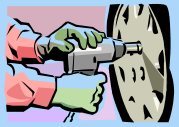
Strategies to Meet EPACT Metering Requirements

Pit Stop: Timely Procurement Topics

Session 5B

August 8, 2006



Pit Stop:
Timely
Procurement
Topics

Performance Specs for Advanced Metering Systems

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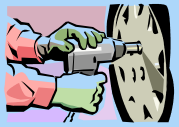
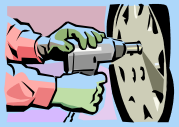
Background



Pit Stop: Timely Procurement Topics

- EPAct 2005 requires installation of advanced metering at all federal facilities by 2012
- DOE/FEMP developed guidelines for feds
- Fed's plans were due last week.

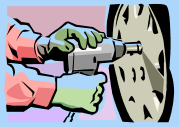
Now what?



Pit Stop: Timely Procurement Topics

- How does one go about procuring the right metering system?
  - It's really an IT system when you get down to it.
    - Hardware
    - Software
    - Data Collection, Communication & Management
    - Procedures
    - People

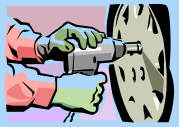
Primary Considerations



Pit Stop: Timely Procurement Topics

- Determine first:
  - Why am I doing this?
  - What information do I need?
  - When/How often do I need it?
  - What's the best way to get it?
  - How am I going to analyze it?
  - Where do I store it?
  - Who's going to keep track of all of this?

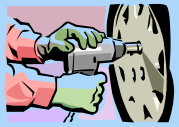
Why Meter?



Pit Stop: Timely Procurement Topics

- Revenue Billing
- Time of Use Metering
- Load aggregation
- Submetering
- Real time pricing
- Cost Allocation
- Energy use diagnostics
- Power quality
- M&V
- Planning & reporting
- Emergency Response

Specifying a system

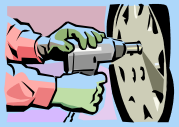


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- where multiple tenants or programs with distinct electric consumption are present
- energy usage is segregated by tenants
- tenants are then billed for their particular portion of the electric bill
- Cost allocation should reflect the charge elements found on the site's electric bill.

Specifying a system (cont'd)

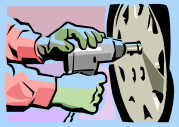


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- Typical metered costs found on electric bills are:
  - Energy charges in kilowatt-hours (kWh).
  - Demand or capacity charges in kilowatts (kW)
  - Fuel adjustment charges
  - Fixed charges and/or prorated charges
  - Power factor
  - Ratchet charges

Specifying a system (cont'd)

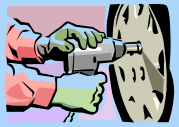


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- **Criteria**
  - The site must have the ability to identify and bill tenants.
  - Cost allocation must be deemed to be cost effective based on relevant factors:
    - metering cost,
    - desired simple payback, and
    - estimated/targeted energy savings.

Specifying a system (cont'd)

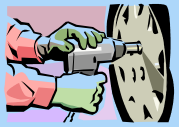


Pit Stop: Timely Procurement Topics

Data Acquisition Requirements for Cost Allocation

Electric Bill Component	kWh	kW interval	kVA
	Note: In all cases, the meter shall have the capability to measure, record, and store data. Interval data requirements and communications capabilities are determined on an application specific basis.		
kWh	kWh (energy) data should be acquired where energy cost allocation is practiced.		
kW		kW (demand) data should be acquired as demand charges typically account for significant portion of the total bill. Interval demand data should be synchronized to the electric utility's revenue meter.	
kW Ratchet		Ratchet charges are determined based on maximum kW interval demand. See note in cell above for information on interval demand data.	
Power Factor			A standard watt-hour meter cannot be used since kVA is the product of the current and voltage. kVA is then compared to kW to calculate average power factor. However, power factor must be measured continuously in order to be appropriately allocated.

