Better Buildings
U.S. DEPARTMENT OF ENERGY

SUMMIT
A VIRTUAL LEADERSHIP SYMPOSIUM

Learn more: betterbuildingssolutioncenter.energy.gov/summit
Beyond the Low-Hanging Fruit for Energy Efficiency

Thursday, May 20, 2021
2:00 – 3:15 PM ET
Agenda

1. Welcome & Introductions
2. EMIS Overview
3. Speaker Presentations
4. Q&A Session
Slido will be used as our platform for Q&A throughout the webinar.

Please go to www.slido.com

1. Using your mobile device or web browser enter the event code - #DOE
2. From the list of sessions provided, select **Beyond the Low Hanging Fruit**

Or scan this QR code for quick access!
Where are you joining us from today?  
(City name only is acceptable)
Is this your first time attending a Better Buildings Summit?
What sector are you from?
What is your next big project or challenge related to energy efficiency?
Overview of Energy Management and Information Systems (EMIS)
**EMIS Definition:**

“Energy Management and Information Systems (EMIS) comprise a broad family of tools and services used to manage commercial and federal building energy use and to analyze and apply energy and water metered data. These technologies and associated functionality include monthly data analytics, energy efficient and energy savings information technologies (EE/ES IT), energy information systems (EIS), fault detection and diagnostics (FDD), and automated system optimization (ASO). The technical specification template emphasizes EIS and FDD and includes basic specifications for monthly data analytics and ASO. To learn more about the characteristics of EMIS, see *A Primer on Organizational Use of Energy Management and Information Systems (EMIS).*” Draft EMIS Technical Resources (TR) Report

All EMIS deployments can be broken down into three functional elements: **Capabilities, Stack, and Scope.** (See backup slides.)
Smart Energy Analytics (SEA) Campaign

Partnering with Industry to Drive The Smart Energy Analytics Revolution

Largest Dataset Documents the Costs and Benefits of EMIS

- **104 ORGANIZATIONS**
  - Office
  - Higher Education
  - Health Care
  - Labs
  - Other

- **6,500 BUILDINGS**
- **567 MILLION SQUARE FEET**

- **EMIS SOFTWARE REPRESENTING 40 DIFFERENT EMIS VENDORS HAVE BEEN INSTALLED**

**ENERGY SAVINGS FOR ORGANIZATIONS WITH EMIS:**
- **3% EIS**
- **9% FDD**

**PROJECTED ANNUAL SAVINGS** for all organizations:
- **$95 million**

**ANNUAL SAVINGS for the median portfolio (15 million sq ft):**
- **$3 million**

**FIRST-YEAR INSTALLATION AND SOFTWARE COSTS:**
- **EIS** $0.02/sq ft
- **FDD** $0.08/sq ft

**INVESTMENT PAYBACK:**
- **2 years**

[https://betterbuildingssolutioncenter.energy.gov/alliance/smart-energy-analytics-campaign](https://betterbuildingssolutioncenter.energy.gov/alliance/smart-energy-analytics-campaign)
What is the FEMP EMIS TR Report (Draft)?

- The upcoming EMIS TR Report is complementary to the upcoming 2021 Federal Metering Guidance
  - expands on the “energy management system” section in the Guidance
- The upcoming EMIS Technical Resources Report also serves as an EE/ES IT best practices primer. A web-based best practices guide is forthcoming next year
- EMIS allows federal agencies to integrate advanced metering and building systems and infrastructure with:
  - building automation
  - building controls
  - artificial intelligence
  - grid-integrated facilities and smart grids
  - renewable and clean energy technologies
  - resilience
  - retro-commissioning and retuning
  - EE/ES information technologies
EMIS TR Report (Draft) Goals

• Provide a practical resource
  ➢ Illustrate how EMIS technology can help
  ➢ Planning and acquisition for agency use
  ➢ Overcoming common challenges
  ➢ Practical case studies of existing EMIS’s at various federal agencies

• Integrate with upcoming Federal Metering Guidance

• Incorporate comments and suggestions from federal agencies via O&M Roundtable last year

