

Roofing - a View from the Top

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Presentation summary

- **Why is building and roof energy efficiency important**
- **What's DOE doing about it**

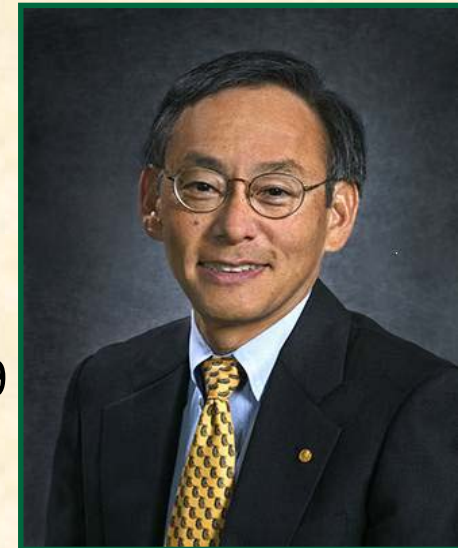
Facing our energy challenges

“We're using 19th and 20th century technologies to battle 21st century problems like climate change and energy security.”

Remarks of President Barack Obama,
Signing of the American Recovery and
Reinvestment Act, February 17, 2009

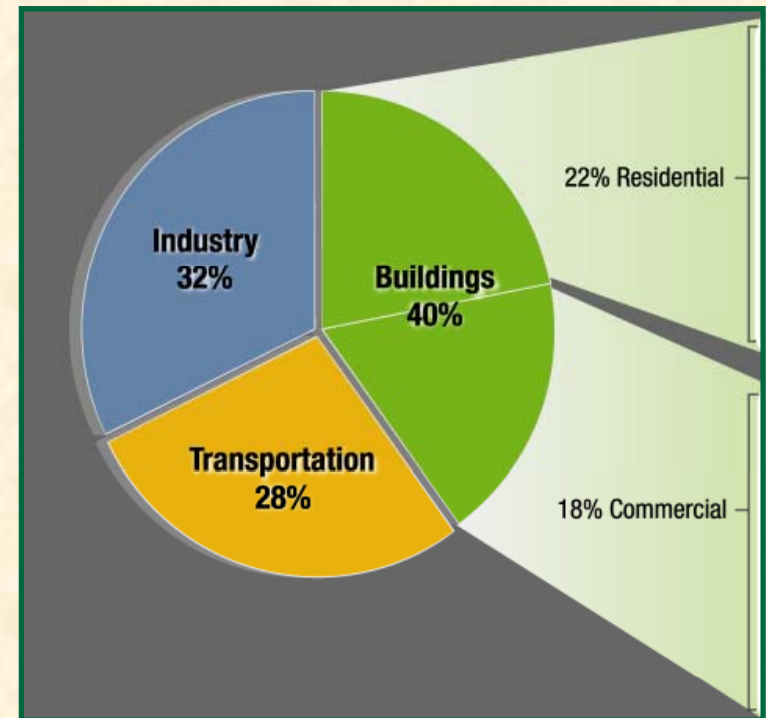


