Building Smart Retrofits with Tracking and Benchmarking

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Motivation for implementing energy efficiency

- End of Useful Life
- Reduce Operating Cost
- Utility Allowances
- Capital/Rebate requires energy reduction
- Increase asset value
- Protection against obsolescence
- Good Payback
- Good for the environment
- Improve tenant/occupant comfort
- Be compliant with local laws
Setting yourself up for success

Typical Approach to Retrofits

Our Approach
Part I: Tracking
Building Characteristics

Age & Type of Building
Built in 1999
Mid-rise apartment building

Housing Category
Low-income housing
Resident type: Mixed/None of the above

Structure
Masonry (load-bearing) construction
No basement

Size
18,700 square feet in total
13,850 sq. ft. in apartments
18 apartments
4 stories tall
33 bedrooms

Energy Efficiency
Not certified as a green building

Heating
Gas heat
Boiler (Hot water)

Cooling
None

Hot Water
Gas hot water heater
Stand-alone storage water heater

Facilities
Laundry (Electric dryers)
1 elevators
No pool

Water Accounts
Water meters are all building-wide
3 water accounts

Electric Accounts
Apartments have electric meters
1 electric account

Gas Accounts
Gas meters are all building-wide
1 gas account

Notes

Utility Data

<table>
<thead>
<tr>
<th>End Date MM/DD/YYYY</th>
<th>Start Date MM/DD/YYYY</th>
<th>Usage Btu</th>
<th>Usage Thms</th>
<th>Total Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/09/2014</td>
<td>06/11/2014</td>
<td>17.9 MMBtu</td>
<td>179 thm</td>
<td>$122.50</td>
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<tr>
<td>08/10/2014</td>
<td>07/11/2014</td>
<td>18.0 MMBtu</td>
<td>180 thm</td>
<td>$133.04</td>
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<tr>
<td>07/10/2014</td>
<td>06/11/2014</td>
<td>27.9 MMBtu</td>
<td>279 thm</td>
<td>$205.97</td>
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<tr>
<td>06/10/2014</td>
<td>05/12/2014</td>
<td>52.6 MMBtu</td>
<td>526 thm</td>
<td>$401.39</td>
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<tr>
<td>05/11/2014</td>
<td>04/11/2014</td>
<td>151.0 MMBtu</td>
<td>1,510 thm</td>
<td>$1,263.16</td>
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</tbody>
</table>
Tracking Your Properties

Spikes
• Leaks

Stepped increases
• Failing equipment
Part II: Benchmarking
Your To Do List

4200 Bradbury Ct
Annual energy data:
Cost: $1,680
Usage: 134,426 (btu/sqft)

Best Buildings
Efficient & Cheaper

Worst Buildings
Inefficient & Expensive
Your Targets

Gas
Entire building usage in Btu / sqft

- Inefficient

| 13.61k |

- Median (7.97k)
- Efficient (6.05k)

- 71% more than the median building
- 125% more than efficient buildings

View meter-level data
# Your Targets

## Building Outlook Report
32 Main St.
2013

Projected Spend: $496,956
- 18/39 in portfolio

Potential Savings: $33,174
- Focus on water

<table>
<thead>
<tr>
<th></th>
<th>2012 (Actual)</th>
<th>2013 (Projected)</th>
<th>Median Building</th>
<th>Potential Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$473,291</td>
<td>$496,956</td>
<td>$463,782</td>
<td>$33,174</td>
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<tr>
<td>Electric</td>
<td>$194,209</td>
<td>$203,919</td>
<td>$198,653</td>
<td>$5,266</td>
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<tr>
<td>Gas</td>
<td>$183,930</td>
<td>$193,127</td>
<td>$193,127</td>
<td>$0</td>
</tr>
<tr>
<td>Water</td>
<td>$95,152</td>
<td>$99,910</td>
<td>$72,002</td>
<td>$27,908</td>
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</tbody>
</table>
Part III: Results
Measure

736,000 Tracked Accounts = 8,832,000 Annual Bills = 5,888 feet
= ~ 1 Mile of Paper
Even for new buildings...
Cost of Delay

<table>
<thead>
<tr>
<th></th>
<th>Winter 2008</th>
<th>Winter 2013</th>
<th>Difference</th>
<th>Life Time Energy Savings</th>
<th>Other Savings</th>
<th>Cost to track</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ 15,606</td>
<td>$ 10,761</td>
<td>$ 4,845</td>
<td>$ 72,675</td>
<td>Maintenance, tenant comfort</td>
<td>$ 900</td>
</tr>
</tbody>
</table>
Improve

Model and Actual Usage

Monthly Gas Use (therms)

Oct 2012

Project Installation

Oct 2013

Baseline Model

Actual Usage

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Massachusetts Green Retrofit Initiative: Gas Savings from Heating Replacements

![Graph showing gas savings from heating replacements. The best fit line is given by the equation: Savings = 55% * Usage - 147.](image-url)
Utility bills for inefficient buildings cost up to eight times more than bills for efficient buildings.
What We’re Learning

Monthly gas bills for gas-heated multifamily buildings

Dollars/bedroom/month

Massachusetts

California

July  October  January  April  July

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