May 14, 2020

Leveraging Energy Data from Start to Finish

VAEEC Spring 2020 Forum
Presentation Outline

- DMME’s newly released Energy Data Warehouse
- Building Automation
  - Types of data can you collect
  - Utilizing the data to meet your needs
- How data collection can lead to project origination
- Project opportunities during a global pandemic
Session Speakers

John Morrill (moderator)
Energy Manager, Arlington County Government
Vice Chair, VAECC Board of Directors

Brandi Frazier Bestpitch
Energy Data Analyst, Division of Energy
Virginia Dept. of Mines, Minerals & Energy

Tim Bernadowski (P.E., C.E.M., C.L.E.P., C.D.S.M.)
Smart Infrastructure, Building Performance & Sustainability
Siemens Industry, Inc.

Scott Dicke
Director, Mid-Atlantic Sales & Support Services
Sustainable Real Estate Solutions

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Energy Manager, Arlington County Government
Vice Chair, VAECC Board of Directors
IMPORTANCE OF COMMERCIAL BUILDING ENERGY MANAGEMENT

Share of total U.S. energy consumption by end-use sectors, 2018

Total = 101.3 quadrillion British thermal units

- Commercial: 18%
- Industrial: 32%
- Residential: 21%
- Transportation: 28%

Note: Sum of individual percentages may not equal 100 because of independent rounding.
Source: U.S. Energy Information Administration, Monthly Energy Review, Table 2.1, April 2019, preliminary data
IMPORTANCE OF COMMERCIAL BUILDING ENERGY MANAGEMENT

The Commonwealth of Virginia’s Building Asset Portfolio

BY THE NUMBERS

- 433,900 acres of land in 1,015 locations
- 10,888 million square feet of space
- 543+ leases administered with annual rental of $62.9 million
- 2,021 non-DGS administered leases
- $148.7 million in cost savings and avoidance since 2005
- Over 6.5 million square feet of facilities managed
- 8,000+ annual customer-generated service requests
- 40 buildings managed, including the Capitol and Governor’s Executive Mansion
- 4 owned and/or managed properties designated as National Historic Landmarks
- 13 owned and/or managed properties listed on the National Register of Historic Places and on the Virginia Landmarks Register
- 20 parking facilities with over 7,000 parking spaces

PARETO 80/20 RULE

Total Annual Electric Cost vs Count of Accounts

- Cumulative Rev
- Percentage of Cumulative from total
FACILITY ENERGY DATA

Meters
Usage
Weather
Square Footage
Degree Days

Cost
Occupancy
Building Age
Utility Accounts
ENERGY DASHBOARD PORTAL VIA DMME
HTTPS://WWW.DMME.VIRGINIA.GOV/DE/ENERGYDATAWAREHOUSE.SHTML
DASHBOARDS & MAPS

Commonwealth of Virginia Energy Dashboard

Welcome!

Please note

The dashboard is in the early stages of development and may reflect incomplete data. We are consistently improving on what is reported as information becomes available or is added.

As the dashboards are further developed, agency energy managers assigned access will be able to further drill down into their specific building data.

We welcome your comments and suggestions to help us improve the dashboard.

You can also learn more about Energy Management Programs.

Energy Conservation Resources

State Agency Aggregated Accounts - Highest to Lowest Calendarized Annual Account Billing Rank: FY18

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>$11,201,916</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Department of General Services</td>
<td>$677,962</td>
</tr>
<tr>
<td>Virginia Port Authority</td>
<td>$292,072</td>
</tr>
<tr>
<td>Virginia Community Colleges</td>
<td>$11,115,594</td>
</tr>
<tr>
<td>Virginia Museums</td>
<td>$2,581,013</td>
</tr>
<tr>
<td>Virginia Department of Transportation</td>
<td>$46,527</td>
</tr>
<tr>
<td>Virginia State Police (VSP)</td>
<td>$207,668</td>
</tr>
</tbody>
</table>

Vendor Year Utility Cost from July 2018 through June 2019

<table>
<thead>
<tr>
<th>Agency/Location</th>
<th>Cost (KWH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia International Gateway</td>
<td>34,987,000 kwh</td>
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<tr>
<td>VCU Nursing</td>
<td>16,569,921 kwh</td>
</tr>
<tr>
<td>James Monroe Boyl</td>
<td>13,225,613 kwh</td>
</tr>
<tr>
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<td>James Monroe Boyl</td>
<td>11,407,033 kwh</td>
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<td>Mass Street Center</td>
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<td>Prince George Boyl</td>
<td>7,348,292 kwh</td>
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<tr>
<td>SCC of Long</td>
<td>6,722,449 kwh</td>
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<td>5,209,398 kwh</td>
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<tr>
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<td>5,025,002 kwh</td>
</tr>
<tr>
<td>Defense Court Building</td>
<td>1,250,400 kwh</td>
</tr>
<tr>
<td>Prince Henry Boyl</td>
<td>3,425,901 kwh</td>
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State Agency Accounts - Highest to Lowest Calendarized Annual Account Use Rank: FY18

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State Agency 12 Month Commodity Cost Ending June 2019

<table>
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<tr>
<th>Commodity</th>
<th>Cost</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$13,031,876</td>
<td>14%</td>
<td>16%</td>
<td>14%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>Electric</td>
<td>$13,031,876</td>
<td>14%</td>
<td>16%</td>
<td>14%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>Water</td>
<td>$13,031,876</td>
<td>14%</td>
<td>16%</td>
<td>14%</td>
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REPORTS, CHART, & GRAPHS
LET’S TAKE A BRIEF LOOK
Building Systems Data
The Power of the Data Behind the Meter
Digitalization and the Internet of Things

