Accelerating the Adoption of Energy Efficient Technology

U.S. General Services Administration | Public Buildings Service | Green Proving Ground Program
U.S. Department of Energy | Office of Energy Efficiency & Renewable Energy | High Impact Technology Catalyst

GSA | GPG Green Proving Ground Program | U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Building Innovation and Economic Growth

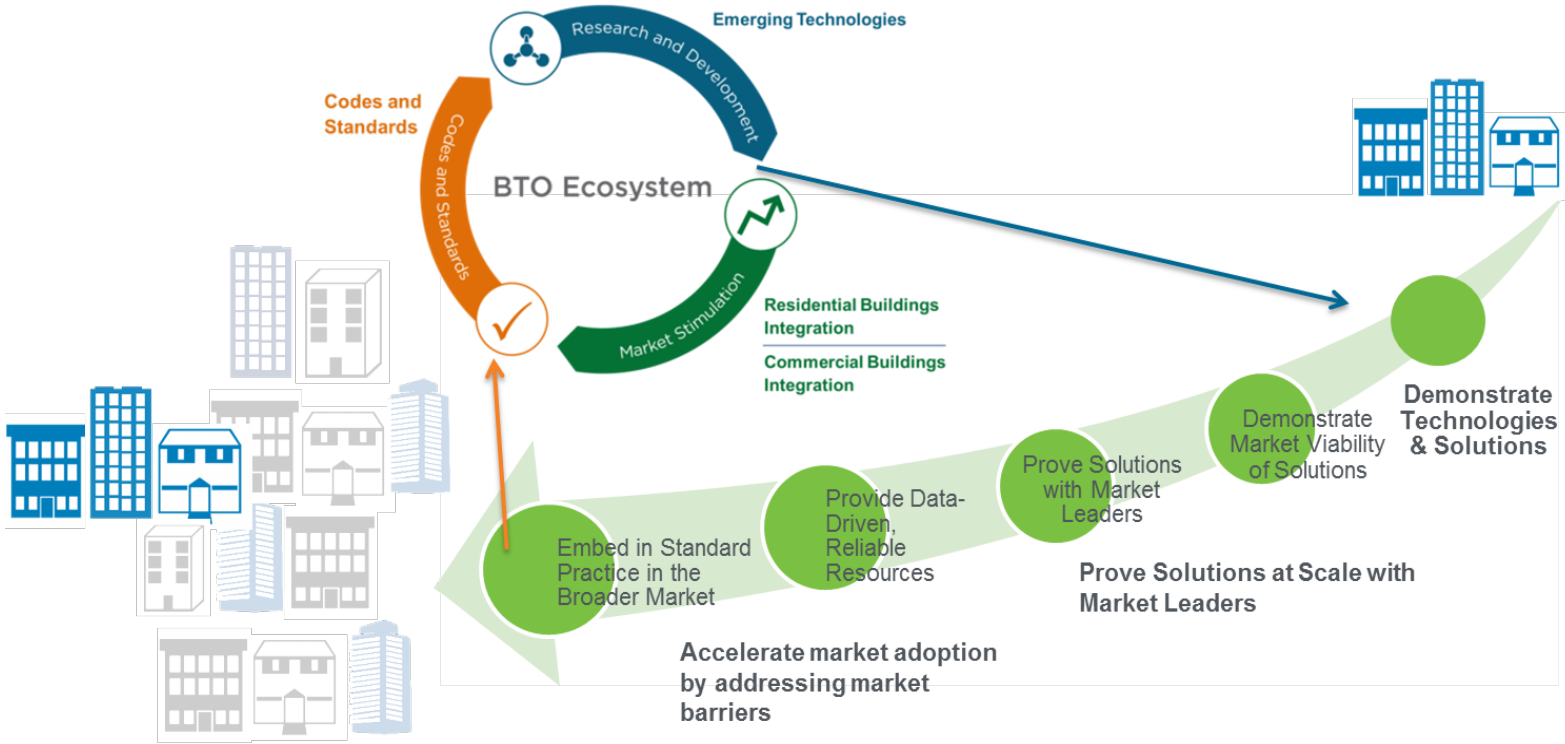
- Building Energy expenditures = $410 billion/year
- Represent 75% of the nation's electricity consumption.
- Contribute 40% of greenhouse gas emissions.

