CWEA Plant O&M Committee Seminar, Laurel MD, June 12, 2015, 2:00-2:30 PM

Preparing Your Organization and O&M for ENR and Biosolids-to-Energy

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Agenda

- *Case Study* – ***Frederick-Winchester Service Authority (FWSA), VA***
- Authority Overview
  - Opequon WRF
- Plant Management Evaluation
- ENR (2010)
- Energy Project (ESCO) (2016)
- Summary
- Questions

FWSA, Opequon WRF

- FWSA TN & TP Bubble Permit (3 facilities, 17.6-MGD)
- Opequon - BNR online 2001, ENR design in 2007 and online in 2010
  - County Landfill not meeting permit (incl. TKN) in 2008-9 *(a "4th")*
- Effluent-dominated Opequon Creek Watershed, local TMDLs

Frederick-Winchester Service Authority, Opequon 12.6-MGD ENR

(FWSA, VA - Parkins Mills - 5-MGD ENR)

Opequon WRF "MRRE" Scope & Approach

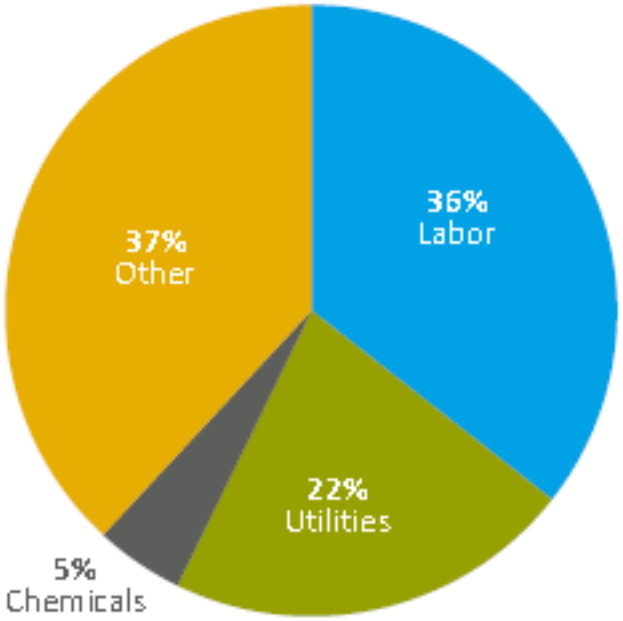
- *Case Study - Frederick-Winchester Service Authority, Opequon WRF* – ***Managerial and Staff Retention / Recruitment Evaluation (MRRE)***
  - FWSA owner and permittee, City and County customers (2), City operations

- Phase 1 – Organization, Operating Structures
  - Consolidate all staff for Opequon under FWSA?
  - Formal and informal arrangements
  - Impact of the FWSA energy project
    - Costs / Revenues, New and Unfamiliar Technology
- Phase 2 – Plan and Schedule for Consolidation *(if recommended)*
  - Salary differentials, Recruitment by nearby utilities
- Phase 3 – Implementation – financial, organizational, technical support

- Financial – FWSA, MFSG
- Organizational – City O&M, FWSA, MFSG, OBG
- Technical – City O&M, OBG

Energy Project Drivers, MRRE Drivers

- ENR, Biosolids-to-Energy
- How to Pay for the Project? Cut Costs?
- Organizational Changes

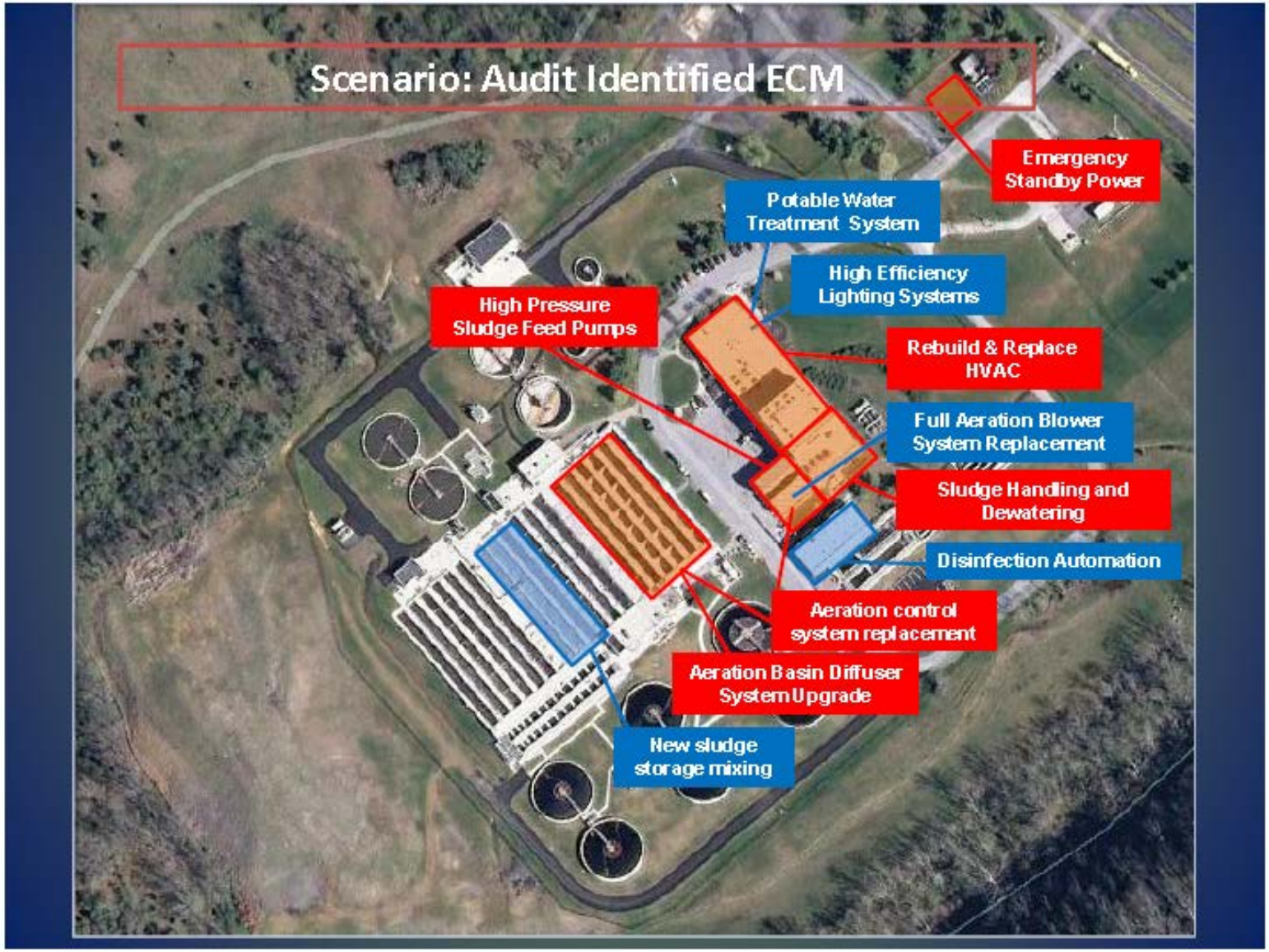


Position*	Number of Employees	City Salary Grade
Facility Manager	1	20
Chief Operator	1	18
Lead Operator	3	17
Operator II	3	12
Operator I	2	10
Operator Trainee	3	9
Environmental Program Coordinator	1	14
Senior Lab Technician	1	15
Lab Technician II	2	12
Instrument Technician/Electrician	1	17
Plant Mechanics	3	11
Vacancies	2	
Total	**23**	