Smart Devices

- Significant growth in IoT devices provides valuable data

The Cloud

- Real-time data is collected and sent to “the cloud”

Data Analytics

- Advanced data analytics deliver actionable insights

Mobile Interface

- Data and insights are available anytime, anywhere
Most Equipment & Control Systems have Data & Communications Capabilities

- Equipment Operational Data
- Space Condition Data
- External Condition Data
- Occupant Data
Energy Dashboards & Benchmarking

Using the Data Available to Improve Operations

Displays Trends & Analyses

Meter & Submeter Data

Key Performance Indicators

Benchmarks & Trends
Lighting - Intelligent End-Points

Smart Sensors
- Intelligent, flexible and code compliant
- 5 sensors in one: temperature, light level, motion, energy, and Bluetooth
- Bluetooth technology enables location-based services
Advanced Wireless Sensor Networks Using Lighting Systems

Smart Sensors, Gateways, Room Control, Energy Management
Running Chiller Systems in the “Sweet Spot”

Coordinating Chiller, Pump, Air Handler, Water Loop and Space Data

Air Handler Data:
- Fan Speed/ Load
- Flows, Temperatures,
- Damper Position, Manf.
- Ratings/ Perf.

Chiller Data:
- Fan Speed/ Load
- Flows, Temperatures,
- Pressures, Manf. Ratings/ Perf.

Cooling Tower Data:
- Fan Speed/ Load,
- Flows, Temperatures,
- Manf. Ratings/ Perf.

Space Data:
- Temperatures, Humidity,
- Occupancy, TOD,
- Schedules.
Using Data to Improve Services & Operations

Digital O&M Services

- Monitoring Services
- Proactive Services
- Cloud Based Improvements
- Predictive Services
- Cloud Based Operations
- Compliance Reporting
Using Data to Improve Services & Operations

Digital O&M Services

- Data from Meters & Equipment
- Continuous Monitoring & Event Response
- Remote Adjustment, Correction & Reporting
- Onsite Adjustment & Correction as Needed
Using the Data Available

Moving to the Digital Future

Nearly everything we use can generate & communicate digital information

Using that data effectively is the next level of energy efficiency
Get started on your smart building journey today

Tim Bernadowski
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Leveraging Energy Data to Support Small Energy Efficiency Project Sales

(Commercial & Publicly Owned Buildings)
SRS Background

- 2010: SRS was founded by CRE technology and energy efficiency professionals with 25+ years’ experience

- Deep history in CRE software, data, analytics, and services

- Industry leader in Commercial Property Assessed Clean Energy (C-PACE) Program Administration
  - Provided C-PACE program support services nationwide since 2012 (CO, CT, DE, NV, OH, OR, RI, UT, VA)
  - Developed a suite of C-PACE software, analytics, QA/QC tools to enable contractors to efficiently develop C-PACE project scenarios
Importance of Contractor Channel

- Energy efficiency project developers and HVAC servicing & equipment replacement firms
  - Maintain a roster of building owner clients under equip. service contracts
  - Know which buildings have equip. replacement needs
  - Often submit “cost” proposals for owners to self-fund equip. replacement

- For these reasons, many programs managers – including utility PMs, non-profits, and C-PACE PMs - target such firms as a primary EE retrofit project origination channel
  - SRS: 1,400+ contracting firms trained in support of C-PACE programs
  - SRS: Facilitated C-PACE projects valued over $260M (~70% contractor sourced)
EE Project Sales: Problem

- **Why is it so hard to sell energy efficiency?**
  - Building owners often reluctant to pay cash for unwelcome HVAC replacement (particularly in Class B & C)
  - They rarely see that high efficiency equipment will typically generate 25%-30% energy cost savings for years to come

- **CRE energy performance assessment and improvement scenario analysis requires an energy audit, typically costing thousands and taking weeks to deliver**
  - Many HVAC contractors lack tools to quickly estimate energy cost savings and financial impacts for inclusion in proposals
  - EE project developers’ “first look” often conducted at risk

- **Result:** *Building owners, with information limited to replacement cost, often delay the decision to replace equipment beyond its useful life*
EE Project Sales: Innovation

- EPIC™ is a powerful cloud-based app that uses minimal project data inputs to instantly estimate energy savings and financial impacts for:
  - HVAC, EMS, and lighting equipment replacement projects
  - Including C-PACE financing cash flow projections

- EPIC™ is powered by SRS proprietary data and predictive analytics and proven technology from thousands of energy improvement projects conducted nationwide over the last 10 years

- **Result:** HVAC contractors and EE project developers can provide building owners the project economic analysis they need to make a fully informed, expedited investment decision in audits/projects
EE Project Sales: Owner Engagement

- The EPIC Report can be appended to project proposals to
  - Perform a remote, “first-look” at estimated energy savings, energy cost savings, and project implementation costs
  - Compare energy code minimum versus high efficiency options
  - Compare funding scenarios (self-fund, bank loan, C-PACE)
  - Ensure the property owner has the information to justify a more detailed energy audit
  - Help transform an unwelcome capital expense to a compelling investment opportunity

- COVID-19 Note: Property owners expected to be highly sensitive to OpEx for many months, likely increasing demand for – or receptiveness to - energy cost savings information for EE retrofit projects
Thank You

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Thank you, Sponsors.