



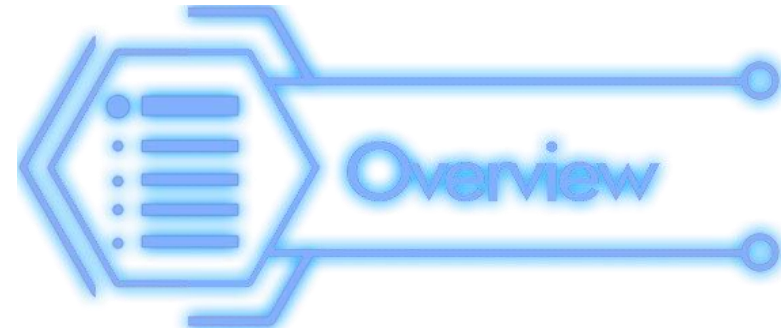
Energy Services Performance Contracting & Investment Grade Energy Audit

January 10, 2020

Chris Wilson



Overview



Background

Phase I- Energy Audit

- Report
- Energy Conservation Measures

Phase II- Evaluation and Design

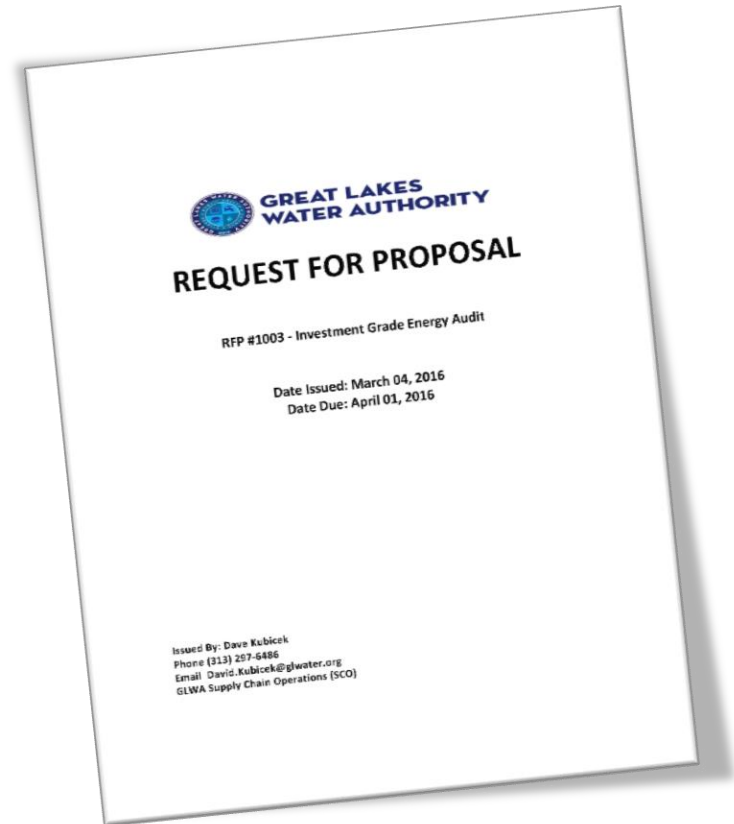
- Evaluation Services
- Design Services - 50%
 - ECM-1: Aeration System Improvements
 - ECM-2: Screened Final Effluent System Improvements

Next Steps

Background

Solicitation

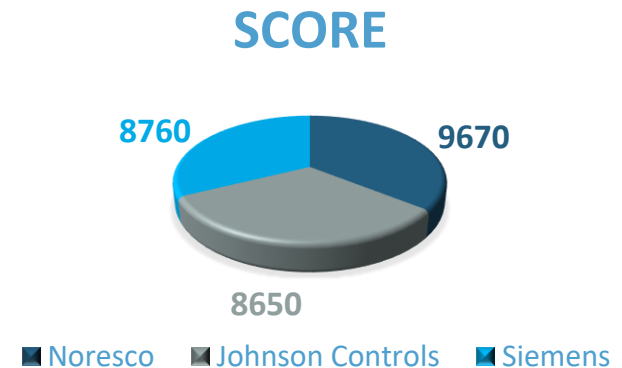
- Posted to MITN on March 4th 2016
- 30 different companies downloaded the RFP