“Make it white,”
Secretary Steven Chu, Daily Show, July 21, 2009

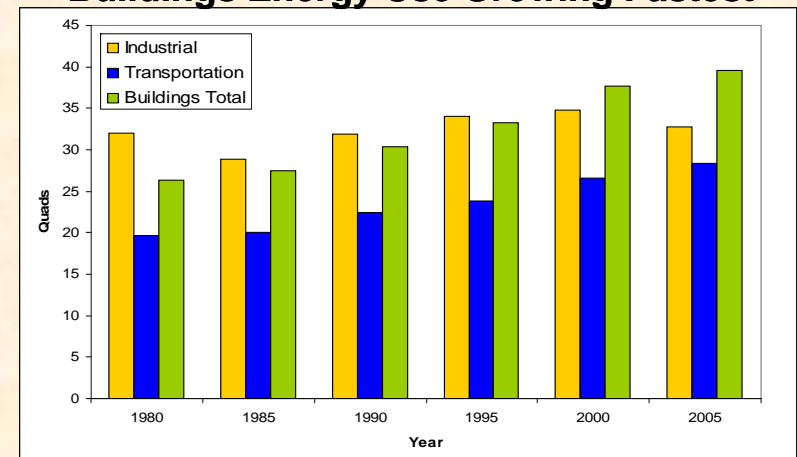


US reality- energy efficiency

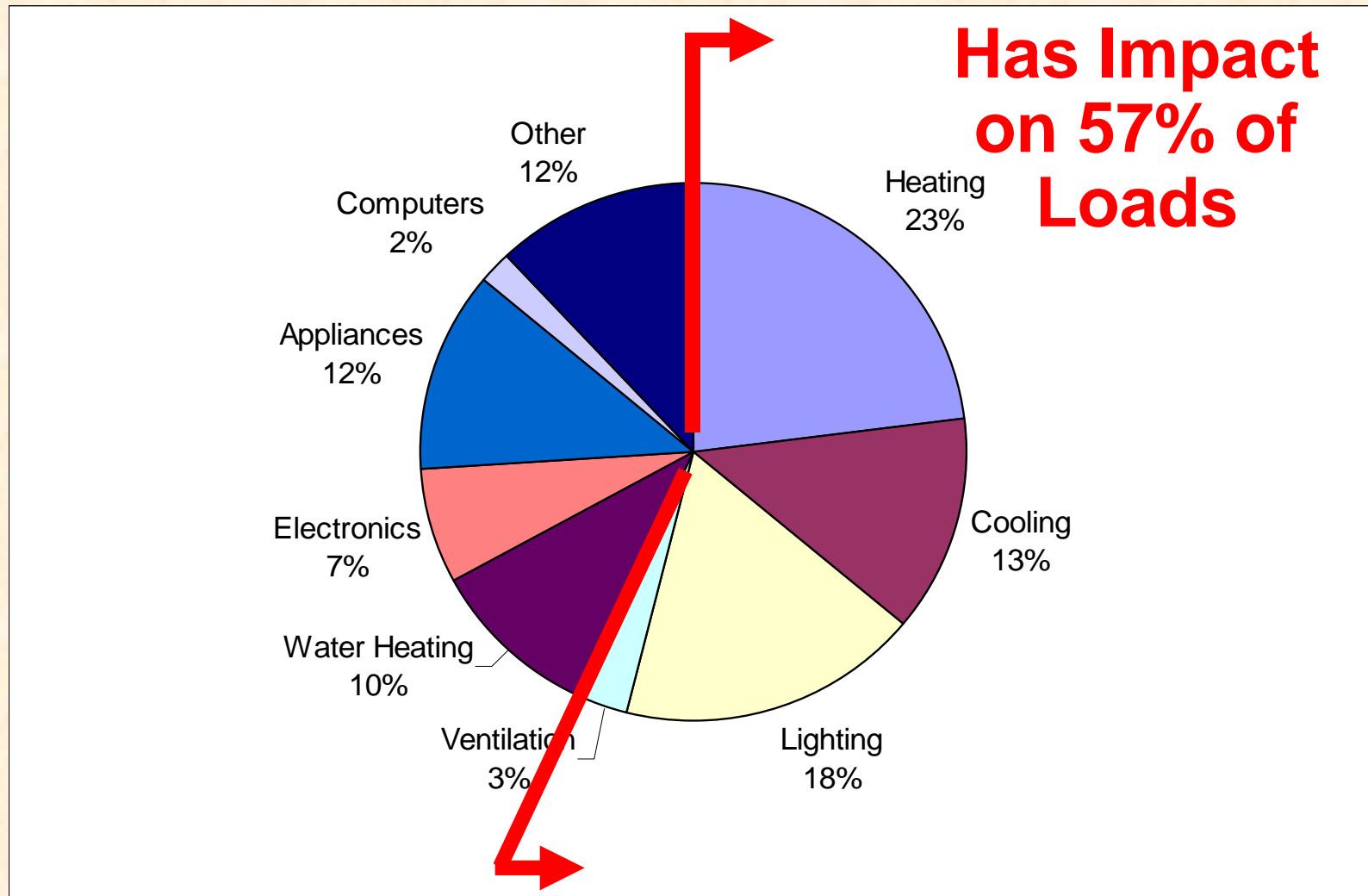
- The U.S. has **5%** of the world population
- The U.S. consumes **20-25%** of the earth's resources
- Buildings consume **73%** of the US electricity generation (**34%** Natural Gas)
- **39%** of U.S. CO₂ emissions are from the energy required by buildings
- Solution to get every building on the path toward energy efficient-ZEB.



