DOE Envelope and Windows Workshop

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

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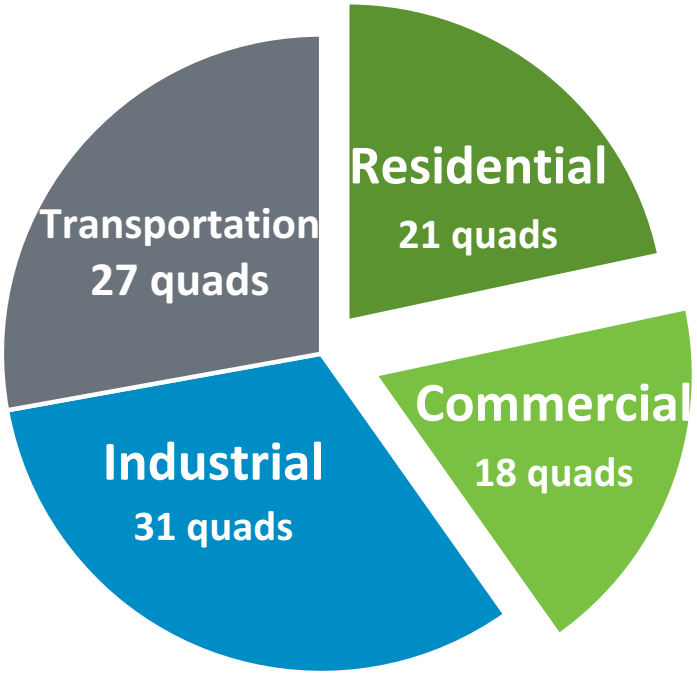
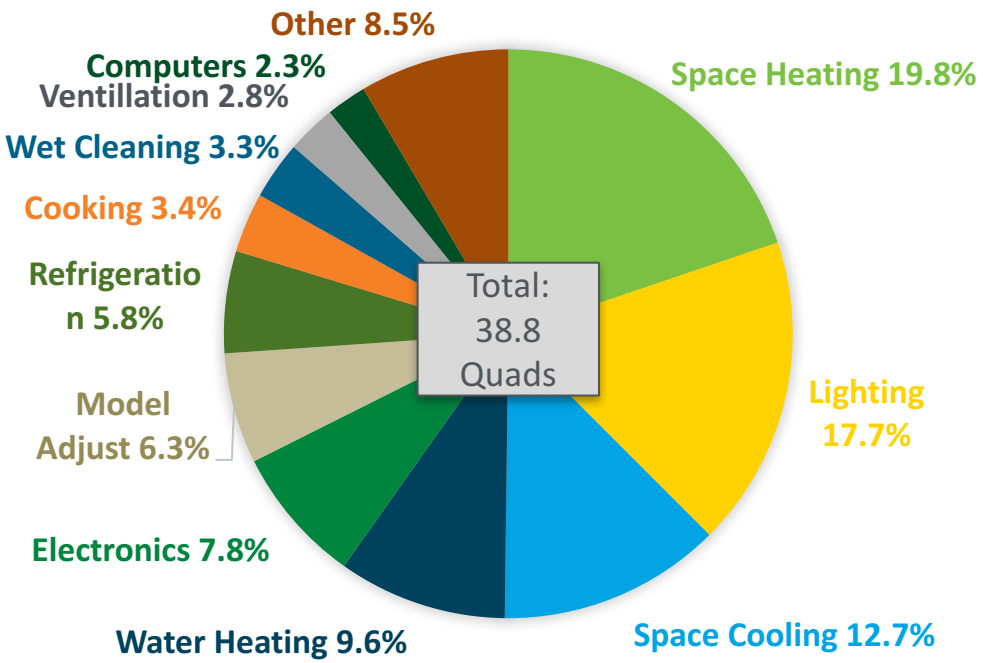
U.S. Energy and Electricity Consumption by Sector

