Evaluating Utility Bills & Identifying Opportunities for Cost Savings

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NEWMOA Webinar
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KPPC’s Energy Assistance Model

- Phase 1: 12-month energy bill analysis:
  - Billing errors
  - Tariff comparison/evaluation
  - Interruptible power
  - Contract demand
  - Load shifting, load shedding
  - Power factor penalties/correction
  - Minimum billing provisions
KPPC’s Energy Assistance Model

- Phase 2: on-site walkthrough to evaluate facility energy subsystems such as:
  - Lighting
  - Facility heating/cooling
  - Compressed air
  - Boilers
  - Ovens, driers, furnaces, other energy-intensive process equipment

Includes energy use breakdown by process area and/or energy subsystems
Energy Bill Analysis

- Essential component of any energy management program
  - Continuing account of energy use and cost
  - Keeping up-to-date records of monthly energy consumption and associated costs
  - A separate record will be required for each type of energy used, i.e., gas, electric, oil, etc.
  - A single energy unit should be used to express the heating values of the various fuel sources (MMBtu)

If you can’t measure it, you can’t manage it!

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Energy Units – Electric Service

- **kW** = unit used to measure electrical demand (power)
  - Usually calculated in 15 or 30-minute intervals
  - Peak Demand = Greatest value in any 15 or 30-minute interval
    - Ex. 1,000 kWh/0.50 Hr = 2,000 kW Demand

- **kWh** = unit of measure for electrical energy
  - 1 kWh = 1,000 Watts of power used for 1 hour
  - 1 kWh = 3,412 Btu = 0.003412 MMBtu
Energy Units – Electricity Analogy

- Electrical Charges typically have two metered components:
  1. Demand (Power)
  2. Consumption (Energy)
ELECTRIC CHARGES

Rate Type: PS-SECONDARY PF ADJ

Customer Charge
75.00

Energy Charge
5,885.54

Demand Charge ($7.65 x 743.40 kw)
5,687.01

88.30% PF Adj to 90.00% ($7.65 x 14.3 kw)
109.40

Other Charges For Above Rates
Fuel Adjustment ($0.00409 x 179328 kwh) 733.45
Program Cost Recovery ($0.00006 x 179328 kwh) 10.76
Environmental Surcharge (6.500% $12,501.16) 812.58
Merger Surcredit (1.013% CR x $13,313.74) -134.87

Total Electric Charges $13,178.87
Power Factor

- **Low Power Factor (PF) Penalty**
  - Typically caused by using magnetic devices such as light ballasts, motors, transformers…
  - Assessed when below 80% or 90%

- **Three Effects of Low PF(<80%)**
  - Robs the Distribution System of Capacity
  - Higher Currents = High Voltage Drop & Electrical System Losses
  - Billing Penalty ($) 

- **Improvements:**
  - Capacitors, High-PF Motors and Lighting Ballasts
Natural Gas Service

- Natural Gas Charges typically have two components on the bill:
  - Supply – The purchase cost for the physical natural gas supplied by the utility (local distribution company).
  - Distribution/Transportation – The cost to deliver the physical natural gas through the utility’s distribution system to the customer.
GAS CHARGES

Rate Type: COMMERCIAL

Customer Charge 117.00
Gas Distribution Charge 61.07
Gas Supply Component ($0.65666 x 319 ccf) Prev Rate 25 days 209.47

Please see reverse side for additional charges. Please bring entire bill when paying in person.

Customer Service (502) 627-3313

<table>
<thead>
<tr>
<th>Account Number</th>
<th>Payment Due Date</th>
<th>Amount Due By Due Date</th>
<th>Amount Due After Due Date</th>
<th>Winter Help Donation Amount Enclosed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>05/24/07</td>
<td>488.49</td>
<td>488.49</td>
<td>$</td>
</tr>
</tbody>
</table>

DATE DUE 05/24/07
AMOUNT DUE $488.49

ACCOUNT INFORMATION

Account Number: Account Name: Service Address: Next Read Date: 06/06/07

BILLING SUMMARY

Previous Balance 0.00
Payments as of 05/06 0.00
Balance as of 05/08 0.00
Gas Charges 474.26

Average Temperature This Year 58° Last Year 63°

Averages for Billing Period Year Year

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E2
Billing & Rate Structure

Rate Analysis (‘‘Tabletop’’ Assessment)

- Utility companies classify electric and natural gas service according to Rate types
  - Potential Rate Examples: Residential; General Service; Commercial; Industrial

- Riders modify the structure of a Rate and based upon specific qualifications of the customer
  - Potential Rider Examples: Interruptible; HLF (High Load Factor); TOD (Time-of-Day); Green Energy

- Tariff Rates & Riders:
  - State Public Service Commission Websites
  - Utility Website
Billing & Rate Structure

