

**ON-GOING SERVICES AGREEMENT  
FOR OPERATING COST-SAVINGS MEASURES**

THIS ON-GOING SERVICES AGREEMENT FOR OPERATING COST-SAVINGS MEASURES (the "Service Agreement" or "Agreement") is made and entered into as of this \_\_\_\_ day of \_\_\_\_\_, 2014, by and among AMERESCO, Inc., a Delaware corporation doing business in Nevada, whose principal place of business is located at 111 Speen Street, Suite 410, Framingham, MA 01701 ("AMERESCO") and the City of Reno and the City of Sparks as owners of the Truckee Meadows Water Reclamation Facility ("TMWRF"), located at 8500 Clean Water Way, Reno, Nevada 89502 (collectively, the "City"). AMERESCO and City are referred to in this Services Agreement as the "Parties" and each individually as a "Party."

**RECITALS**

**WHEREAS**, AMERESCO is a qualified Energy Services Company (ESCO), engaged in the business of providing energy conservation and management services to its customers, which may include, among other things, energy conservation projects, measurement and verification services, and energy conservation measure services.

**WHEREAS**, AMERESCO and the City have entered into a Performance-Based Contract of even date herewith (the "ESA"), pursuant to which AMERESCO has agreed to perform certain services and/or provide goods at the TMWRF for the purpose of providing energy cost savings to the City.

**WHEREAS**, pursuant to the ESA, AMERESCO has guaranteed certain energy savings to the City.

**WHEREAS**, the City desires confirmation that the energy conservation equipment installed by AMERESCO through various energy conservation measures by its subcontractors meets the projected energy savings, specified by AMERESCO in Schedule C to the ESA.

**WHEREAS**, the City desires measurement and verification services of the energy conservation equipment installed by AMERESCO through various energy conservation measures by its subcontractors, specified by AMERESCO in the Financial-Grade Operational Audit Report, dated January 10, 2014 and approved by the City.

**NOW, THEREFORE**, in consideration of the foregoing and the mutual promises set forth in this Agreement, the Parties agree as follows:

1. **Scope of Services** – AMERESCO will provide the services (the "Services") to the City, as more particularly provided in the respective Schedules hereto, as part of this Service Agreement.
2. **Effective Date of the Agreement** -- This Agreement is effective as of the day and year first above written (the "Effective Date").
3. **Term of the Agreement** – The term of this Agreement shall commence on the date on which the Final Commissioning Report (as such term is defined in the ESA) becomes effective as provided in the ESA, and will remain in effect for a period of (15) years from that date.
4. **Fees for Services** – AMERESCO'S fees for the performance of the Services contemplated in this Agreement are stipulated in Schedule A for measurement and verification services; and Schedule B for MyEnergyPro, and shall not be subject to change without the express written consent of the City.

**5. Billing and Payment –**

**5.1** Annual Measurement & Verification Report (as specified in the ESA, the “M&V Report” and detailed in Schedule A, attached hereto): The City shall pay AMERESCO within thirty (30) calendar days after receipt of AMERESCO’S invoice. An invoice for measurement and verification services should be submitted within 45 days of the City’s approval of the M&V Report submitted by AMERESCO. If the City disputes a billing submitted by AMERESCO, it will pay the undisputed portion and the Parties will promptly meet and resolve the dispute in accordance with the dispute resolution terms set forth in Section 14 (Dispute Resolution). In the event it is later determined that the amounts were due to AMERESCO, the City shall pay AMERESCO the disputed amount plus interest at said delinquency rate from the time the payment was due until paid.

**5.2** Payments associated with MyEnergyPro (as detailed in Schedule B). The City shall pay AMERESCO within thirty (30) calendar days after receipt of AMERESCO’s invoice. Invoices will be submitted to the City on a quarterly basis. If the City disputes a billing submitted by AMERESCO, it will pay the undisputed portion and the Parties will promptly meet and resolve the dispute in accordance with the dispute resolution terms set forth in Section 14 (Dispute Resolution). In the event it is later determined that the amounts were due to AMERESCO, the City shall pay AMERESCO the disputed amount plus interest at said delinquency rate from the time the payment was due until paid.

**6. Books and Records --** AMERESCO shall maintain accurate books and records regarding the Services it provides under this Agreement and such books and records shall be available for inspection and audit by the City or its audit agency during reasonable business hours for a period of five (5) years after the later of the termination or expiration of this Agreement, for the purpose of verifying the accuracy of AMERESCO’S billings to the City under this Agreement, but for no other purposes. Such records will be made available to the City at the offices of AMERESCO, located in Tempe, Arizona, or at the City, upon reasonable written notice to AMERESCO, which shall be given not less than ten (10) business days prior to the date upon which the City desires to conduct the inspection and audit.

**7. Compliance**

**7.1** AMERESCO will obtain and keep in effect throughout the term of this Agreement all licenses, permits and authorizations that are required by applicable regulatory authorities to be obtained to provide the Services. These may include, without limitation, contractor’s licenses and engineering registrations, as well as specific permits required to undertake the Services.

**7.2** AMERESCO will comply with all applicable laws, rules, regulations, ordinances and orders of regulatory authorities having jurisdiction over the Services and the various locations where they will be performed. AMERESCO will also comply with applicable site rules and procedures in effect or imposed by the City.

**8. Uncontrollable Forces**

**8.1** If an event occurs that is beyond the control of a Party which prevents said Party from performing its obligations hereunder (hereinafter referred to as “Uncontrollable Force(s)”), said Party will not be considered to be in default under this Agreement; except the preceding condition will not apply to the Parties’ obligation to make all payments when due as provided for herein.

- 8.2 The Party affected by an Uncontrollable Force will promptly provide written notice to the other Party describing the nature of the event, the length of time it is expected to continue and the Party's efforts (planned or under way) to overcome the affects of the event.
- 8.3 The term "Uncontrollable Force(s)" as used in this Section 8 means natural, operational and mechanical events that are not within the control of the affected Party, and which that Party is unable to prevent or overcome in the exercise of commercially reasonable diligence. By way of example and not limitation, Uncontrollable Force(s) may include occurrences including acts of God, severe storms and floods, earthquakes, tornadoes, material breakages or sudden accidents to or breakdown of machinery, plant, power lines or equipment, the necessity for making unscheduled, emergency repairs, labor disruptions or shortages, disruptions or shortages in the supply or transportation of materials and supplies, or acts of government regulatory or judicial authorities exercising jurisdiction over the parties and their obligations under this Agreement. Uncontrollable Forces do not include economic events, like changes in market conditions or prices.

## **9. Indemnity**

The indemnification obligations are set forth in Section 20 of the ESA and are incorporated herein by reference.

## **10. Insurance**

The insurance requirements are set forth in Schedule G to the ESA and, with the exception of the requirements regarding AMERESCO's Errors and Omissions insurance coverage, which the Parties agree is not required under the terms of this Agreement, are incorporated herein by reference.