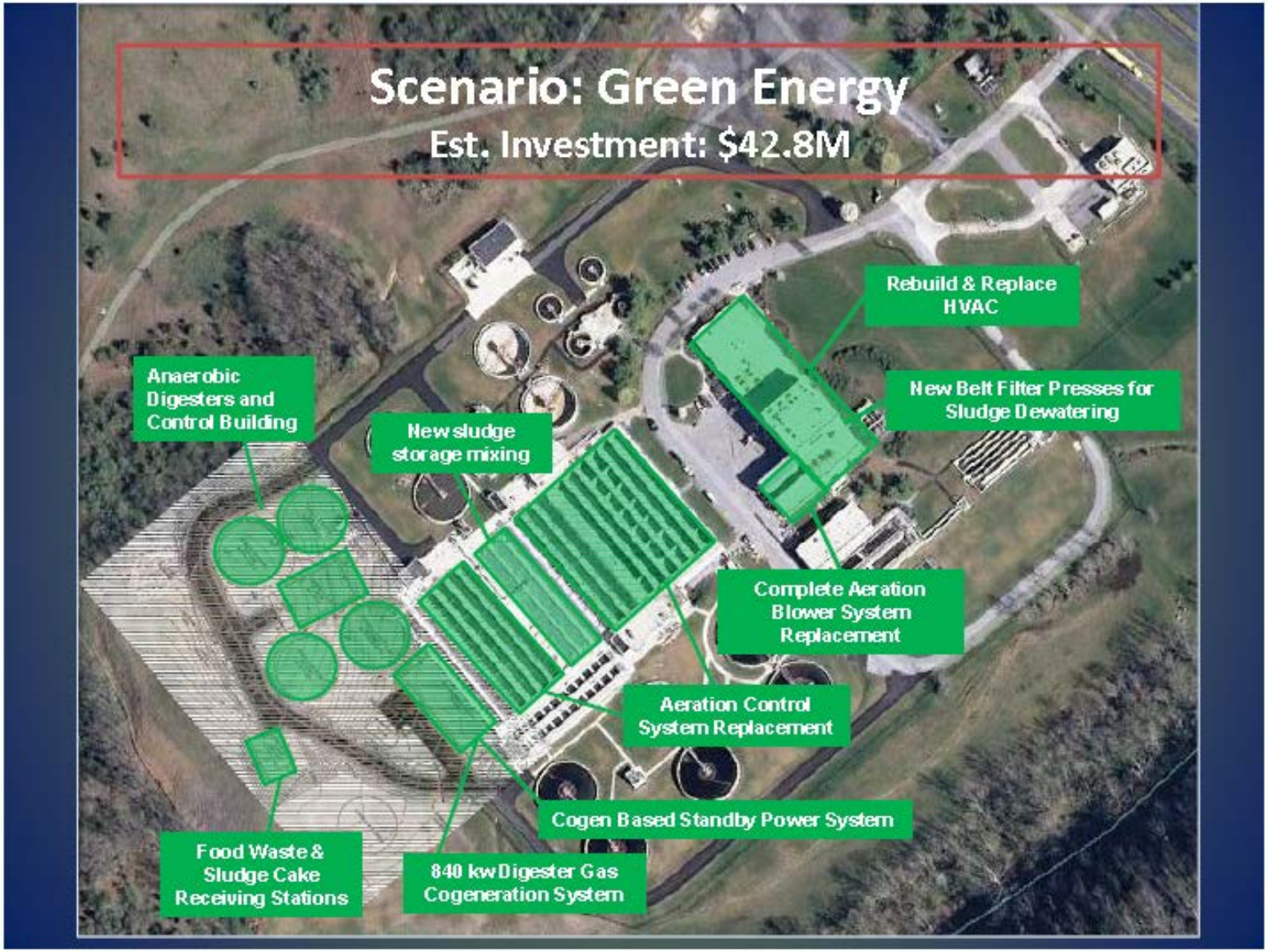
* No Dedicated Industrial Pretreatment Program Coordinator

- Risk / Reward (ESCO)
- Staffing – More, not Less!

Opequon WRF – Energy Project Upgrades



Opequon WRF – Energy Project Upgrades



FWSA Board: “No More Debt!” *(?)*

What will the Future Bring?

What Are Our Challenges

- "Sky Rocketing" Operational Costs
  - Higher Energy Usage and Cost
  - Chemical Usage and Cost
  - Increased Sludge Production
  - Supplemental Food Source (ENR)

- Uncertainty

And Now For Something Completely Different

One's Initial Doubts

- The Energy Concept
- Going Away from "Traditional" Contracting
- Engineering Firm Playing "Second" Fiddle
- Adequate Information to Make Good Choices
- Monitoring and Verification Plan
- Regulatory Agencies
- Financing Options