Energy Use



Building Energy Use



Buildings Energy Use: 40% of U.S. total

Buildings Electricity Use: 75% of U.S. total

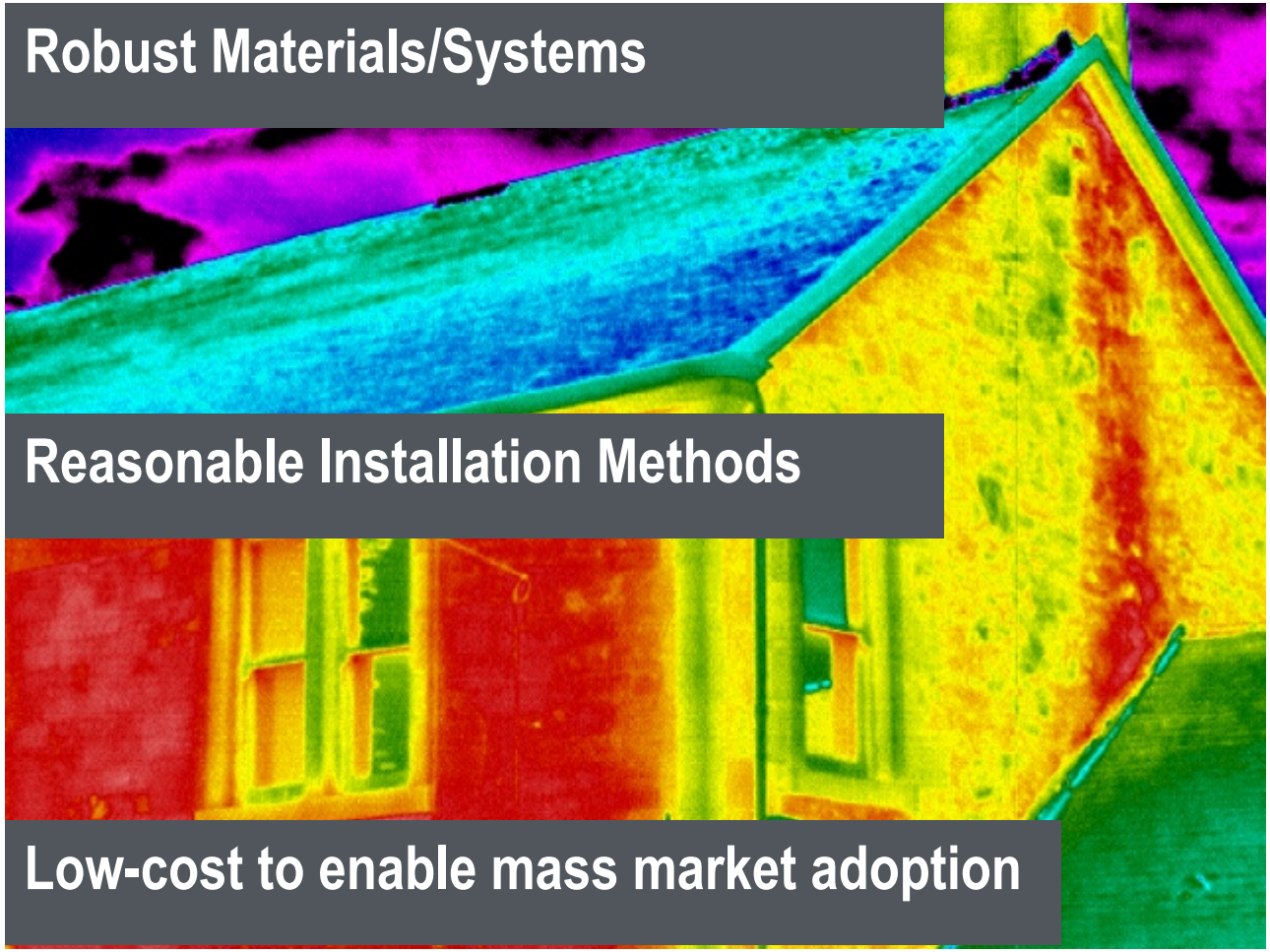
U.S. Building Energy Bill: $380 billion per year

Two Strategies for Reducing Energy Consumption

1. Make more efficient machines

Two Strategies for Reducing Energy Consumption

2. Be smarter about how we use energy



Energy use associated with the envelope (2010)

Opaque envelope 7.3 quads

Roofs	2.4 quads
Walls	3.3 quads
Foundation	1.5 quads

Air Infiltration 4 quads

Windows 4.3 quads

Windows & Building Envelope Program Goal:

25% Reduction in Energy Consumption due to Building Envelope by 2030

- Building Envelope
- Commercial & Residential Sectors
- New Buildings & Retrofits

Requires next-generation energy efficiency technologies for **mass-market adoption**

Priority areas for envelope R&D based on roadmap

Technology	2025 Installed Cost Premium Target	2025 Performance Target
Highest Priority R&D Area		
Building envelope insulation	≤ $0.25/ft^2	• ≥ R-12/inch thermal insulation material for retrofitting walls • Meets durability requirements • Minimizes occupant disturbance
Air-sealing technologies	≤ $0.5/ft^2 finished floor	• Residential < 1 ACH50 • Commercial: < 0.25 CFM75/ft^2 • Concurrently regulates heat, air, and moisture
High Priority R&D Areas		
Highly insulating Roofs	≤$1//ft^2	• An energy use reduction equivalent to doubling current ASHRAE R-values