## **11. Warrantees and Limitations of Liability**

Performance guarantees on Measurement & Verification Services are as provided for in the respective Schedules hereto, as part of this Services Agreement.

**NOTWITHSTANDING ANY PROVISION TO THE CONTRARY SET FORTH IN THIS CONTRACT, NEITHER PARTY SHALL BE LIABLE FOR ANY FOR SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES.**

## **12. Termination**

If a Party (the "Defaulting Party") fails to perform its obligations under this Agreement, and such failure is unexcused under Section 10 (Uncontrollable Forces), or should a Party (the "Non-Defaulting Party") have reasonable basis to question the intention or ability of the Defaulting Party to perform its obligations under this Agreement, then the Non-Defaulting Party may elect to terminate this Agreement, if, in respect to the payment of moneys, the Defaulting Party has not cured the default within five (5) business days after receipt of a written notice of default from the Non-Defaulting Party; or, in the case of other defaults, the Defaulting Party has not cured the default or provided the Non-Defaulting Party with adequate written assurances of its intention to cure the default and otherwise perform its obligations under this Agreement within thirty (30) days after receipt of a written notice of default from the Non-Defaulting Party. Any termination of this Agreement by the Non-Defaulting Party will not be deemed to be an election of remedies and will be in addition to all other remedies available to the Non-Defaulting Party under applicable law. Under no circumstances, however, will the Defaulting Party be liable to the Non-Defaulting Party for lost profits or revenues, indirect, incidental, consequential, punitive or exemplary damages resulting from its default.

**13. Confidentiality**

Except as may otherwise be required by law and in accordance with Chapter 239 of the Nevada Revised Statutes, each Party agrees to hold in confidence, and further agrees to cause its officers, directors, employees, agents and representatives to hold in confidence, all information received from the other Party concerning any Services to be performed under this Agreement, and shall use such information solely for pursuit of the objectives set forth in this Agreement. This confidentiality requirement will continue for two (2) years after termination of the Agreement.

**14. Dispute Resolution**

The dispute resolution provision is set forth in Section 13D of the ESA and is incorporated herein by reference.

**15. [Intentionally Omitted]**

**16. Assignment and Subcontracting**

16.1 Neither Party will assign, transfer or otherwise dispose of its rights or obligations under this Agreement or any interest therein, without the other Party's prior written consent; *provided, however,* that without the other Party's prior written consent, AMERESCO may assign this Agreement to its parent corporation, or an affiliate or subsidiary, or to a company or entity that succeeds to substantially all of its assets.

16.2 AMERESCO will not subcontract or delegate any of its obligations under this Agreement without the City's prior written consent which shall not be unreasonably withheld, conditioned or delayed. AMERESCO will remain liable for the performance of this Agreement notwithstanding any subcontract or assignment consented to by the City.

**17. Notices**

All notices required to be given by this Agreement will be given in person, by certified United States Mail, postage prepaid, return receipt requested, or by telecopier (confirmed by the mailing of the original in the manner as abovementioned). All notices shall be deemed given when received. Notices shall be directed to the Parties as follows:

If to AMERESCO

Ameresco, Inc.  
60 Rio Salado Parkway, Suite 1001  
Tempe, Arizona 85281

Attention: Robert Georgeoff  
Telephone: (480-499-9122  
Email: [rgeorgeoff@ameresco.com](mailto:rgeorgeoff@ameresco.com)

With copy to:  
General Counsel  
Ameresco Inc.  
111 Speen Street, Suite 410  
Framingham, MA 01701

If to City

The City of Reno  
1 East First Street  
Reno, Nevada 89501

Attention: John Flansberg, P.E.  
Telephone: (775) 657-4570  
Email: [flansbergj@reno.gov](mailto:flansbergj@reno.gov)

The City of Sparks  
Neil C. Krutz, P.E  
431 Prater Way  
Sparks, Nevada 89431  
Telephone: (775) 353-2340  
Email: [nkrutz@cityofsparks.us](mailto:nkrutz@cityofsparks.us)

**18. Relationship of the Parties**

The Parties will act as independent entities and neither Party will act as agent for or partner of the other Party for any purpose whatsoever, and the employees of one will not be deemed employees of the other. Nothing in this Agreement will grant to either Party, the right to make commitments of any kind for or on behalf of the other Party without prior written consent of the other Party.

**19. Amendments and Modifications**

This Agreement can be modified or rescinded only by a writing signed by both Parties or their duly authorized agents. No course of dealing or oral changes between the Parties will be effective or legally binding as an amendment to this Agreement.

**20. Survival**

Upon termination for any reason, the Parties' rights and obligations will continue to be determined in accordance with the terms and conditions set forth herein until the Parties' rights and obligations are finally determined.

**21. Severability**

The invalidity or unenforceability of any provision of this Agreement under any present or future law, rule, regulation or ordinance will not affect any other provision of this Agreement, and the remaining provisions of this Agreement will continue with the same force and effect as if such invalid or unenforceable provision had not been inserted in this Agreement.

**22. Waivers**

No waiver by a Party of any breach of the provisions of this Agreement by the other Party shall in any way be construed to be a waiver of any future breach or bar such Party's right to insist on strict performance of the provisions of this Agreement.

**23. Governing Law**

This Agreement will be interpreted in accordance with the internal laws of the State of Nevada, without giving effect to Nevada's conflicts of laws that would require the application of the law of any other jurisdiction.

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**24. Execution**

IN WITNESS THEREOF, the parties have caused this Agreement to be executed and delivered by their duly authorized officers as of the date first above written.

Ameresco, Inc.

By: \_\_\_\_\_  
Title: \_\_\_\_\_

The City of Reno

By: \_\_\_\_\_  
Robert A. Cashell, Sr., Mayor

ATTEST:

\_\_\_\_\_  
Reno City Clerk

Approved as to Form:

\_\_\_\_\_  
Deputy City Attorney

The City of Sparks

By: \_\_\_\_\_  
Geno Martini, Mayor

ATTEST:

\_\_\_\_\_  
Sparks City Clerk

Approved as to Form:

\_\_\_\_\_  
Sparks City Attorney

## SCHEDULE A

### A.1 Measurement and Verification Costs

The following table summarizes the cost of the Measurement and Verification services provided by Ameresco in each year following Final Project Acceptance. Measurement and Verification services will be invoiced within 30 days after delivery of each annual measurement and verification report.

Year	M&V Cost
1	\$ 39,585
2	\$ 40,527
3	\$ 41,492
4	\$ 42,480
5	\$ 43,491
6	\$ 44,526
7	\$ 45,586
8	\$ 46,671
9	\$ 47,782
10	\$ 48,919
11	\$ 50,083
12	\$ 51,275
13	\$ 52,495
14	\$ 53,744
15	\$ 55,023

Please note that the costs included in the table above are reflected in the Installment Purchase Cash Flow Analysis, Line 17, included as Schedule C of the Performance-Based Contract. Costs are to be paid out of the project's savings and will be invoiced annual in accordance with the schedule above.