Energy Conscious, Green, *Pro Forma*

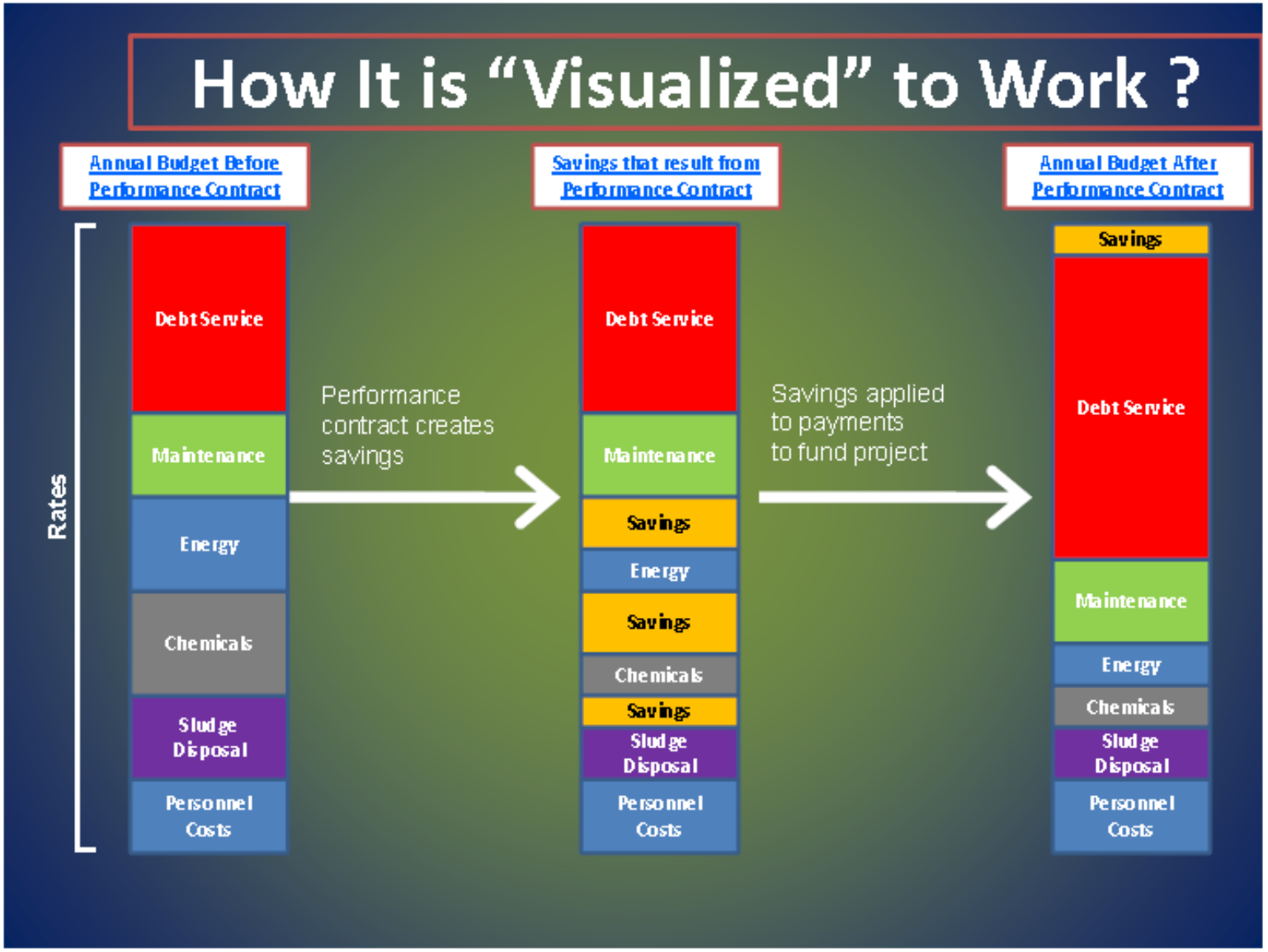
The Details of “Different”

Why Energy Performance Contracting

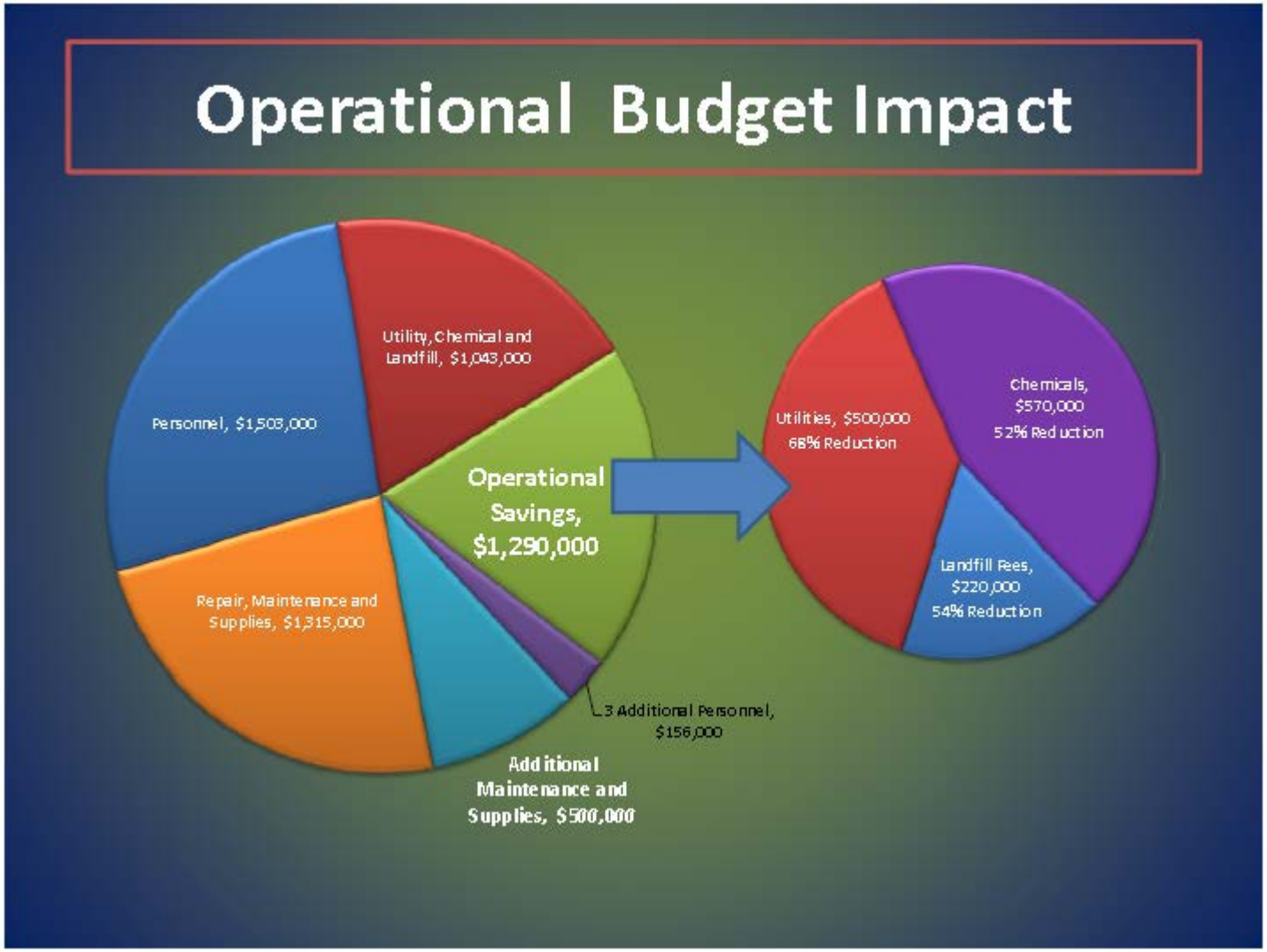
- Shared Risk in Results
- Extensive Interaction between ESCO, Owner, Engineer and Contractor
- Long Term Commitment of Parties
- Innovative Way of Dealing with Capital Needs

Comfort Level with Public-Private Partnerships

Financial and O&M Commitments



What will the Future Bring?



- O&M Needs and Challenges

Competing Priorities, Organizational Issues?

