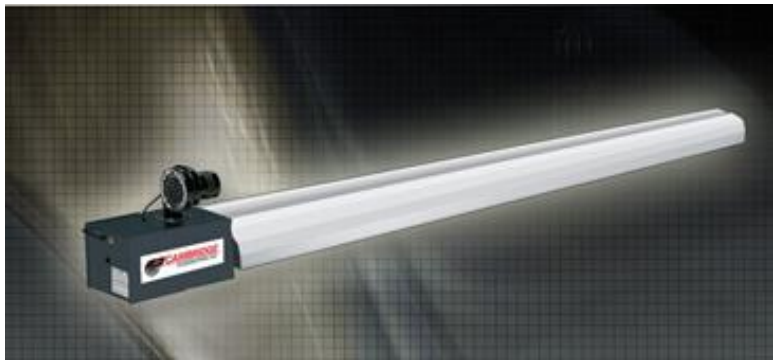
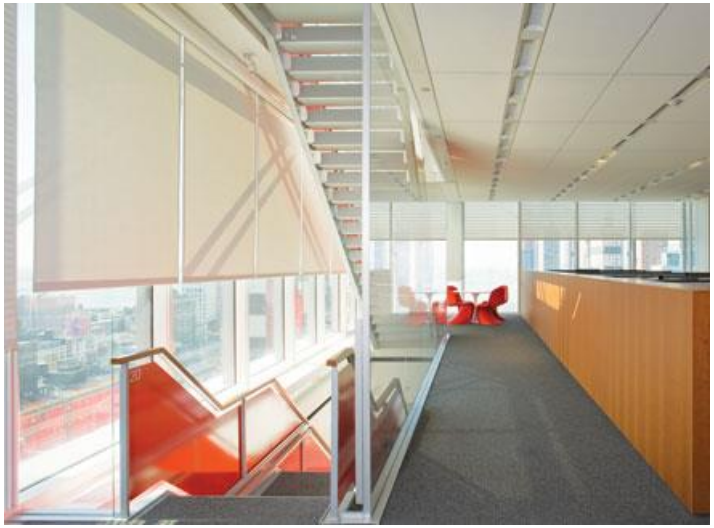
High Impact Technology (HIT) Catalyst





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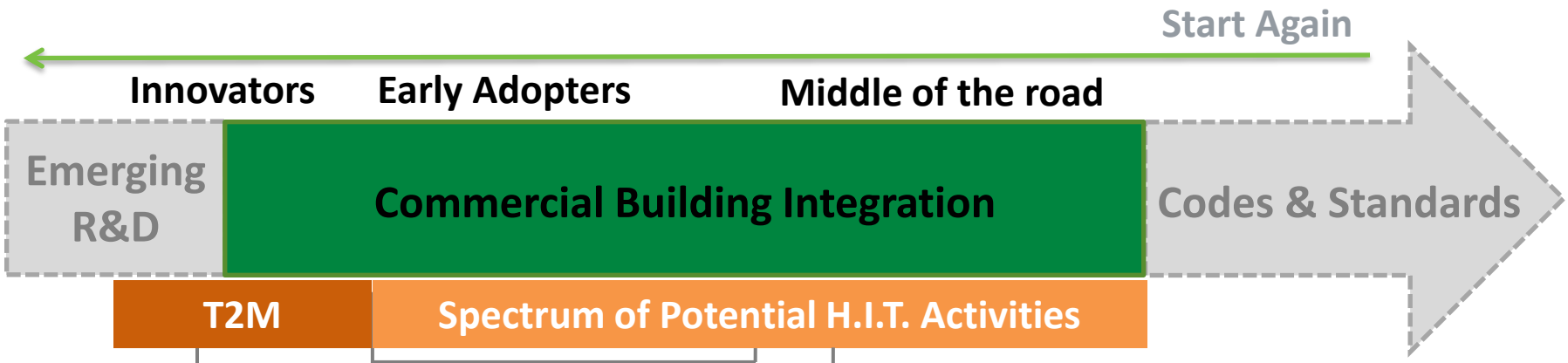
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Commercial Buildings Integration
Building Technologies Office


How can we catalyze the adoption of high impact commercial building technologies?
Owners
Managers
Designers
Engineers
Occupants
Financial Institutions
Government
Utilities
Stakeholder Engagement & Partnerships
Manufacturers
Dealers
Suppliers
Scientists