### A.2 Measurement and Verification Plan

Please reference the following section for the M&V Plan for TMWRF. The Parties agree that, as used in Tables 6.3, 6.4 and 6.5 of the M&V Plan, "significantly" shall mean any change of more than 5% of the average of the relevant measurement as established by the Financial-Grade Operational Audit. The Parties further agree that, at the time of the issuance of the Final Commissioning Report, the Parties may, if they so elect by mutual agreement, re-evaluate the baselines provided in the Financial-Grade Operational Audit.

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## 6.0 Measurement and Verification

The long-term success of any comprehensive energy efficiency program depends on the development of an accurate, successful measurement and verification (M&V) plan. The main objective is to develop a cost effective plan that quantifies and verifies the performance results of the ECMs. Ameresco subscribes to using industry standard M&V protocols that have been developed in response to the need for reliable and consistent measurement practices.

The following reference is used for the development of M&V procedures for this project:

- Efficiency Valuation Organization. International Performance Measurement & Verification Protocol (IPMVP). September 2010.
- The protocols also help to allocate various risks associated with achieving energy cost savings and allowing risk reduction and better risk management. The M&V options description, provided herein, was developed by summarizing the IPMVP and contains excerpts taken from that document. The benefits of the protocols are as follows:
  - Defining the role of verification in energy contracts and implementation.
  - Discussing procedures, with varying levels of accuracy and cost, for verifying:
    - Baseline and project installation conditions, and
    - Long-term energy savings performance.
  - Providing techniques for calculating “whole-facility” savings, individual technology savings, and stipulated savings.
  - Providing procedures that are consistent, industry accepted, impartial, and reliable.
  - Providing procedures for the investigation and resolution of disagreements related to performance issues.

The general approach to determining energy savings in these plans involves comparing the energy use of the retrofitted system before installation of the ECM (baseline) and after installation of the ECM (post-retrofit). In general:

$$\text{Energy Savings} = \text{Baseline Energy Use} - \text{Post Retrofit Energy Use}$$

The IPMVP protocols have defined four M&V options (Options A through D) that meet the needs of a wide range of performance contracts and provide suggested procedures for baseline development and post-retrofit verification. These M&V options are flexible and reflect the considerations previously mentioned. The options are summarized in Table 6.1.

**Table 6.1.** Measurement and Verification Options

M&V Option	How Savings Are Calculated	Typical Applications
<b>Option A: Partially Measured Retrofit Isolation</b>		
<p>Savings are determined by partial field measurement of the energy use of the system(s) to which an ECM was applied, separate from the energy use of the rest of the facility. Measurements may be either short-term or continuous of the error they may introduce.</p> <p>Partial measurement means that some but not all parameter(s) may be stipulated, if the total impact of possible stipulation error(s) is not significant to the resultant savings. Careful review of ECM design and installation will ensure that stipulated values fairly represent the probable actual value. Stipulations should be shown in the M&amp;V Plan along with analysis of the significance of the error they may introduce.</p>	<p>Engineering calculations using short term or continuous post-retrofit measurements and stipulations.</p>	<p>Lighting retrofit where power draw is measured periodically. Operating hours of the lights are stipulated.</p>
<b>Option B: Retrofit Isolation</b>		
<p>Savings are determined by field measurement of the energy use of the systems to which the ECM was applied, separate from the energy use of the rest of the facility. Short-term or continuous measurements are taken throughout the post-retrofit period.</p>	<p>Engineering calculations using short term or continuous measurements</p>	<p>Application of controls to vary the load on a constant speed pump using a variable speed drive. Electricity use is measured by a kWh meter installed on the electrical supply to the pump motor. In the base year this meter is in place for a week to verify constant loading. The meter is in place throughout the post-retrofit period to track variations in energy use.</p>
<b>Option C: Whole Facility (Calibrated Building Modeling)</b>		
<p>Savings are determined by measuring energy use at the whole facility level. Short-term or continuous measurements are taken throughout the post-retrofit period.</p>	<p>Analysis of whole facility utility meter or sub-meter data using techniques from simple comparison to regression analysis.</p>	<p>Multifaceted energy management program affecting many systems in a building. Energy use is measured by the gas and electric utility meters for a twelve month base year period and throughout the post-retrofit period.</p>
<b>Option D: Calibrated Simulation (Bill Comparison)</b>		
<p>Savings are determined through simulation of the energy use of components or the whole facility. Simulation routines must be demonstrated to adequately model actual energy performance measured in the facility. This option usually requires considerable skill in calibrated simulation.</p>	<p>Energy use simulation, calibrated with hourly or monthly utility billing data and/or end- use metering.</p>	<p>Multifaceted energy management program affecting many systems in a building but where no base year data are available. Post-retrofit period energy use is measured by the gas and electric utility meters. Base year energy use is determined by simulation using a model calibrated by the post-retrofit period utility data.</p>

Table 6.2 below lists the proposed M&V plans for the ECMs. Of the 7 ECMs developed for the project, only 4 ECMs are projected to produce savings that need to be measured and verified. ECMs 4B, 9, and 10 are capital projects that do not require M&V after construction.

Table 6.2. M&V Plan Summary

ECM	IPMVP Option
<b>ECM 2: Centrate Nutrient Recovery</b>	
Crystal Green Fertilizer Savings	C
Alum Savings	B
Alum Biosolids Hauling and Disposal Savings	A
Methanol Savings	A
<b>ECM 4a: Biogas Cogeneration System</b>	
Electricity Generation	B
<b>ECM 4b: Digester Domes Rehabilitation</b>	
(No Savings to Verify)	n/a
<b>ECM 6: Dewatering System Upgrade</b>	
Biosolids Hauling Frequency Reduction	C
Biosolids Disposal Weight Reduction	C
<b>ECM 7: Lighting System Upgrade</b>	
Lighting Retrofit Savings	A
Lighting Controls Savings	A
<b>ECM 9: Near-Term Dewatering Improvement</b>	
(No Savings to Verify)	n/a
<b>ECM 10: MyEnergyPro™</b>	
(No Savings to Verify)	n/a

More comprehensive M&V plan summaries for the ECMs are shown in Table 6.3 to Table 6.6. The sections that follow provide a detailed description of how the savings will be verified. M&V plan details are provided only for those ECMs that produce savings. Results of the M&V services will be reported to TMWRF on an annual basis.