- Overall Waste Management
  - *Industrial Pretreatment Program*
  - *Partnering*
- Laboratory, QA/QC

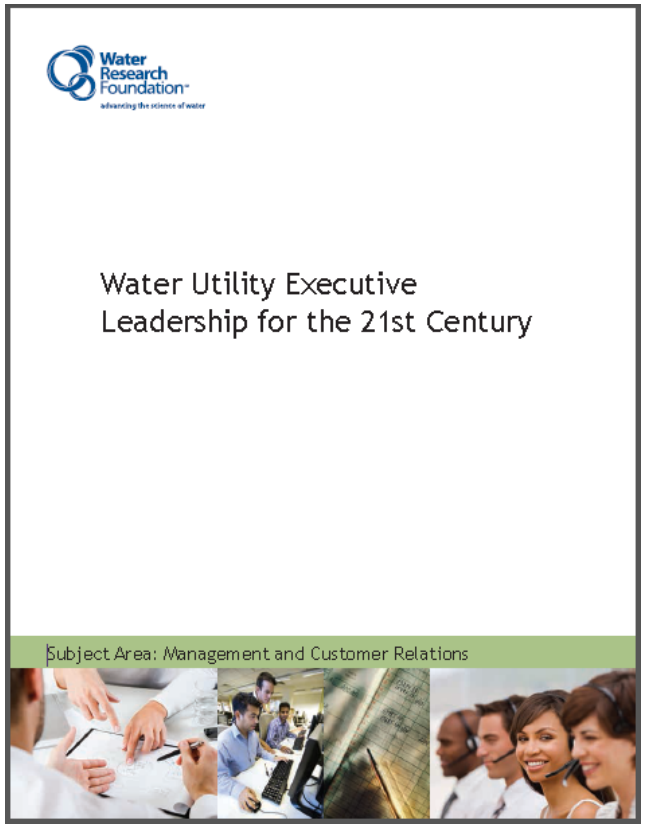
MRRE Scope & Approach - Information

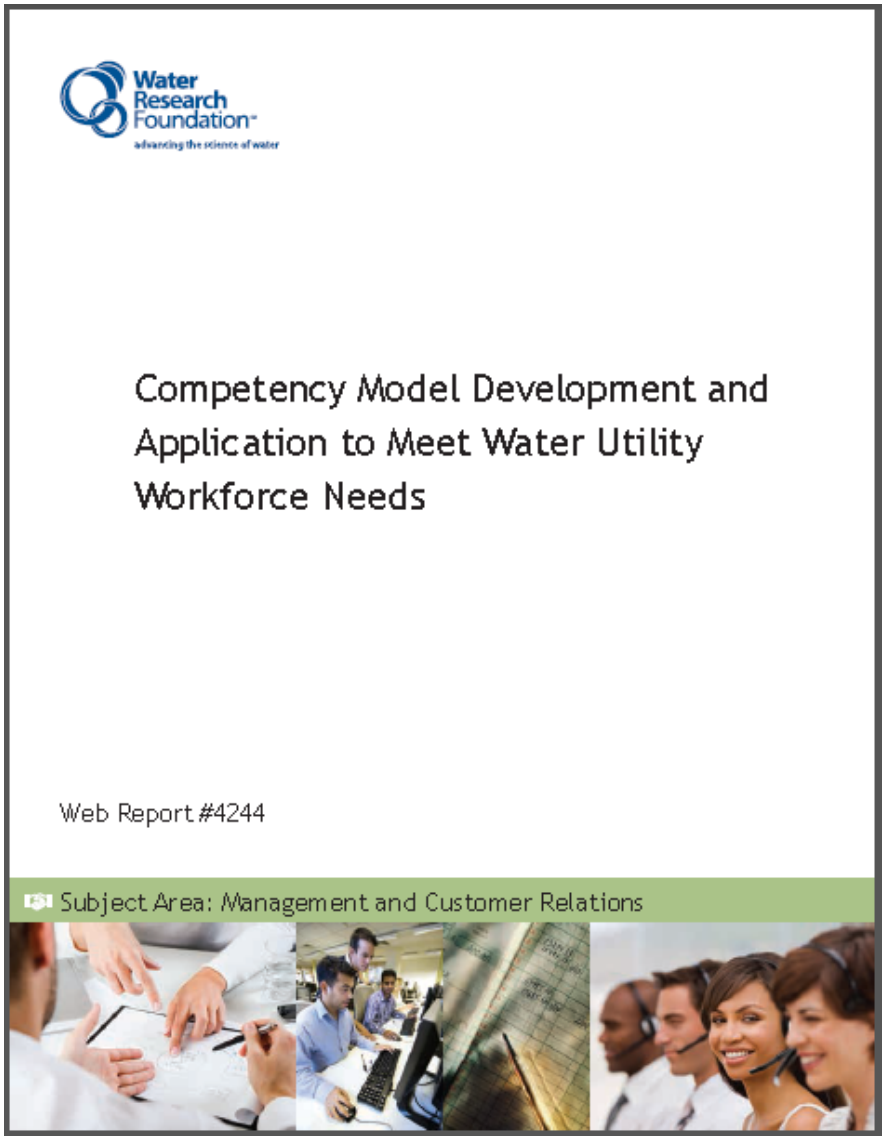
- Data Collection
  - Staff listing – employment dates, classification, compensation, skills, position
  - Current job descriptions – FWSA, City
  - Salary and Benefits
  - HR Manuals, Policy & Procedures
  - Capital Improvement Program
  - Anticipated Future Changes to the Plant, Influent, Organization, Regulations
    - Needs for talent, education, training
  - Historical overview
    - Formation, phases, staffing levels, facilities, performance
  - Operating procedures and policies (SOPs)

MRRE Scope & Approach - Benchmarking

- Site Visits
  - Opequon WRF
  - Benchmarked facilities (5) – vicinity, Mid-Atlantic region
    - Staff, management, recruitment and retention, lessons learned
    - Staffing levels, organizational structure, training programs, career development
- Compare, Contrast
- Right Number, Right People

Workforce Needs





- Standards & Sophistication
- "Brain Drain"
- Succession Planning
- State-of-the-art Facilities

The Evaluation's Operational Review

- Web-based (Anonymous) Employee Survey
- O&M staff interviews

- Increase in O&M complexity
- Additional assets to manage
- Foreign waste acceptance
- Industrial pretreatment program
- Environmental, health & safety
- Plant laboratory

- New FWSA Employee Classification & Staffing Plan developed

Operational Review – Additional Positions

- Concluded 26 employees needed at OWRF
  - Energy project will bring changes
- Training, re-training, and timing of hires will be very important
- Suggests three additional hires should be made
  1. Maintenance manager
  2. Manager to address energy project work, safety and planning
  3. Instrument mechanic/electrician

“Staffing Calculator”

NEIWPCC
New England Interstate Water Pollution Control Commission

THE NORTHEAST GUIDE FOR ESTIMATING STAFFING AT PUBLICLY AND PRIVATELY OWNED WASTEWATER TREATMENT PLANTS

Chart Navigation

Go to Chart 1	Go to Chart 5
Go to Chart 2	Go to Chart 6
Go to Chart 3	Go to Chart 7
Go to Chart 4	Instructions

Choose Staffing Shifts: One Shift

Enter Plant Design Flow: Default

Reset # of Units

Instructions:
1) Choose Staffing Shifts
2) Enter Plant Design Flow
3) Complete Charts 1-7
4) Select Final Table to View Staffing Estimate

