U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

# Grid-Interactive Efficient Buildings

## *Improving & Optimizing*

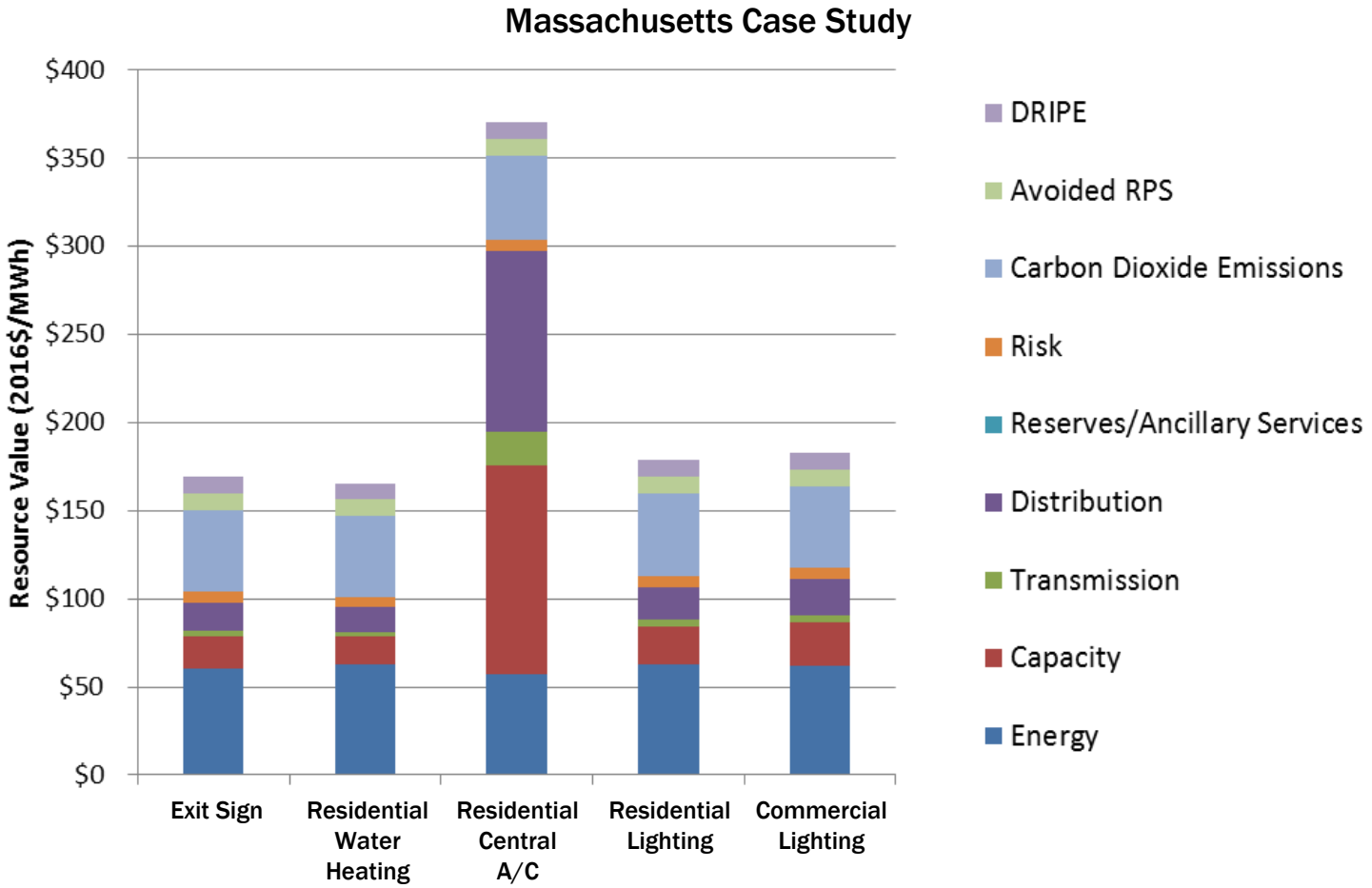
**David Nemtzow**
Director, Building Technologies Office

*NASEO 2018 Annual Meeting, Detroit*

# Questions & Challenges

- How do grid-interactive efficient buildings fit into larger grid modernization?
- What are the top priority benefits buildings provide the grid? And how well can building owners/operators/occupants capture those benefits?
- How critical are better Technologies? Analytics? Policies & programs?
- What are key barriers to adoption of advanced controls, technologies, practices?
  - Making the business/investment case?
  - Complexity of advanced controls and potential of obsolescence?
  - Cybersecurity (reality and/or perception)?
- Will efficiency get its "fair share" of benefits of advanced technologies?
- How is this issue faring among State governments? How can others help?
- For that matter, is this a "bridge too far" (at least today) for buildings, utilities, governments?