Table 6.3. Summary of M&amp;V Plan for ECM 2: Centrate Nutrient Recovery

Savings Source	IPMVP Option	Baseline M&V Requirements	Post Retrofit M&V Requirements	Measurement and Metering	Stipulated Variables	Performance Period M&V Requirements
<b>Crystal Green fertilizer</b>	C	None. This is a new process.	Amount of Crystal Green® fertilizer produced in tons.	Ameresco will analyze the fertilizer purchase invoices from Ostara annually to verify this savings.	<p>Baseline centrate properties and Orthophosphate load is stipulated from TMWRF's historical data.</p> <p>Baseline Crystal Green® fertilizer production will be adjusted if centrate properties and Orthophosphate load is significantly different than historical data.</p>	<p>Annual inspection of the Pearl® nutrient recovery system.</p> <p>Annual review of the centrate properties and Orthophosphate load going to the Pearl® nutrient recovery system.</p>
<b>Alum Savings</b>	B	Baseline alum consumption for existing Phosphorous Removal System (PRS).	Alum consumption for PRS after ECM implementation.	Alum consumption for the PRS will be measured using existing flow meter.	<p>Alum dry tonnage in the liquid solution will be calculated using chemical properties data provided by manufacturer.</p> <p>Baseline alum consumption will be adjusted if centrate properties and Orthophosphate load is significantly different than historical data.</p>	<p>Annual inspection of the Pearl® nutrient recovery system.</p> <p>Annual review of the centrate properties and Orthophosphate load going to the Pearl® nutrient recovery system.</p>
<b>Alum Biosolids Hauling and Disposal Savings</b>	A	None.	Amount of Crystal Green® fertilizer (tons) produced.	<p>Reduction in biosolids from deferred Alum use is related to the amount of Phosphor removed from the centrate.</p> <p>Ameresco will use the</p>	<p>Theoretical weight ratio of P in fertilizer, biosolids weight ratio per pound of P, and centrifuge efficiency will be stipulated.</p> <p>Reduction in biosolids</p>	<p>Annual inspection of the Pearl® nutrient recovery system.</p> <p>Annual review of the centrate properties and Orthophosphate load</p>

**Table 6.3.** Summary of M&V Plan for ECM 2: Centrate Nutrient Recovery

Savings Source	IPMVP Option	Baseline M&V Requirements	Post Retrofit M&V Requirements	Measurement and Metering	Stipulated Variables	Performance Period M&V Requirements
				verified amount of fertilizer produced to calculate the amount of P removed.	<p>hauling frequency will be calculated using average tonnage data per truck pick up.</p> <p>Reduction in biosolids disposal tonnage will be calculated based on the amount of P removed and the stipulated parameters.</p>	going to the Pearl® nutrient recovery system.
<b>Methanol Savings</b>	A	None.	Amount of Crystal Green® fertilizer (tons) produced.	<p>Reduction in methanol use correlates to the ammonia load reduction in the centrate.</p> <p>Ameresco will calculate the reduction in ammonia load based on the amount of fertilizer produced.</p>	<p>Theoretical weight of N in fertilizer will be stipulated.</p> <p>Reduction in methanol cost will be calculated based on % ammonia load reduction in the centrate, and using the unit methanol price.</p>	<p>Annual inspection of the Pearl® nutrient recovery system.</p> <p>Annual review of the centrate properties and Ammonia load going to the Pearl® nutrient recovery system.</p>

**Table 6.4.** Summary of M&V Plan for ECM 4A: Biogas Cogeneration System

Savings source	IPMVP Option	Baseline M&V Requirements	Post Retrofit M&V Requirements	Measurement and Metering	Stipulated Variables	Performance Period M&V Requirements
<b>Electricity Generation</b>	B	None.	Actual kWh produced by the cogeneration system.	Ameresco will meter the net electricity generated by the cogeneration system.	Digester gas flow rate is stipulated from TMWRF's historical meter data.  Baseline kWh production will be adjusted if actual digester gas flow rate is significantly lower than historical data.	Annual inspection of the cogeneration system.  Annual review of the digester gas production data.

**Table 6.5.** Summary of M&V Plan for ECM 6: Dewatering System Upgrade

Savings Source	IPMVP Option	Baseline M&V Requirements	Post Retrofit M&V Requirements	Measurement and Metering	Stipulated Variables	Performance Period M&V Requirements
<b>Biosolids Hauling Frequency Reduction</b>	C	Baseline biosolids hauling frequency (number of pick-ups) before ECM implementation from invoices.	Biosolids hauling frequency (number of pick-ups) after ECM implementation from invoices.	Ameresco will analyze the biosolids hauling invoices annually to verify this savings.	Biosolids production is stipulated from TMWRF's historical data.  Baseline biosolids hauling frequency will be adjusted if actual biosolids production is significantly different than historical data.	Annual inspection of the centrifuges, cake conveyance system, and polymer system.  Annual review of the biosolids production data.
<b>Biosolids Disposal Weight Reduction</b>	C	Baseline biosolids disposal tonnage before ECM implementation from invoices.	Biosolids disposal tonnage after ECM implementation from invoices.	Ameresco will analyze the biosolids disposal invoices and tonnage annually to verify this savings.	Biosolids production is stipulated from TMWRF's historical data.  Baseline biosolids disposal tonnage will be adjusted if	Annual inspection of the centrifuges, cake conveyance system, and polymer system.  Annual review of the

**Table 6.5.** Summary of M&V Plan for ECM 6: Dewatering System Upgrade

Savings Source	IPMVP Option	Baseline M&V Requirements	Post Retrofit M&V Requirements	Measurement and Metering	Stipulated Variables	Performance Period M&V Requirements
					actual biosolids production is significantly different than historical data.	biosolids production data.

**Table 6.6.** Summary of M&V Plan for ECM 7: Lighting System Upgrade

Savings Source	IPMVP Option	Baseline M&V Requirements	Post Retrofit M&V Requirements	Measurement and Metering	Stipulated Variables	Performance Period M&V Requirements
<b>Lighting Retrofit Savings</b>	A	Input power of select existing light fixtures.  Run hours of select existing light fixtures.	Input power of select new light fixtures.	Short-term metering of power consumption for select light fixtures.  Short-term metering of run hours for select light fixtures.  Number of selected fixtures must be statistically significant.	Power consumption of light fixtures that are not metered.  Operating hours of light fixtures.	Annual inspection of a percentage of retrofitted light fixtures.
<b>Lighting Controls Savings</b>	A	Operating hours of select light fixtures before controls retrofit.	Operating hours of select light fixtures after controls retrofit.	Short-term metering of run hours for select light fixtures before and after controls retrofit.  Number of selected fixtures must be statistically significant.	Light fixtures power consumption will be stipulated from lighting retrofit metering.  Reduction of operating hours of light fixtures.	Annual inspection of a percentage of retrofitted lighting controls.

## 6.1 Utility Rate Summary

Energy savings will be calculated using the applicable unit of energy (kWh, tons of fertilizer, tons of biosolids, etc.) The following table summarizes the value of each of the different types of utility savings that will be used to calculate dollar savings in each year of the Measurement and Verification period.