Building Technology Pathway and Program Strategy



Near-commercialized

Bridge the Valley of Death

- Technology Challenges
- (Lab or test bed demonstrations)
- (Commercialization plans)

Commercialized, under-utilized

Seed the market for new technologies

- Technology Demonstrations & Case Studies
- Purchasing Specifications
- Training / O&M resource to drive down costs
- Add to BTO tools - BCL/TPex/EnergyPlus and OpenStudio

Commercialized, not widely accepted

Accelerate market uptake

- Technology campaigns via partnerships with industry organizations
- Support voluntary incentives via partnerships such as CEE, REEOs, EE programs, etc.
- Create technology packages to hand off to Codes & Standards

() = potential new activities

Putting it all together: The HIT Catalyst

Goal: The High Impact Technology (HIT) Catalyst will identify and prioritize cost-effective, underutilized, energy-efficient technologies so that we can focus resource development and deployment activities.

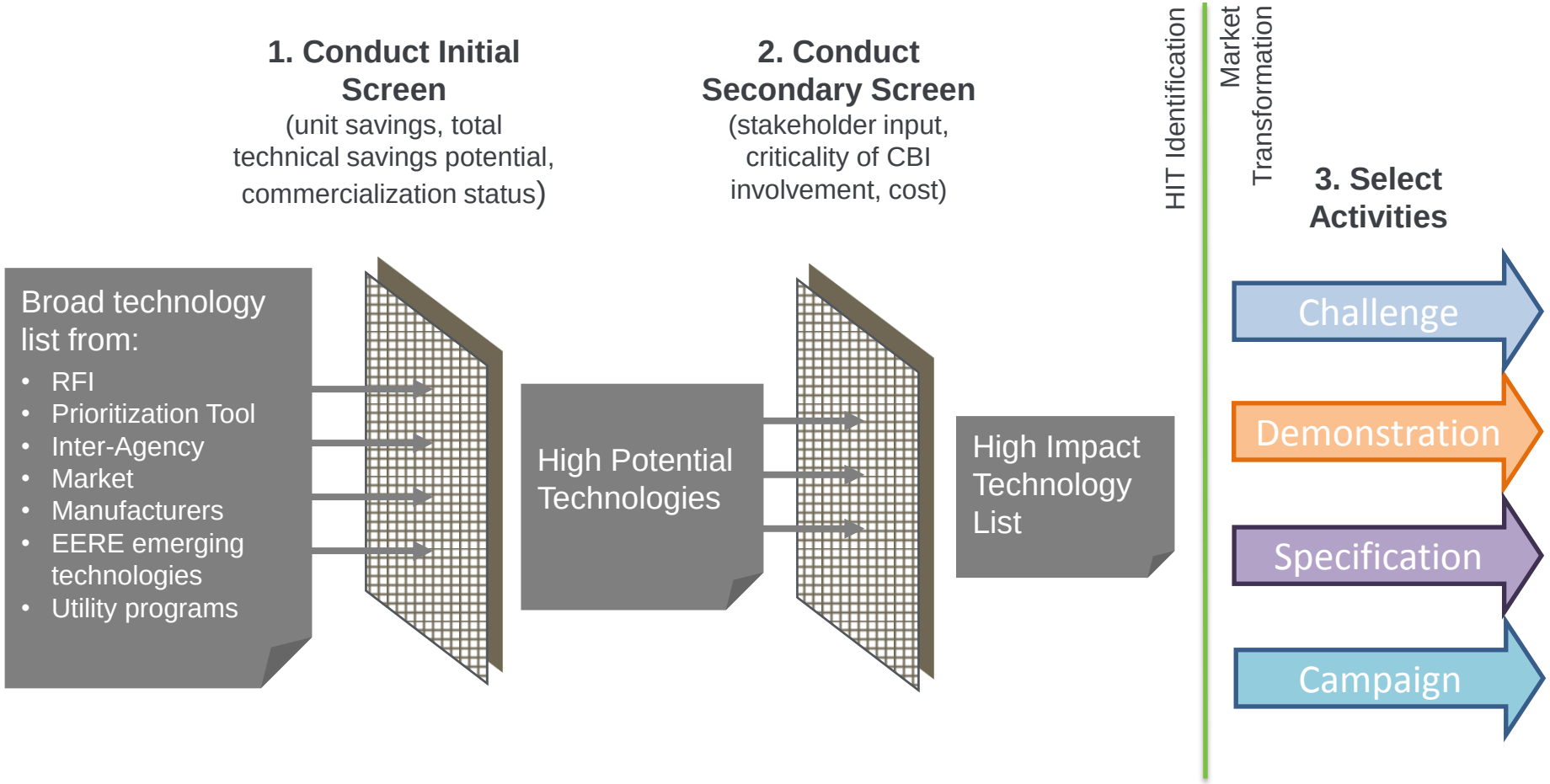
Methodology: Cohesive step-by-step strategies move techs from newly commercialized to full adoption. Each step in the tech-to-market pipeline has a purpose and connection to the next step; all are integrated into existing BTO deployment networks.

