



2021-2022 Better Buildings WEBINAR SERIES

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U.S. DEPARTMENT OF
ENERGY



Kick the Tires: Understanding the Role Of R&D in the Deployment of Building Energy Technologies

September 21, 2021

3:00 – 4:00 pm EDT



Gregory Dierkers

Technical Project Officer / US Department of Energy

What is Field Validation?

- Addresses the lack of objective performance and cost data that inhibit some technologies from finding their customer base.
- DOE EERE helps to identify, install and monitor technology performance in real world installations and then communicates the results to the public via a case study.

What Are the Objectives?

Validate the potential of selected technology

Technical Examples

- Verify energy reduction, associated utility cost savings, peak demand reductions
- Verify occupant satisfaction impacts

Market Adoption

- Investigate applicability to different building types, sizes and end use systems
- Evaluate maintenance, operability benefits to operations/management staff
- Verify the cost-effectiveness

EERE's Field Validation Partnership

- **Overview:** The Federal Energy Management Program (FEMP), Weatherization and Intergovernmental Programs Office (WIP), Building Technologies Office (BTO) and the Advanced Manufacturing Office (AMO) are collaborating on near-term technology field validation efforts.
- **Goal:** Identify, validate and move forward DOE-supported technologies with state/local governments and federal partners. Focus is on host sites and demonstrations in the near-term.

Host Site Role vs Lab Role

- **Site Role:** Work with Lab team and technology provider to provide information needed for site evaluation, conduct demonstration, provide information for monitoring and verification (M&V) scope development and during M&V process
- **Lab Role:** Evaluate candidate sites, recruit and select site, develop M&V Scope, conduct rigorous M&V

Example Field Validation Schedule

- Site selection (1-3 months)
 - Interested sites fill out site recruitment and scoping forms
 - Lab follows up for any additional information
- Technology installation (1-2 months)
- Testing and evaluation (12-18 months)
- Prior examples can be found in the report for Building IQ Technology Field Validation
 - (available at <https://eta.lbl.gov/publications/buildingiq-technology-field>)

Benefits of State, Local, and Tribal Government Participation

- Engage in low-risk pilot with installation and deployment managed by others.
- Receive independent M&V and an evaluation of benefits, conducted by DOE National Research Labs.
- Inclusion in a well-supported, high-visibility DOE-funded demonstration program.
- Gain insights regarding how near-commercial ready energy-savings technologies can help states meet their energy goals.

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Enter Event Code

#DOE

Poll 1

What sector are you from?

Please go to www.slido.com and enter code **#DOE** to respond

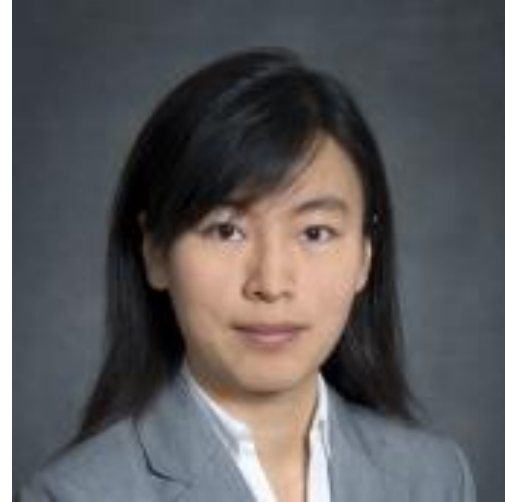
Today's Presenters



Chad Kruse
Illinois Environmental
Protection Agency



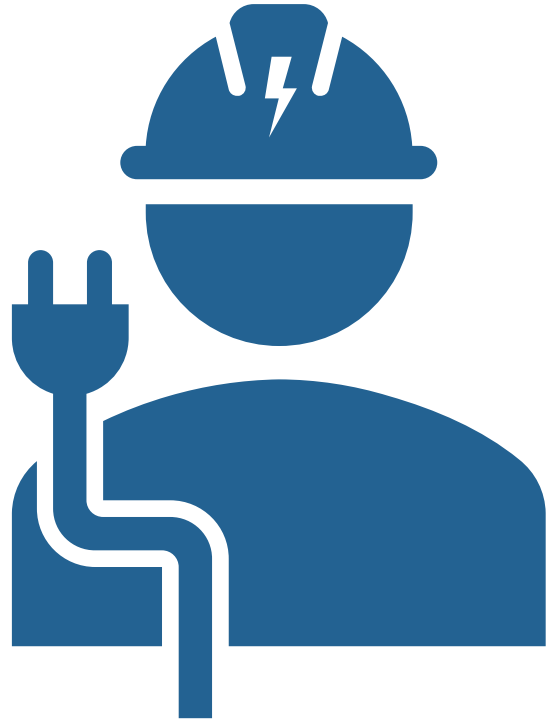
Kevin Dwyer
Illinois Central
Management Services