Total Staffing Hours: 0.00

Data Notes	# of Units	Process/Activity/Flow	Hours	Calculated	Subtotal

NEIWPCC
New England Interstate Water Pollution Control Commission

THE NORTHEAST GUIDE FOR ESTIMATING STAFFING AT PUBLICLY AND PRIVATELY OWNED WASTEWATER TREATMENT PLANTS (One Shift)

Plant Name:

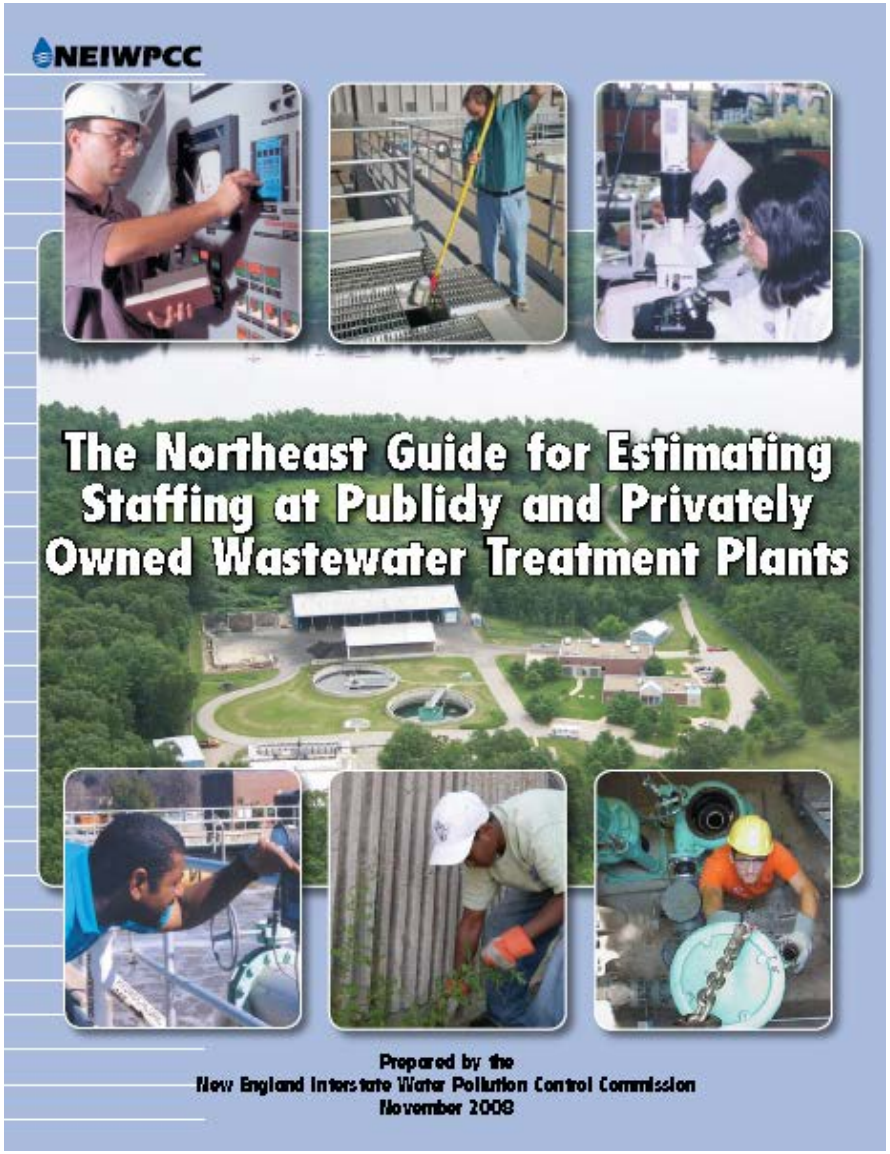
Design Flow:	Actual Flow:

FINAL ESTIMATES	
Chart #	Annual Hours
Chart 1 – Basic and Advanced Operations and Processes	0.00
Chart 2 – Maintenance	0.00
Chart 3 – Laboratory Operations	0.00
Chart 4 – Biosolids/Sludge Handling	0.00
Chart 5 – Yardwork	0.00
Estimated Operation and Maintenance Hours	0.00
Estimated Operation and Maintenance Staff	0.00
Estimated Additional Staff from Chart 7	
TOTAL STAFFING ESTIMATE	0.00

Note: The Total Staff estimate from Charts 1-5 will not be the final amount of staff necessary to run the facility. Please review Chart 7 for additional staffing needs.

Chart 6 - Automation/SCADA

Chart 7 - Considerations for Additional Plant Staffing



- Objective means to assess staffing levels?
  - Good tool, Starting point
- Site-specific situation?