# Not All Energy Efficiency is Equally Valuable

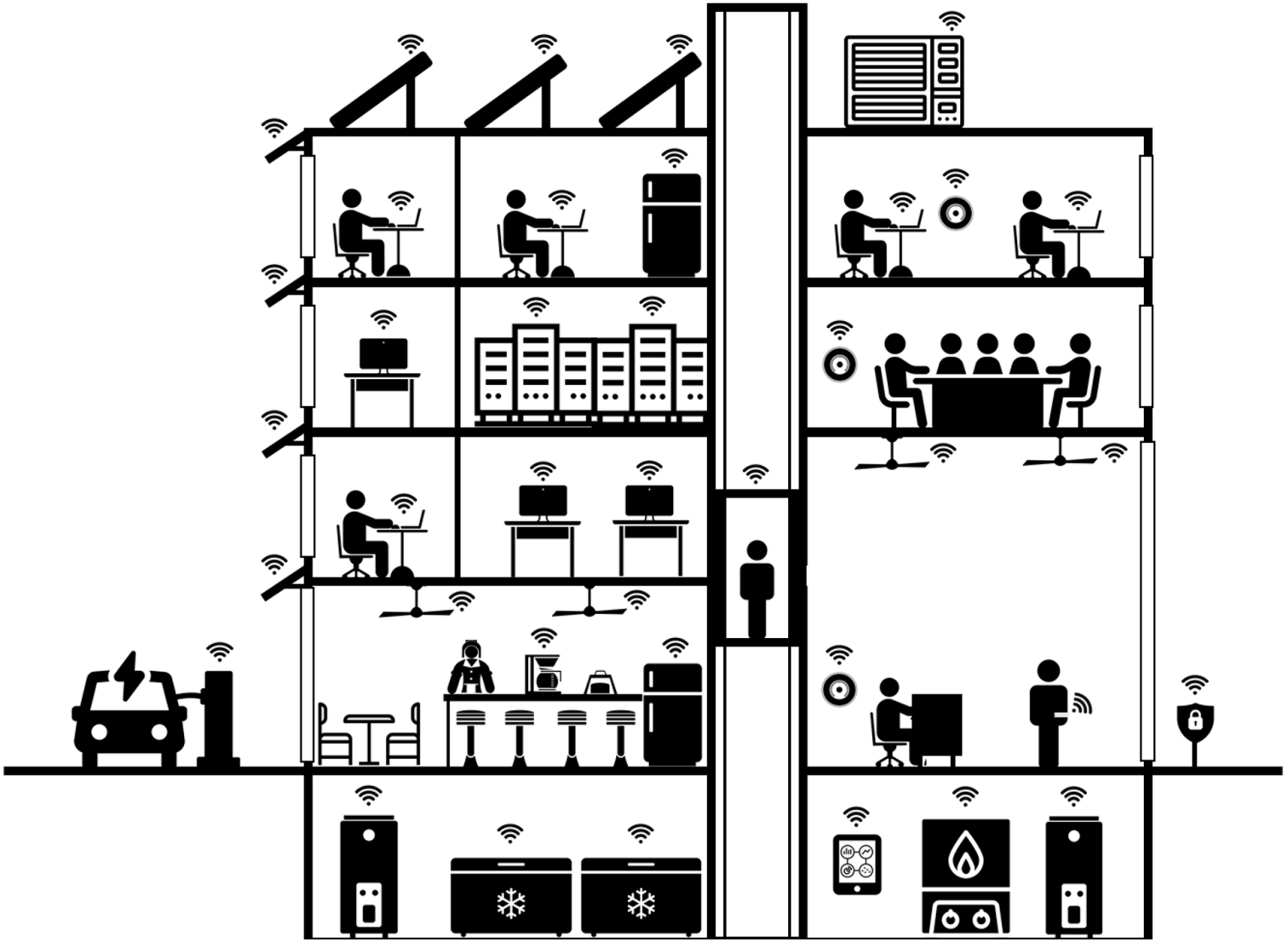



**Time-varying value of energy efficiency savings by load shape**

*(reflects publicly available data only)*

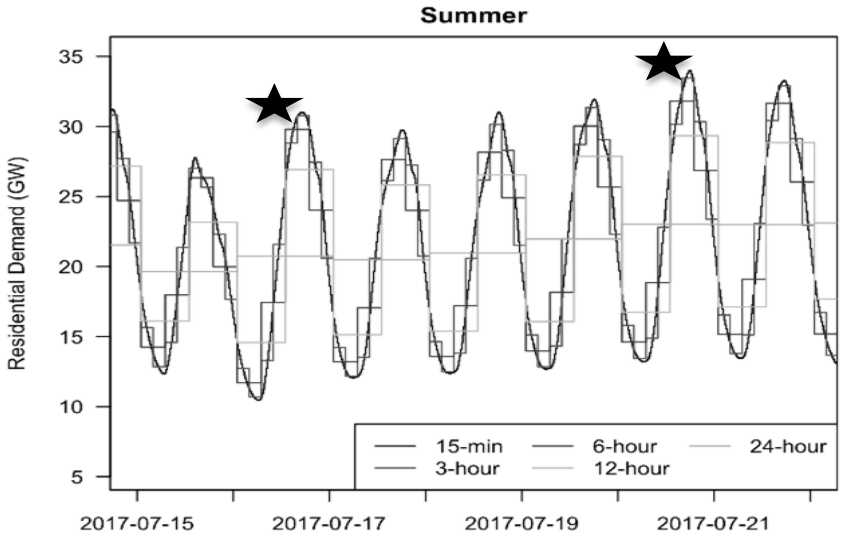
Source: ***Time-Varying Value of Electric Energy Efficiency*** *June 2017* N.Mims, T.Eckman & C.Goldman, LBNL, for BTO

