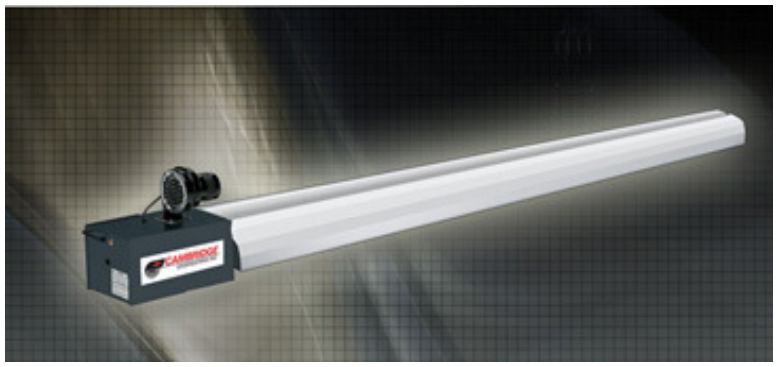
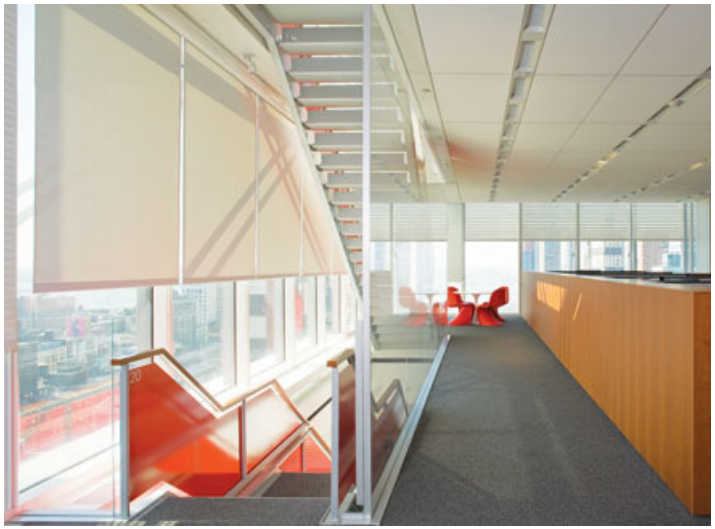
Commercial Buildings High Impact Technology (HIT) Catalyst

EE-1 Briefing





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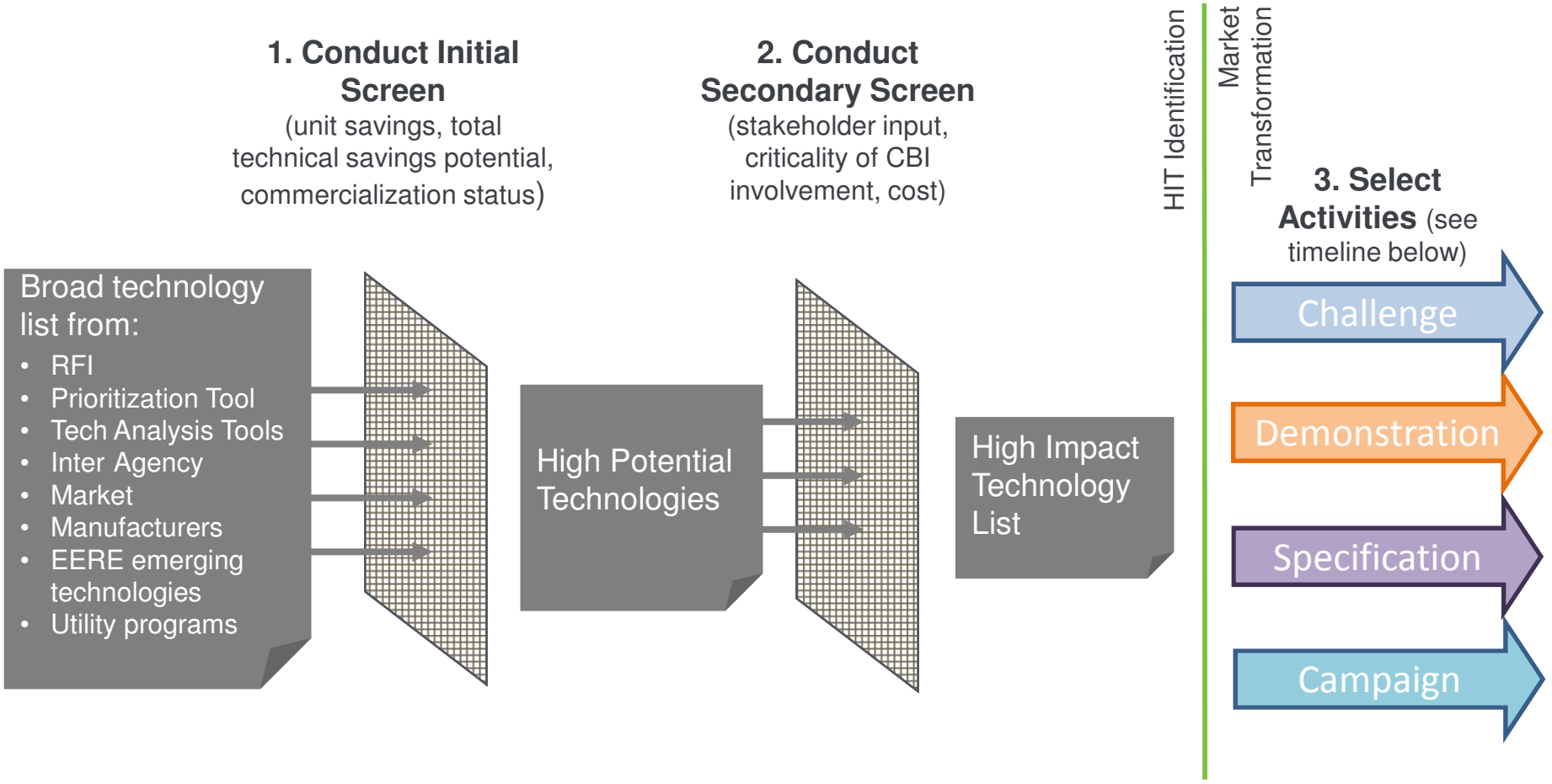
HIT Catalyst Approach