Target Market and Audience: Deploy HITs through partnerships with the commercial buildings industry via the Better Buildings Alliance, federal leaders, regional non-profits and efficiency organizations.

Outcome: Provide commercial building stakeholders with resources and proven deployment paths to accelerate implementation and market acceptance of HITs.

Identification and Evaluation of HITs

Identify HITs through a rigorous prioritization process; characterize HITs based on their stage in the product life cycle; develop appropriate resources; evaluate and implement the most effective deployment activities.



What is the most effective market transformation pathway?

Activities

Technology Demos

Theory of Impact: Building owners are uncertain about the performance of new technologies and risk adverse; real building performance information will make them more likely to adopt.

Technology Procurement

Theory of Impact: Template language that outlines the performance characteristics of proven and cost effective HITs streamlines purchasing, enables "apples to apples comparisons potentially lowering overall cost of adoption.

Technology Campaign

Theory of Impact: Once a company has successfully piloted a new technology through a campaign, they will replicate that technology throughout their building portfolio.

Outputs

Case Studies

Metric: Number of case studies Published

Specifications

Metric: Number of technical specs produced

Installations

Metric: Number of sites/sf/orgs committed

Key Outcomes

Greater organic adoption of HITs (*leading to greater energy savings)*

HITs support voluntary programs *(leading to greater adoption and energy savings)*

Collect HIT market transformation data *(leading to higher efficiency candidate levels and energy savings)*