- Clauses:
  - Contract Demand – minimum monthly billing demand and excess demand charge
  - Demand Ratchet – billing mechanism that selects the highest demand from the current month or previous month(s)
    - Sometimes a percentage of the highest demand recorded in the previous 11 months is used.
Billing & Rate Structure

- **Clauses (continued):**
  - **Minimum Energy Charge** – typically based upon a contract demand.
    - Ex. Contract Demand 500 kW x 400 Hours = 200,000 kWh
    - 200,000 kWh x Energy Price (~$0.06 kWh) = $12,000
  - **Time of Day**
    - Establishes a daily time period in which the peak demand is measured
    - Can also be used to establish peak and non-peak energy usage charge (Time of Use)
“As a result of your analysis, ICS did switch to a more economical electrical rate structure that will save us over $11,000 per year. The Vice President of Operations was able to get a rebate in excess of $13,000 …”

“and to have our two companies metered together so that we can enjoy the optimal rate structure with an estimated savings of $17,800 for both companies in the upcoming year.”
Energy Bill Analysis Leads Where?

- Trends and irregularities in energy usage and costs can be detected
- Track energy use, demand and cost

Common tools:
- Spreadsheets
- Energy Star Portfolio Manager
- Utility websites
- Energy Service Provider/Energy Service Company (ESCO)($)  
  - Web-based utility tracking & reporting services
  - Real-time energy tracking services
What is Baseline & Benchmarking?

- **Baseline** – Initial collection of data which serves as a basis for comparison with subsequently acquired data.

- **Benchmarking** – Measurement and comparison of the facility’s own energy use over time (internal) or a comparison to similar facilities outside the organization (external).
Typical School Energy Use Breakdown

- Lighting: 30%
- Space Heating: 35%
- Cooling: 20%
- Water Heating: 5%
- Other: 5%
- Ventilation: 5%

Typical Savings Potential: 10-15%
Can Be As High As 30%

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Basic Energy Accounting

- Normalizing - process of removing the factors impacting on energy use to fairly compare the energy performance of facilities and operations

- A facility’s energy usage/cost can be normalized using:
  - Building Size (ft² of heated/cooled space)
  - Operation Hours
  - Production Numbers
## Energy Tracking Systems Comparison

<table>
<thead>
<tr>
<th>Tool</th>
<th>Data Entry</th>
<th>Custom Functions</th>
<th>User Friendly</th>
<th>Software Cost</th>
<th>Overall Rating</th>
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</thead>
<tbody>
<tr>
<td>Spreadsheet</td>
<td>Manual</td>
<td>Yes</td>
<td>No</td>
<td>Usually Free</td>
<td>Good for DIY’s</td>
</tr>
<tr>
<td>Energy Star Portfolio Manager</td>
<td>Manual/Auto</td>
<td>Some</td>
<td>Yes</td>
<td>Free</td>
<td>Good for overview and basic tracking</td>
</tr>
<tr>
<td>Energy Service Provider/Company</td>
<td>Auto</td>
<td>Yes</td>
<td>Yes</td>
<td>Initial Set Up and Annual Service Fee</td>
<td>Good for clients with multiple meters</td>
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</tbody>
</table>
Rate Spreadsheet

Rate: Customer / Facility:
Account Number:

<table>
<thead>
<tr>
<th></th>
<th>Jan-08</th>
<th>Feb-08</th>
<th>Mar-08</th>
<th>Apr-08</th>
<th>May-08</th>
<th>Jun-08</th>
<th>Jul-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand (kW)</td>
<td></td>
<td></td>
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<tr>
<td>Peak Demand (kW)</td>
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<tr>
<td>Usage (kWh)</td>
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<tr>
<td>Power Factor (%)</td>
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</tbody>
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Bill Calculation
- Customer Charge
- Energy Charge
- Demand Charge
- Peak Demand Charge
- Unmetered
  - Power Factor Charge
  - DSM Charge
  - Fuel Adjustment
  - Program Cost Recovery
  - Environmental Surcharge
  - Surcharge
  - Other Charges
    - Power Factor Charge
    - DSM Charge
    - Fuel Adjustment
    - Program Cost Recovery
    - Environmental Surcharge
    - Surcharge
- Charges
- School Fee
- Franchise Fee
- Sales Tax
- Total Charges
- Total Electric Charges (Before Tax)
- Amount Due

Unmetered Charges
- (charge 1)
- (charge 2)
- Unmetered Total (before tax)
Spreadsheet – Energy Usage

Usage (MMBtu)

Month

- Jul-07
- Aug-07
- Sep-07
- Oct-07
- Nov-07
- Dec-07
- Jan-08
- Feb-08
- Mar-08
- Apr-08
- May-08
- Jun-08

Electrical Usage
Gas Usage
Questions & Comments

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