• Facilitate procurement
  ➢ https://betterbuildingssolutioncenter.energy.gov/resources/emis-specification-and-procurement-support-materials

• Integrate into upcoming FEMP EMIS website
  ➢ Structure focused on easy to find answers for potential questions
  ➢ Easily updatable
<table>
<thead>
<tr>
<th>Heading</th>
<th>Topics</th>
</tr>
</thead>
</table>
| Benefits to Federal Agencies | Cost Savings  
Compliance with Federal Laws & Regs |
| What is EMIS     | Framework for understanding  
Technology primer                                         |
| Capabilities     | Survey of features  
Examples from marketplace                                   |
| Planning         | Overcoming challenges  
Creating a plan                                            |
| Procurement      | Considerations and case studies  
RFP Tool                                                      |
| Operations       | Roles and responsibilities  
Processes for EMIS success                                 |
Federal/Commercial Portfolio Characteristics:

1. Small size buildings with packaged heating, ventilating, and air conditioning (HVAC), no BAS, and no AMI installed (Level 1)

2. Small-to-medium size buildings with packaged HVAC, no BAS, and AMI installed (Level 2)

3. Medium-to-large size buildings with more advanced HVAC, BAS, and AMI installed. (Level 3 & Level 4)
Is “Deep” Energy Efficiency Idealistic or Sensible?

Wendell Brase
Associate Chancellor – Sustainability
University of California, Irvine
25 Years of Energy Efficiency

![Graph showing energy efficiency over time from 1990 to 2016. The x-axis represents years from 1990 to 2016, and the y-axis represents source + site energy (billions of BTUs) from 1,000 to 2,600. The graph shows a general increase in energy efficiency over the years, with a notable increase from 2005 to 2007. The text "Business as usual" is mentioned in the graph, indicating a reference to a baseline or expected scenario.]
25 Years of Energy Efficiency

Adopted goal: Beat Title 24 by 30% in new construction

Thermal energy storage

Business-as-usual
25 Years of Energy Efficiency

Source + Site Energy (billions of BTUs)


Would have been consumed without measures indicated
Actually consumed (FY2016 projected)

Adopted goal:
Beat Title 24 by 30% in new construction

Priority "deep efficiency"

Thermal energy storage

American College & University Presidents’ Climate Commitment

Adopted goal: LEED Gold NC
25 Years of Energy Efficiency

- **Adopted goal:** Beat Title 24 by 30% in new construction
- **Adopted goal:** LEED Gold NC
- **American College & University Presidents' Climate Commitment**
- **Prioritized "deep efficiency"**
- **Thermal energy storage**

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LEED Gold NC

Attained Better Buildings Challenge

Prioritized "deep efficiency"

American College & University Presidents’ Climate Commitment

U.S. EPA Climate Leadership Award

Inaugural partner President Obama’s Better Buildings Challenge

Thermal energy storage

Business-as-usual

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Attained Better Buildings Challenge
Why Was 50\% Possible?

- **Not** due to below-standard buildings or operations
- Waste had been tolerated to provide “a margin of safety”
- We questioned “more is better” thinking
- We applied evidence-based findings
- Laboratories’ energy use-intensity is 5-10X other campus facilities
- Some efficiencies yielded non-linear results
- Our cost of capital was low (but so was our cost of energy).
Why Was 50% Possible?

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More Factors

- Engineers “with an attitude”
- Evaluated based on debt-coverage rather than years of payback
- Evaluate co-benefits if a project was on debt-coverage threshold
Considered Buildings as Complete Systems

• Best projects leveraged complete energy retrofit with comprehensive deferred maintenance
• Much greater energy savings
• Overall debt-coverage, not separate components
• More sensible retrofit projects
Co-Benefits

• Cost of breakdowns
• Indoor air quality
• Infection control
• Lower central energy plant costs
• Equipment lifespans more than double
• Lighting CRI and CCT optimized
• Improved safety
• Real-time fault detection
• Continuous commissioning
Primary Lessons Learned