Guanjing Lin
Lawrence Berkeley
National Laboratory



Armando Casillas
Lawrence Berkeley
National Laboratory



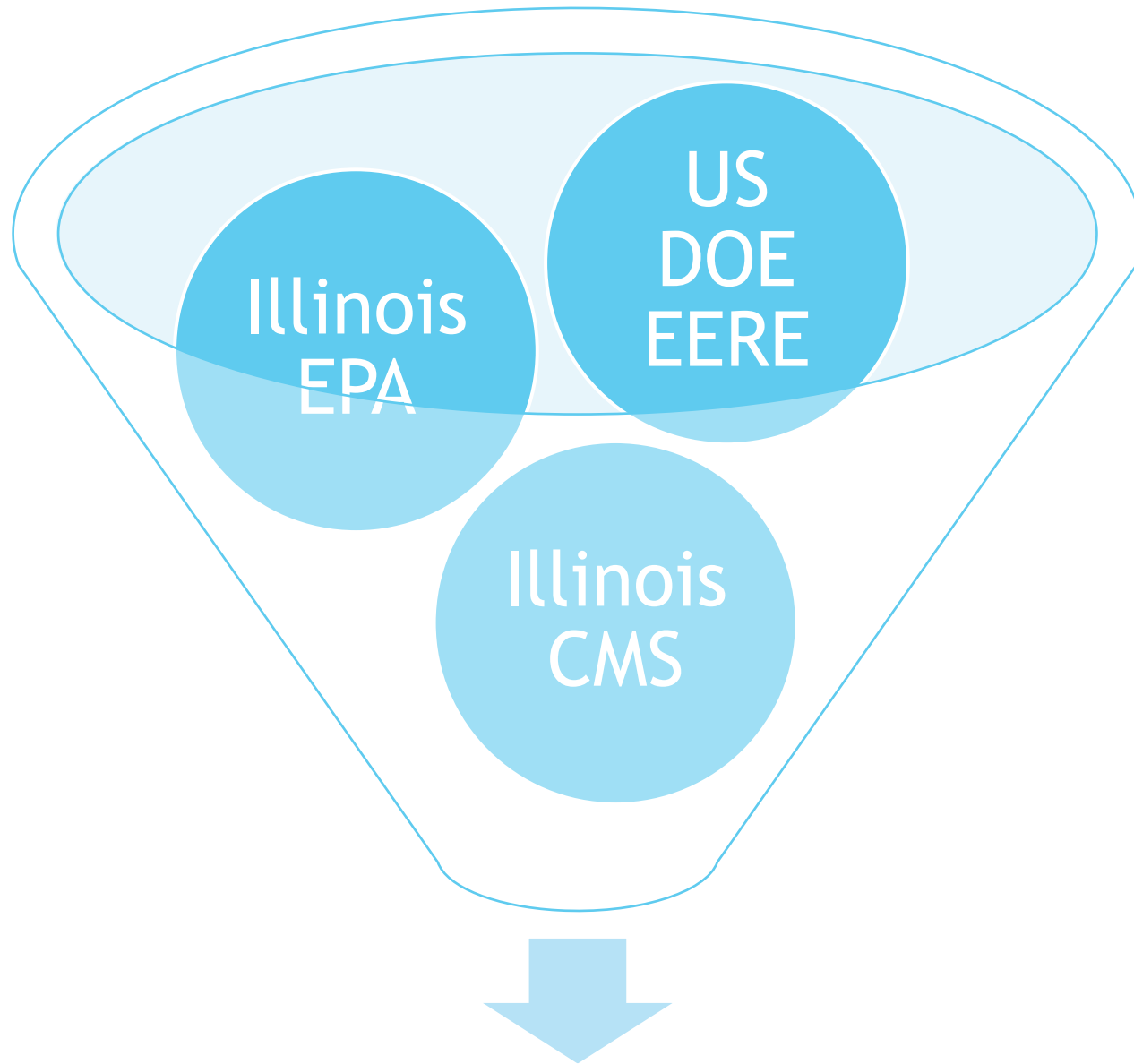
Field Validation advances Illinois EPA Office of Energy priorities:

