Performance Assurance and M&V for UESC Projects

Virginia Natural Gas

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Customer Situation

- Funding
- Metering Infrastructure
- O&M
- Savings Ownership
- Energy Conservation Measures
- Personnel
- Reporting Requirements
- Long-term Plans

AGL Resources
Energy Conservation Measures

- Chillers
- Water Conservation
- Lighting Retrofit
- Air Handling Units
- Controls
- Boilers
- Variable Air Volume

AGL Resources
Lighting Retrofit

Savings variables:

Δ Power draw
Δ Burn hours
Δ % Burn outs
Δ Electricity Cost
Domestic Water Conservation

Savings variables:

Δ Fixture flow rate
Δ Frequency of use
Δ Hot/cold water use
Δ Water/Sewer Cost
Chiller Replacement

Savings variables:

Δ Equipment efficiency (full & part load)
Δ Building load
Δ Weather
Δ Controls strategies
Δ Hours of operation
Δ System deterioration over time
Δ Electricity/Fuel Cost
Customer Situation

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Personnel

Considerations:

- In house expertise
- Man-hours available
- Turn-over and training
- Ability to validate savings
Customer Situation

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Reporting Requirements

Considerations:

- Federal guidelines
- Methodology and frequency
- How to address changes in mission/facility use
Customer Situation

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- Long-term Plans
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- O&M
- Savings Ownership
Savings Ownership

Considerations:

- Long term plans for facility
- Changes in facility operation
- Recourse in case of shortfall
- Funding options
- Responsibility for corrective actions
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Metering Infrastructure

Considerations:

- Utility meters and sub-meters
- Control points
- Historical baseline
- Reasonable expense to measure savings
Customer Situation

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Considerations:
- In-house or outsourced
- Preventative vs. reactive
- Commissioning
- Opportunity to maximize efficiency over time and adjust to changes
Customer Situation

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Savings Validation

Goal is to prove new equipment is able to generate savings, however savings are calculated based on agreed upon conditions:

- Baseline building use and operation
- Typical weather
- Utility rates
- Proper equipment maintenance
- Control strategies and set-points

More than comparing pre/post BTUs and dollars
How should we validate savings?

- Savings Ownership
- O&M
- Reporting Requirements
- Personnel
- Energy Conservation Measures
Performance Assurance Strategies

- Start-up performance verification (based on measured data)
- Performance verification at end of warranty period (based on measured data)
- Operations and maintenance training
- Continuing training
- Periodic inspections and verification of appropriate O&M performance
- Performance discrepancy resolution
- On going metering and continuous commissioning for complex projects
Measurement and Verification (M&V)

- M&V is one of the PA strategies (term confusion)
- FEMP protocol

- Historically included in ESPC projects:
  - Legal requirement for guaranteed savings
  - Agreed upon methodology to determine if ESCO met their obligation
  - M&V validates previous performance (retroactive)
Measurement and Verification (M&V)

**Provides:**
- ✓ recourse on ESPC contracts (guaranteed savings)
- ✓ data to report energy efficiency status / track project ROI
- ✓ information that can be leveraged to optimize/correct systems

**Does not provide:**
- × corrective actions in case of non-performance (separate step)
- × remedy for unrealized savings due to changes in weather, rates, operation, etc.
- × system optimization over time
“The appropriate performance assurance and rigor of the M&V method necessary to cost effectively assure compliance with that specified in the contract must be at the discretion of the individual contracting officer.” - FEMP
Effective Performance Assurance Plan

- Customized to agency requirements and nature of ECMs implemented (savings certainty)
- Leverage existing metering and controls infrastructure to develop cost effective plan
- Incorporate site/staff requirements and future plans for facility
- Apply short and long term strategies
- Provides agency with tools to track energy savings (compliance)
### Performance Assurance Plan Components

#### Short term strategies – ensures potential to perform
- Utilize metering to develop solid baselines
- Validates engineering calculations with attention to stipulations/assumptions
- Start-up TAB and commissioning
- Warranty provisions

#### Long term strategies – maximizes performance over time
- Leverage control system and metering
- On going Cx to maximize performance of equipment to changing conditions
- O&M
- Training
Based on agency programmatic requirements and project goals

Project specific plan establishes services to be performed and obligations of each party

Cost effective PA plan typically includes:

- Full system commissioning at the end of construction to ensure that all project measures are functioning as designed.
- Measurement & Verification (M&V) where it makes sense
- Leverages control system to validate savings
- On-going commissioning to ensure projects savings persist
- Staff Training
Thank You!