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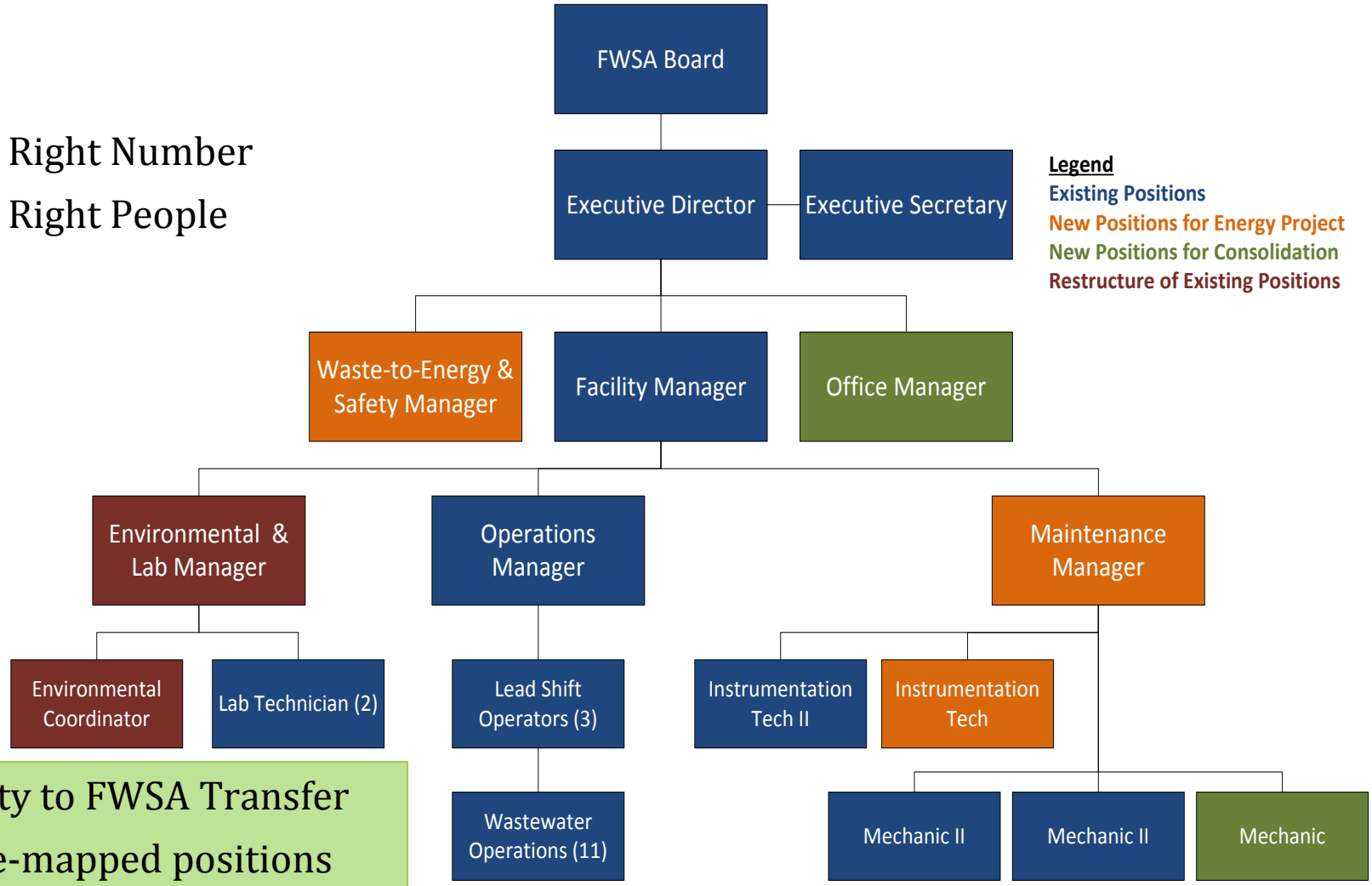
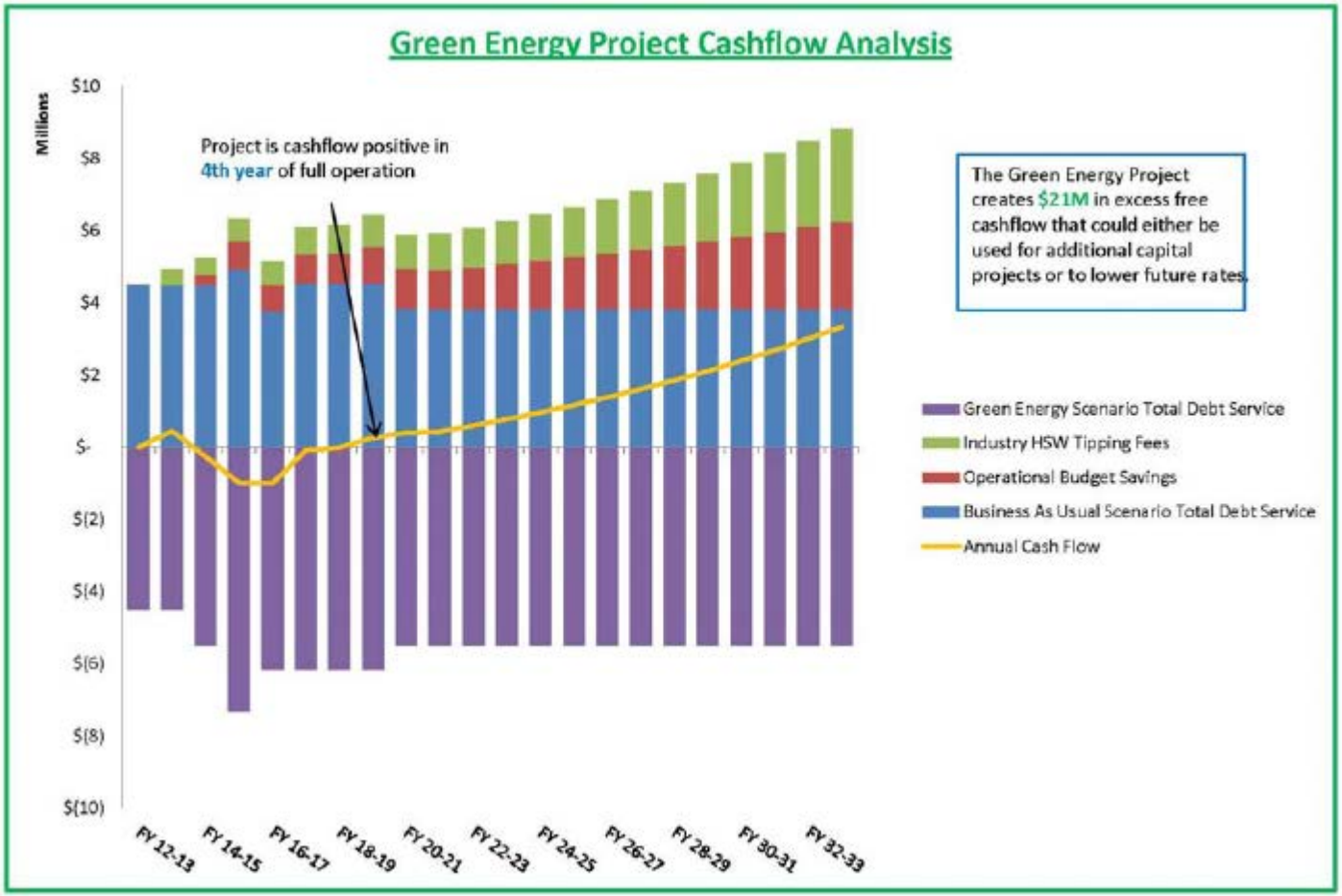
A Changing Organization

- Right Number
- Right People



- City to FWSA Transfer
- Re-mapped positions
- 3-5 new positions ($)

ESCO Contract – Cash Flow Analysis



- Pro Forma
  - ECMs (Measure, Verify)
  - "Stipulated Savings"

Justification of Expanded Project - Savings & Revenue

	Costs and Revenues				Net Costs/(Savings) over Business as Usual		
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 2	Scenario 3	Scenario 4
Expenses	**Business As Usual (BAU)**	**Green**	**Consolidation**	**Green + Consolidation**	**Green**	**Consolidation**	**Green + Consolidation**
Wages	$25.6	$26.5	$29.1	$29.9	$0.8	$3.5	$4.3
Fringe Benefits	9.8	9.8	10.6	10.6	0.0	0.8	0.8
Repair & Maintenance	25.7	28.4	25.7	28.4	2.7	-	2.7
Landfill Fees	21.2	10.1	21.2	10.1	(11.1)	-	(11.1)
Utilities	18.7	6.1	18.7	6.1	(12.6)	-	(12.6)
Insurance	0.3	0.8	0.3	0.8	0.5	-	0.5
Chemicals	41.9	16.8	41.9	16.8	(25.1)	-	(25.1)
Material & Supplies	1.6	4.0	1.6	4.0	2.4	-	2.4
Others	1.1	1.1	2.7	2.7	-	1.6	1.6
Total Expenses	**$145.9**	**$103.5**	**$151.8**	**$109.3**	**($42.4)**	**$5.9**	**($36.6)**
Operational CIP	$6.6	$6.6	$6.6	$6.6	-	-	-
Debt Service Payments	$80.3	$119.2	$80.3	$119.2	$38.9	-	$38.9
Life Cycle Costs w/o HSW	**$232.8**	**$229.3**	**$238.7**	**$235.1**	**($3.5)**	**$5.9**	**$2.3**
High Strength Waste Revenue	-	($31.5)	-	($31.5)	($31.5)	-	($31.5)
Life Cycle Costs w/ HSW	**$232.8**	**$197.7**	**$238.7**	**$203.6**	**($35.1)**	**$5.9**	**($29.2)**