Energy Efficiency as a Resource

Lead by Example

Convening of Stakeholders over
Energy Projects

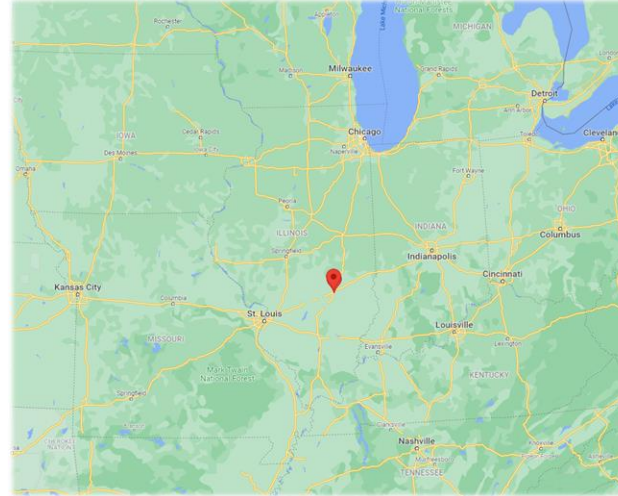
Reaching the Entire State with
Energy Projects



Field Validation at Effingham IL Illinois
Dept. of Transportation Facility

400 W. Wabash

- ▶ Effingham, IL
 - ▶ Central/Southern IL
 - ▶ Climate
- ▶ Building Information
 - ▶ Built in 1933
 - ▶ 2 Stories
 - ▶ Brick exterior envelop
- ▶ Site Selection Criteria
 - ▶ Building Automation
 - ▶ Building Use
 - ▶ Building Size



Mechanicals

▶ Selection Criteria

- ▶ No existing building automation system
- ▶ Units 10 years old or newer
- ▶ Heating/Cooling unit is controlled by a single, simple thermostat

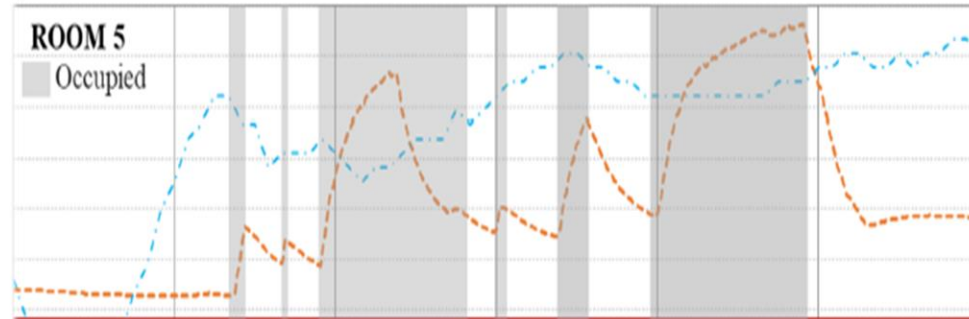
▶ Roof Top Unit Selections

- ▶ 5 Roof Top Units (RTU)
- ▶ Dx cooling and gas fired heating
- ▶ Existing RTU controls: non-programable thermostat



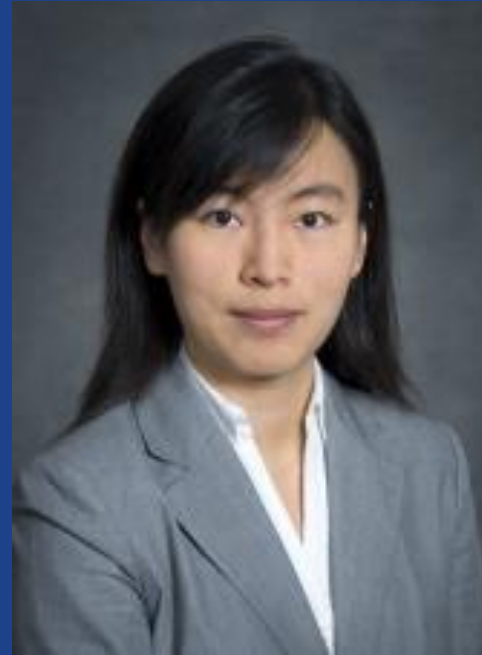
Project Phase

- ▶ **Baseline Development**
 - ▶ State maintained utility consumption data
 - ▶ Smart meter interval data
- ▶ **Controls Criteria**
 - ▶ Programmable thermostat
 - ▶ Installs to existing wiring
 - ▶ Data logger
- ▶ **Anticipated Project Benefits / Next Steps**