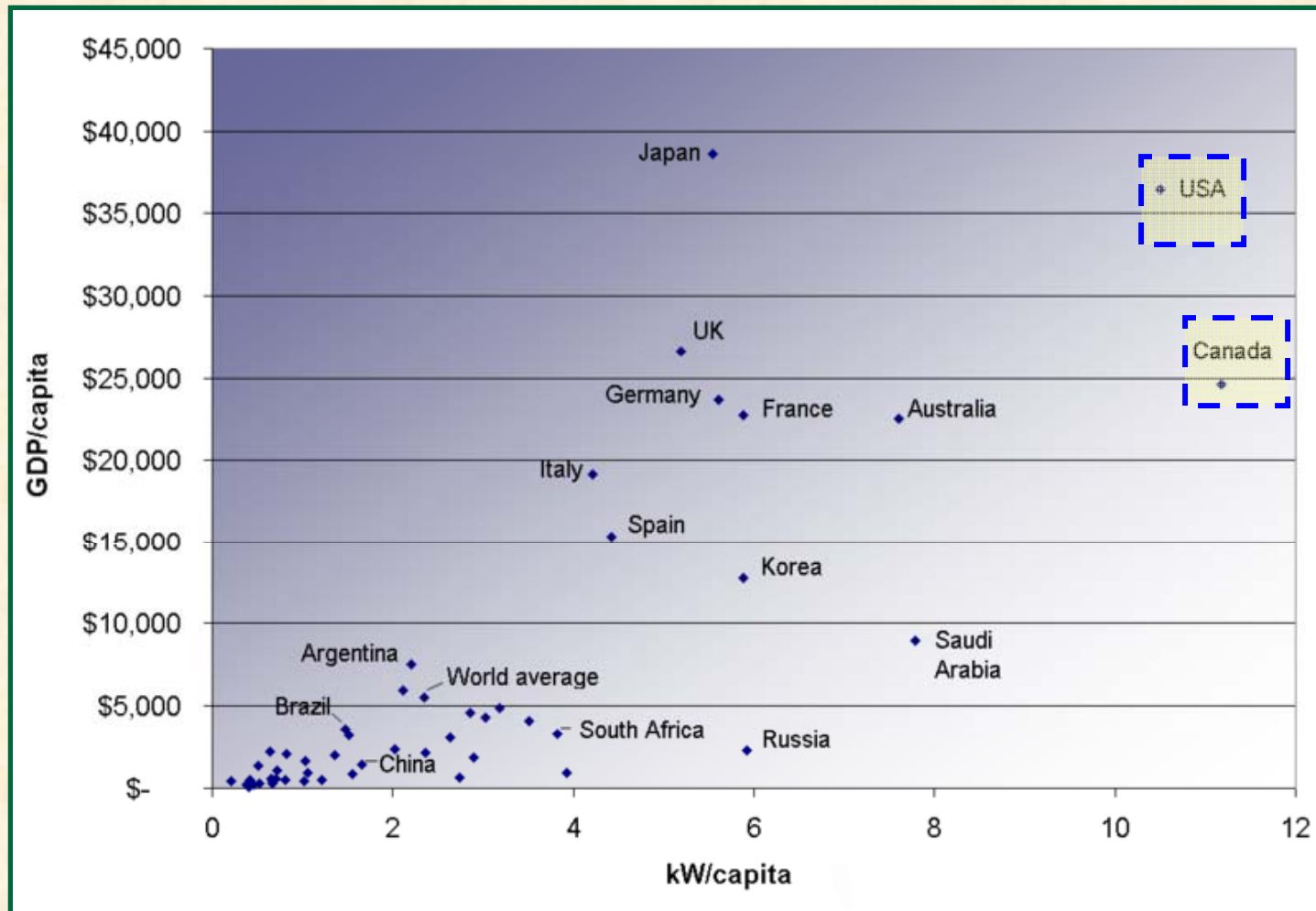
Buildings Energy Use Growing Fastest



Building consumption – envelope contribution



Opportunity for advancement



Source: http://renaud.ca/wordpress/wp-content/uploads/2008/11/Energy_consumption_versus_GDP.png

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Durability & energy efficiency

- **Durability is defined as: “... the ability of a building or any of its components to perform its required functions in its service environment over a period of time without unforeseen cost for maintenance or repair.”**
- **Durability is a must to achieve long-term sustainability ...**
- **Green building rating systems provide little assurance that durability is adequately addressed.**

Canadian Standards Association “Guideline on Durability in Buildings” (CSA S478-95, Rev. 2001)

Fixing moisture problems leads to cities of tarps



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Policy being proposed....



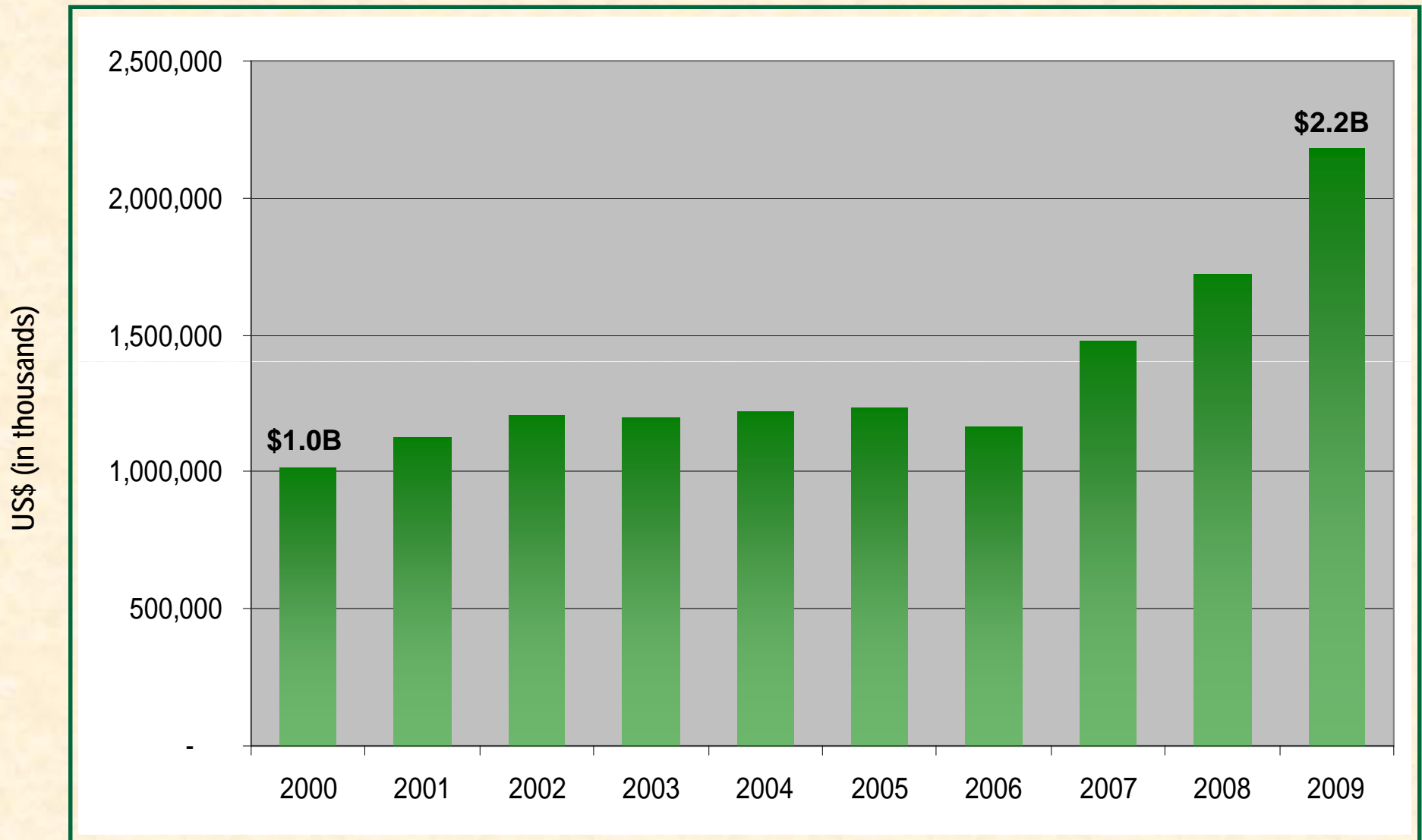
President Barack Obama, United Nations, 23 September 2009