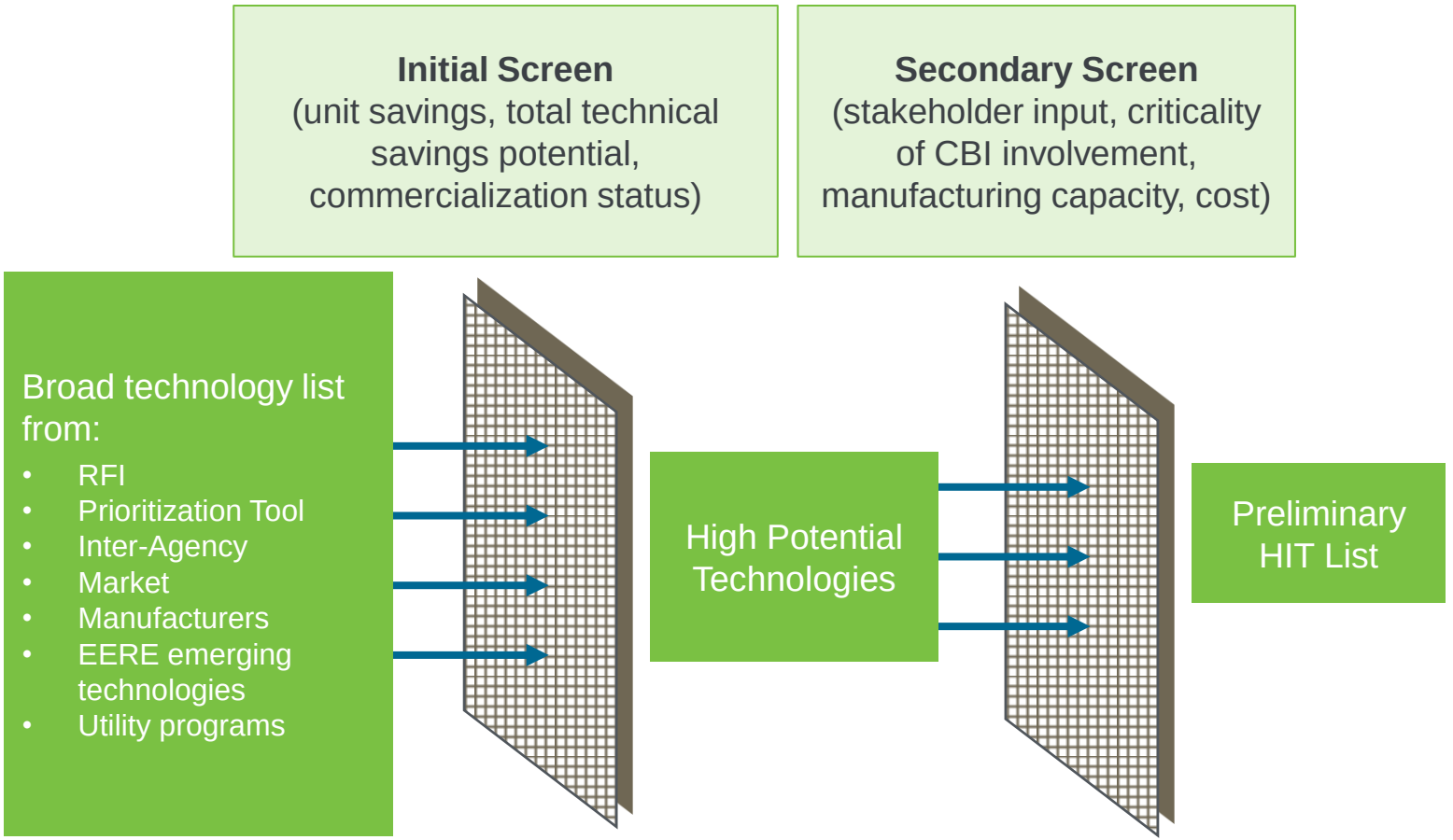
How we deploy? The RTU example

Screen → Plan & Develop → Implement → Track Market Uptake → Reduce Energy Consumption (BTO goal)

CBI DEPLOYMENT STRATEGY	Direct resource development and demonstration	Market stimulation via leading organizations	Deployment through leaders' portfolios and consideration for voluntary standards	Data feeds into market acceleration
ACTIVITIES	FY12-13: Produced Manufacturer's Challenge **SPECIFICATION** via ET and BBA.	FY14-15: **DEMONSTRATIONs** of winning units with building owners and federal partners.	FY14-16: Drive market uptake through the **Advanced RTU Campaign** for adoption of CEE Tier 2 RTUs or replacement with advanced controls	FY15-16: continue to campaign for Tier 2 replacements which support the adoption of a higher Tier 3 which matches Challenge Unit efficiency and drives overall efficiency higher.
IMPACTS	By end of FY13, 2 manufacturers had met the RTU Challenge. By FY14, 5 different manufacturers had produced units meeting the combined efficiency requirements of the specification (IEER = 18).	Measurement from demos prove average savings and reduce risk for owners; case studies help make the business case.	Campaign quantifies actual energy savings, market uptake trajectory, and adoption by market leaders. **If 100% of RTUs were replaced based on Advanced RTU Campaign targets, we would save .4-1 Quad of primary energy.**	Advanced RTU Campaign impact: 26,000 RTUs have been upgraded with high efficiency Tier 2 replacement units (minimum 20% savings) or retrofitted with advanced system controls (average 50% savings).

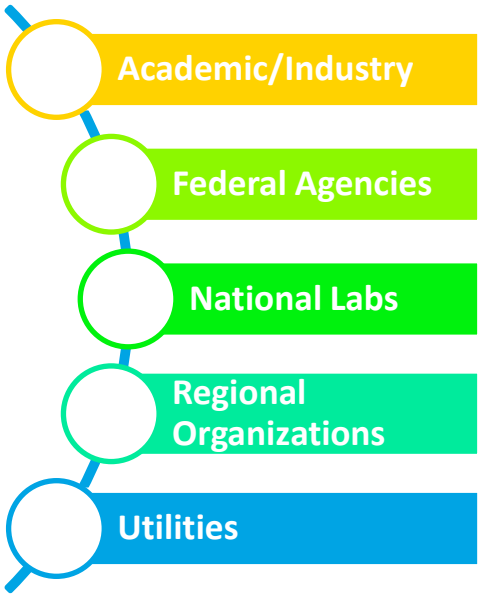
HIT Catalyst: Where We Are Today

The tech sweep and screens have been preliminarily conducted, information has been gathered from an RFI, and we have held workshops with a number of stakeholder groups to develop a ranked list of HITs.



