



DOE Buildings Program and Windows R&D Update

NFRC – San Antonio, TX

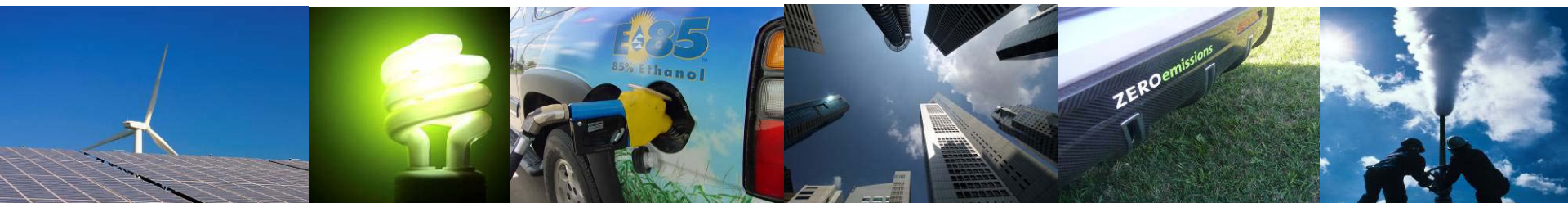
16 November 2009

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Building Technologies Program

Office of Energy Efficiency and Renewable Energy





Electric Power Generation

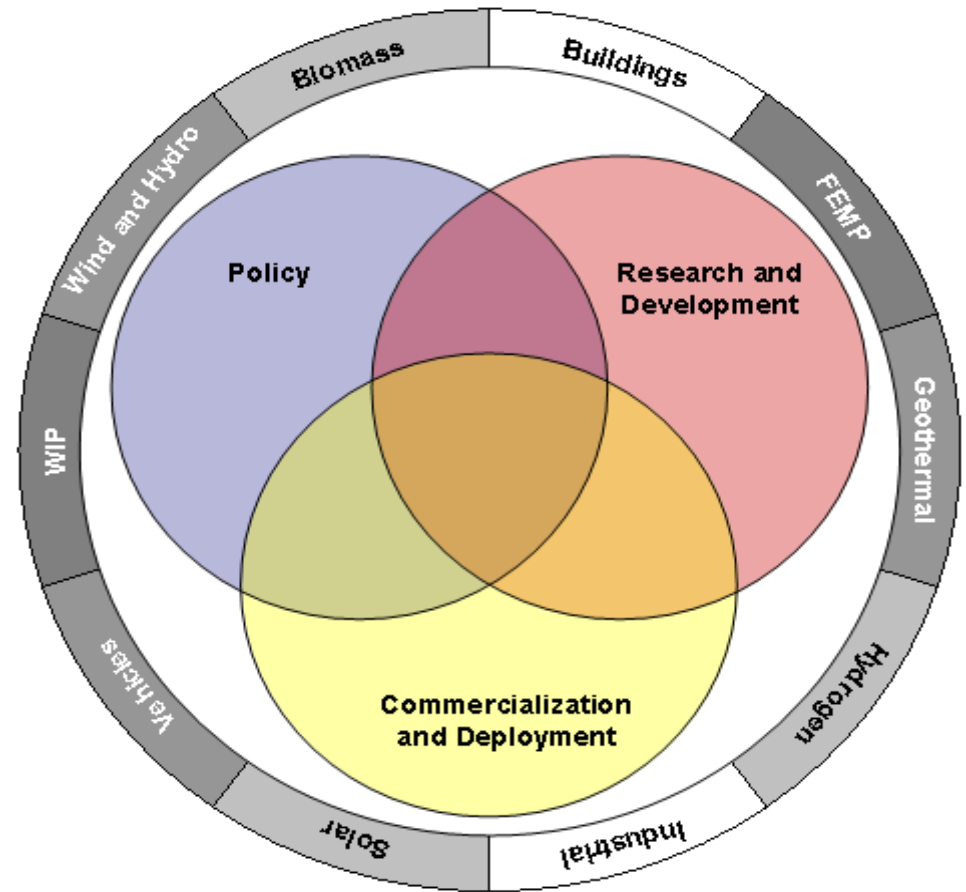
- Geothermal
- Solar
- Wind
- Hydropower & Advanced Water Power