“The danger posed by climate change cannot be denied. Our responsibility to meet it must not be deferred....

“Future generations will look back and wonder why we refused to act; why we failed to pass on an environment that was worthy of our inheritance.

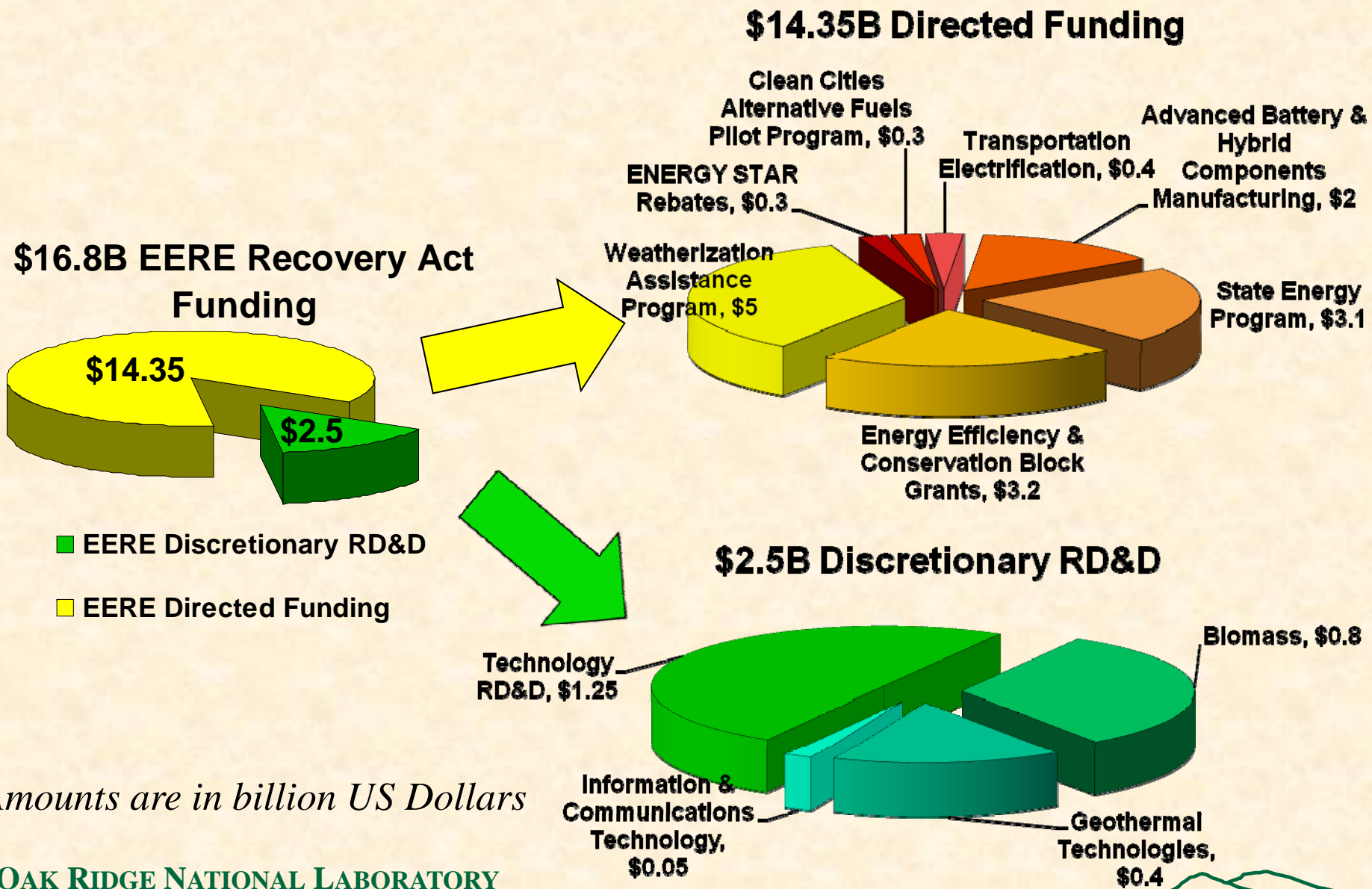
“And that is why the days when America dragged its feet on this issue are over.”