• Building systems have been designed to worst-case conditions rather than measured conditions
• More is not necessarily better
• Years of payback is a poor measure of project value
• A project at the margin of financial feasibility may be a clear winner when co-benefits are included
• Deep efficiency results are 49% technology, 51% attitude
• Aiming low will produce certain results.
Now is the Time to Go Deep on Energy Efficiency

- Cost of capital is low
- De-carbonized energy could double the real cost of energy
- Carbon costs in various forms
- Efficient technologies have been developed and proven
  - System performance and fault detection systems
  - Wavelength-selective glass films and coatings
  - Wireless lighting controls
  - High-SEER heat pumps
  - Energy services contracting now a viable alternative
  - Infection control improvements can accompany HVAC energy retrofits
About Jamestown

Jamestown employs approximately 450 people worldwide with headquarters in Atlanta, Georgia, and Cologne, Germany. The company has offices in Amsterdam, Bogotá, Boston, London, Los Angeles, Madrid, New York, and San Francisco. Since its founding in 1983, Jamestown has executed transactions in excess of $35 billion. As of December 31st 2020, the company has assets under management of $121 billion.

Jamestown is a design-focused real estate investment and management company with a 37-year track record and a clear mission: to transform spaces into innovation hubs and community centers. Current and previous iconic projects include Chelsea Market in New York City, Industry City in Brooklyn, Ponce City Market in Atlanta, Ghirardelli Square in San Francisco, and the Innovation and Design Building in Boston. The company has grown its portfolio in key markets throughout the U.S. and expanded its investment footprint to South America and Europe.

Jamestown differentiates itself through its vertically integrated platform. In addition to excelling at the traditional functions of a real estate management company, such as acquisitions, capital markets, and asset management, Jamestown possesses internal expertise to bring added value to all aspects of the real estate business. Through in-house capabilities in Development & Construction, Architecture & Design, Retail Leasing, Creative & Marketing, and Food & Beverage curation, employees maximize value throughout an asset’s ownership period.

Jamestown is well-known in the industry for its market discipline. For example, ahead of the great recession, Jamestown sold more than $5.1 billion in assets, a majority of its then portfolio, in 2006 and 2007, believing that the real estate market was overheated.

In 2019, Jamestown launched Jamestown Invest, its first digital investment platform for U.S. Investors.
Ownership Perspective

- Fiduciary Responsibility
- Investor Expectations
- Tenant Attraction and Retention
- The Split Incentive
- Asset Diversity
- Community Character
Environmental Highlights

- Achieved 20% energy and GHG reduction targets, four years ahead of schedule.
- 21 new ratings and certifications earned, including:
  - 2 Fitwel certifications at Ballston Exchange
  - 8 LEED certifications and recertifications
  - 10 ENERGY STAR ratings with an average score of 85
  - 1 BOMA 360 certified property
- 19 LEED Certified Properties representing 6,305,022 sf
- 10 ENERGY STAR Properties representing 1,327,771 sf
- 1 BOMA 360 Certified Property representing 1,078,319 sf
- Adopted goal of achieving net zero carbon emissions by 2050
Performance Indicators

**ANNUAL PERFORMANCE INDICATORS (2018-2019)**

The performance indicators below represent mixed-use, office, and retail assets that were owned at the end of 2018 and 2019. Due to the dynamic nature of Jamestown’s portfolio, energy, water, and GHG impact is analyzed each year using a like-for-like analysis - focusing on buildings owned for both years of a two-year period.

When carbon offsets are included, Jamestown realized a total like-for-like emissions reduction of 3.6% from 2018 – 2019. That is an emissions reduction equivalent of 114 single family homes not using electricity for one year.