Table 6.7. Utility Rate Summary

	Electricity (\$/kWh)	Methanol (\$/gal)	Alum (\$/ton)	Fertilizer (\$/ton)	Biosolids Hauling Fee (\$/ pick up)	Biosolids Disposal Fee (\$/ton)
<b>Construction</b>	\$ 0.06017	\$ 1.782	\$ 385	\$ 250	\$ 99.90	\$ 11.68
<b>Year 1</b>	\$ 0.06191	\$ 1.833	\$ 396	\$ 250	\$ 103.09	\$ 11.96
<b>Year 2</b>	\$ 0.06370	\$ 1.886	\$ 408	\$ 250	\$ 106.38	\$ 12.24
<b>Year 3</b>	\$ 0.06554	\$ 1.941	\$ 419	\$ 250	\$ 109.77	\$ 12.53
<b>Year 4</b>	\$ 0.06743	\$ 1.997	\$ 431	\$ 250	\$ 113.27	\$ 12.83
<b>Year 5</b>	\$ 0.06938	\$ 2.055	\$ 444	\$ 250	\$ 116.88	\$ 13.14
<b>Year 6</b>	\$ 0.07139	\$ 2.114	\$ 457	\$ 250	\$ 120.61	\$ 13.45
<b>Year 7</b>	\$ 0.07345	\$ 2.175	\$ 470	\$ 250	\$ 124.46	\$ 13.77
<b>Year 8</b>	\$ 0.07557	\$ 2.238	\$ 484	\$ 250	\$ 128.43	\$ 14.10
<b>Year 9</b>	\$ 0.07776	\$ 2.303	\$ 498	\$ 250	\$ 132.53	\$ 14.43
<b>Year 10</b>	\$ 0.08000	\$ 2.369	\$ 512	\$ 250	\$ 136.75	\$ 14.78
<b>Year 11</b>	\$ 0.08232	\$ 2.438	\$ 527	\$ 250	\$ 141.12	\$ 15.13
<b>Year 12</b>	\$ 0.08469	\$ 2.508	\$ 542	\$ 250	\$ 145.62	\$ 15.49
<b>Year 13</b>	\$ 0.08714	\$ 2.581	\$ 558	\$ 250	\$ 150.26	\$ 15.86
<b>Year 14</b>	\$ 0.08966	\$ 2.655	\$ 574	\$ 250	\$ 155.06	\$ 16.24
<b>Year 15</b>	\$ 0.09225	\$ 2.732	\$ 590	\$ 250	\$ 160.00	\$ 16.62



## ECM 2: Centrate Nutrient Recovery

### 6.1.1 Crystal Green Fertilizer Savings

The M&V protocol for this savings source is based on IPMVP Option C. For this savings, Ameresco will verify the amount of Crystal Green fertilizer produced by the Pearl process from the monthly fertilizer purchase invoices.

After the Pearl process installation, Ostara will come to the plant every 2-3 weeks to collect the fertilizer produced. The collected fertilizer will then be analyzed, sorted, and weighed for resale through Ostara's distribution network. Ostara in turn will reimburse TMWRF for the amount of fertilizer that is deemed acceptable for resale. Ameresco will use this amount from the monthly invoice to verify that the savings are realized.

Measured Variables:

- Crystal Green fertilizer amount (in tons)

Stipulated Variables:

- Unit price of Crystal Green fertilizer = \$250 per ton

#### > Cost Savings Calculations

Total annual savings for TMWRF from this source will be calculated as follows:

$$\text{Annual fertilizer revenue} = \text{Measured fertilizer tonnage} \times \$250/\text{ton}$$

### 6.1.2 Alum Savings

The M&V protocol for this savings source is based on IPMVP Option B. For this savings, Ameresco will measure the amount of Aluminum Sulfate (Alum) solution that TMWRF uses before and after the Pearl process installation. The measurement will be performed using existing flow meter and SCADA system. Baseline consumption of the chemical will be the last 12 months of metered data before installation. Post-retrofit consumption will be trended continuously through the SCADA.

Although the chemical is delivered as liquid solution, the vendor charges TMWRF based on the dry tonnage of the chemical. To determine the cost savings, we will calculate the amount of dry Alum in the solution using manufacturer's chemical properties data.

Measured Variables:

- Baseline Alum Sulfate consumption (in gallons per day)

- Post-retrofit Alum Sulfate consumption (in gallons per day)

Stipulated Variables:

- Alum solution density = 11.8 lbs/gal
- Dry Alum content in solution = 48.8%
- Unit price of dry Alum = \$385 per ton

### > Cost Savings Calculations

Total annual Alum Sulfate solution savings will be calculated as follows:

$$\text{Baseline annual Alum solution} = (\sum \text{Baseline daily Alum consumption})_{\text{for year}}$$

$$\text{Post-retro annual Alum solution} = (\sum \text{Post-retro daily Alum consumption})_{\text{for year}}$$

$$\text{Annual Alum solution savings} = \text{Baseline annual Alum solution} - \text{Post-retro annual Alum solution}$$

The amount of dry Alum saved will be calculated based on the annual Alum solution savings.

$$\text{Annual dry Alum savings} = \text{Annual Alum solution savings} \times \text{Solution density} \times \% \text{ dry Alum ratio}$$

$$\text{Annual dry Alum savings (lbs/yr)} = \text{Annual Alum solution savings (gal/yr)} \times 11.8 \text{ lbs/gal} \times 48.8\%$$

The weight of dry Alum in tonnage is then:

$$\text{Annual dry Alum savings (ton/yr)} = \text{Annual dry Alum savings (lbs/yr)} / 2,000 \text{ lbs/ton}$$

Cost savings to TMWRF from not using this chemical is then:

$$\text{Alum cost savings} = \text{Annual dry Alum savings (ton/yr)} \times \$385/\text{ton}$$

### 6.1.3 Alum Biosolids Hauling and Disposal Savings

The M&V protocol for this savings source is based on IPMVP Option A. The amount of biosolids reduction at TMWRF from reduction in Alum chemical use will be calculated based on the measured production of Crystal Green fertilizer in the previous M&V. Cost savings at the landfill will then be calculated based on this biosolids reduction. Cost savings from reduced biosolids pick-up frequency will be calculated based on the baseline amount of biosolids hauled per pick up.