Advanced Transportation

- Biomass
- Fuel Cells
- Advanced Vehicles

Energy Efficiency

- Buildings
- Industrial
- Federal Energy Management
- Weatherization and Intergovernmental

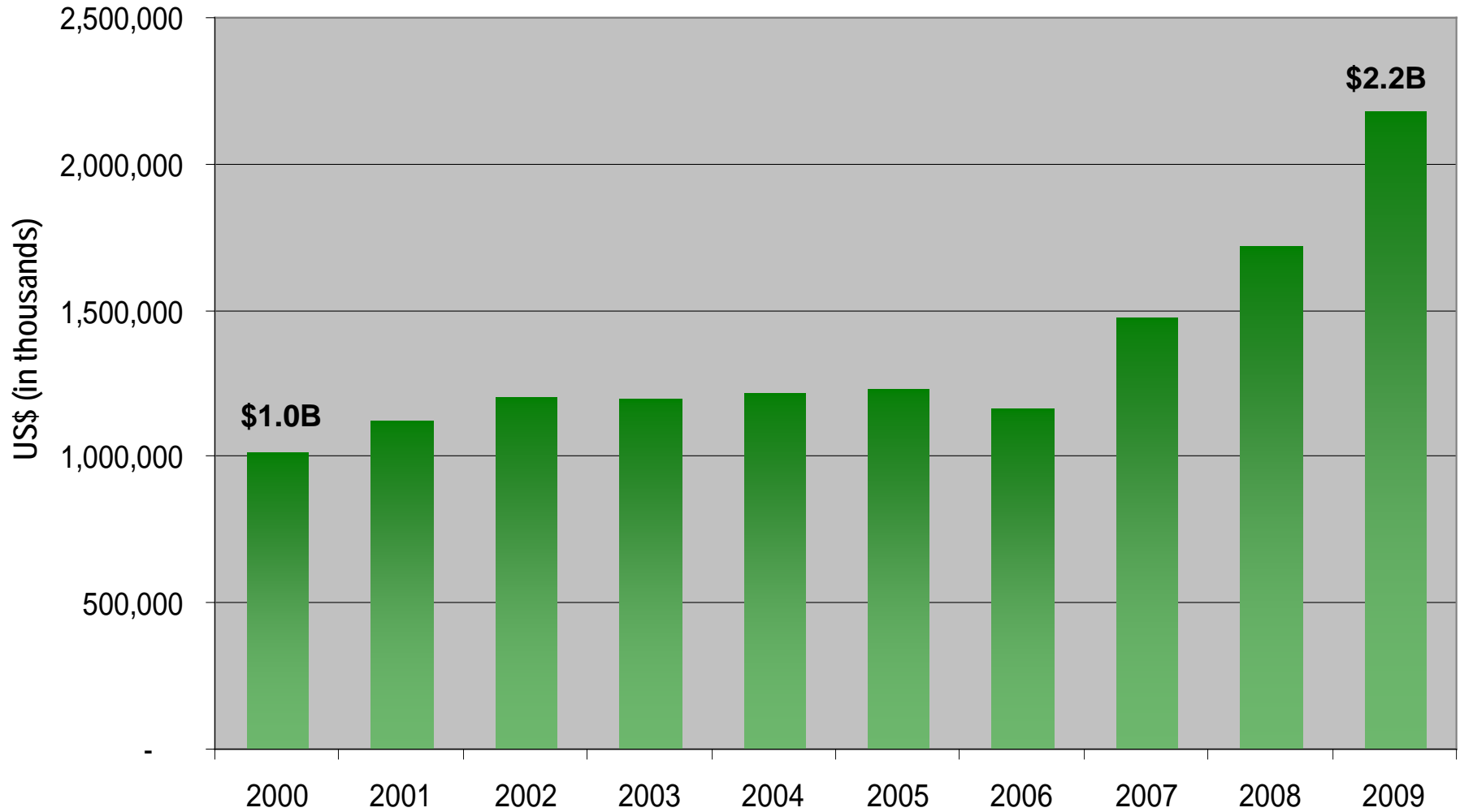


Mission Statement

To develop cost competitive technology, facilitate commercialization and deployment to the marketplace