- **7.95% ↓** in Energy Use Intensity (EUI)
  
  2019 average EUI: 81.23 kBTU/lf

- **3.87% ↓** in Energy Consumption
  
  2019 absolute total energy consumption: 320,748,171 kWh

- **2.92% ↓** in Water Consumption Intensity
  
  2019 absolute total water consumption: 1,240,249 kiloliters

- **4.2% ↓** in Total GHG Emissions
  
  2019 absolute total GHG emissions: 88,000 metric tons of CO₂

- **0.5% ↓** in Direct GHG Emissions (Scope 1)
  
  2019 absolute direct GHG emissions (Scope 1): 4,665 metric tons of CO₂

- **26.7%** of like-for-like GHG emissions offset
  
  10.9% of 2019 absolute GHG emissions offset, totaling 9.68 MTOE
ESG Impact Areas

- Emissions
- Energy Efficiency
- Water Efficiency
- Waste Management
- Resilient Site Selection and Design
- Materials and Supply Chain
- Transparency and Disclosure
- Health and Wellbeing
- Social and Community Impact
U.N. Sustainable Development Goals
ESG Impact Area: Energy Efficiency

**ESG Impact Area / Energy Efficiency**

**Energy Intensity (KBTU/SF)**

<table>
<thead>
<tr>
<th>Year</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBTU/SF</td>
<td>50.0</td>
<td>50.2</td>
<td>50.5</td>
<td>50.8</td>
<td>51.2</td>
<td>51.6</td>
<td>52.0</td>
<td>52.4</td>
<td>52.8</td>
</tr>
</tbody>
</table>

**Short-Term Targets (Present Through 2024):**
- Drive energy efficiency improvements of approximately 3% per year.
- Pilot three energy-saving technologies for Jamestown’s innovation program.
- Install building-level energy management software in 100% of eligible office properties.
- Complete a portfolio-wide solar assessment and increase renewable energy production by 2% annually.
- Conduct energy audits for 100% of properties and establish an emissions / energy reduction plan for 100% of properties.

**Medium-Term Targets (2025 Through 2034):**
- Reduce energy use by 50% across the portfolio by 2030 (from a 2014 baseline).
- Pilot ten energy-saving technologies for Jamestown’s innovation program.
- Install building-level energy management software in 50% of eligible retail and mixed-use properties.
- Increase solar production across portfolio to 3MW.

**Long-Term Targets (2035 Through 2050):**
- Reduce energy use by 75% across the portfolio (from a 2014 baseline).
- Rollout the successful energy-saving technologies at top ten worst performing properties.
- Install building-level energy management software in 100% of eligible retail and mixed-use properties.
Right-sizing EMIS Solutions

LEVEL 4
Sophisticated Buildings
Advanced supervisory control (including grid interaction)

LEVEL 3
Buildings with BAS and/or UCS
AFDD • O&M optimization (including CBM)

LEVEL 2 – Buildings with AMI and DER
Interval meter analytics

LEVEL 1 – All buildings with a utility bill
Utility bill management • M&V • Centralize, visualize, normalize data

JAMESTOWN EARN 2020 ENERGY STAR PARTNER OF THE YEAR
In 2020, Jamestown was named an ENERGY STAR Partner of the Year in the Energy Management Category. The highly competitive award is based on Jamestown’s support of the ENERGY STAR program. Jamestown has applied for this award since 2003, and worked to strategically increase ENERGY STAR engagement across a diverse portfolio with many historic and adaptive reuse buildings that are not always eligible for a HIGH ENERGY STAR score due to their mixed-use nature. In addition to earning more ENERGY STAR ratings each year, Jamestown has enhanced communications through internal trainings, tenant outreach, and social media.
Portfolio Level Data Management

- Utility Bill Management
- Monthly Data in ENERGY STAR Portfolio Manager
- Environmental Data in Measurabl
Property Level Energy Management

- Energy Management Information Systems (EMIS)
- Efficiency Projects
Peter Isabell
Life Time

Submit Questions
www.slido.com event code #DOE
Beyond the Low-Hanging Fruit for Energy Efficiency
<table>
<thead>
<tr>
<th>Founded</th>
<th>150+ athletic resort destinations</th>
<th>100,000 square feet average club size</th>
<th>19 boutiques inside</th>
<th>500+ pools and spas</th>
</tr>
</thead>
<tbody>
<tr>
<td>in 1992</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>100+ LifeCafes</th>
<th>100 LifeSpas</th>
<th>320+ tennis courts</th>
<th>24,000+ team members</th>
<th>255 million healthy school meals served</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>5 Life Time Work Locations</th>
<th>28 Athletic events</th>
<th>1.7+ million Life Time members</th>
<th>$2+ billion Value of owned real estate</th>
<th>19+ million Annual group fitness participants</th>
</tr>
</thead>
</table>
What have we done in energy efficiency?