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.



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Evaluating the Next Technologies: Prioritization

Phase 1: The **HIT Matrix** helps us identify market ready technologies including:

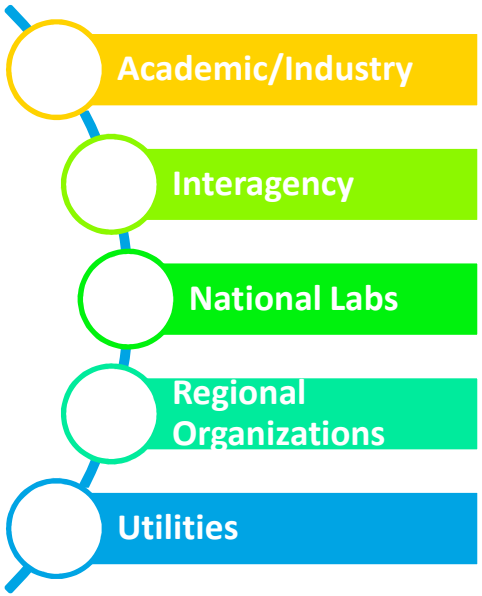
- information on technologies developed through work by the BTO Emerging Technologies team (P-Tool);
- technology-specific and national energy savings potential values;
- In total, over **400 measures** to evaluate.
- The Matrix includes two screens for: 1) energy savings opportunity and deployment readiness; and 2) market factors.

Phase 2: **Peer Workshops** provide perspective on market factors and feedback on priority technologies identified in the Matrix:

- Academia, Federal Agencies, Utility, Regional Energy Organizations
- 28 unique organizations and 50 individuals participated
- RFI open for input by building owners/end-users and technology providers

Major Takeaways from Peer Workshops

- 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 Prioritization Long, Short List

Measure Name	Description	National Savings Potential (Tbtu/Yr)	Market Criteria
LED Troffers with Controls	Deploy high-efficiency (solid-state) 2x4 troffers with added controls	**500-1000**	LED technology offers new controllability for whole building reductions; assess rapidly changing offerings and interactions.
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.	**1000+**	New data supports energy savings enabled through building information and control; simplify solutions for better cost-effectiveness and to address data overload by end-users.
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.	**100-500**	Fume hood improvements offers better management of laboratory ventilation; provide tools and resources on the availability, application of products, and energy benefits.
Shading & Awnings	Demonstrate energy reductions and other benefits to awnings and other shading devices on commercial buildings	**100-500**	Widely adopted in other parts of the world; assess barriers to end use in the U.S. which may include training, lack of real building energy savings/operation data, details on system-level savings.
Refrigeration Controls & Display Case Retrofits	• Use variable speed compressors in select new commercial refrigeration equipment; • Anti-sweat heaters, vinyl/composite door frames, and high-performance glass in display case doors	**100-500**	GHG and energy reduction potential for new and retrofit applications, 2-pronged approach with ET R&D coupled with CBI grocery partner demonstrations
Heat Pump Water heaters	Deploy highest efficiency heat pump water heaters in residential and small commercial buildings	**500-1000**	ET graduate; evaluate and demonstrate for applications with high hot water demand for cost-effectiveness

HIT Prioritization: what's not on the list and why

Measure Name	Why Not?
Other LEDs	• Market assessments show that LEDs are already on an accelerated trajectory for adoption
Challenge Unit RTUs	• Continue to deploy as part of RTU portfolio (controls, diagnostics, replacements, etc.) through the Advanced RTU Campaign • Needs more ET/Development to improve weight and size issues
Pumps	• Not enough technical savings potential compared to other techs that scored high.
Ultra-low temperature laboratory freezers (ULTs)	• Existing coordinated effort targeted at laboratory efficiency measures. • Not enough technical savings potential compared to other techs that scored high.
Solar PV	• We will continue to partner with the Solar program on commercial building applications until they have a program ready for transfer.

