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ESPC Performance Assurance:  
Tips, Tools and and Techniques for  
Avoiding Troubles  
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# Objectives

- Discuss current FEMP guidance and tools on M&V, Commissioning, Operations, Maintenance, Repair, Replacement and Performance Period activities
- Review some tips and techniques for avoiding troubles and assuring savings
- Examples of practical applications

# Measurement and Verification (M&V)

- M&V of energy savings
  - requires special project planning
  - unique engineering practices
  - several common practices exist for M&V
  - it is not an exact science
- FEMP M&V Guidelines Version 3.0
- Standard Lighting & Chiller M&V Plans
- Draft Renewable Energy Guidelines
- FEMP M&V Guidelines, Plan and Report



outlines at <http://mnv.lbl.gov/keyMnVDocs>

# Measurement and Verification (M&V)

- Establish a reasonable baseline
  - OK to continue to collect baseline data after award
- M&V Plan review
  - Under what conditions will the ESCO not achieve the guaranteed savings?
  - Sometimes lots of words little substance
  - Focus on ECMs and fuel types with the greatest energy savings
- Post-Installation M&V report review
  - Most important for Option A



Make sure performance parameters are being realized-

- light levels
- temperature
- ventilation
- and humidity requirements
- emissions requirements
- Include requirements in TO RFP
- ECM demonstrations during development phase can help mitigate risks



# USCG Puerto Rico



## Investment Grade Audit

scope includes the demonstration of:

- cool roofs
- variable refrigerant volume air-conditioning
- Baseline and post-retrofit conditions will be measured before award (for each ECM)
- USCG is funding demonstrations directly
- Helps reduce price, installation and performance risk

# House Office Building



- Duct sealing ECM
- Limited “trial” demonstration early in the implementation phase
- if successful, contract will be modified to increase the scope of the ECM
- Option A utilized during post-installation
- Performance held constant for remainder of term
- Helps mitigate ESCOs performance risk

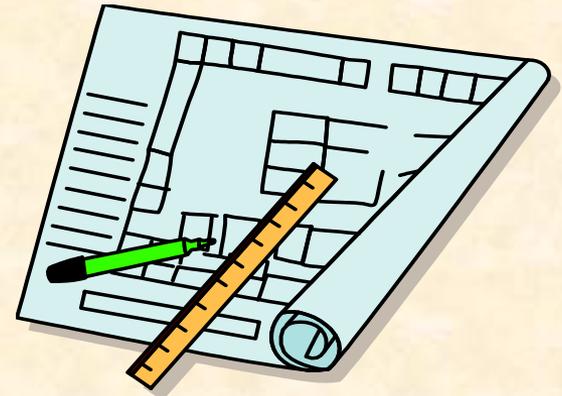
# M&V (cont)

- Building simulation models can be black boxes
  - input and output files
  - calculations in Excel w/formulas
- Install permanent metering during the project development phase
  - can be used to help establish baseline and verify savings



# Commissioning

- Commissioning Approach
- Commissioning Plan-
  - design intent
  - Commissioning team roles and responsibilities
  - Commissioning activities
  - Commissioning schedule
  - performance requirements and criteria
  - Seasonal testing
  - Pre-functional checklist
  - Functional performance tests
- Review plan for site specific requirements and considerations



# Commissioning (cont)

- Commissioning Report
- Commissioning Agent
- Training
- Acceptance test periods (30-90 day)
- Witnessing of M&V and Commissioning Activities
- Witnessing, Commissioning and Acceptance guidelines on FEMP website



# Operations and Maintenance

- Combined with a good M&V plan your best assurance that savings will be achieved
- Consider including an FTE during the performance phase
  - for M&O and/or M&V
  - typically seen with large control system upgrades
- Roles and responsibilities need to be clearly defined
  - ESCO
  - Government
  - Maintenance contractors



# Charleston AFB



- All equipment is well maintain and in good operating condition
- Sophisticated and integrated approach to maintenance, operations, repair and replacements- some activities performed by ESCO, some by site staff
- Two ESCO employees included as part of the SOW
- Escrow funds established for repair and replacement
- Technical staff is knowledgeable of scope of work, contract requirements, roles and responsibilities
- Ground source heat pumps (GHP), HVAC Upgrades , EMCS, Motors and Drives, Lighting, Central Utilities, Boilers, Chillers, and Water Conservation



- ESCO appears to be performing maintenance on systems beyond scope of the ESPC
- Separate maintenance responsibilities for heating and cooling presents challenge for ESPC
- ESCOs roles and responsibilities not clear to building occupants and service requestors
- Insufficient staff and resources to handle all ventilation and A/C (whether ESCO or site performs)
- Existing HVAC equipment beyond service life – resulting in excessive equipment failures – campus wide (not ESCO installed)
- Site is satisfied with ESCO performance of maintenance activities

# Repair and Replacement



- Escrow accounts are a way of managing risks and expenses for repair and replacement of ECMs
  - Distributes R&R payments evenly over the term of the contract
  - No large payment required (possibly to start fund)
  - Pay only for those services you use
  - Excess funds can be used to pay the loan off early
- Contract term in excess of equipment life

# Management Approach

- Risk Responsibility matrix-
  - Financial
  - Operational
  - Performance
- Warranties
  - Warrantee table
  - Who administers the warrantees?
- Training
  - record for new employees
  - periodic retraining



# Performance Period Activities

- Life of contract
- Keep complete records
  - Contract award documents
  - M&V Plan and reports
  - Contract modifications
- At a minimum, a CO and COR should be administering the contract throughout the term



# Other Tips

- Schedule management during development and construction phases
  - schedule delays savings and can incur interest expense
  - People change
  - Risk tolerance can change
- Consider having gov't staff perform annual inspections of ECMs at small remote sites

# Summary

- Utilize FEMP tools for various elements and stages of the ESPC project
- Maintain complete project documentation during all stages of the project development, implementation and performance
- Take a graded approach
  - prioritize activities based on importance/value



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# Summary

- Consult SME for advice and reviews
- Do your due diligence
- Read every word
  - Contract
  - Proposals
  - Reports



**3 Hour ESPC and UESC Webcasts (monthly)**

<http://www1.eere.energy.gov/femp/news/events.html>

**Alternative Financing Info on the Web:**

<http://www1.eere.energy.gov/femp/financing/mechanisms.html>



# FEMP Resources/POCs

## Federal Financing Specialists (FFSs)

- **Scott Wolf** (MT, WY, UT, CO, NM, LA, AL WA, OR, ID, CA, NV, AZ, HI, Pacific Islands)  
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***Questions?***