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



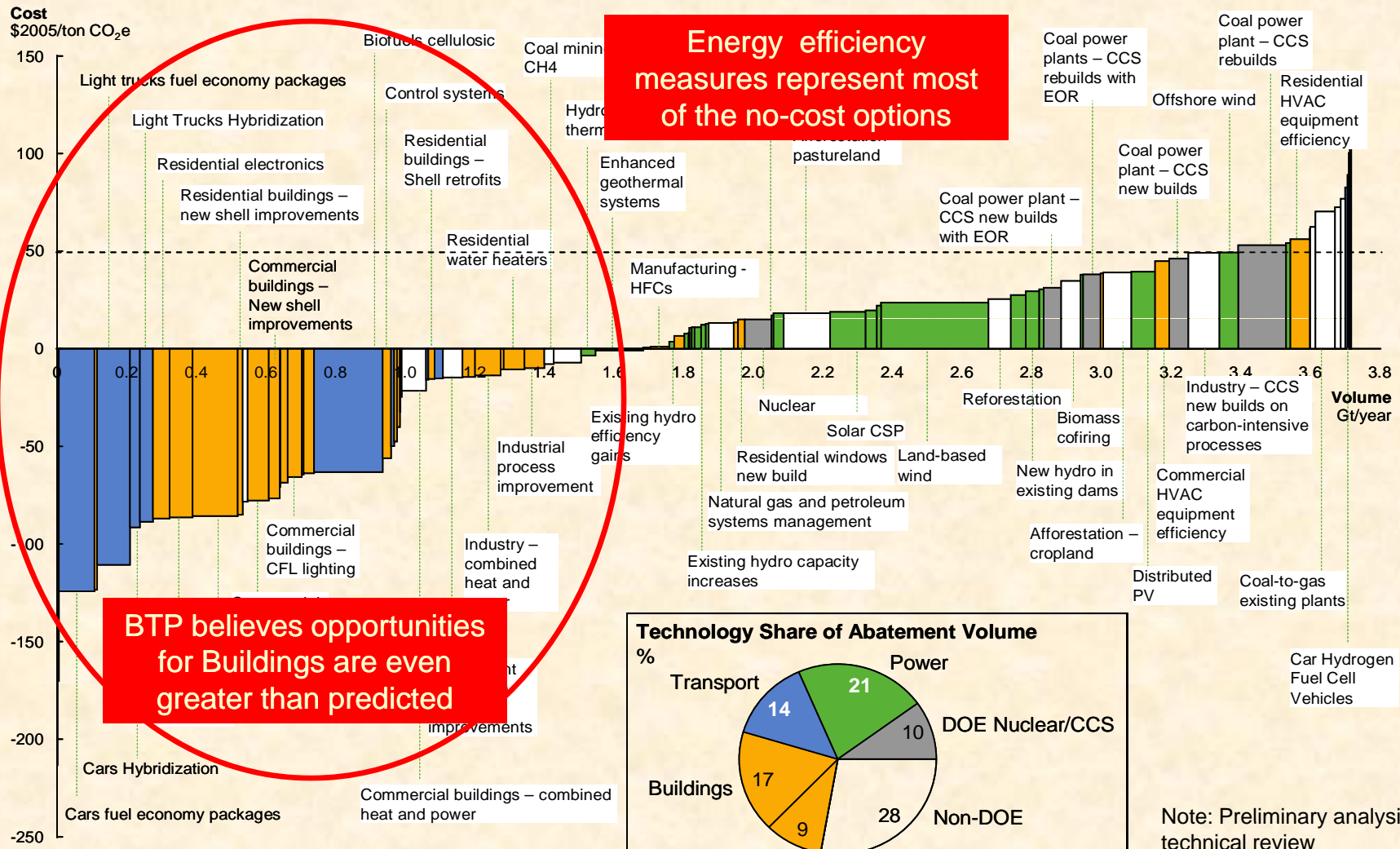
Amounts are in billion US Dollars

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EERE technologies – potential carbon abatement

■ EERE Power ■ EERE Energy efficiency
■ DOE Nuclear/CCS ■ EERE Transport



Source: December 2008 analysis conducted by EERE with McKinsey using 2008 DOE technology performance projections; mid-range case