EERE Budget History (2000-2009)

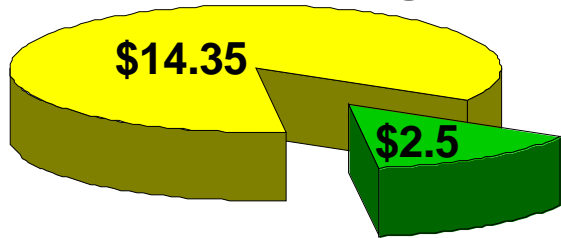


In addition to FY09 funding, EERE received \$16.8 billion in funding through the American Recovery and Reinvestment Act of 2009



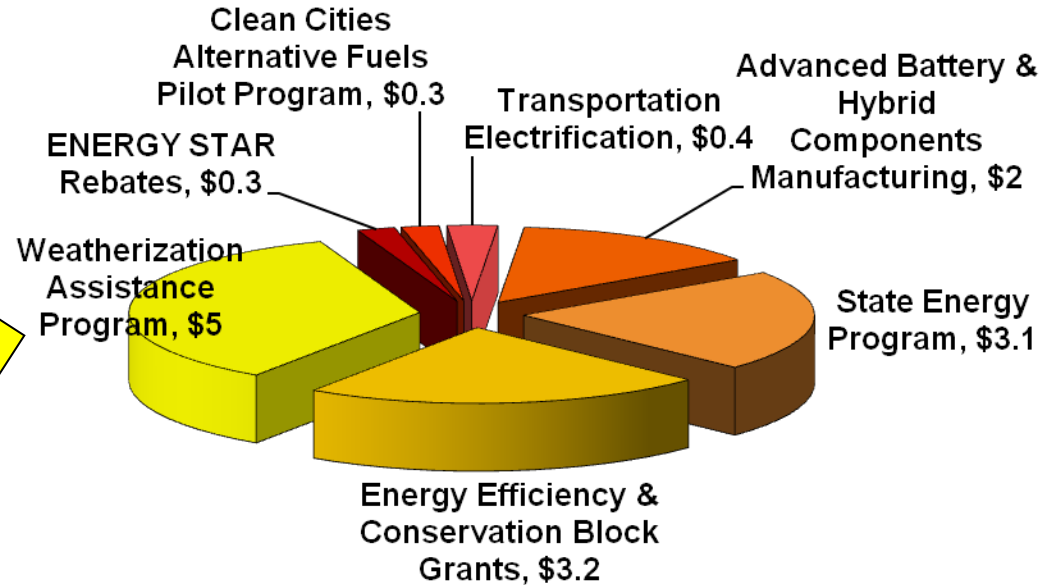
EERE Recovery Act Funding

\$16.8B EERE Recovery Act Funding

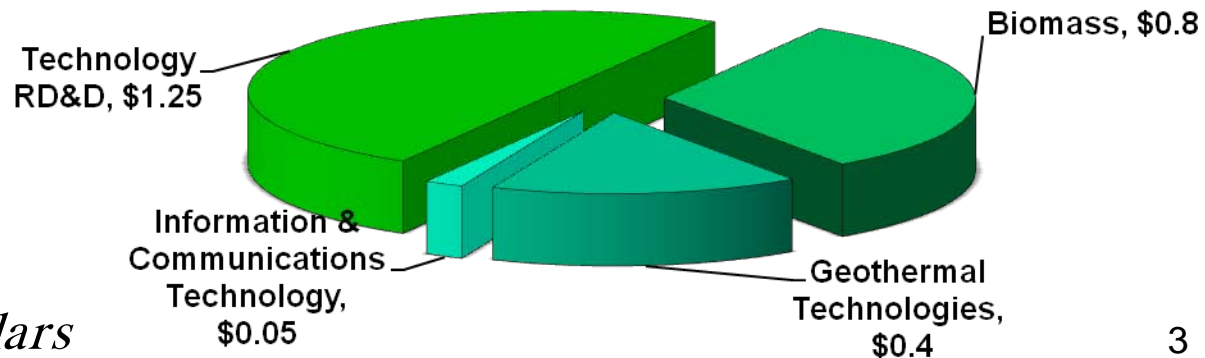


- EERE Discretionary RD&D
- EERE Directed Funding

\$14.35B Directed Funding