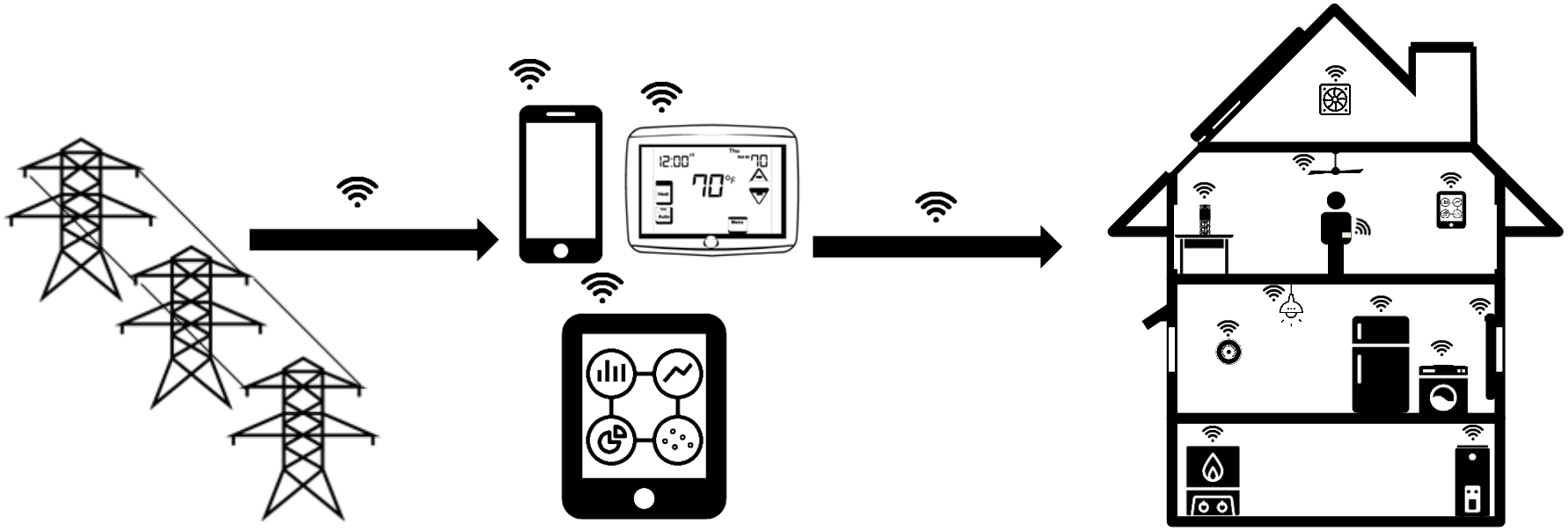
# The Modern – and thus Connected – Building



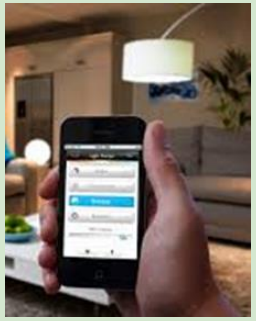
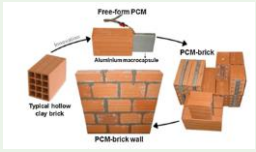
# Grid-interactive Efficient Building Concept

1. Lowers total electricity demand
2. Flattens peak demand
3. Flexibly aligns with variable renewables (considers load net of renewables)