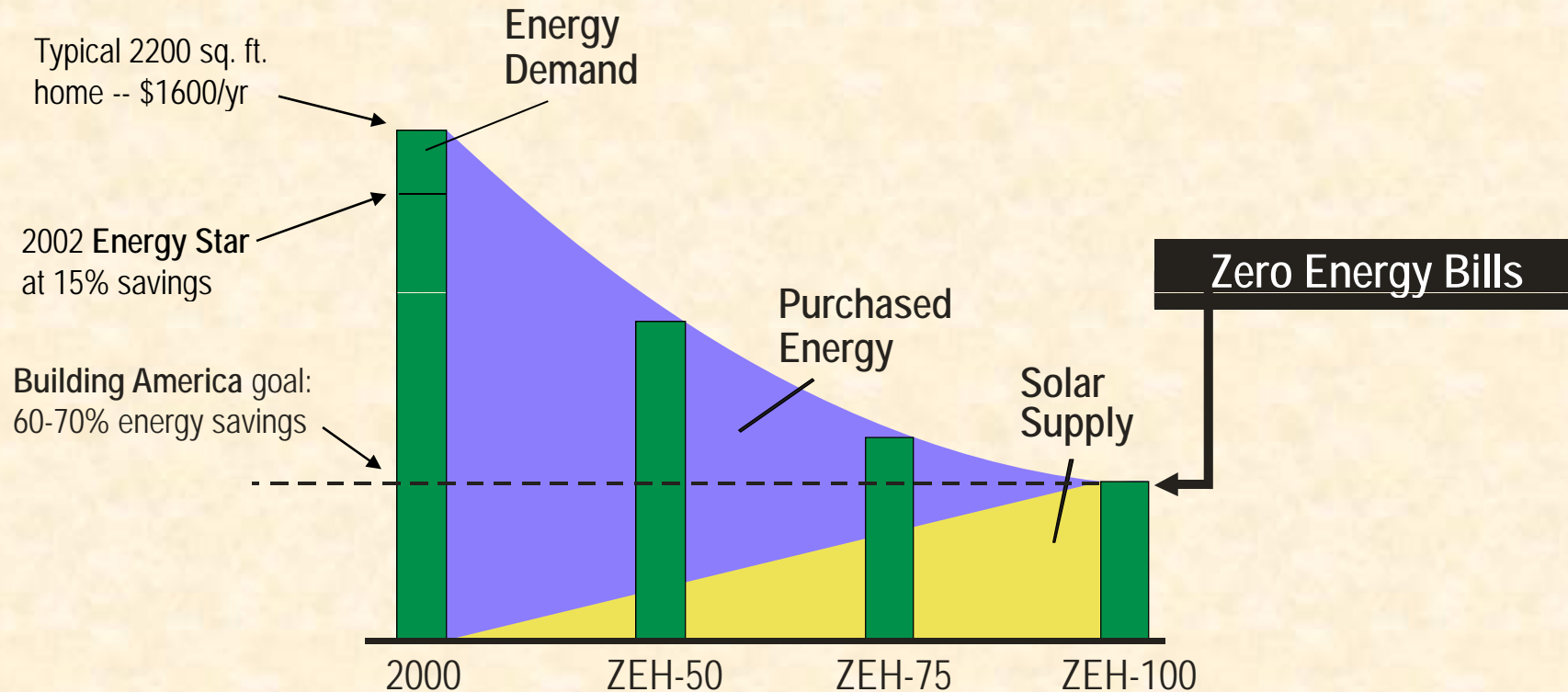
Note: Preliminary analysis, under technical review

Building technologies goal

- Net-zero energy commercial buildings by 2025
- Net-zero energy homes by 2020
- Low incremental cost



The zero energy building



ZEH-100 Saves 100% of Traditional Household Energy Use

Five NZEHs (2002-07): 40% savers in mixed-humid climates



Aug 06 total energy bill \$14.52

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Mainstream, full-sized, appealing NZEHs in FY09-10