1. Custom Showerheads - 2010
2. First Generation Lighting Upgrade - 2010-2012
3. On-Demand Steam - 2013
5. HVAC/VFDs - 2014
8. Recommissioning of HVAC/Controls - 2019
9. Irrigation Management - 2020
11. Enhanced New Construction Design Goals - 2021
What was the impact? (all data pre-Covid)

- Electric down – 35% (normalized for building additions and adders) or equivalent to 130,000,000 kWh/year

- Gas down – 15% (normalized for building additions and adders) or equivalent to 2,700,000 therms/year

- Water down – 10% (normalized for building additions and adders) or equivalent to 130,000,000 million gallons of water/year

When I refer to building additions and adders, I mean we added cooling to our laundry room for our team members (building addition) or we have increased our indoor pool temps 4 degrees for our members (adder).
Electric/Gas/Water Consumption – Same store

[Graphs showing Electric, Gas, and Water consumption over years]
Where are we going?

- Electric down – **55%** (an incremental 20% normalized for building additions and adders) or equivalent to 205,000,000 kWh/year

- Gas down – **35%** (an incremental 20% normalized for building additions and adders) or equivalent to 6,300,000 therms/year

- Water down – **50%** (an incremental 40% normalized for building additions and adders) or equivalent to 650,000,000 million gallons of water/year
How are we going to get there?

**Big Picture**
- Dive deeper into baselining, analytics, and reporting. Improve variance management with control metrics, process management, and tighter alignment with design/construction striving towards design excellence in future clubs, along with education to team members and members.

**Projects Big Picture**
- Variance reporting and performance alarming on our energy management system, accountability with commissioning, additional PM's in clubs and with third party vendors, utility efficiency goals influence new club design
Electric Projects:

- Lighting: lighting control and validation
- Pool Pumps: yearly validation of VFD’s
- Steam Boilers: ensure PM’s are done, relay and button still work
- HVAC: ensure motors are shut down during non-operational hours, ensure VFD’s are engaged, ensure airflow is optimized, turn off power exhaust, review Merv 13 frequency, ensure compressors aren’t kicking in prematurely
- Controls – quarterly updates of schedules, variance reporting on temps, schedules, performance
- ERU Commissioning
- Education and accountability to team members (see future slide)
- VAV optimization
- In review - batteries, renewables, demand control
Natural Gas Projects:

- Outside Air: optimize RTU's/ERU's to run during occupied hours (including heating yoga overnight) w/o compromising covid guidelines

- Boilers: control boilers and setbacks

- Dryers: ensure dryers optimized

- Hot water: ensure water not running when not in use, behavioral

- Eliminate communication loss in studios/yoga spaces and locally controlled spaces
Water Projects:

• Irrigation: optimize systems and do proactive maintenance
• Showers: annually test and validate GPM through heads
• Laundry: ensure programming is validated
• Domestic/Pools: ensure no leaks/autofill issues with real time metering
• Education and accountability
Clean Water Goal – Creating Purpose

- Our lofty goal around water reduction of an incremental 40%, can have big on-going impacts

- Looking to connect a give back to the water reduction savings and be able to bringing clean water to communities in need.

  - Example, For every million gallons of water that Life Time saves, we will be donating $2,000 to a third party to help bring clean water to a community in need (which equals 20% of the monies saved).