Measured Variables:

- Crystal Green fertilizer amount (in tons)

Stipulated Variables:

- Fertilizer acceptance rate = 90%

- P weight ratio in fertilizer = 12.7%
- Biosolids dry weight ratio per P = 4.87 lb/lb
- Centrifuge wet/dry biosolids ratio = 6.41 wet lb/dry lb
- Baseline hauling load = 23 tons/pick up
- Hauling cost = \$99.90 per pick up
- Landfill cost = \$11.68 per ton

### > Cost Savings Calculations

Annual fertilizer tonnage is obtained from the previous M&V work. The fertilizer amount in the invoice is the amount acceptable for resale. Assuming a 90% acceptance rate, the actual fertilizer produced at the reactor is then:

$$\text{Annual fertilizer produced} = \text{Measured fertilizer tonnage} / 90\%$$

The Crystal Green fertilizer is an equimolar crystalline matrix of magnesium, ammonium, and phosphate:  $\text{NH}_4\text{MgPO}_4 \cdot 6(\text{H}_2\text{O})$ . The molar ratio of P in the fertilizer is 12.7% by weight. Therefore, the annual amount of P removed from the centrate is:

$$\text{Annual P removed} = \text{Annual fertilizer produced} \times 12.7\%$$

After the Pearl process installation, TMWRF will no longer use Alum to remove P from the centrate. This deferred chemical use is the reason for the reduction in biosolids production. Theoretically, every pound of P precipitated using Alum will generate 4.87 pounds of dry biosolids. The amount of biosolids saved from not using Alum can then be calculated as follows:

$$\text{Annual dry biosolids savings} = \text{Annual P removed} \times 4.87 \text{ lb/lb}$$

The biosolids that is ultimately hauled off the plant and disposed of at the landfill is not completely dry because the centrifuges cannot completely separate the biosolids from the water. Existing centrifuges at the plant generate on average 6.41 lbs of wet solid per one pound of dry solid. As such, the amount of wet biosolids that need to be hauled off the plant is then:

$$\text{Annual wet biosolids savings} = \text{Annual dry biosolids savings} \times 6.41 \text{ lb/lb}$$

This reduction in wet biosolids will save TMWRF money in two ways: (1) by reducing the number of pick-ups needed by the trucking company to haul the biosolids to the landfill, and (2) by reducing the amount of biosolids disposed at the landfill. On average, the trucking company picks up 23 tons of wet biosolids each time they come to the plant. Using this average load, the savings in number of hauling pick-ups is:

$$\text{Hauling pick up saved} = \text{Annual wet biosolids savings} / 23 \text{ tons/pick up}$$

$$\text{Hauling cost savings} = \text{Hauling pick up saved} \times \$99.90/\text{pick up}$$

The landfill operator charges TMWRF a disposal cost based on the amount of wet biosolids. The baseline unit cost for disposal is \$11.68 per wet ton. The reduction in wet biosolids will then reduce TMWRF's disposal cost by:

$$\text{Disposal cost savings} = \text{Annual wet biosolids savings} \times \$11.68 \text{ per ton}$$

### 6.1.4 Methanol Savings

The M&V protocol for this savings source is based on IPMVP Option A. Installing the Pearl process will reduce methanol consumption at the plant because the process also partially removes nitrogen from the centrate. The amount of N reduction after installation will be determined based on the amount of fertilizer produced. The methanol cost savings from this reduction will then be calculated using baseline parameters.

Measured Variables:

- Crystal Green fertilizer amount (in tons)

Stipulated Variables:

- Fertilizer acceptance rate = 90%
- N weight ratio in fertilizer = 5.72%
- Baseline plant total N load = 7,120 lbs/day
- Baseline plant methanol use = 2,984 gal/day
- Methanol cost = \$1.78 per gallon

### > Cost Savings Calculations

Annual fertilizer tonnage is obtained from the previous M&V work. The fertilizer amount in the invoice is the amount acceptable for resale. Assuming a 90% acceptance rate, the actual fertilizer produced at the reactor is then:

$$\text{Annual fertilizer produced} = \text{Measured fertilizer tonnage} / 90\%$$

The Crystal Green fertilizer is an equimolar crystalline matrix of magnesium, ammonium, and phosphate:  $\text{NH}_4\text{MgPO}_4 \cdot 6(\text{H}_2\text{O})$ . The molar ratio of N in the fertilizer is 5.72% by weight. Therefore, the annual amount of N removed from the centrate is:

$$\text{Annual N removed} = \text{Annual fertilizer produced} \times 5.72\%$$

$$\text{Daily N removed} = \text{Annual N removed} / 365 \text{ days}$$

Baseline daily total N load at the plant, including both centrate load and main process load, is 7,120 lbs/day. So, the daily percent N load savings is:

$$\% \text{ daily N removed} = \text{Daily N removed} / 7,120 \text{ lbs/day}$$

Baseline methanol use at the plant is 2,984 gal/day, and the consumption is linear with the N load in the water. The amount of methanol saved from N load reduction is then:

$$\text{Daily methanol savings} = \% \text{ daily N removed} \times 2,984 \text{ gal/day}$$

$$\text{Annual methanol savings} = \text{Daily methanol savings} \times 365 \text{ days}$$

Cost savings to TMWRF from reduced methanol use can then be calculated using the baseline unit price of methanol.

$$\text{Methanol cost savings} = \text{Annual methanol savings} \times \$1.78 \text{ per gal}$$

## 6.2 ECM 4A: Biogas Cogeneration System

### 6.2.1 Electricity Generation

The M&V protocol for this savings source is based on IPMVP Option B. For this ECM, savings will be verified by continuously metering the electricity produced by the cogeneration system. Metered data from the system will be monitored via the MyEnergyPro™ suite to be installed in ECM 10.

Measured Variables:

- Electricity production from the system as metered

Stipulated Variables:

- None

#### > Cost Savings Calculations

Ameresco's guarantee applies to the electricity production of the cogeneration system.

$$\text{Annual electricity savings} = \text{Actual metered production data}$$

Cost savings from this ECM will then be calculated using the Time-of-Use rate schedule, as appropriate.

## 6.3 ECM 6: Dewatering System Upgrade

### 6.3.1 Biosolids Hauling Frequency Reduction

The M&V protocol for this savings source is based on IPMVP Option C. Reduction in biosolids hauling cost will be verified by comparing the invoiced pick-up frequency before and after the upgrades. Monthly

invoices from the hauling company will contain the number of pick-ups per month, as well as the tonnage of the biosolids hauled.

Baseline hauling frequency before upgrade will be the last 12 months invoiced before the upgrades are completed. Hauling frequency after upgrades will be compiled and analyzed annually.

Measured Variables:

- Hauling frequency before upgrade from invoice
- Hauling frequency after upgrade from invoice

Stipulated Variables:

- Baseline biosolids tonnage = 23 tons/pick up
- TMWRF will be responsible to ensure the hauling company fills the truck to full, per pick up
- Hauling cost = \$99.90 per pick up

## > Cost Savings Calculations

Total reduction in hauling frequency will be the difference in frequency before and after the upgrades.

$$\text{Total hauling frequency savings} = \text{Baseline hauling frequency} - \text{Post upgrade hauling frequency}$$

As described previously, ECM 2 will also reduce biosolids hauling frequency. To isolate the hauling frequency savings due to ECM 6 upgrades only, the total hauling frequency savings from the invoices must be adjusted.

$$\text{Adjusted hauling frequency savings} = \text{Total hauling frequency savings} - \text{ECM 2 hauling savings}$$

Annual hauling cost savings for this ECM is then:

$$\text{Hauling cost savings} = \text{Adjusted hauling frequency savings} \times \$99.90/\text{pick up}$$

### 6.3.2 Biosolids Disposal Weight Reduction

The M&V protocol for this savings source is based on IPMVP Option C. Reduction in biosolids disposal cost will be verified by comparing the invoiced tonnage of biosolids at the landfill before and after the upgrades. Each time the hauling company brings the biosolids to the landfill, it is weighed before disposed of. Monthly invoices from the landfill company will contain this weighed tonnage.