Specifying a system (cont'd)

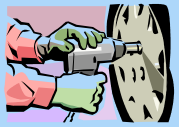


Pit Stop: Timely Procurement Topics

Data Management Requirements for Cost Allocation

Electric Bill Component	Data retrieval	Data storage
	Note: Data management refers to the retrieval and storage of measured meter data, and its availability for analysis and review.	
- kWh	Data retrieval for the purposes of cost allocation should be completed no less frequently than the end of each billing or accounting period. However, other data uses may require more frequent retrieval of data. In this case, the frequency of data retrieval should be the longest time interval necessary to support all metered data uses.	Factors affecting data storage requirements when data are being used for cost allocation include allowing time for tenant inquiries and billing reviews, and agency policy and/or guidance. Other data uses may require longer term storage than for cost allocation. In this case, data storage should be capable of storing data for the longest term necessary to support all metered data uses. In general, all data should be stored for 3 to 5 years.
- kW		
- kW Ratchet		
- Power Factor		

Specifying a system (cont'd)

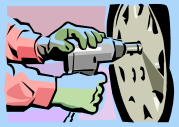


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- Analysis Requirements
  - kWh –
    - Develop summary of cumulative kWh for desired metering periods by tenant/cost account, seasonal rates, and/or time-of-day: billing cycle and/or interim consumption data for tenants. Example: Quarterly billing with monthly updates to tenants.
    - Aggregation of kWh data is necessary when there is more than one meter/sub-meter for a tenant/cost account.

Specifying a system (cont'd)

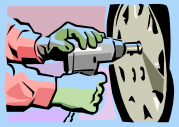


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- Analysis Requirements
  - kW -
    - Develop summary of metered kW. Can also be used for:
      - kW profiles for energy management,
      - rate negotiations, and
      - participation in demand control programs. Aggregation of kW data by tenant/cost account is necessary when there is more than one meter/sub-meter to a tenant/cost account.
    - Cost allocation strategies can range from prorating tenant share based on kW usage to total demand charge (relatively simple) to assigning kW tiers and matching tenant kW use to appropriate tiered rate (complex), but should be in agreement overall billing structure.

Specifying a system (cont'd)

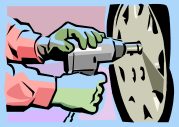


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- Analysis Requirements
  - kW Ratchet –
    - Same as KW except metered portion of the ratchet setting period must be isolated. Aggregation of kWh data is necessary when there is more than one meter/sub-meter for a tenant/cost account.
    - Same as KW except aggregated portion of the ratchet setting period must be isolated by tenant/cost account.
    - Allocate portion of tenant/cost account contribution to the ratcheted charge.

Specifying a system (cont'd)

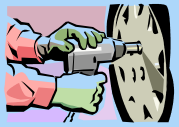


Pit Stop: Timely Procurement Topics

Cost Allocation Example

- Analysis Requirements
  - Power Factor –
    - A standard watt-hour meter cannot be used since kVA is the product of the current and voltage. kVA is then compared to kW to calculate average power factor. However, power factor must be measured continuously in order to be appropriately allocated.
    - Allocation to be done similarly to other charges when power factor is metered.

More to come

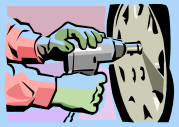


Pit Stop: Timely Procurement Topics

We're developing similar performance specs for other advanced metering applications.

Should be available around mid-FY 2007.

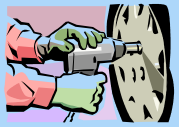
Potential Financing



Pit Stop: Timely Procurement Topics

- Appropriations
- Retained energy savings
- Energy Savings Performance Contracts (ESPCs)
- Utility Energy Services Contracts (UESCs)
- Utility company financing
- Bonneville Power Administration (BPA)
- Public benefits programs and utility demand response programs
- Require as part of new building and major renovations projects
- Mandatory tenant submetering fees
- O&M Performance Incentives
- Lease metering equipment

The End



Pit Stop: Timely Procurement Topics

THANKS!

Questions/Comments?

My contact info:
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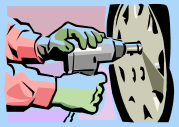

Pit Stop: Timely Procurement Topics

Implementing Energy Metering Using ESPC

Case Study

Andrew Morton
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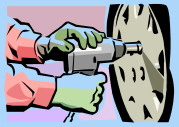
August 8, 2006

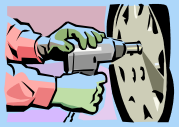
GSA's Denver Federal Center – Site Overview



Pit Stop: Timely Procurement Topics

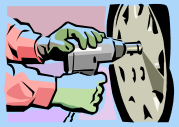
- 640 Acre Site
- More than 60 buildings
- 4.2 million Square Feet
- 38 Buildings Represent 96% of Gross Space
- Master Utility Meter for Electric
- Individual Utility Meters for Gas

Case Study - GSA's Denver Federal Center



Pit Stop: Timely Procurement Topics

Denver Federal Center's Goal



Pit Stop: Timely Procurement Topics

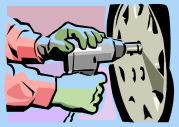
Ultimate Goal:

Reduce Energy Use & Costs

How?