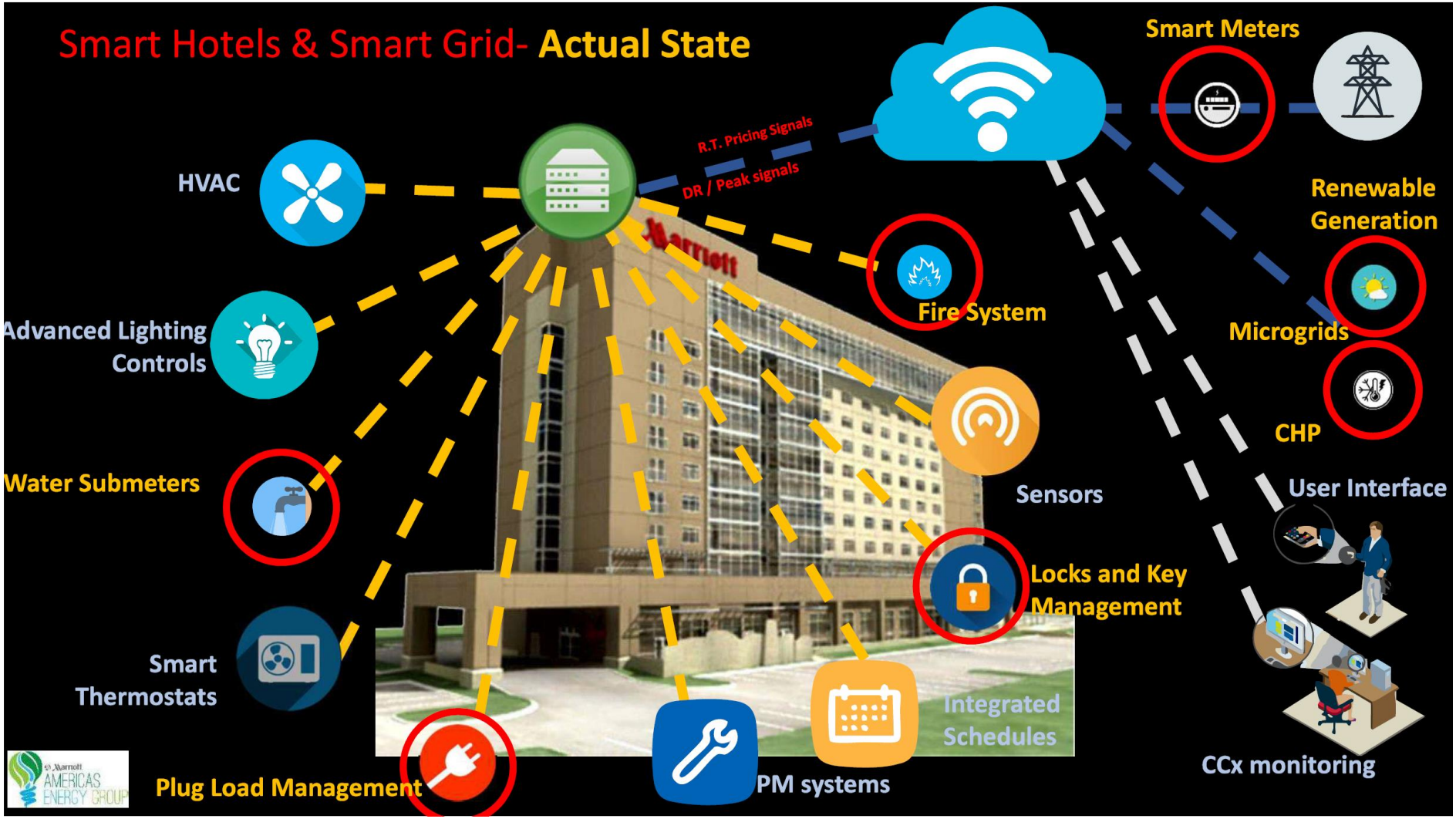


# Examples of grid-interactive efficient technologies

| | Passive | Active | Connected | Performance |
|---|---|---|---|---|
| Lighting | Daylighting  | LED Lighting  | Lighting Controls  | *Optimized Lighting:*<br>• Minimized Energy Consumption<br>• High Occupant Comfort<br>• *Low* Ability to Provide Grid Services |
| Storage/ storage-like | Phase Change Materials   | $H_2O$-Based Thermal Storage  | Controllable Multi-Speed HVAC   | *Optimized Comfort:*<br>• Minimized Energy Consumption<br>• High Occupant Comfort<br>• *High* Ability to Provide Grid Services |

# Is Everything Working Right?




Source: Douglas Rath, Marriott International

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*(If you have answers send them to david.nemtzow@ee.doe.gov!)*

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# *QUESTIONS? COMMENTS? LET'S WORK TOGETHER!*


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