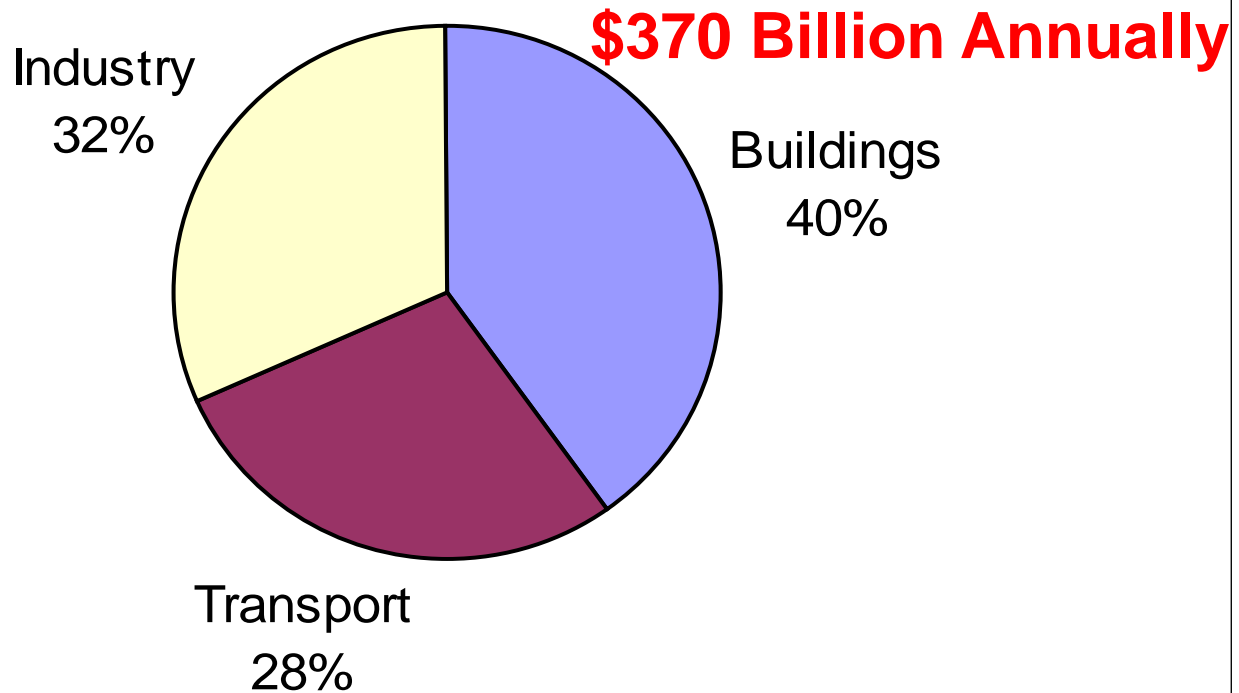
\$2.5B Discretionary RD&D



Amounts are in billion US Dollars

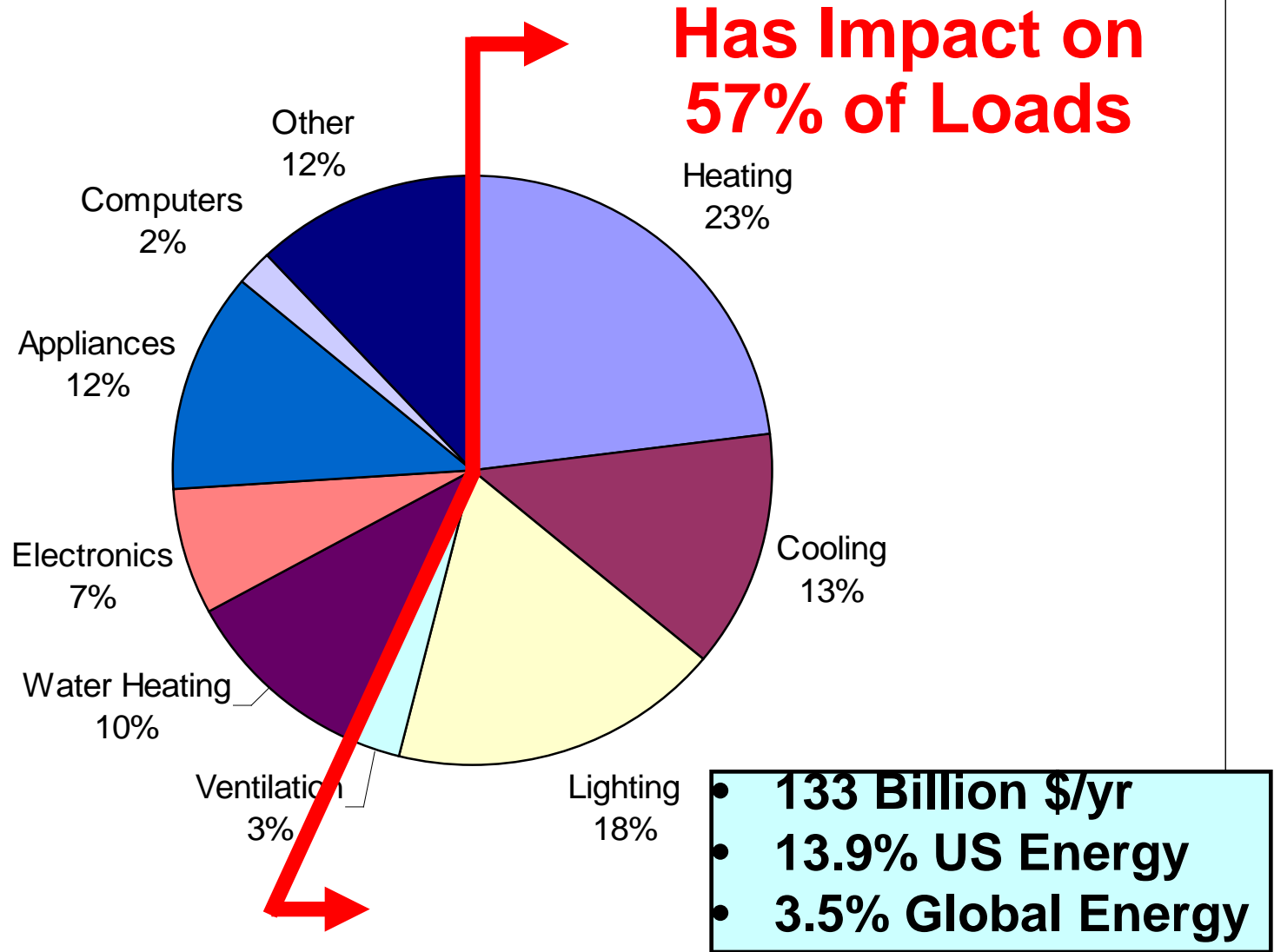


Electricity – 72% for Buildings
Natural Gas – 55% for Buildings





Building Consumption – Envelope Relationship





Net-Zero Energy Buildings by 2025

Net-Zero Energy Homes by 2020

Low incremental cost.





Major Areas of Building Technologies Program

Research & Development

- Emerging Technology (Component R&D)
 - Lighting R&D (Solid State Lighting)
 - Envelope R&D (Windows and Thermal Materials)
 - HVAC and Water Heating R&D
- Residential Integration (Building America)
- Commercial Integration (National Accounts)
 - Retail, Schools, Office Buildings, etc
 - Energy Plus Software

Deployment

- Technology Validation & Market Introduction
 - ENERGY STAR (DOE Role Test Procedures, etc)
 - Building Codes