Armando Casillas
LBNL



Guanjing Lin
LBNL



Technology Field Validation

EMIS Project Team

Jessica Granderson, Guanjing Lin, Armando Casillas

Lawrence Berkeley National Laboratory

Introduction to Lawrence Berkeley National Laboratory



LBNL Commercial Buildings Research

- Energy management and information systems (EMIS), data analytics, operational efficiency
- Decision tools for owners, operators, finance
- Simulation tools for design and operation
- Integrated systems, controls, interoperability

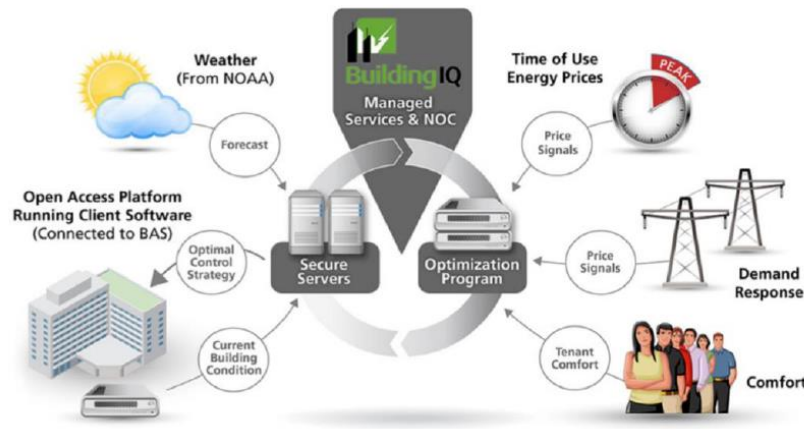
DOE Technology Field Validation

- LBNL conducts 3rd party performance measurement and verification for technologies selected from DOE HIT Catalyst/GSA proving ground annual solicitation
- Helps to de-risk technologies, increase confidence among industry stakeholders
- Helps to grow the industry for these products and services
- Technology field validation projects
 - Completed: BuildingIQ
 - Ongoing: Nantum Building OS
 - Ongoing: BEM Controls WiseBldg
 - New: eSpin Nanofiber Air Filters

DOE Technology Field Validation - BuildingIQ

BuildingIQ

- Integrates with building automation system to conduct supervisory optimal control
- Optimizes commercial building HVAC control for system efficiency, occupant comfort, and cost
- Targeted for use in large, complex buildings



Site criteria development; Site selection

M&V plan development

Conduct M&V

Final technical report

DOE Technology Field Validation - BuildingIQ

Evaluation Objectives

- Energy and utility cost savings
- Occupant comfort impacts
- Scale-up considerations
 - Implementation lead time
 - Staff engagement
 - Impact on building energy management activities
 - Information security, continuity of connectivity



Public Validation (unlike utility or other tests)

- **Across 4 building types** in different climate zones, performance analysis over a period of 7 to 15 months
- **Showed what was saved & how**, in terms of practical applicability, generalizability, and robustness — establishing conditions to achieve positive benefits
- **Informed R&D** with deep insights into state-of-art commercial product performance

Results https://betterbuildingssolutioncenter.energy.gov/sites/default/files/granderson_-_buildingiq_0.pdf

Ongoing Technology Validation

Nantum BuildingOS Technology Validation (FY19-22)

- Tech description: a cloud-based building operating system platform, providing data visualization, analytics, and optimal control based on floor-level occupancy
- Test site: an office building in Washington DC
- Status: conduct M&V, to be completed in spring 2022

BEM Controls WiseBldg Technology Validation (FY21-22)