  - $5 can help get clean water to an individual for a lifetime

- What can $1,000,000 do?
  - Brand enhancement
  - Increased Positive Impressions
  - Positive Social Chatter
### Education Slide

<table>
<thead>
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<th>Date</th>
<th>Item</th>
<th>Focus</th>
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<tbody>
<tr>
<td>Apr (4/19)</td>
<td>Initial communication - Energy Management and Sustainability survey</td>
<td>Briefly introduce topic and solicit level of awareness around sustainability / TM confidence in ability to make an impact</td>
</tr>
<tr>
<td>May</td>
<td>Course launch</td>
<td>Educational product with TM Call to action around three core sustainability topics</td>
</tr>
<tr>
<td>Jun</td>
<td>LT Grid post on Water Conservation</td>
<td>Provide further understanding of why, what &amp; how</td>
</tr>
<tr>
<td>Jul</td>
<td>LT Grid post on Energy Saving</td>
<td>Provide further understanding of why, what &amp; how</td>
</tr>
<tr>
<td>Aug</td>
<td>LT Grid post on Reducing Waste</td>
<td>Provide further understanding of why, what &amp; how</td>
</tr>
<tr>
<td>Sep</td>
<td>Energy Management and Sustainability survey</td>
<td>Solicit level of change in awareness around sustainability / change in TM confidence in ability to make an impact</td>
</tr>
<tr>
<td>Oct</td>
<td>LT Grid post on accomplishments/progress</td>
<td>Bring awareness to progress so far</td>
</tr>
<tr>
<td>Nov/Dec</td>
<td>Communication – Next Steps</td>
<td>Recap of accomplishments and goals/additional actions/behaviors for 2022+</td>
</tr>
</tbody>
</table>

### Example:

**Café**
- Smoothie Maker – don’t run water
- Back of house sinks
- Shut off lights when not in use
- Clean Fridge/Freezer door seals
- Garbage/Recycling/Organics
Accountability Slide – Service Channel

Service Channel/Work order management
- Identify needs
- Prioritize resources
- Manage planned/preventive work
- Engage vendors
- Less admin, faster work completion
- Knowledge repository (warranty, manuals, etc.)
- All team member access (single sign on)

Mobile Work Order creation anytime, anywhere
- Create WOs from a mobile device
- App mirrors web WO creation
- View/Enter notes
- View/Add photos
- iOS and Android supported
Q & A

Submit Questions
www.slido.com event code #DOE
Additional Resources

University of California, Irvine – Better Buildings Partner Profile
https://betterbuildingssolutioncenter.energy.gov/partners/university-california-irvine

Jamestown, LP – Better Buildings Partner Profile
https://betterbuildingssolutioncenter.energy.gov/partners/jamestown-lp

Life Time – Better Buildings Partner Profile
https://betterbuildingssolutioncenter.energy.gov/partners/life-time
Solution Center Video Place Holder
<table>
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<tr>
<td>Electrifying Our Buildings: Challenges and Solutions</td>
<td>June 8</td>
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<tr>
<td>Becoming ESPC-Ready</td>
<td>June 15</td>
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<td>Boosting Industrial and Manufacturing Efficiency and Resiliency with CHP</td>
<td>June 17</td>
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<td>Financing in Higher Education</td>
<td>June 22</td>
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<td>What's Hot with Heat Pumps</td>
<td>June 29</td>
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<td>How to Identify CHP Projects That Fit Your Goals</td>
<td>July 1</td>
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<td>Kick the Tires: Understanding the Role of R&amp;D in the Deployment of Building Energy Technologies</td>
<td>July 6</td>
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<td>ESPC in the Express Lane: New Project Tracking Tools</td>
<td>July 13</td>
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<td>Workplace Evolution: Supporting Occupant Health While Achieving Energy Efficiency</td>
<td>July 20</td>
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<tr>
<td>Waste Reduction: Lessons Learned and What Comes Next</td>
<td>August 3</td>
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<tr>
<td>Visualize Your Energy Future with 'Slope': The State and Local Planning for Energy Platform</td>
<td>August 10</td>
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Additional Questions?

Please Contact Us

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