Background

Proposal evaluation

- Proposals received
 - Noresco
 - OpTerra
 - Siemens
 - Johnson Controls
- Oral Interviews held between April 21st – 28th
 - Noresco
 - Siemens
 - Johnson Controls
- Internal Evaluation

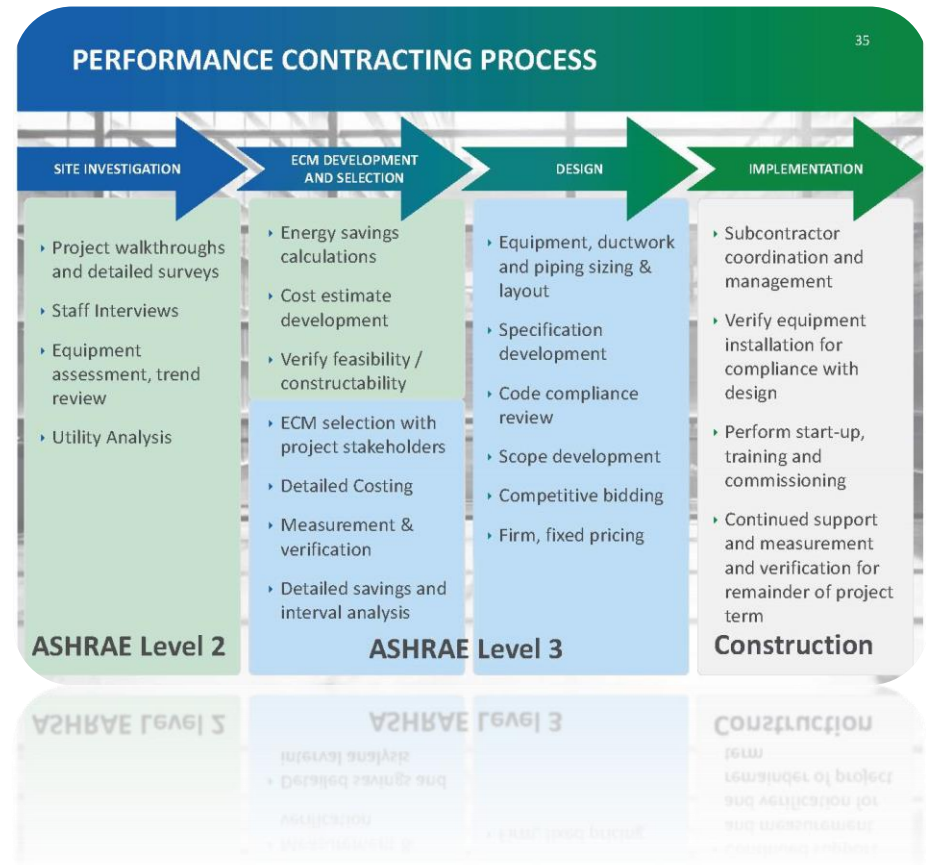


Background

Recommendation for Award

➤ Noresco

- Vendor-neutral approach
- GLWA-preferred products and equipment
- Quality products ensure persistence of savings and long-term performance
- Design review by GLWA
- Performance-based specifications
- Pre-qualify subcontractors
- Single point of contact for planning, design, and construction
- Turnkey approach



Scope of Services

Phase I

- Complete Investment Grade Energy Audit (IGEA)
- GLWA selects which projects move forward

Phase II – Evaluation

- Define Projects
- Calculate Present Worth

Phase II – Design

- *Develop Design Documents*
- *Solicit and Obtain Construction Bids*
- *Guarantee Performance and Savings*