- Tech description: A central, multi-end use building control system for small and medium commercial buildings
- Test site: an office building in Effingham IL
- Status: site negotiation

eSpin Nanofiber Air Filters Technology Validation(FY21-22)

- Tech description: High performance energy efficient HVAC air filters
- Status: site criteria development; site selection

Collaboration with State on BEM Controls' WiseBldg Technology Validation

- Field validation site selection
 - Small to medium (<100,000 sq.ft.)
 - Rooftop unit (RTU) < 10 years old and able to communicate with a new Wi-Fi thermostat. Current thermostat is manually controlled.
 - Access to stable Wi-Fi network or allow to set the Wi-Fi network
 - Nice to have, or ability to install sub-metering.
 - Historical baseline electrical and gas data for 12 month
- Regular meetings for project progress
- Virtual building walk through



Q & A

Submit Questions
www.slido.com event code **#DOE**

Poll 2

Based on what you heard, would you be interested in a further discussion with DOE/LBNL on validation opportunities?

Please go to www.slido.com and enter code **#DOE** to respond

What happens next? What if I want to host a technology? How do I learn more?

Reach out. States and partners interested in hosting a technology or learning more should contact DOE

Greg Dierkers, (gregory.dierkers@ee.doe.gov)

BTO: Amy Jiron (amy.jiron@ee.doe.gov) and Eric Werling, BTO (eric.werling@ee.doe.gov)

Dive Deeper. DOE EERE offices will set up individual calls with technology experts as needed.

Listen to [prior webinar](#)

Building energy management and thin film windows.

Recording: <https://www.youtube.com/watch?v=cb5OA70BPo0>



2021-2022 Better Buildings WEBINAR SERIES



SEP 14



SEP 21



SEP 28



OCT 5



OCT 19



NOV 9



NOV 16



NOV 30



DEC 7



DEC 14



JAN 11



JAN 18



FEB 1



FEB 15



MAR 1



MAR 15



APR 5

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WHAT'S NEXT IN WATER EFFICIENCY FOR MULTIFAMILY HOUSING

Tue, September 28, 2021 | 11:00 AM - 12:00 PM ET

[REGISTER TODAY >](#)

As extreme drought conditions threaten western states, hear from water efficiency experts who reach beyond the low-hanging fruit of faucet aerators and low-flow shower heads to implement deep water conservation measures in multifamily housing. Learn about innovative irrigation and landscape design techniques, rainwater harvesting systems, and cutting-edge toilet monitoring and leak detection technologies.

Interested in Learning More?



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What's Hot with Heat Pumps
2021-2022 BETTER BUILDINGS WEBINAR SERIES

ADDITIONAL RESOURCES
Learn more about the topics discussed on the webinar by visiting the resources below.

Better Buildings Resources

- BTO [Peer Review session](#) on electrification November 2020
- Better Buildings Electrification [webinar](#) held June 8, 2021
- The E3 Initiative [Fact Sheet](#) and [website](#)

Explore more resources on the [Better Buildings Solution Center](#)

Other Resources

- The White House [fact sheet](#) announcing the Energy, Emissions and Equity (E3) Initiative
- Articles [\(1, 2\)](#) on Maine's ambitious heat pump goals
- NYSERDA clean heating and cooling [program](#)
- [Building Decarbonization Coalition](#)
- Sacramento Municipal Utility District (SMUD) Clean Heating and Cooling [programs](#)

Up Next in the 2021-2022 Better Buildings Webinar Series

Internal Engagement and Communication: Sharing Your Energy Vision
Tuesday, September 14th from 3 – 4 pm ET

This webinar will discuss how organizations can share their energy efficiency vision with employees and engage them in contributing to that vision.
[Register here](#)

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Download the Additional Resources PDF from the chat box.

- Better Buildings Solution Center resources
- Speaker-chosen content
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Additional Questions?

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Program Support
BetterBuildings@retechadvisors.com



Armando Casillas

Lawrence Berkeley National Laboratory
acasillas@lbl.gov



Kevin Dwyer

Illinois Central Management Services
Kevin.Dwyer@Illinois.gov



Chad Kruse

Illinois Environmental Protection Agency
chad.kruse@illinois.gov



Guanjing Lin

Lawrence Berkeley National Laboratory
gjlin@lbl.gov



Gregory Dierkers

US Department of Energy
gregory.dierkers@ee.doe.gov