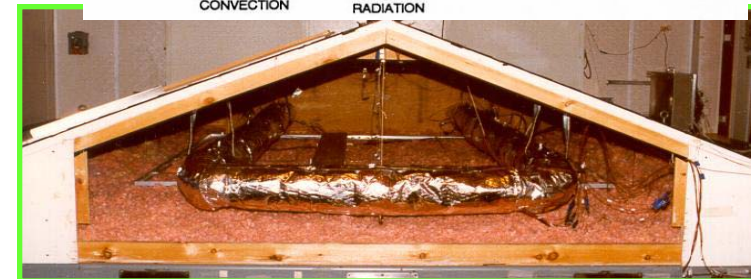
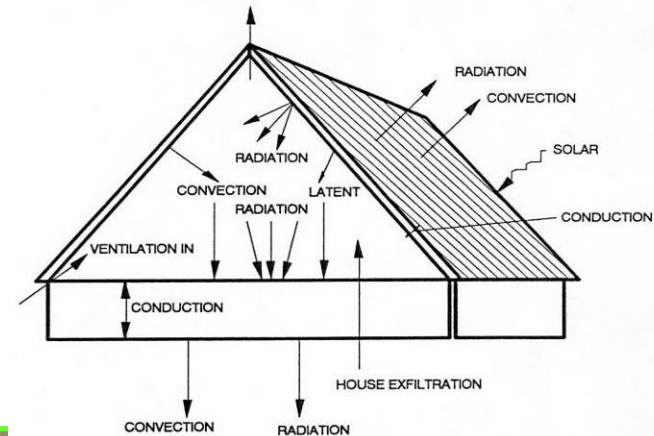
Regulatory

- Appliance and Equipment Standards



Thermal Envelope R&D

- Advanced walls to reach R20 in 3.5" cavity, exterior insulation systems, R30 total wall
- Next Generation of Attic/Roof System to save 50 Percent Energy
- Renewed interest in Cool Roofs
- New Material Development
 - 100 R&D Award in 2009 for phase change insulation
 - Higher performing foams and aerogels
 - Dynamic membranes





Next Generation of Windows

- **Highly Insulating**
 - Goal U value 0.10 (SI U value 0.56)
 - Possible vacuum glazings
- **Dynamic solar control**
 - Passive heating
 - Dramatic peak cooling reduction
 - Market ready, prices will drop with more investment



Prototype – Concept Window
(Highly Insulating and Dynamic
U Value 0.18 (SI U value 1.0)
SHGC 0.04 – 0.34)
Low cost unsealed center lite