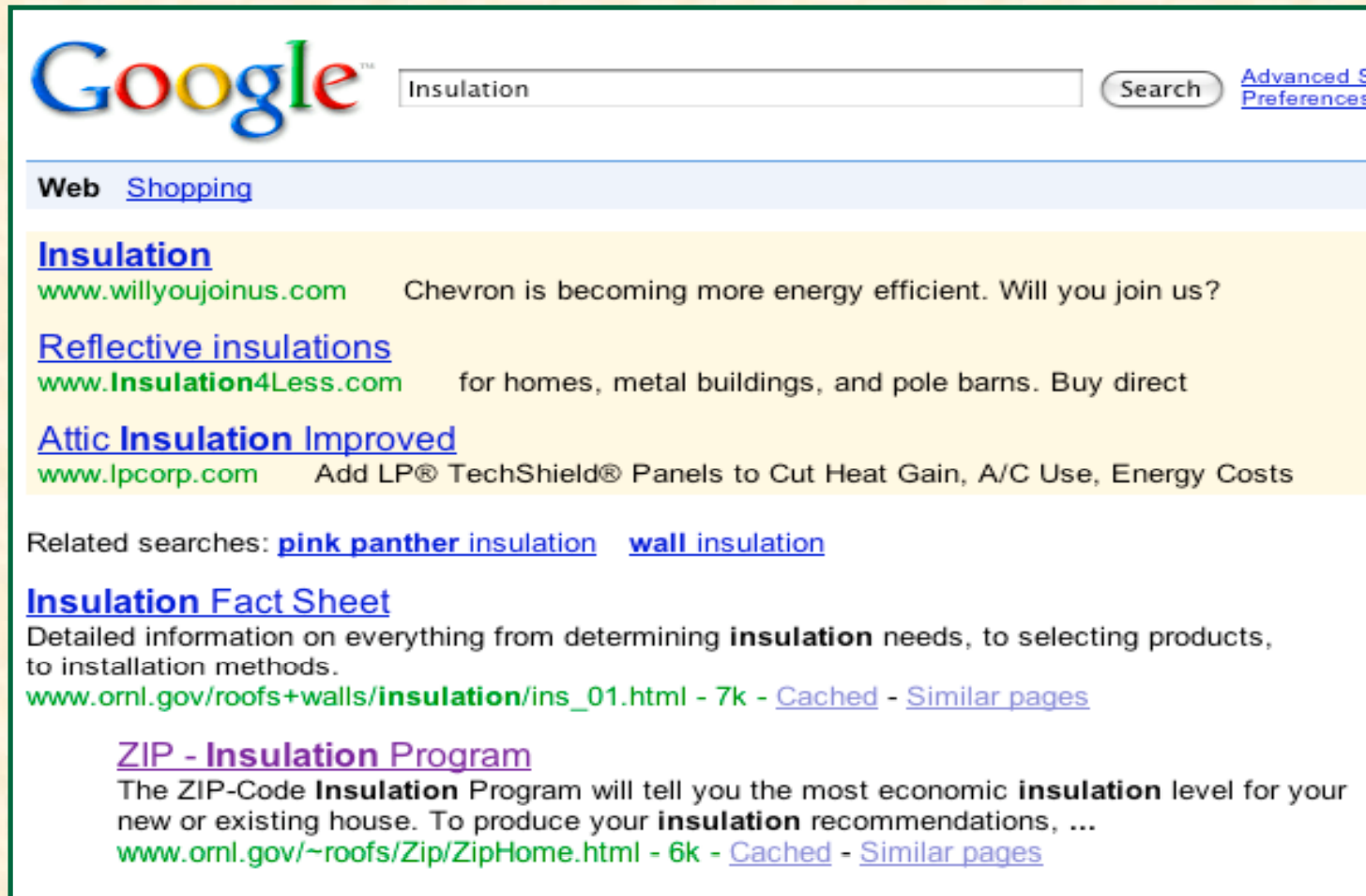
ZEBRAAlliance™

Zero Energy Building Research Alliance

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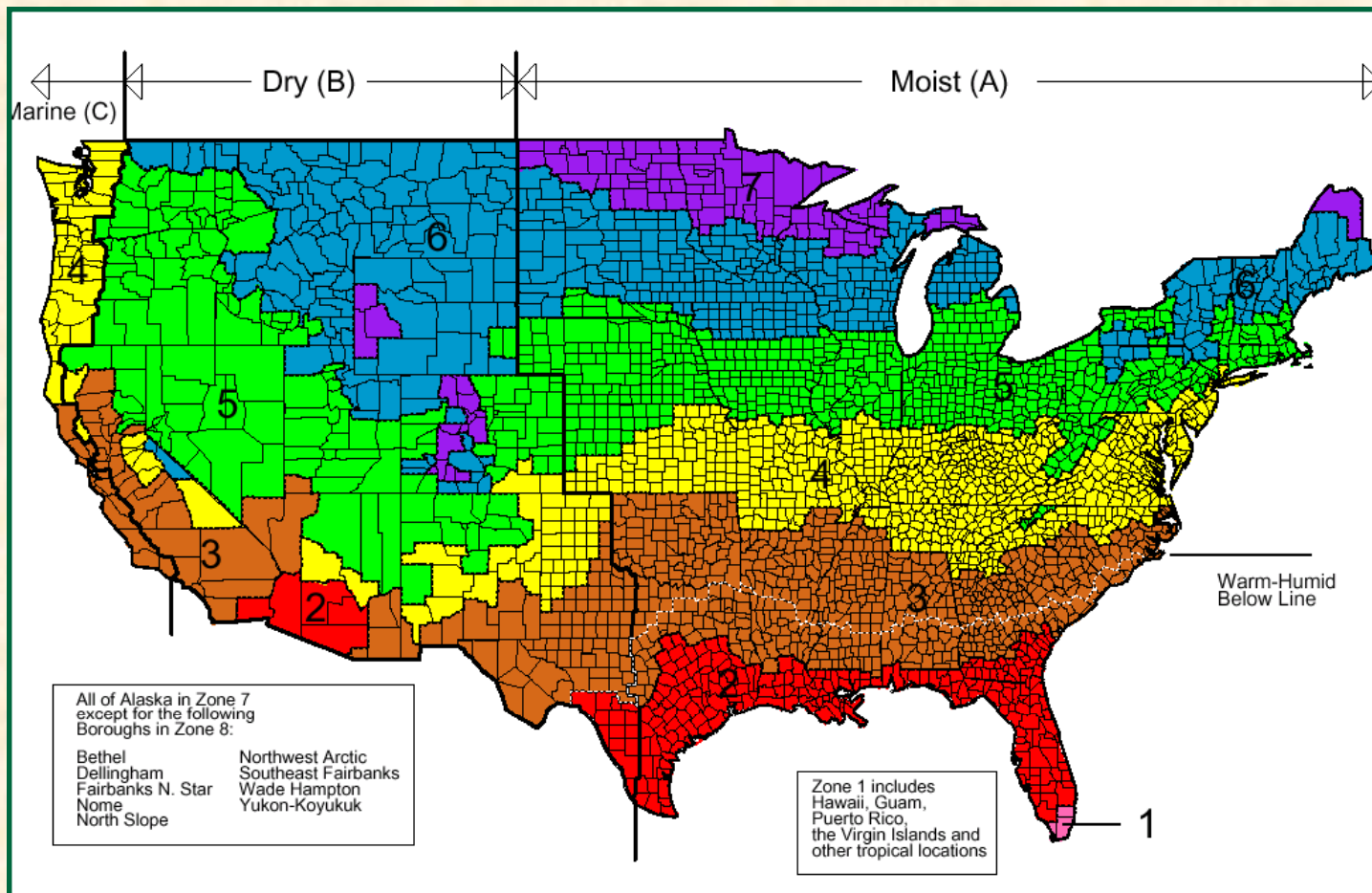