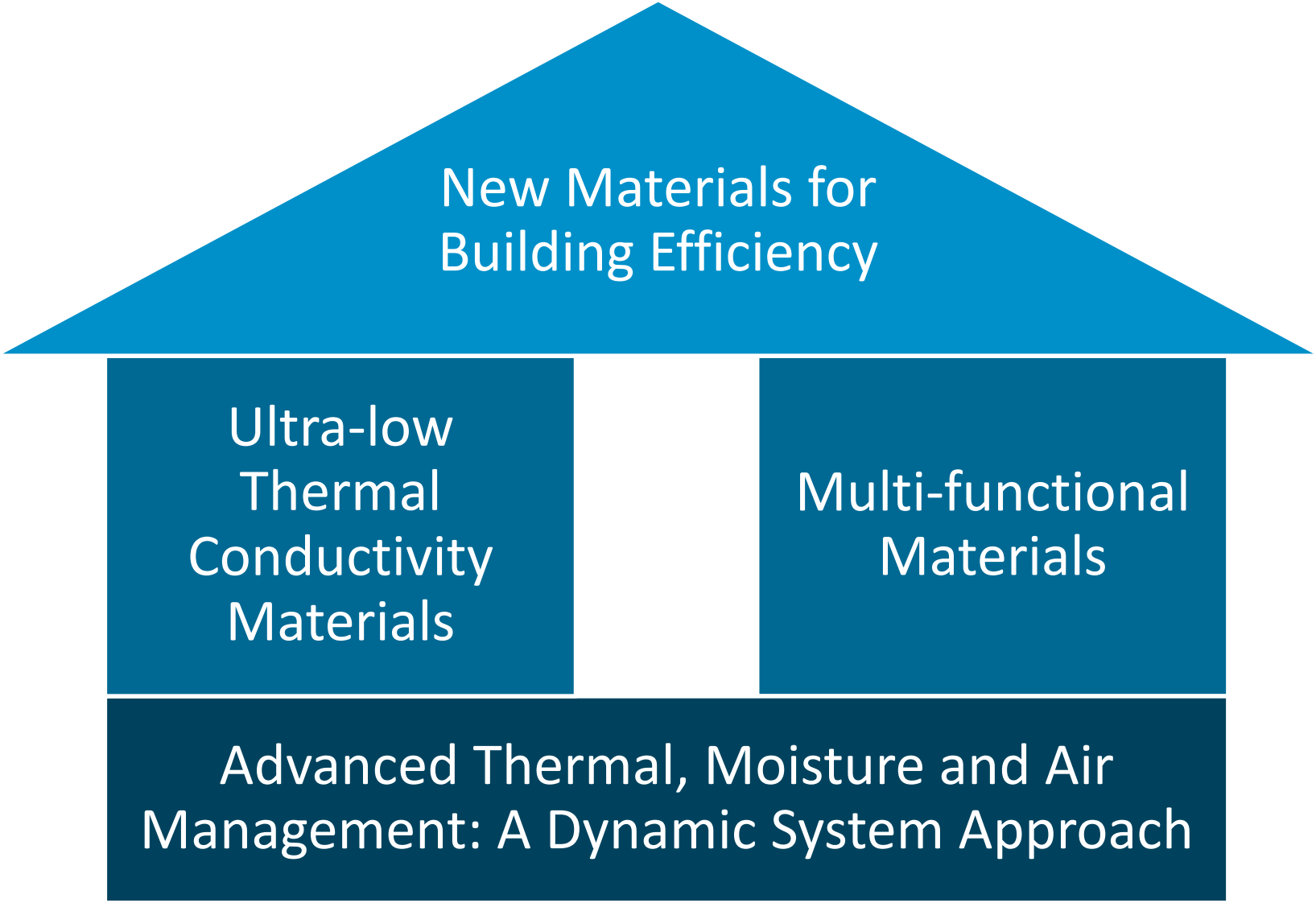
Metrics and targets for 2020 and 2025

Metrics, Statuses, and Targets: Building Envelope				
Project Area	**Metric**	**Status**	**2020 Target**	**2025 Target**
Building Envelope Material for Retrofit Applications	R/in	R-6/in	R-8/in	R-12/in
	Installed cost premium ($/sq. ft.)	$1.1	$0.35	$0.25
Air-Sealing System: Residential	ACH50	7	3	1
	Installed cost premium ($/sq. ft. finished floor area) Incl. mechanical ventilation	$1.4	$0.5	$0.5
Air-Sealing System: Commercial	CFM75 per 5-sided envelope;	1.38	0.25	0.25
	Installed cost premium ($/sq. ft. 5-sided envelope) incl. mechanical ventilation	$1.40	$0.60	$0.50
Highly Insulating Roof: Commercial	R-value (climate zones 2; 6);	R-17	R-35; R-45	R-50; R-60
	Installed cost premium over today's roofs ($/sq. ft.)	$4.4	$3	$1

Building Envelope Needs

- Quick and easy building envelope retrofit solutions that reduce cost and complexity
- "Seamless" interfaces/transitions between functional areas (e.g., roof-walls, walls-windows, walls-foundation)
- Novel approaches for measuring envelope infiltration
- Cost-effective air-sealing technologies that are well-suited to retrofit applications (remediate flaws and infiltration points)

Building Envelope R&D Areas of Interest to BTO



At the end of the our two days together…..

- Input to Roadmap update
- Topic areas for possible inclusion in R&D portfolio
  - Idea/technology solution/gap addressed
  - Technology impact/benefit
  - Technology pathway to success
  - Key metrics & targets
- Relevant cross-cutting perspectives
  - Residential & Commercial
  - Retrofit & New Construction

Contact Information

Thank you!

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