PERFORMANCE CONTRACTING PROCESS

Performance Contracting Steps

- ESCO selection
- Complete investment grade energy audit (IGEA)
- GLWA selects which projects move forward to construction
- Sign energy services agreement
- ESCO can solicit competitive bids for project financing
- Implement selected measures
- System start-up, training and commissioning
- Periodic measurement reports ensure savings

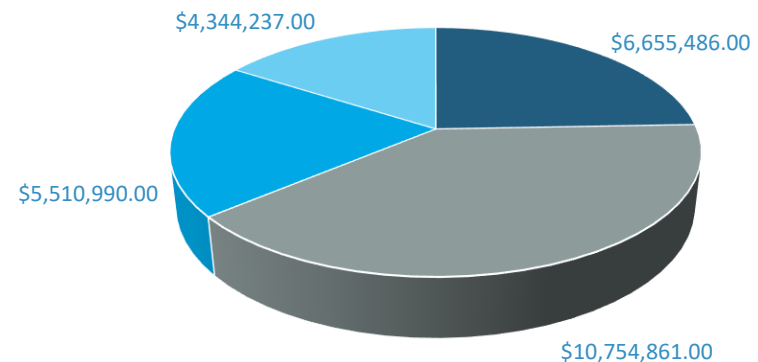


Collaborative Approach with GLWA Input at all Critical Milestones

Phase I - Preliminary Energy Audit

- Report
 - Electrical
 - 25 Building/Process Areas Were Identified
 - Rates Broken Down by Components
 - Loading During Normal and Peak Conditions
 - Natural Gas
 - 19 Building/Process Areas Were Identified
 - Water
 - 13 Meters
 - Process Chemicals
 - 6 Suppliers

Approximate Annual Operating Spend Breakout



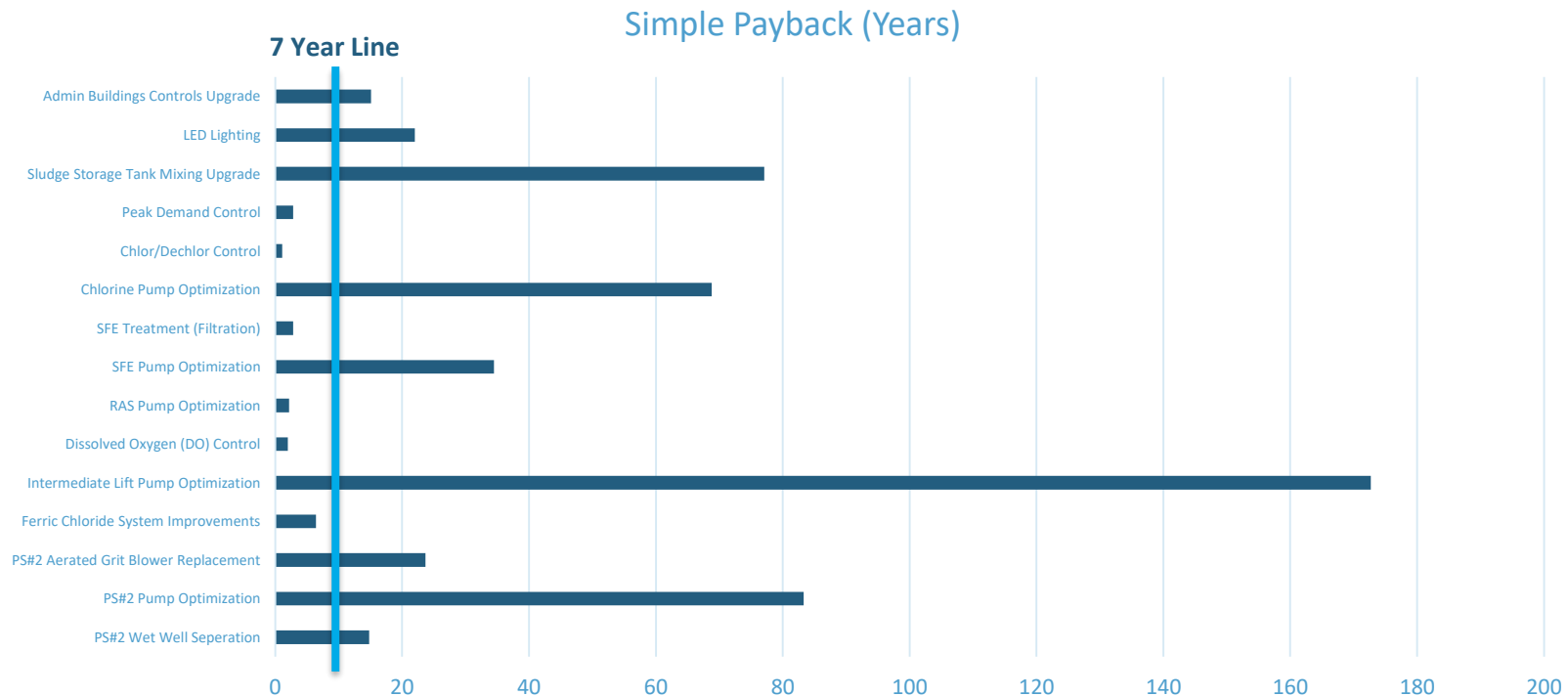
■ Chemical ■ Electricity ■ Natural Gas ■ Water