BUT…

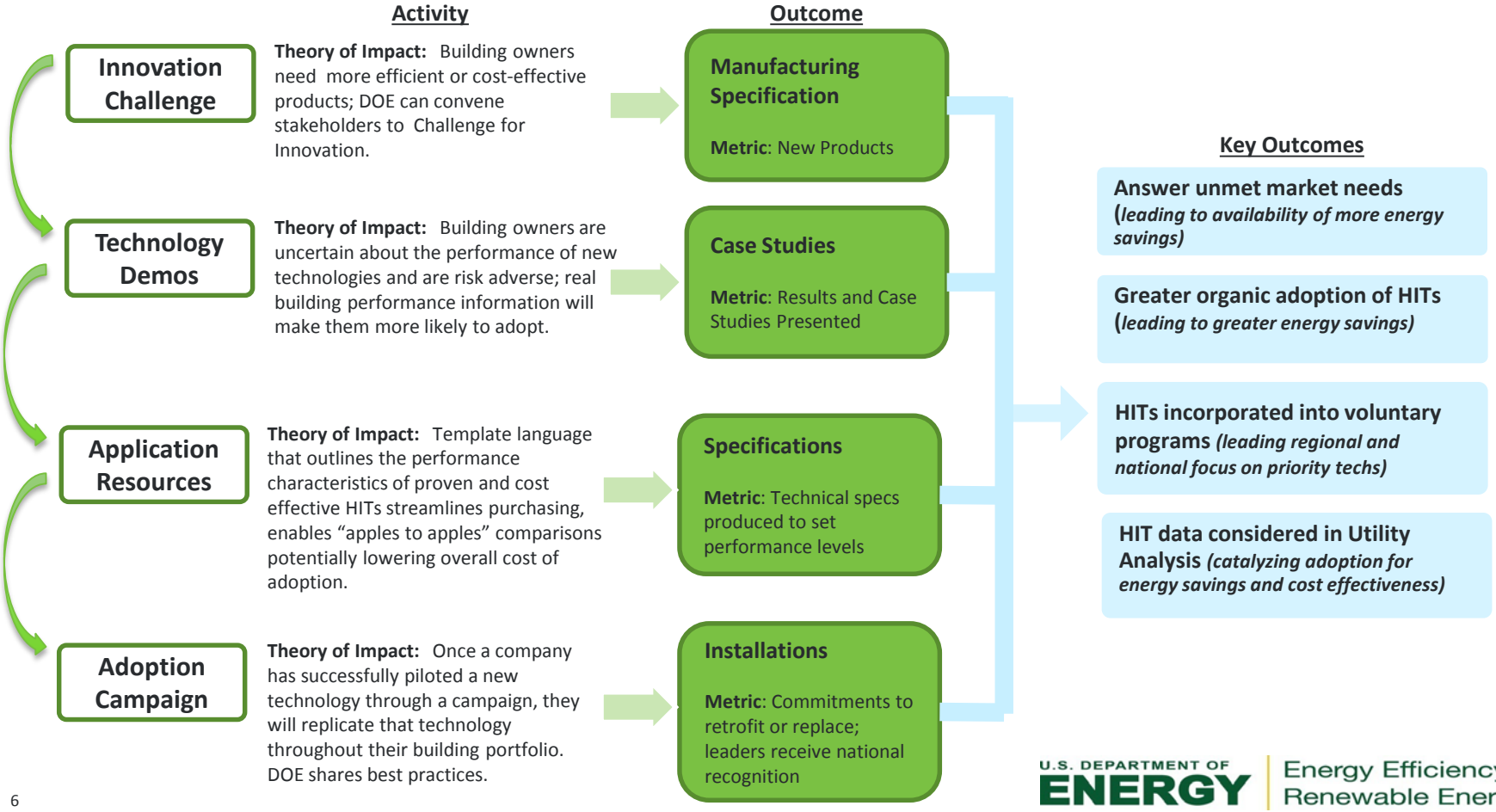
Building efficiency products represent $60 billion in U.S. revenue; up 43% over the last 4 years.

Innovative building technologies are critical for commercial building owners to meet energy and financial goals.

DOE'S HIGH IMPACT TECHNOLOGY CATALYST



Pathways to Support Broad Adoption for National Impact



HIT CATALYST: 4-Step Playbook

Owners demonstrate interest in high impact technologies but…	A 4-step solution — The HIT Catalyst Playbook
…the cost is too high →	1. **INNOVATION CHALLENGE** to increase competition
…they are uncertain about real world performance →	2. **TECHNOLOGY DEMO** to validate performance
…there are too many barriers →	3. **RESOURCE DEVELOPMENT** to support adoption
…they are waiting until the broader market adopts →	4. **ADOPTION CAMPAIGN** to lock in savings

HIT CATALYST PLAYBOOK: 1. Innovation Challenge

2010: DOE and commercial building owners issued a challenge for more efficient rooftop HVAC units (RTUs)

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

TARGET
Walmart
Yum!
LOWE'S
GRUBB & ELLIS. From Insight to Results
Gundersen Lutheran
macy's
IHG InterContinental Hotels Group
Publix.
Cleveland Clinic
THE HOME DEPOT
COSTCO WHOLESALE
McDonald's
EDENS & AVANT

RESULT: In 2010 zero commercial RTUs met the Challenge. Today five different manufacturers offer 195 model variations of units that meet the Challenge.