Baseline biosolids tonnage before upgrade will be the last 12 months invoiced before the upgrades are completed. Biosolids tonnage after upgrades will be compiled and analyzed annually.

Measured Variables:

- Biosolids disposed tonnage before upgrade from invoice

- Biosolids disposed tonnage after upgrade from invoice

Stipulated Variables:

- Landfill cost = \$11.68 per ton

## > Cost Savings Calculations

Total reduction in disposed biosolids tonnage will be the difference before and after the upgrades.

$$\text{Total tonnage savings} = \text{Baseline biosolids tonnage} - \text{Post upgrade biosolids tonnage}$$

As with hauling cost savings, ECM 2 will also reduce the amount of disposed biosolids. To isolate the savings due to ECM 6 only, the total tonnage savings must be adjusted.

$$\text{Adjusted tonnage savings} = \text{Total tonnage savings} - \text{ECM 2 tonnage savings}$$

Annual biosolids disposal cost savings for this ECM is then:

$$\text{Disposal cost savings} = \text{Adjusted tonnage savings} \times \$11.68/\text{ton}$$

## 6.4 ECM 7: Lighting System Upgrade

### 6.4.1 Lighting Retrofit Savings

The M&V protocol for this savings source is based on IPMVP Option A. Electricity reduction from the lighting retrofit will be verified by measuring a select number of light fixture's power before and after retrofit. The measurements will be done one time. Run hours for the light fixtures will be stipulated based on the logged run hours data collected during the energy audit.

Selection of light fixtures for measurement will be based on Federal Energy Management Program (FEMP) guide for sample sizing. For this ECM, we will use the number of samples that correspond to 80% confidence level with 20% precision.

Measured Variables:

- Baseline power consumption of selected light fixtures
- Post retrofit power consumption of selected light fixtures

Stipulated Variables:

- Run hours of light fixtures based on logged data collected in the audit. Table 6.8 shows the stipulated run hours.

**Table 6.8.** Baseline Run Hours by Room Types

Room Type	Annual Run Hours
Corridors and Lobbies	3,432
Offices and Laboratories	3,276
Shops and Warehouses	3,016
Equipment Rooms	4,732
Connecting Galleries	5,694
Exterior Lighting	4,368

### > Cost Savings Calculations

Peak demand reduction from lighting retrofit will be determined based on the measured power consumptions.

$$\text{Peak monthly kW savings} = \text{Baseline kW} - \text{Post retrofit kW}$$

$$\text{Peak annual kW savings} = \text{Peak monthly kW savings} \times 12 \text{ months}$$

In our savings projection, we assumed that peak demand savings exist in only five buildings listed below. This is because the other buildings are process equipment buildings that are typically empty during peak periods. The only exception is the Reuse Irrigation Pump Station that has all emergency lights that are on 24/7.

- Administration Building
- Laboratory Building
- Maintenance/Warehouse Building
- Training Building
- Reuse Irrigation Pump Station

Electricity savings from lighting retrofit will be calculated from the measured power reduction and stipulated run hours.

$$\text{Annual kWh savings} = \sum [ (\text{Baseline kW} - \text{Post retrofit kW}) \times \text{Run hours} ]_{\text{for all fixtures}}$$

Cost savings from lighting retrofit will then be calculated using the Time-of-Use rate schedule, as appropriate.

### 6.4.2 Lighting Controls Savings

The M&V protocol for this savings source is based on IPMVP Option A. There is no peak demand savings for this savings source. Electricity savings will be realized from reduced run hours due to lighting controls. Post retrofit power consumption of the light fixtures after lighting retrofit will be used as the baseline power use for this savings verification. Similarly, run hours collected from the audit will be used as the



baseline. The additional measurement scope for this savings source will be to install light loggers for at least two weeks to determine the new, reduced, run hours after controls installation.

As in the lighting retrofit M&V, a selection of lighting controls for measurement will be based on Federal Energy Management Program (FEMP) guide for sample sizing. We will use the number of samples that correspond to 80% confidence level with 20% precision.

Measured Variables:

- Power consumption of selected lighting fixtures
- Run hours of selected lighting fixtures after controls installation

Stipulated Variables:

- Baseline run hours of light fixtures based on logged data collected in the audit as shown in Table 6.8.

### > Cost Savings Calculations

Electricity savings from lighting controls retrofit will be calculated from the measured light fixture power and run hours.

*Annual kWh savings =  $\Sigma$  [Post retro kW x (Baseline run hours – Post retro run hours)] for all fixtures*

Cost savings from this lighting controls retrofit will then be calculated using the Time-of-Use rate schedule, as appropriate. Since the savings will occur mostly during off-peak period, the cost savings calculation must use the off-peak rates.

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## SCHEDULE B

### B.1 MyEnergyPro™ Costs

The following table summarizes the cost of the MyEnergyPro (MEP) services provided by Ameresco in each year following Final Project Acceptance.

Year	Fee
1	\$9,598.00
2	\$9,827.00
3	\$10,060.00
4	\$10,300.00
5	\$10,545.00
6	\$10,796.00
7	\$11,053.00
8	\$11,316.00
9	\$11,585.00
10	\$11,861.00
11	\$12,143.00
12	\$12,432.00
13	\$12,728.00
14	\$13,031.00
15	\$13,341.00

Please note that the costs included in the table above are reflected in the Installment Purchase Cash Flow Analysis, Line 18, included as Schedule C of the Performance-Based Contract. Costs are to be paid out of the project's savings and will be invoiced annual in accordance with the schedule above.

### B.1 MyEnergyPro™ Scope of Work

Please reference the following section for a full description of the MEP Scope of Work.



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## **B.1 ECM 10: MyEnergyPro™**

TMWRF utilizes several different tools to track energy and utility usage at the plant. The DCS provides staff and operators with electrical demand and consumption data for some of the major process equipment. TMWRF also has six digester gas meters connected to the DCS for monthly reporting of gas production. There are also other various process monitoring and controls sensors that track the chemical use for other processes.

These existing utility monitoring tools are not integrated; instead, they serve to provide supplementary information to the main process monitoring system. It is often difficult and time-consuming to collect and combine all of the separate data together to form a complete picture of the plant's energy and utility use. Much of the data is not readily compatible, as some are measured on a daily basis while others are collected as monthly averages.