*The cost are for the WRRF facility only. The cost presented in the graph above are based on usage data from May 2017 thru April 2018.

Phase I - Preliminary Energy Audit

➤ Energy Conservation Measures (ECMs)

- 20 Measures were identified, 15 with Simple Payback



Phase I - Preliminary Energy Audit

		Turnkey Cost	Utility Savings	Chemical or O&M Savings	Simple Payback (Years)
CON-222 & CIP-211008	Ferric Chloride System Improvements	\$417,000.00		\$65,000.00	6.4
	Dissolved Oxygen (DO) Control	\$1,160,000.00	-	\$570,000.00	2
	RAS Pump Optimization	\$665,000.00	\$307,200.00		2.2
CON-238	SFE Treatment (Filtration)	\$8,936,000.00	\$3,170,500.00		2.8
	Chlor/Dechlor Control	\$100,000.00	-	\$90,000.00	1.1
	Peak Demand Control	\$963,000.00	\$343,900.00		2.8

- Cost provided are at preliminary level estimates
- The audit identified six improvement opportunities with less than 7-year payback
- Several of those opportunities are captured in existing projects in progress
- GLWA elected to focus on two of the ECMs to advance into Phase II
 - Aeration Optimization
 - Secondary Final Effluent System (SFE)

Energy Conservation Measures

- ECM-1: Aeration System Improvements (CIP 212008)
 - Innovative Oxygen Control
 - Electric Peak Demand Control
 - Additional Operational Needs (Greater than 7 year payback)
 - Anaerobic Zones
 - Level Control
 - Evaluate Four Different Mixing Technologies

	Turnkey Cost	Savings Source	Savings per Year	Simple Payback (Years)
Dissolved Oxygen Control	\$1,160,000.00	Oxygen	\$570,000.00	2.04
Peak Demand Control	\$963,000.00	Electricity	\$343,900.00	2.8
Level Control	\$3,000,000.00	Electricity & Operations	\$106,000.00	28.3
Anaerobic Zones	\$5,000,000.00	Chemical	TBD	TBD
Mixer-Aerator Replacement	\$35,000,000.00	Electricity & Oxygen	\$312,450.00	112

*The added scope increase the total payback for the project to greater than 20 Years

Energy Conservation Measures

- ECM-2: Screened Final Effluent (SFE) System Improvements (CIP 216008)
- Right-Size the system to improve efficiency
 - Adding treatment to allow for additional water reuse to improve the facility sustainability and resiliency
 - New structure to improve the operation and maintenance of the assets including needed space for treatment.