The first manufactures to meet the Challenge:

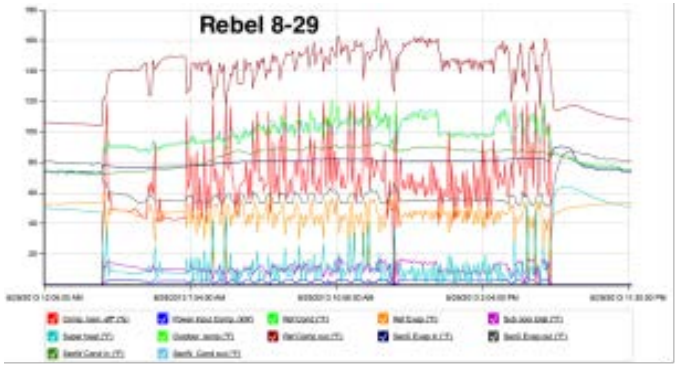
Carrier turn to the experts
DAIKIN McQUAY

HIT CATALYST PLAYBOOK: 2. Technology Demonstration

Demonstration Unit

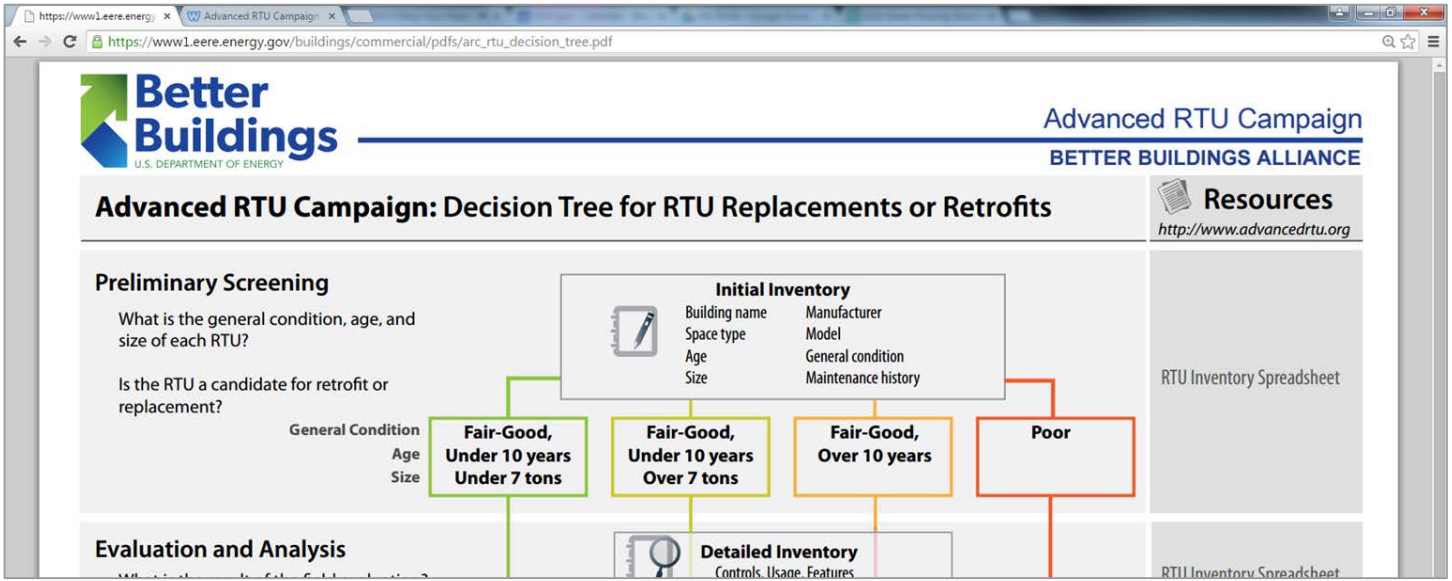
Baseline Unit

2013-2016: HIT supported 25 technology demonstrations at 63 commercial building host sites.



HIT CATALYST PLAYBOOK: 3. Resource Development

Critical resources and criteria enable better, more streamlined decision-making. Resources, such as technical specifications and operations guidance, help owners and operators identify appropriate performance levels for apples to apples comparisons of key operational criteria for purchasing.