### **B.1.1 Recommendations**

Ameresco recommends implementing the MyEnergyPro™ (MEP) software suite for TMWRF to better monitor the energy and utility use at the plant. MEP is a suite of web-based energy information products developed by Ameresco to provide clients with an integrated tool to monitor utility consumption. Using MEP, TMWRF can view real-time energy consumption and renewable generation on its own unique MEP site. Historical utility and savings data can be viewed in charts and graphs and exported to Microsoft® Excel for further analysis. Using the built-in variance report, TMWRF can identify potential billing errors. The software also includes alarm and forecast modules with easily customizable settings and algorithms.

Ameresco recommends installing a display kiosk at TMWRF to provide staff and visitors with an interactive tool to educate users about the plant's operation and commitment to environmental sustainability. Ameresco has developed an industry-leading kiosk and web display system designed to engage all facets of TMWRF and the Washoe County community in activities pertaining to resource conservation. The program includes physical display kiosks, as well as an interactive web layer designed to pinpoint wasteful behaviors, educate individuals on the importance of reducing waste, measure program results, and provide feedback through interactive displays. Overall, the system is structured to foster a community-wide attitude that values efficiency and sustainability.

Integrated with real-time utility data, the system monitors utility consumption within targeted areas or zones. The systems are fully customizable to the needs and objectives of TMWRF. TMWRF could include animated educational videos, interactive workshops to explore energy usage, and explanations of energy technologies, including solar PV and cogeneration. In

addition, the system can function as a general communication tool for the TMWRF, ensuring that vital information is readily accessible to staff and community members. The displays can be designed to include TMWRF announcements, news, closures, community involvement opportunities, and any other TMWRF communications needs.

### B.1.2 Scope of Work

As part of the project, Ameresco will provide MyEnergyPro UtilityPRO, where TMWRF can view its monthly bills and savings, including electric, chemicals, waste disposal, in one comprehensive chart. The monthly usage will be compared with the facility's baseline usage, which can have weather normalization, facility changes, and set point adjustments. Key utility data can be displayed in a table report format, and exported to Microsoft® Excel or an image file. With proper permissions, a client can also view its measurements and verification report, which shows the monthly savings as well as the guaranteed amount. The savings is displayed in both usage and dollars, and converted to pounds of CO<sub>2</sub> for greenhouse gas impact. The variance report compares monthly usage, rate, and demand from year to year, and color-coded based on the difference. This report provides users with ability to easily identify potential errors in their facilities' utility bills.

A second component of the MyEnergyPro system for TMWRF will be DashPRO, where near-to-real time digester gas electricity generation can be viewed in charts and graphs. The renewable data will also be integrated with the existing Reno Green Energy Dashboard at [greenenergy.reno.gov](http://greenenergy.reno.gov), and displayed on a website as well as a kiosk for public dissemination.

#### UtilityPRO

The following monthly data will be tracked on UtilityPRO:

- Total three electricity meters from NV Energy
- Two chemical bills (aluminum sulfate and methanol)
- Sludge hauling bills Western NV Transport
- Sludge disposal bills from Waste Management
- Invoices for 3<sup>rd</sup> party fertilizer purchase from the plant. These invoices will be provided by Ostara Nutrient Recovery Technology as part of the Crystal Green fertilizer product off-take agreement from ECM 2.

The following activities are included as part of initial implementation:

- Configure MyEnergyPro with site and meter information, including meter number, site square footage, location, etc.
- Import historical billing data
- Download historical weather data
- Calculate weather normalization coefficients for each site
- Review data with customer
- Onsite training

The following functions are included on the MEP website upon implementation:

- Monthly utility billing report for the utilities listed previously on one centralized portal. Other utility can be added over time.
- Monthly utility charts and graphs
- Automated bill import from utility companies, if applicable
- Weather normalization
- Variance report with a year-to-year comparison function
- M&V analysis and reporting
- ENERGY STAR integration, if applicable
- Export data function to csv or Microsoft® Excel file

Hardware and software licenses included:

- Servers: MEP for will reside on the Ameresco network. Ameresco will provide server space for both the web and SQL servers

## DashPRO

The ESCO project will include a renewable energy system which will be included in the DashPRO site:

- Biogas cogeneration system (850 kW)

DashPRO will also track six digester gas meters at the plant:

- Digester gas flow meter for sludge heaters 1 and 2
- Digester gas flow meter for sludge heaters 3 and 4
- Digester gas flow meter for sludge heater 5
- Digester gas flow meter for the flare



- Digester gas flow meter for the compressed digester gas
- Digester gas flow meter for the dewatering building boiler

The following scopes of work are included as part of initial project implementation:

- Install a data gateway and electric meter to acquire data for the biogas cogeneration system
- Develop front end using MEP DashPRO
- Install kiosk to display renewable production data

On-going maintenance will include the following:

- Monitor data alarms
- Repair data, if required
- Coordinate data acquisition related troubleshooting

### Maintenance and Support

The following continuing maintenance and support services are included in the ECM scope:

- Server maintenance: Both the web and SQL servers will reside at the Ameresco data center. Routine system updates will be performed as part of the IT server maintenance. Ameresco will ensure the general health of the servers, as well as the network that the servers are hosted on.
- Monthly utility data import: Ameresco will be responsible for the manual download of utility data where applicable, and the successful completion of automated data import jobs.
- Controls data nightly archive: Ameresco will ensure the successful completion of nightly data archive of data, such as room setpoints.
- Software upgrades: Software upgrades are included in annual maintenance procedures.
- Software defects repair: Ameresco will be responsible for fixing software defects discovered in the web application.
- Help desk: Ameresco's MEP team will provide email and phone assistance for MEP website-related issues during regular business hours.

### B.1.3 Baselines and Assumptions

The following assumptions were made in the development of this ECM:

- A local network through TMWRF is assumed to be available for the biogas cogen system. Additional cellular modem cost may be incurred if it is not.
- It is assumed that Ameresco will use the existing digester gas meters. Data from the meters are assumed to be available to MEP (e.g., through FTP upload).

## **B.1.4 Detailed Energy Analysis**

### **Energy Savings**

Ameresco does not claim any energy or utility savings from this ECM.

### **Maintenance Savings**

Ameresco does not claim maintenance savings from this ECM.

### **Savings Interactions**

There is no savings interaction between this and other ECMs.

## **B.1.5 References**

Data obtained from the TMWRF:

- Architectural, mechanical and electrical drawings
- Electricity, chemicals, and biosolids disposal bills
- Digester gas meters locations and readings
- DCS and TIMS reports

General data:

Field notes and photos

## **B.1.6 Utility Interruptions**

Installation of the MyEnergyPro software will be done independently of the plant's process operation. No utility interruption is anticipated during installation.

## B.1.7 Other

### Equipment Service Life

The equipment service life for the major components is as follows:

- MEP Software: Technical maintenance and support provided for the 15 years performance period

### Compatibility with Existing Systems

MyEnergyPro™ is an independent, web-based software product for energy and utility monitoring. It will be used primarily as a monitoring tool and will not interfere with the treatment process in any way. Interface between MEP and data collection equipment will be made through remote connection. Utility data from bills and invoices that are not available electronically will be manually entered into the system.

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