trains. Given that WSSC’s flows to Blue Plains are below its IMA allocation, has WSSC looked at sizing its own ADP/CHP project to assume some biosolids could go to Blue Plains? From a fiscal standpoint, is there significant savings from building a smaller ADP/CHP facility? What would be the pros and cons of a hybrid solution of using both Piscataway and Blue Plains for biosolids?

First and foremost, to shift some greater portion of unstablized biosolids to Blue Plains, WSSC would have to negotiate a new agreement through the IMA process (this does not fall within IMA parameters). In addition, although having a smaller Piscataway AD/CHP plant as well as an outlet for taking unstablized biosolids to Blue Plains might seem attractive, the reverse is actually true. Remember that the Blue Plains option does not have a payback. This is because

the tipping fee to go to Blue Plains is higher than the disposal costs currently in place and thus there are no savings to cover the capital investment. The conclusion from the Study is that the best option is to locate one plant and maximize its use to achieve the best economic return on the investment. Further, designing and building a smaller capacity AD/CHP plant at Piscataway would not result in a substantial cost savings due to economies of scale. The plant's operating cost would be virtually the same for the larger or smaller amounts of processed biosolids. The study shows that building in redundancy and reliability in the Piscataway plant is less expensive and operationally simpler than using Blue Plains as an outlet for that reliability in the future.

10. Under the Piscataway option is WSSC assuming to sell the Tier 1 renewable energy credits associated with the electricity generation? If yes, is that revenue included in the fiscal comparison numbers for "Energy-electrical"? I assume any assumptions of WSSC potentially getting any energy savings/renewable energy credits assumed from implementing a 5th treatment train at Blue Plains would be subject to future negotiation. Is that correct? OMB had previously asked WSSC to confirm whether WSSC could realize any energy-related credits under the Blue Plains option.

WSSC is not assuming to sell the Tier 1 RECs associated with the electricity generation. Our published Green House Gas Action Plan is to apply this to WSSC's stated goal of reducing Green House Gas (GHG) emissions by 10% every 5 years, or 50% by 2030 (compared to a 2005 baseline) in concert with the COG goal of 80% reduction by 2050. DC Water has no plans to sell its Tier 1 RECs from the new AD/CHP plant at Blue Plains. Any electricity savings incurred from increased power generation by the Blue Plains AD/CHP 5th train will be credited to Blue Plains unless negotiated otherwise.