	Turnkey Cost	Savings Source	Savings per Year	Simple Payback (Years)
SFE Treatment	\$8,936,000.00	Water	\$3,170,500.00	2.83
SFE Pump Replacement	\$8,861,000.00	Electricity	\$256,700.00	34.5
Connect to Secondary Water	\$750,000.00	Water	\$96,172.00	7.8
SFE Building and Infrastructure	\$7,151,000.00	N/A	N/A	N/A
Total	\$25,698,000.00		\$3,523,372.00	7.3

Noresco Proposal

Evaluation Phase

Design
Memorandum

Guaranteed
Saving
Estimate

\$1,320,000

- Further Evaluation
- Verifying Proof of Concept
- Present Worth Analysis

Design Phase

Bid Level Design
Package

Solicit
Competitive
bids

Firm, Fixed
Price

\$1,685,000

- 50% Drawings and Specifications, with GLWA involved in equipment selection
- GLWA involved in vendors and contractor selection
- GLWA involved in the bid review
- Guaranteed Performance, with GLWA setting duration
- Guaranteed Savings, assuring the designer and general contractor an incentive to minimize O&M costs

Next Steps

- Obtain O&R Committee approval to proceed with Energy Audit Project Delivery Method
- Revise the scope of services to eliminate ECM1 (Aeration System Improvement)
- Obtain Consensus from Stakeholders
- Begin negotiation with Noresco to establish a contract for Phase II & III
- Request GLWA Board Authorization to enter into contract for Phase II & III
- Continue forward with Aeration System Improvement Design through alternative delivery method.

ECM - 1: AERATION SYSTEM IMPROVEMENTS - PRELIMINARY DRAWING LIST

GENERAL	DESCRIPTION
G-01	COVER SHEET
G-02	SHEET LIST
G-03	PROCESS FLOW SCHEMATIC
G-04	PROCESS FLOW SCHEMATIC
CIVIL	
C-01	OVERALL SITE PLAN - EXISTING AND DEMOLITION
C-02	OVERALL SITE PLAN
STRUCTURAL	
S-01	HIGH PURITY OXYGEN AERATION DECK - SECTIONAL PLAN
S-02	HIGH PURITY OXYGEN AERATION DECK - TOP PLAN
S-03	HIGH PURITY OXYGEN AERATION DECK - SECTIONS
MECHANICAL	
M-01	HIGH PURITY OXYGEN AERATION DECK - DEMO - TOP PLAN
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M-03	HIGH PURITY OXYGEN AERATION DECK - REACTOR 10 - SECTIONAL PLAN
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M-08	HIGH PURITY OXYGEN AERATION DECK - SECTIONS
M-09	MISC. CELLAROUS DECKS
ELECTRICAL	
E-01	ELECTRICAL SITE PLAN - POWER
E-02	HIGH PURITY OXYGEN AERATION DECK - POWER PLAN
E-03	WCC PLAN
E-04	POWER DISTRIBUTION FLOW CHART AND POWER ON-LINE DIAGRAM
E-05	WCC ON-LINE DIAGRAM
E-06	INSTRUMENTATION, EXISTING & SUGGESTED SCHEDULES AND SECTIONS
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I-01	HIGH PURITY OXYGEN AERATION DECK - REACTOR 1 - SHEET 1 OF 2
I-02	HIGH PURITY OXYGEN AERATION DECK - REACTOR 1 - SHEET 2 OF 2
I-03	HIGH PURITY OXYGEN AERATION DECK - REACTOR 2 - SHEET 1 OF 2
I-04	HIGH PURITY OXYGEN AERATION DECK - REACTOR 2 - SHEET 2 OF 2
I-05	HIGH PURITY OXYGEN AERATION DECK - REACTOR 3 - SHEET 1 OF 2
I-06	HIGH PURITY OXYGEN AERATION DECK - REACTOR 3 - SHEET 2 OF 2
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Phase II Investment Grade Energy Audit Scope of Services DRAFT 2.0

Questions





GLWA

Great Lakes Water Authority