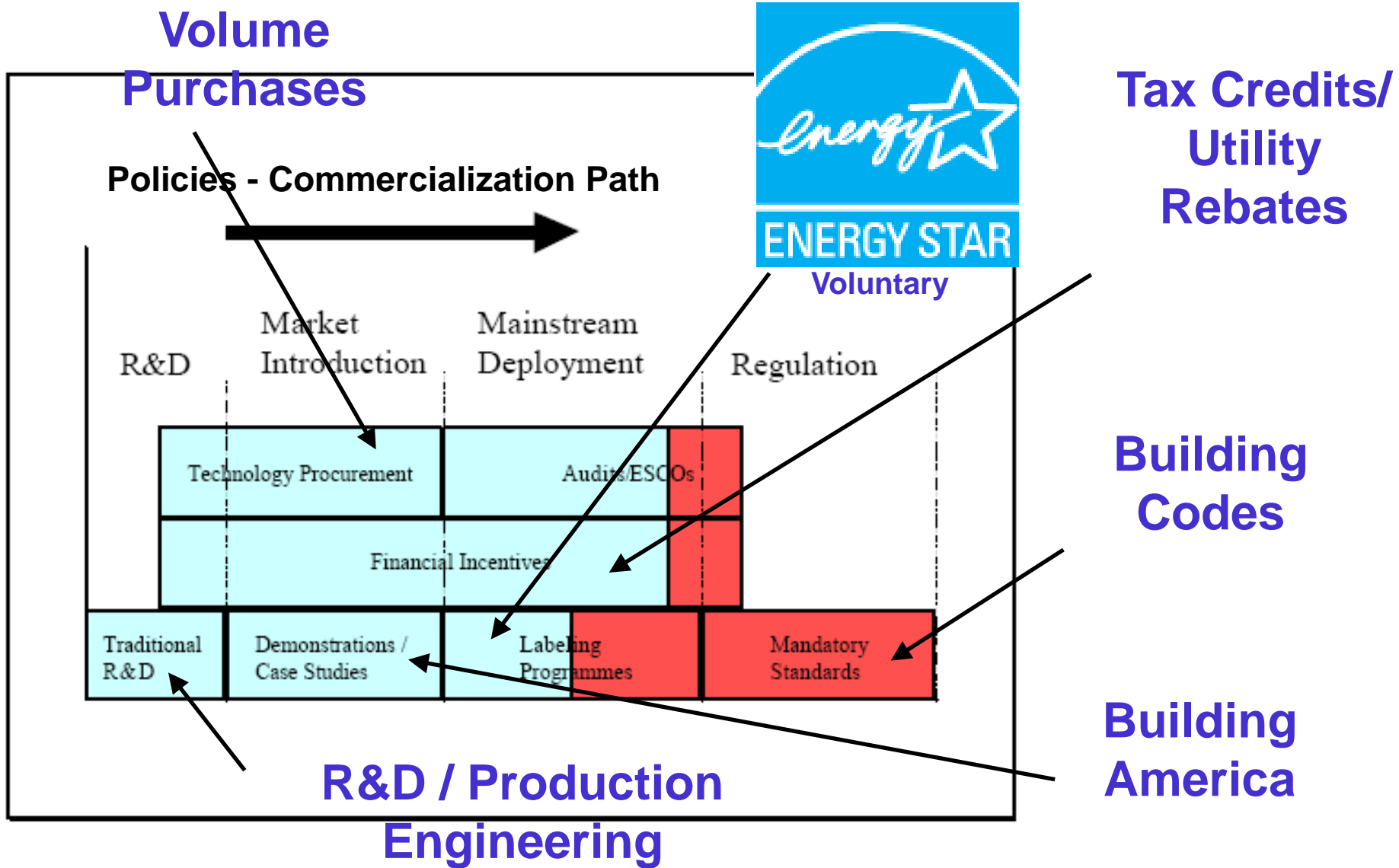
Total Building Envelope and Window R&D Budget

	Administration Budget Request	Enacted Appropriations	
FY04	5.1M	8.2M	
FY05	5.0M Windows 0 Envelope	5.8M Windows 2.8M Envelope	
FY06	5.0M Windows 0 Envelope	*3.8M Windows (*earmarks) 2.9M Envelope	
FY07	4.7M Windows 2.4M Envelopes	4.7M Windows 2.4M Envelope	
FY08	4.7M Windows 2.4M Envelopes	4.7M Windows 2.4M Envelope	
FY09	5.2M Windows 3.4M Envelopes	5.5 Windows 4.5 Envelope	
FY 10	10.5M Windows 5.5M Envelope	Core 10.5M Windows 5.5M Envelope	ARRA ~ 20M ~15M





Efficiency Policies for Windows





Integrated Programs to Reduce Price of Highly Insulating Windows

Building America demonstrations/ production housing for easy markets

High-performance specs in LEED for Homes & NGBS

**Production Engineering RFP – 50%
Cost Share**

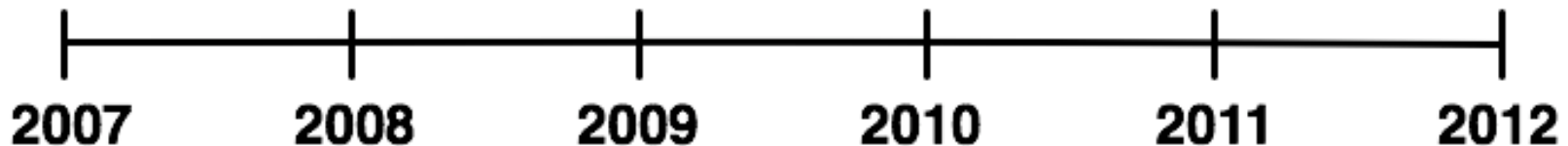
**Technology Procurement/Volume Purchases
– Multifamily/Public Housing/Condo, Builders, etc**