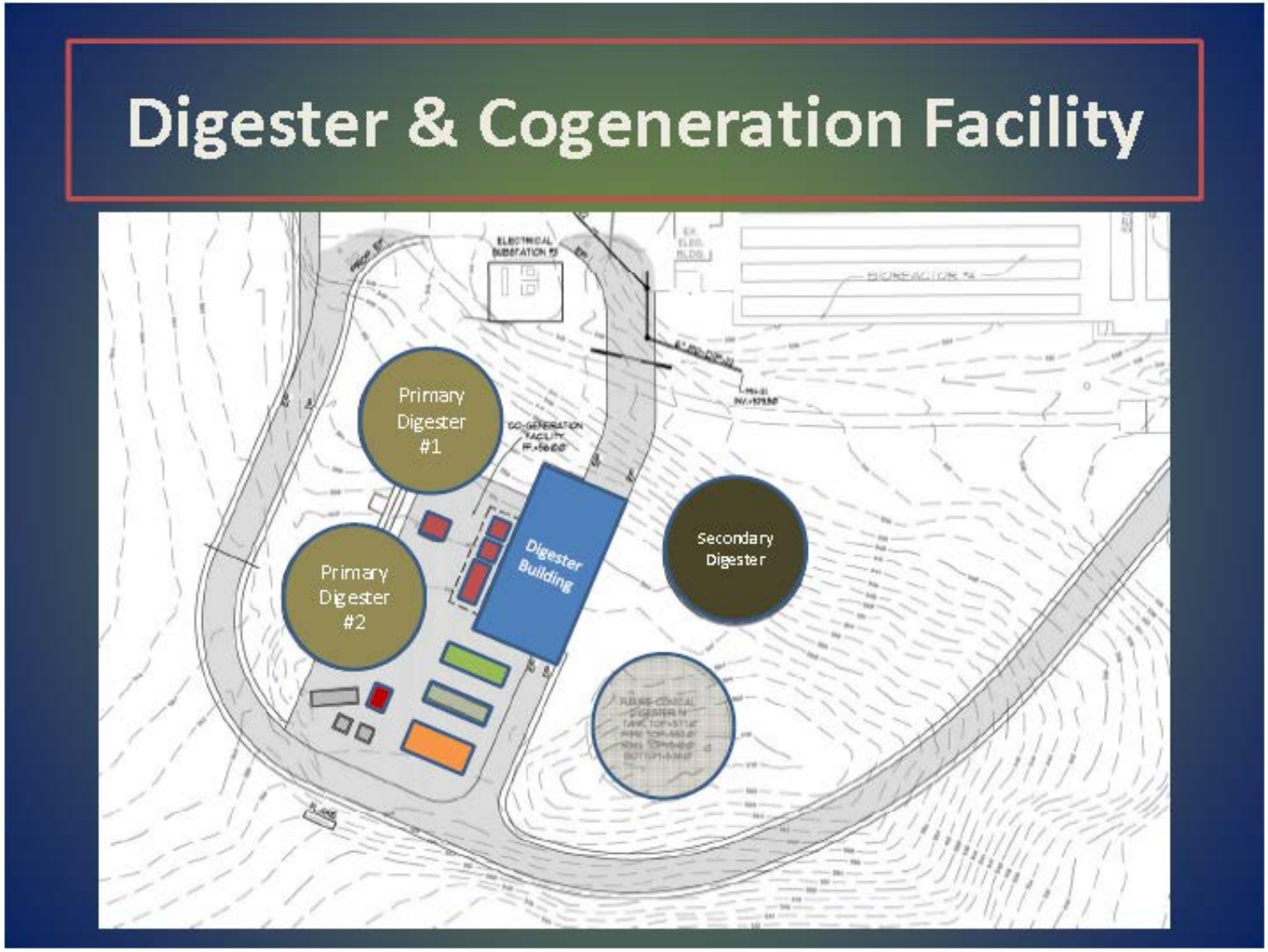
Notes

- Green assumes only high strength customer is Valley Proteins
- Wages include reduction of City Management salaries and addition of Mechanic II and Office Manager salaries as well as market adjustment for other salaries
- Fringe Benefits include reduction of City Management benefits and addition of Mechanic II and Office Manager benefits as well as market adjustment for other benefits
- Others includes addition of lease and furnishing of office space

Operational & Financial Review

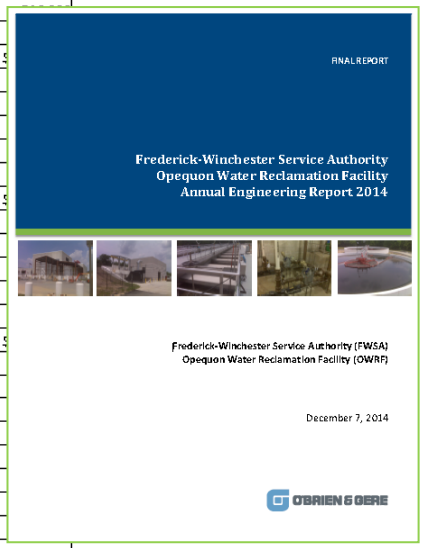
- Consolidation first-year cost of $425,000 in the first year
  - Impact of 3% on total costs (operating and debt)
- FWSA charge to the City will potentially increase by five cents per 1,000 gallons
  - City wastewater rate is $10.16 (per 1,000 gallons)
- Consolidation plus waste energy 20-year cost net savings: **$29.2M**
  - **$45M** Project
  - Additional revenue source – foreign waste acceptance **(The Balance)**
- *FWSA capital reserve utilized for one-time consolidation costs*