- Turned to ESPC
- Selected Johnson Controls in '99
- Overall Site Assessment
- Resulted in Multi-Phase Approach

DFC Metering Idea

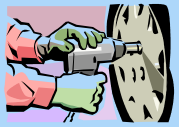


Pit Stop: Timely Procurement Topics

- Developed ESPC Phase 1 in ’99
- Needed Building Energy Use Info
- Make More Informed Energy Investment Decisions
- Sub-Meters Wanted

➢ Fundamental Question: Could ESPC be used?

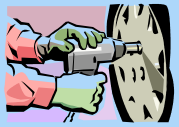
Existing Situation



Pit Stop: Timely Procurement Topics

- Some Buildings Had Electric Sub-Meters
- Manual Meter Readings
- Misreads/Inaccurate Data
- Data Manually Entered Into Spreadsheet
- Only _ of Major Users

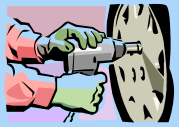
DFC's Metering Needs



Pit Stop: Timely Procurement Topics

- Determining Use By Building
- Identify What Buildings Consume/Contribute to Bill
- Demand & Energy
- Obtain Data Electronically
- Monthly Reporting to Central Computer

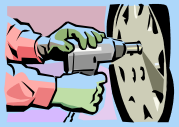
Metering ECM Solution



Pit Stop: Timely Procurement Topics

- Install Sub-Meters on 38 Largest Buildings
- 70 New Electronic Socket Meters
- Data Pulse for Gas Meters
- Use Phone Lines To Central Computer
- Special Software to Process Data

ECM Savings and M&V

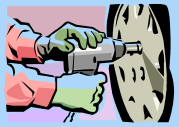


Pit Stop: Timely Procurement Topics

- DOE Super ESPC Contract Requires Savings and M&V
- Installed Meters Don't Create Savings
- Research Shows Information Results in Savings

Fundamental Question: How do we quantify savings?

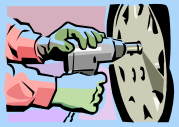
Savings and M&V Approach



Pit Stop: Timely Procurement Topics

- Install Meters and Gather Data in 1st Year
- JCI to Recommend "Operational Strategies" and/or "Minor Equipment Mods"
- GSA to Implement at Nominal Cost
- JCI Measures/Verifies After Implementation

Savings and M&V Approach

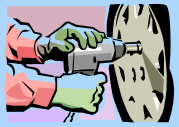


Pit Stop: Timely Procurement Topics

Review and Approvals from:

- DOE Contracting
- Worked with DOE M&V Contractor
- Involvement from DOE's NREL Team
- Ultimately GSA's Technical Approval

Metering ECM Results



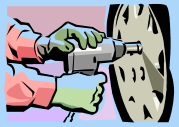
Pit Stop: Timely Procurement Topics

- Success Story – Exceeds Estimated Savings
- Corrected Existing Metering Problems

RESULTS

	Energy Cost Savings	O&M Savings	Net Savings
Estimated	$33,032	($10,850)	$22,182
Actual	$45,051	($6,226)	$38,825
575,546 kwh/Yr	1,009 kW/Yr	49,557 Therms/Yr	6,920 MMBtu/Yr

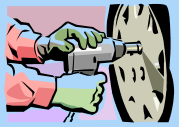
Lessons Learned



Pit Stop: Timely Procurement Topics

- Customer Vision & Commitment
- Team Dedicated to Creative Approach
- Metering Data Analysis Takes Time & Resources
- Analysis Is Not Administrative Function
- Technical Skills & Knowledge Necessary

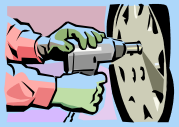
Case Study - GSA's Denver Federal Center



Pit Stop: Timely Procurement Topics

QUESTIONS???

Case Study - GSA's Denver Federal Center



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