DOE insulation fact sheet receives 1500 hits a day



The image is a screenshot of a Google search results page for the query "Insulation". At the top left is the Google logo. To its right is a search box containing the text "Insulation" and a "Search" button. Further right are links for "Advanced S" and "Preferences". Below the search bar is a navigation bar with "Web" and "Shopping" tabs. The search results are listed below, each with a blue underlined title, a green URL, and a snippet of text. The first result is "Insulation" from "www.willyoujoinus.com" with the snippet "Chevron is becoming more energy efficient. Will you join us?". The second is "Reflective insulations" from "www.Insulation4Less.com" with the snippet "for homes, metal buildings, and pole barns. Buy direct". The third is "Attic Insulation Improved" from "www.lpcorp.com" with the snippet "Add LP® TechShield® Panels to Cut Heat Gain, A/C Use, Energy Costs". Below the results is a section for "Related searches" with links for "pink panther insulation" and "wall insulation". The fourth result is "Insulation Fact Sheet" with a detailed snippet: "Detailed information on everything from determining **insulation** needs, to selecting products, to installation methods." and a URL "www.ornl.gov/roofs+walls/insulation/ins_01.html - 7k - Cached - Similar pages". Below this is another result, "ZIP - Insulation Program", with a snippet: "The ZIP-Code **insulation** Program will tell you the most economic **insulation** level for your new or existing house. To produce your **insulation** recommendations, ..." and a URL "www.ornl.gov/~roofs/Zip/ZipHome.html - 6k - Cached - Similar pages".

Program impacts building codes (vapor retarders and cool roofs)



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Research on air barrier systems and garden roofs support code efforts

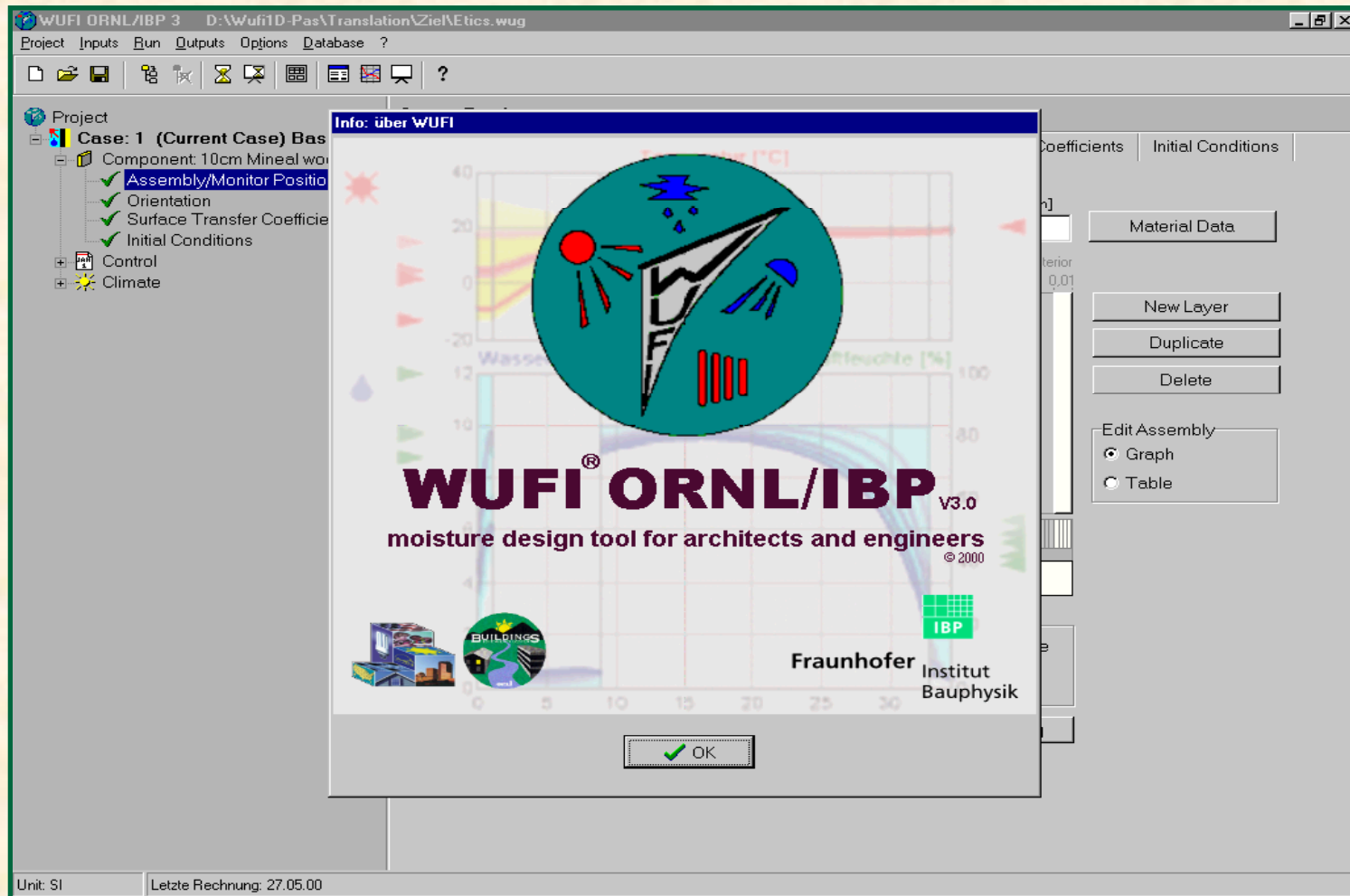


Air and Weather Resistive Barriers

Garden Roofs



Hygrothermal model widely used



Other simulation tools developed

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Long history in Building Technologies
— residential and commercial —
including ORNL's own facilities



Final remarks

- **The USA has initiated unprecedented investment in energy efficiency and renewable energy**
- **New Administration – High priority on retrofit**
- **New technology will be essential to achieve zero energy buildings – major investment with Stimulus Funding**
- **For our children's sake, we cannot fail**

*"To achieve results never before accomplished,
we must employ methods never before attempted."
- Sir Francis Bacon*

Questions?