FWSA Opequon WRF – Biosolids Upgrades



FWSA 1+5-Year CIP

Frederick-Winchester Service Authority										12/7/2014
Annual Engineering Report 2014										
Capital Improvement Program - Tabulation of Proposed Projects (2014-2020)										
									Future	CIP 1+5
No.	Project	Further Description	FY14-15	FY15-16	FY16-17	FY17-18	FY18-19	FY19-20	*3 Years*	Total
P-1	WWTP - Process Modeling	Sampling, Modeling, Study		$95,000			$45,000		*$55,000*	$140,000
P-2	WWTP - Mixing / CFD Study	Bioreactors (BNR, SAx)		$20,000					*$65,000*	$20,000
P-3	Asset Management	Program Development (FWSA inventory)	$150,000	$100,000		$25,000		$150,000	*$350,000*	$425,000
	Main Influent Pumping Station	Influent Gate Replacement	$37,000							$37,000
P-4	VA TECH - Digester Performance	Digestion and Gas Production Evaluation	$50,000							$50,000
P-5	Surcharge Fees	HSW and Industrial Surcharges TN, TP, BOD, TSS	$80,000							$80,000
C-1	Security	Front Gate		$45,000						$45,000
C-2	Septage Receiving	Hardware, Scale, Reader, Deck, Enclosure			$300,000					$300,000
C-3	PC, SC, GT Drives	Eight units - Allowance for improvements		$215,000	$200,000					$415,000
	Secondary Clarifiers	Valve Replacement Clarifier #2 Drain Valve	$20,000							
C-4	RAS Pumping	Interim Solution for Higher Capacity		$40,000						
C-5		2nd Well & Pump Drywell, Piping / Valving				$50,000	$300,000	$1,000,000	*$250,000*	
C-6	Effluent Cloth Filters	Structure Cover & exp-metal sides			$75,000	$650,000				
	Effluent Filters	Drain and valve - Flocculator Basins	$20,000							
C-7	Chemical Storage & Feed	Motor operators for valves (2x8)		$56,000						
C-8		Expanded Metal side protection (Coag, SC)		$85,000						
C-9		Carbon - process control enhancements		$50,000						
C-10	Disinfection	Retrofit Cl/Decl to UV			$575,000	$1,150,000				
C-11	Maintenance Building	Post-UV, Cl/Decl Bldg to Maint. (not shop)					$300,000	$100,000		
C-12	Gravity Thickeners	Refurbish for Ostara EQ, ferment, cover+OC			$200,000	$275,000				
C-13	Odor Control	Media/canister replacements		$75,000		$100,000		$125,000	*$125,000*	
C-14	SCADA	Hardware and software upgrades	$15,000	$30,000		$40,000		$40,000	*$75,000*	
C-15		Process control analyzers - upgrades		$20,000		$30,000		$30,000	*$75,000*	
C-16	Laboratory & Office Space	New Lab, convert Existing to Offices		$450,000	$1,100,000		$150,000			
C-17	Clearwell Pumps	Three repl groundwater pumps & controls		$40,000						
C-18	Power Generation	Biogas generator rebuild (/ 3 years)					$325,000		*$450,000*	
C-19		Future additional generator					$750,000		*$350,000*	
C-21	Underground Storage Tank	Removal of remaining UST (not used)		$25,000						
C-22	Vehicle Fleet Additions	Roll-off Trucks		$110,000		$125,000				
C-23		Smaller Truck (w/o City->FWSA staff vehicles)		$45,000			$90,000			
C-24	Metering Stations	Communications (8+1 stations, WWTP)		$65,000	$120,000					
C-25		Station - City (relocate, new)		$225,000						
C-26		Station - Greenwood Road (new)		$175,000						$175,000
C-27		Stations - Carlisle, Blue Ridge, Asbury		$50,000		$75,000		$75,000		$200,000
C-28		Stations - Mill Race, Pioneer Hgts, Jordan Spgs			$50,000		$75,000			$125,000
P-4	Abrams Creek Interceptor	SSES (3.9 lineal miles)					$150,000			$150,000
C-29		Rehabilitation (allowance)						$250,000	*$350,000*	$250,000
C-30	Facility - Surface Restoration	Painting	$45,000	$25,000	$25,000	$25,000	$25,000	$25,000		$170,000
	Primary Clarifers	Splitter Box Gate Hoists	$15,000							$15,000
	Plant Water System	Extension 4"" Plant Water - Clarifers #5&6	$35,000							$35,000
	Primary Sludge Pumping	Pumping Manifold Modification	$20,000							$20,000
C-3					$75,000		$50,000			$125,000
			$487,000	$2,041,000	$2,720,000	$2,545,000	$2,260,000	$1,795,000	*$2,145,000*	$11,848,000
			$487,000	$2,528,000	$5,248,000	$7,793,000	$10,053,000	$11,848,000	*$13,993,000*	



- Other Work To Do, Prioritized

Summary

- Consolidate, Reorganize
- Hire and Re-Train before the Energy Project goes online
  - Know-how, Training, Operations assistance
- Balance Foreign Waste Acceptance and Industrial Pretreatment Program
- Enhance Laboratory staff, capabilities, and facilities
  - Reliance on timely and accurate information
- Update Health & Safety programs

- Recognize
  - Current and pending complexity
  - High standards for ENR effluent and Revenue-driven ESCO project
  - Solids Recycle management
  - Remaining CIP
  - Change management

QUESTIONS?

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Thank you!

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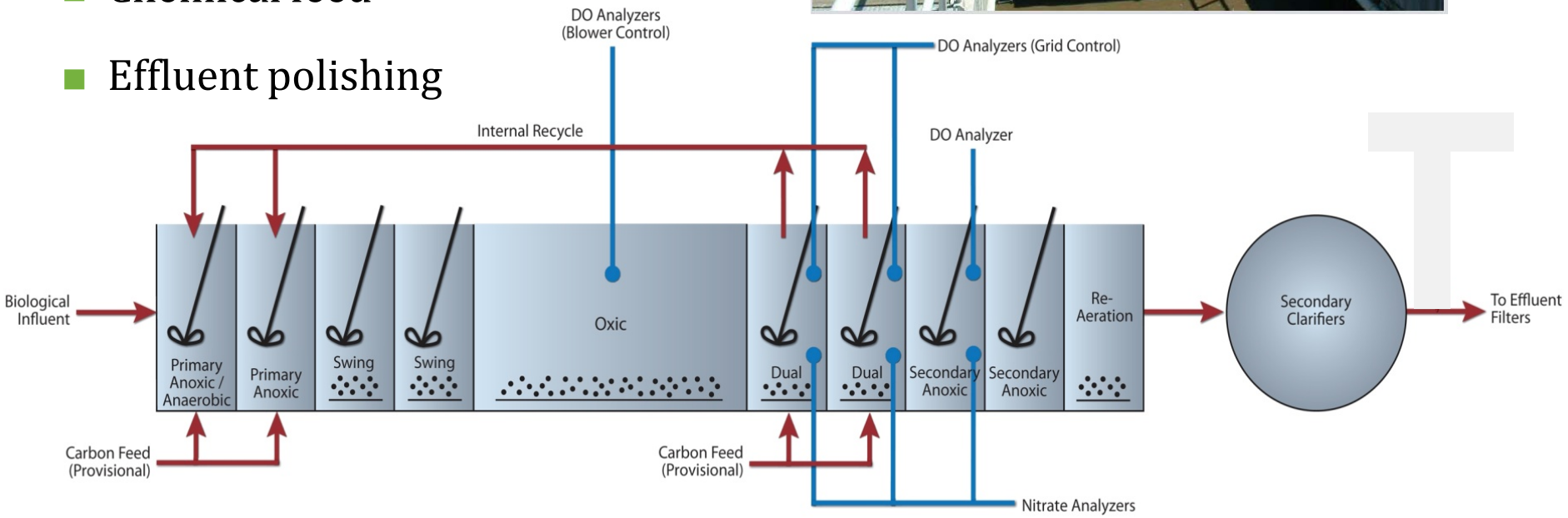
FWSA Opequon WRF – ENR, Biological Treatment

- Simultaneous Nitrification – DN
- Primary & Secondary Ax, Swings
- Plant operations is critical
- DO monitoring and control
- Chemical feed
- Effluent polishing



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