HIT CATALYST PLAYBOOK: 4. Adoption Campaign

- **Advanced RTU Campaign** Launched in 2014
  - 200 partners with 68,000 RTUs retrofitted or replaced
  - **Savings**—2 trillion kWh, 11 Trillion BTU/year source, and 758 million pounds of CO_2
  - 6 projects recognized at the Professional Retail Store Maintenance (PRSM) Association's National Conference in 2016.

ASHRAE

RILA
RETAIL INDUSTRY LEADERS ASSOCIATION
Educate. Innovate. Advocate.

FEMP
Federal Energy Management Program

Better Buildings
U.S. DEPARTMENT OF ENERGY

HIT CATALYST PLAYBOOK: 4. Adoption Campaign

- **smart-energy-analytics.org Adoption Campaign recruiting now** to encourage the use of Energy Management and Information Systems + submetering to achieve ongoing energy savings.
- Campaign participants receive **technical support and national recognition.**

- Guidance on getting started or improving your EMIS installation
  - Resources to help with business case, specifying EMIS, and planning for monitoring-based commissioning (MBCx)
  - Guidance to help better utilize EMIS
- Archive of short EMIS software demos
- Peer sharing for specific areas of interest (energy information, Fault Detection and Diagnostics, submetering)

1. Increase market acceptance with verified performance.
2. Engagement of facility managers, energy managers and portfolio owner/operators.
3. Support for GSA Schedules.
4. Performance Sepcifications
5. Streamlined entry for utility incentive and rebate programs.

Stakeholder Engagement: Better Buildings Alliance

>200 partner organizations >11 billion sq. ft.

20% more efficient by 2020


Commercial Real Estate


Food Service, Retail & Grocery

Healthcare


Hospitality


Higher Education

Technology Solutions Teams


Lighting


Space Conditioning


Plug & Process Loads


Refrigeration


Energy Information Systems


Renewables Integration

Market Solutions Teams


Financing Strategies


Leasing and Tenant Engagement


Training / Workforce


Appraisals and Valuation


Data Access

Driving Adoption and Demand: Energy Efficiency Programs

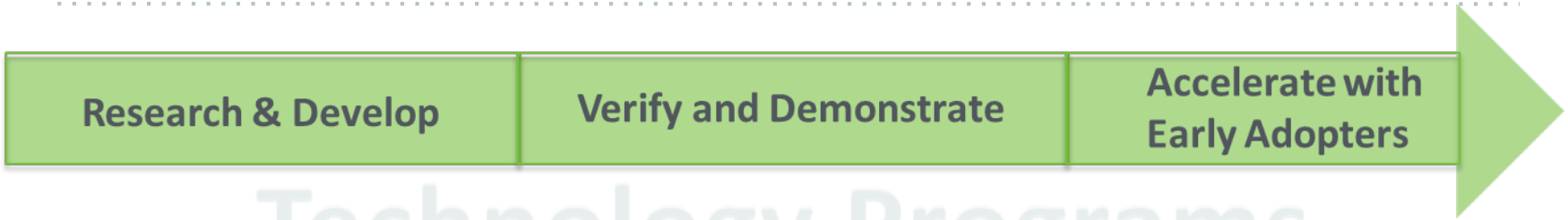
- Tech 2 Utility: program demonstration objectives and methodologies; leverage federal outcomes.
- ESource distribution of demonstration outcomes and reports.
- Demonstration results inform CEE Tiers used by utilities to set incentive levels.

DOE-funded refrigeration motor demonstration results = **CA Emerging Tech Coordinating Council recommendation for state-wide rebates**.

Additional portfolio deployment by national supermarkets and retailers.

More than 75 different EMIS-related utility programs in 42 states

Federal Support: With a Little Help from our Friends



Technology Programs

- ARPA-E (DOE)
- Emerging Technologies (DOE)
- ESTCP (DoD)
- Green Proving Ground (GSA)
- High Impact Technology Catalyst (DOE)
- Energy Conservation Investment Program (DoD)
- FEMP Preferred Products (DOE)
- Better Buildings (DOE)

ROLES AND RESPONSIBILITIES

Federal Program

- Overall project management
- Support site selection
- Coordinate and fund M&V
- Lead report review and publication
- *GPG only: Fund tech installation*

Host Site

- Oversee all contracting
- Manage technology installation
- Facilitate tenant engagement
- Provide user feedback

National Lab

- Design project plan
- Collect and analyze data
- Author technical report

Tech Vendor

- Provide technology
- Support design, installation and commissioning

Example: Looking for Host Sites

Energy Management

- High Performance Circulator Pump
- Boiler Load Optimization Control
- Turnkey Controls and Analytics
- Guaranteed Performance for Analytics-Based Energy Savings
- Cloud-based Interoperable Building Analytics

