Getting Everyone to “Yes”: Standardizing Meter Data Analysis

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2015 IEPEC Conference — Long Beach, California
Vermont Energy Investment Corporation

- Mission-driven nonprofit
- Over 25 years reducing economic, environmental costs of energy
- Energy efficiency, renewable energy & transportation
- Consulting & implementation
- 3 energy efficiency utilities
The Meter Cave
Data: More is Better!

Frequency

Granularity

Spot metering

Sub-metering

Monthly

AMI
Old Faithful
All the Cool Kids Are Doing It

First-year savings (kWh)

- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013

0  5,000,000 10,000,000 15,000,000 20,000,000 25,000,000
I Got Your Data Right Here

= 32.7 kWh / year
Says Who?
It’s As Easy As…

Begin

Create meter plan

Project tracking system (connected to KITT)

Customer BEMS data, facility changes & events

AMI data, weather, public data

Analysis method from plan

Data reporting

Read data

Submeter data management

Update

Modify meters

New record

Reservation status

Update

Prepare meters for deployment

Deployment forms, labels, etc.

Surplus meters returned

Resolve problems

Preview data, receive alerts/reports

CAT measurement inputs

Output results

Make decision if needed

End

Return to availability

Prepare list

Check out

Fill out

Update
And a Bargain at Half the Cost!*  

<table>
<thead>
<tr>
<th>Step</th>
<th>Work time (hours)</th>
<th>Elapsed time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop plan</td>
<td>1 – 20</td>
<td>1 – 60</td>
</tr>
<tr>
<td>Schedule meters</td>
<td>0.25 – 8</td>
<td>1 – 4</td>
</tr>
<tr>
<td>Deploy meters</td>
<td>5 – 13</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Collect data</td>
<td>0</td>
<td>7 – 60</td>
</tr>
<tr>
<td>Retreive &amp; download data</td>
<td>1 – 5</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Analyze data</td>
<td>1 – 25</td>
<td>1 – 14</td>
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<tr>
<td>TOTAL</td>
<td>8 – 71 hours of work</td>
<td>12 – 142 days elapsed</td>
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</table>

*$2,500/project average with internal labor costs
Compressed Air Pay-for-Performance

Customer

Contractor Pays for Repairs

Compressor Energy & Flow Data

Program Pays Contractor

Efficiency Vermont

Contractor

Vermont Energy Investment Corporation

IEPEC Long Beach 2015
Sharing the Love

- Smaller Projects
- Less Experienced Programs
- Ubiquitous Data
Process Improvements

Cheap meters
Templates
Deployment Kits
Error-checking
Automated Analysis
Finding the Needles
## Data, Data, Everywhere...

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Record Date</th>
<th>Record End Time</th>
<th>Day of Week</th>
<th>High Pressure Pump 1 [kW]</th>
<th>High Pressure Pump 2 [kW]</th>
<th>High Pressure Pump 3 [kW]</th>
<th>High Pressure Pump 4 [kW]</th>
<th>High Pressure Pump 5 [kW]</th>
<th>High Pressure Pump 6 [kW]</th>
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Jackpot! (Eventually)

High Pressure Line - Compiled Pressure and Power

*Note: Black pressure trendline is a rolling 100 point average, and is thus slightly out of phase with data; it is included solely for visual clarity and was not used for calculations.*
Follow the Bouncing Light Level

Total Percent On-Time: 63.95 %
Projected Annual Operating Hours: 5600.00 Hrs
Projected On-Time During Summer Peak: 16.92 %
(1-5 PM, Mon-Fri, Jun - Aug, excluding federal holidays)
Projected On-Time During Winter Peak: 100.00 %
(5-9 PM, Mon-Fri, Dec & Jan, excluding federal holidays)
Annual projection based on 20.96 metered days
FCM projection based on 13 metered business days
Can I Get a Witness?

Yes!

- Program
- Contractor
- Customer
- Evaluator