U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Technology Prioritization and Demonstration Support (Takeaways from Smart Buildings)

Performing Organization(s): LBNL

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Organizers

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- Guanjing Lin, Lawrence Berkeley National Laboratory
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- Felipe Leon, Pacific Northwest National Laboratory
- Rois Langner, National Renewable Energy Laboratory
- Amy Jiron, U.S. Department of Energy
- Cindy Zhu, U.S. Department of Energy
- Marina Sofos, U.S. Department of Energy

Commercial Building Participants

Name	Organization
Dionysios, "Dan" Anninos	Iron Mountain
James Becker	CBRE/Sprint
Christian Bigsby	GSK
Paul Butapetch	Westfield
Andrew Carter	Commonwealth of KY
Susan Corry	Univ of MD
Aaron Daly	Whole Foods Market
Johnathan Flaherty	Tishman Speyer
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Martha Larson	Carleton College
Pat Lydon	Legacy Health
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Name	Organization
Alex Polo	Costco
Cristian Popa	7-11
Doug Rath	Marriott
Katie Rossman	Uni of Iowa
Francisco Ruiz	Oracle
Becca Rushin	Jamestown
Cameron Scott	Salt Lake City
Kenny Seeton	California State University Dominguez Hills
Darrell Smith	Google
Eric Teicholz	IFMA
Joe Thomas	Loews
Jon Utech	Cleveland Clinic
Craig Wright	Aurora Public Schools

Objectives

- Understand what motivates commercial building owners to pursue smart building technology adoption
- Understand how the commercial building sector envisions the usage and uptake of smart building technologies
- Understand the challenges and barriers faced by owners when deploying current technologies.

Roundtable Format

Group Discussion

Small Group Break Out

- Data Management
- Data Analytics
- Advanced Control Strategies
- Smart Devices and Plug Loads
- Cross-Cutting Issues.

Individual Feedback

High Level Outcomes

Motivation: energy cost reduction, occupant comfort and productivity, equipment life and reliability. Water efficiency also featured strongly for some owners, along with managing renewables and storage;

Vision: In an environment of rapid innovation, and in the absence of formal standards, owners are moving forward organically and opportunistically rather than planning a path toward a defined end point specification. A common element, however, is a vision for a robust and secure data management backbone to support smart building initiatives.

Challenges and Barriers: Choice overload and fear of obsolescence is a fundamental barrier being faced by all owners (hence the value placed on learning from Roundtable peers). Additional technical and organizational challenges are summarized in more detail below.

Data Management

- **The volume of data being collected in building operations has grown exponentially**
- **Data is transferred across multiple software and storage platforms**
- **Attendees are managing 1000s of BAS points across portfolio, alongside thousands of meters**
- **Key Themes:**
  - Legacy Systems Integration
  - Data Security
  - Data Privacy for occupant-centered building operations

Data Analytics

- **Most attendees were deploying EIS, FDD, or both and 5 had been recognized through the SEA Campaign**
- **Key Themes**
  - Capturing Non-Energy Benefits such as productivity, reduced maintenance costs, extending equipment life
  - Translating Insights into Action
  - Energy Modeling and M&V Underutilized
  - Patchwork Approach of analytics configurations

Advanced Control Strategies

- **Many attendees utilize digital HVAC controls with separate lighting control systems; some smaller properties using wireless thermostats and overlay control packages for RTUs**
- **Key Themes:**
  - Specifications & Complexity
    - Lack of controls specifications
    - Lack of standardization for advanced control sequences
    - Finding operators and service providers qualified to operate and maintain controls
  - Interoperability and Integration
    - Interoperability of controls big issue for large portfolios
    - Desire to see more integration with HVAC and lighting/other end uses

Smart Devices and Plug Loads

- **IoT and smart devices did not feature strongly in Roundtable discussions, and in general, there is a lack of clarity around the definition of IoT and what problems they aim to solve**
- **Key Themes:**
  - Business Case and Ongoing Maintenance
    - Smart outlets and smart power strips have small individual loads
  - Interoperability and cybersecurity

Cross Cutting Issues

- **Roundtable attendees described how analytics software not only helps optimize operations team, but also enables evaluation of piloting new technologies**
- **Key Themes:**
  - Choice overload and fear of obsolescence
    - Currently the SEA Campaign lists 56 available EIS applications, 27 FDD tools, and 42 EMIS service provider firms
  - Demonstrating a Holistic Business Case
  - Facility Management/ Information Technology Interface
  - Lack of Standardization
  - Engaging and Incentivizing Staff and Occupants

Conclusion

High Level Themes emerged:

- To what degree can the analytics power of FDD be integrated with controls to enact automated system optimization?
- How can water efficiency and other non-energy benefits be monetized and integrated with smart building technology development?
- What degree of standardization and guidance is appropriate for smart building data management to balance the need for consistency with the need for innovation and meeting diverse owner needs?
- How can analytics support optimal balance of grid resources, demand response, renewables, and energy storage?
- How can control and ongoing management of plug loads, lighting, and HVAC be fully integrated?
- How can owners capitalize on the full energy modeling benefits of EIS for M&V and load shape management?