**Develop
advanced utility
program specs**

**Utility programs for advanced
windows**

**ENERGY STAR spec
revision**

New ENERGY STAR / Phase II





Oak Ridge National Laboratory / Building America Window Whole Demonstrations

- Highly Insulated Window Demonstrations
- System affects – central ducts, reduced HVAC capacity, improved comfort
- Future project – highly insulating ($>R5$) and dynamic control





2009-2010 Fenestration Tax Credit

- Raised limit for home improvements to \$1500
- Increased to 30 percent of product cost
- Does not cover installation costs
- Removed individual caps on windows and doors
- Established U-factor and SHGC at 0.30 or less
- Took effect February 17, 2009, through end of 2010



Highly Insulating R5 Production Engineering Solicitation

- DOE Selected GED Integrated Solutions in partnership with PPG, and other major window companies
- Goal – Affordable R5 (U value of 0.22 or less for operable window and 0.20 or less for fixed window) with price premium less than \$4/ft² compared to conventional double pane low e
- Multiple paths to market, window companies and IGU sales
- Product availability 12 – 24 months
- Second round RFP closed Aug 18th
- 50% cost share requirement
- Strong response, evaluation underway





R5 (~U 0.2) and Low E Storm Volume Purchase



www.R-5WindowsVolumePurchase.com



- Wait longer for phase II and let triple pane market mature (new products likely 6 – 18 months)
- Pursue window film and low e storm program for lower cost retrofit options – large disparity of products
- Need NFRC U value rating for low e films and storm products
- Commercial ENERGY STAR ?

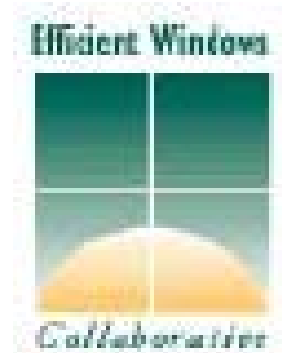
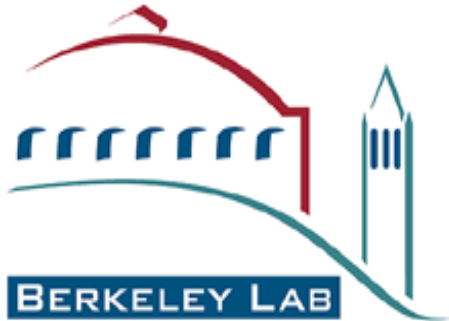


Key Policy Needed to Support Highly Insulating Window in the Future

- Could extend tax credits 2011 – 2013 for triples
- Utility Rebate Programs 2010 – 2013
- To keep policy easy, require low U values (0.20 – 0.24) with any SHGC requirement
- Stimulus program makes sense for the whole country
- Energy Policy only needs to address critical technology development problem (Low U values for mixed and cold climates)



Technical Support Activities



- Full range of software support tools, education materials and expansion to new product categories
- Continued financial support
- New NFRC five year agreement with DOE, late FY09 funding of 622K for FY10, FY11 - TBD



International Activity

Renewed Interest from New Administration

- Recent years with NFRC support
 - Australia
 - India
 - China
 - South Africa
 - Middle East
- Go beyond Fenestration to Whole Envelope Activity
 - Cool Roofs
 - Passive structures in hot climates (low e, window films, cool roofs, reflective walls, radiant barriers, exterior insulation, etc)
 - Envelope certification – India project under the Asia Pacific Partnership on Clean Development and Climate



Final Remarks

- The USA has initiated unprecedented investment in energy efficiency and renewable energy
- New technology will be essential to achieve zero energy buildings – major investment with Stimulus Funding (ARRA)
- Fenestration industry can play a major role in implementation and new product development
- Need greater incentives for 2011 – 2013 time frame
- Greater focus on international collaboration to promote efficient building envelope systems



U.S. Department of Energy

Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

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