Next Steps


HIT Catalyst RFI
an open call for ideas for next year's HIT list
Better Buildings Webinar
announce our focus for next year and offer the opportunity for feedback on the RFI
BTO Presentations ET, Codes , Standards
Review the process, seek feedback
Phase II Kick Off
Use logic models to determine the most effective deployment channels

HIT Pathway: Market Channel Analysis

GOAL: Provide reliable information about high impact technologies through real world demonstrations and deployment activities to accelerate implementation and market uptake.

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 and the adoption of organizational policies.

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 incorporated into voluntary programs *(leading to greater adoption and energy savings)*

HIT data considered in Codes/Standards analyses *(leading to higher efficiency candidate levels and energy savings)*

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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 most effective deployment channels

Select & Execute Deployment:

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

…Hand Off and Start Over

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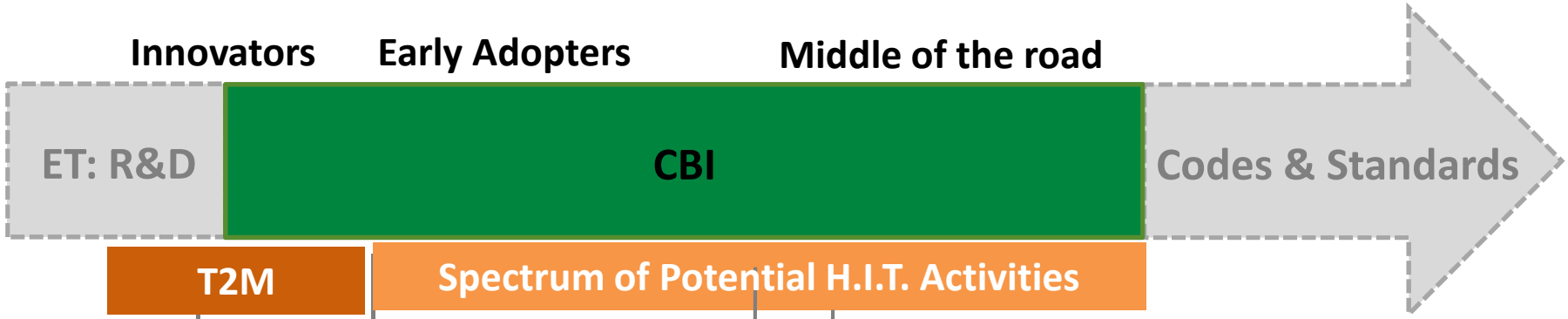
Appendix for Reference

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

CBI's HIT Catalyst - Overview

Goal: The High Impact Technology (HIT) Catalyst to identify and prioritize cost-effective (or with the potential to be cost-effective), underutilized, energy-efficient technologies so that we can focus on resources development and deployment activities.

Methodology: Quantitative, foundational criteria supports a transparent, collaborative and consistent method for directed decision-making. Cohesive step-by-step strategies move techs from newly commercialized or underutilized to national adoption. Each step in the 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, industry organizations, 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 for the best energy and cost impact. Smooth the path for higher levels of efficiency to be incorporated into Codes and Standards.

How HITs move through the Pipeline: Exterior Lighting

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 codes and standards efforts
ACTIVITIES	FY11-12: Produced parking light **SPECIFICATION** via BBA. FY12: Conducted **DEMONSTRATION** via Caliper program.	FY13-15: Campaign for uptake through the Lighting Energy Efficiency in Parking (LEEP) **CAMPAIGN** with market partners and BBA.	FY14-15: Utilities, REOs and OEMs reference specs to deploy efficiency levels broadly through voluntary programs and/or certification.	**FY15: Supply language and technical support for the adoption of a more efficient exterior lighting code requirement**
IMPACTS	Measurement from demos prove average savings and reduce risk for owners; case studies help make the business case. By end of 2012, 10 BBA members representing <5% of US parking space were using spec.	Campaign quantifies actual energy savings, market uptake trajectory, and adoption by market leaders. **If 100% of parking lots and structures nationwide switched to spec-level lighting, we would save over .85 quads and $4 billion/year.**	- Measure penetration rates with market leaders - Confirm tech penetration via market research - Demonstrate sufficient uptake for codes and standards consideration	Proposed LPDs push the code to a 30% more efficient Standard than adopted in 2013. The increased efficiency is justified by market adoption and cost information from the LEEP campaign.

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the RTU Pipeline

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 of RTU efficiency strategies and track impact through the **Advanced RTU Campaign** for adoption of CEE Tier 2 RTUs	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).