Peer Workshops: Takeaways for Preliminary HIT List

- Remain aware of the need for **technology groupings, applications and packages** rather than specific technology types; address the synergies between technologies
- **Controls** in general – across all load types – are an area where much work needs to be done. There are many competing platforms, protocols, etc. and many different ways to implement the control systems (individual fixture/load level, building level, etc.). **End users are confused by the choices, afraid of technology obsolescence, and need guidance in this space.**
- Don't always assume that a pure technology solution is the answer. In some cases, **best practice or operational solutions can yield the same results at much lower costs.**
- Data on "real use" and end user behavior is extremely important in weighing the benefits of a technology, as the **gap between "real use" and "ideal use"** can be large.
- There is value in **enabling technologies** such as smart metering, though it may be difficult to quantify independently.
- Generally speaking, **there can never be too much independent, third-party demonstration data**.



HIT Priority List

Measure Name	Description
LED Troffers with Controls	Deploy high-efficiency (solid-state) 2x4 troffers with added controls
Packages of Building Management and Information Systems and Whole Building Diagnostics	Optimize whole-building management systems that enable the operation of multiple systems to minimize consumption based on occupancy, weather, fuel prices, etc.; includes adjustment of thermostats, schedules, set points, calibration.
Auto Sash Fume Hoods for Laboratories	Deploy restructured laboratory fume hoods with automatic sash closure. This technology has an automatic sash closure system on a VAV hood that is controlled by an occupancy sensor.
Shading & Awnings	Demonstrate energy reductions and other benefits to awnings and other shading devices on commercial buildings.
Refrigeration Controls & Display Case Retrofits	• Use variable speed compressors in select new commercial refrigeration equipment; • Retrofit display case doors with anti-sweat heaters, vinyl/composite door frames, and high-performance glass.
Heat Pump Water heaters	Deploy highest efficiency heat pump water heaters in residential and small commercial buildings

Future Plans

Annual HIT Matrix and Peer Review

- Incorporate stakeholder feedback (including workshop)
- Select HIT focus

Evaluate and update each year to reflect evolving market conditions and advances in technology.

Deployment Plan and Resource Development:

- Evaluate existing resources, gaps, barriers and potential partners
- Determine the most effective deployment channels

Select & Execute Deployment:

- Campaigns, Technology Demonstrations, Specifications
- Strategic Partnerships
- Better Buildings

…Hand Off and Start Over

Working with Better Buildings Partners

+**200 members** from the private sectors

Controlling **+10 billion square feet** of commercial building space

Working together through 4 sector groups and 13 solutions teams

Making commercial buildings **20% more efficient by 2020**

Better Buildings
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Join us for Tech Day at the Better Buildings Summit

May 29th, Washington D.C.

Leading Edge to Market-Ready: How Does Technology fit within the Federal Technology Framework?

- The roles of different federal agencies in accelerating efficient building technologies.
- Representatives from ARPA-E, ESTCP, GPG, FEMP and BTO

Innovative Energy Saving Technologies on the Market Now

- Updates on new real building demonstrations,
- Dynamic glazing, touchless audits and data centers.

What's next? Tech-to-Market Projects for Next Generation Results.

- A suitcase that retro-commissions small buildings,
- Advanced control systems for plug and play devices,
- New easy-to-install air barriers,
- Promising technologies from ARPA-E's Building Energy Efficiency Through Innovative Thermodevices (BEETIT) program.

Current Commercial Building Tech Demo Projects

- *Multi-load Washing Machines*
- *Ultra-low Temperature Freezers*
- *Daylighting and Lighting Controls Retrofits in Office Perimeters*
- *Gas Unit Heaters*
- *Heat Pump Water Heaters*
- *LED Downlights*
- *RTU Challenge Units (Publix)*
- *Advanced RTU Controls with Automated Fault Detection and Diagnostics*
- *HLR (HVAC Load Reduction) "Intelligent scrubber" modules added to HVAC systems*
- *Predictive Energy Optimization (PEO) and Automated Demand Response for Commercial Building HVAC*
- *Advanced Lighting Control (CALC): networked, intelligent lighting control systems*
- *µCHP (20-30kW) in light commercial hot water applications*
- *Advanced fan motor technology for 7-16 watt commercial refrigeration fan applications*