Techniques for Municipal Visualization and Management of Energy Operations

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Energy Data Visualization

- Trane Energy Optics - 3-D Visualization of Electricity Load Profiles:
  - identify excessive energy use during non-occupancy hours.
  - set demand targets, spot exceptions.
Trane Energy Optics

- Load Density Profiles:
  - view energy consumption against weather and time of use
Trane Energy Optics

- Energy use on days with similar temperatures (Degree Days).

Expected curve for tightly controlled buildings using economization.

Two days with very different temperatures, yet identical energy use.

Two days with similar temperatures, yet very different energy use.
Hallandale Beach Municipal Complex
Buildings are at a turning point

- Technology-poor buildings are liabilities
  - High operational costs
- Connected buildings are assets
  - Supporting your mission
  - Aligned to desired outcomes

Data is the great differentiator.
What a Connected Building can deliver

- Energy efficiency
- Occupant comfort
- Increased reliability
- Cyber Security
- Alignment of operational decisions to business outcomes
- Documented results
- Cost reduction
Data & Analytics

Turning building data into an action plan

• Reduce energy use and operating costs
• Identify actionable insights
• Continuously improve building performance

• Identifies how your building uses energy and transforms that data into meaningful, clear information, to help you identify and monetize impactful energy projects for sustained results

• Analyzes data to see what's happening in your building, providing proactive, data-driven insights and solutions to keep your building running optimally

• Uncovers energy waste in every corner of your building and aggregates energy data using powerful visualizations and analytics, to bring clarity and hidden savings opportunities
Building Performance: Simultaneously Heating and Cooling

- The analytics found that units were excessively heating and cooling, wasting a tremendous amount of energy.
- In some applications such as hospitals it is necessary.
- Building was designed 10 years ago. What were the design specifications? Buildings change!!
- By optimizing the original design specifications, the building should save about $20,000 per year.
Building Performance: RTU Improvements

BEFORE

The analytic reflects continuous oscillation of the cooling, heating, and supply temperature before the BAS program variables were adjusted.

AFTER

After the BAS was adjusted it reflects a more linear operation. As a result, energy consumption is decreased and equipment life is increased.
Energy Management System Dashboards

- Web or Mobile access
- Personalized view for each user
- Real-time views of building & energy performance
- Measure your Key Performance Indicators
- Track outcomes and opportunities to improve
FPL Account Dashboards

- Shows history of past energy use data
- Free on FPL website
Energy and the Built Environment

- Thank you for your leadership and advocacy
  - Broward Climate Change Task Force and Action Plan (CCAP)
- Does Energy Conservation Really Matter?
  - More than 76% of U.S. electricity use is for our buildings
  - More than 40% of GHG emissions are from our buildings
  - Technology gains provide real savings opportunities
  - We can significantly affect the outcome despite forecasted growth in population and business activity

1 U.S. Department of Energy Quadrennial Technology Review 2015
Energy and the Built Environment

- Challenges and Barriers
  1. “We can’t really do anything about Climate Change”
  2. Energy is just a fixed cost of doing business
  3. Florida has comparatively low energy costs
  4. Energy conservation is really just optional
  5. Commercial lease structures don’t provide an incentive
  6. It’s too complicated
  7. I don’t like how energy and water efficient products work
  8. I can’t measure the results
  9. I don’t get the benefits
Energy and the Built Environment

- **Myths and Excuses**
  1. “We can’t really do anything about Climate Change”
  2. Energy is just a fixed cost of doing business
  3. Florida has comparatively low energy costs
  4. Energy conservation is really just optional
  5. I have other priorities
  6. It’s too complicated
  7. I don’t like how energy and water-efficient products work
  8. I can’t measure the results
  9. I don’t get the benefit
Energy and the Built Environment

- What are reasonable and achievable energy conservation goals?
  - Better Buildings Challenge - 20% in 10 years
  - European Union - 20% by 2020
  - National Renewable Energy Laboratory - 50% beyond ASHRAE 90.1
  - Residential Consumer Energy Conservation - 4%-11%
  - Theoretical maximum energy reduction - 82%

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1 NREL Setting Whole Building Absolute Energy Use Targets 2012
2 Goal Setting and Energy Conservation, Harding and Shaw 2012
3 U.S, Department of Energy Quadrennial Technology Review 2015
Energy and the Built Environment

- Example - Port Everglades Energy Performance Contract
- $4,436,500 project value
- Completed 2009
- $434,484/year calculated energy savings
- 17 Buildings totaling 655,100 square feet
- 30.9% energy savings target
- Savings guarantee monitored from 2009-2019
- Actual savings above savings guarantee
Energy and the Built Environment

- Example – University of Florida Reitz Union Performance Contract
- $6,472,538 project value
- Completed 2015
- $381,091/year guaranteed energy savings
- 1 Building totaling 123,000 square feet
- 33.5% energy savings target
- 39.2% actual first year savings
- Actual savings increase every year for last five years
Energy and the Built Environment

- Example – University of Florida Reitz Union Performance Contract
- 37% additional improvement with savings monitoring from 2014-15 through 2018-19
Questions

- Energy Data Visualization
- Energy Conservation Targets
- Discussion
- Opportunities