Plug Loads

- Data-driven Receptacle Control

Water

- Chemical-Free Water Treatment

Envelope

- Internal Solar Shade System for Daylight Harvesting & Thermal Control
- Air Barriers: One-Step Sprayable Liquid Flashing and Primerless Self-Adhered Membrane

- Coming in 2017: R-5 Windows, Cold Climate Heat Pumps and Alternative Refrigerants

CHEMICAL-FREE WATER TREATMENT

Non-Chemical Water Treatment

- Eliminates scale formation and corrosion
- Eliminates the need for added chemicals
- Removes heavy metals

Value of Study

- Validate water and HVAC savings
- Validate maintenance reduction

Value to Owners/Operators

- Reduce water and energy consumption
- Reduce sewer charges
- Reduce use of chemicals

AT A GLANCE…

Addresses water treatment and consumption

Technology claim:

25-80% water savings

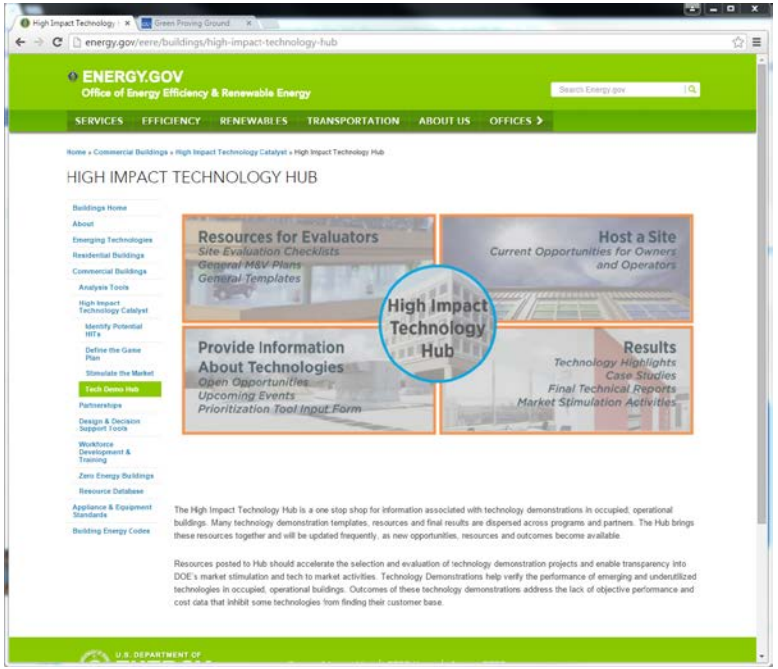
10-50% HVAC savings

< 2 year payback

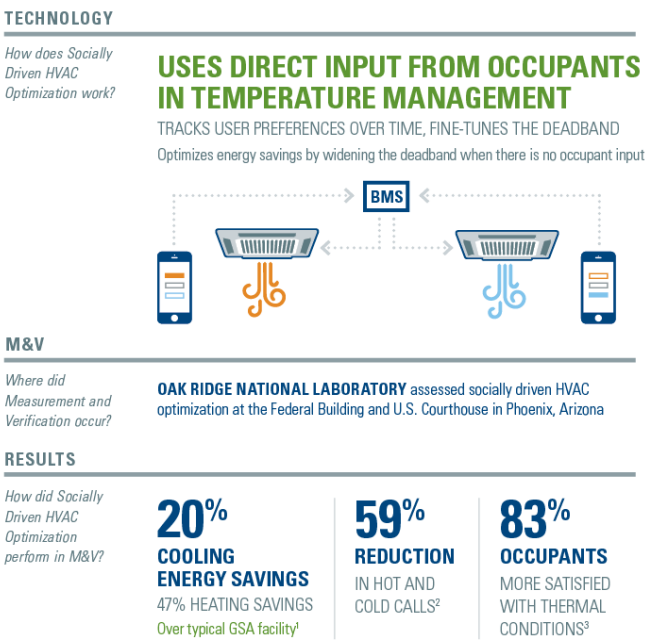
CHEMICAL-FREE WATER TREATMENT

Site Requirements
Cooler tower with existing chemical water treatment (COC range of 3 to 6) *
Well maintained and operated cooling water system *
Existing meters for make-up and blow down water *
Existing energy meters on chillers *
Maintenance records for the cooling water system including chemical and labor costs *

Program Information and Resources



buildings.energy.gov/hitcatalyst



gsa.gov/gpg