HERTY
Advanced Materials

Best Practices and Markets
ECO Building in the US

Eco- Buildings
Växjö, Sweden September 2009

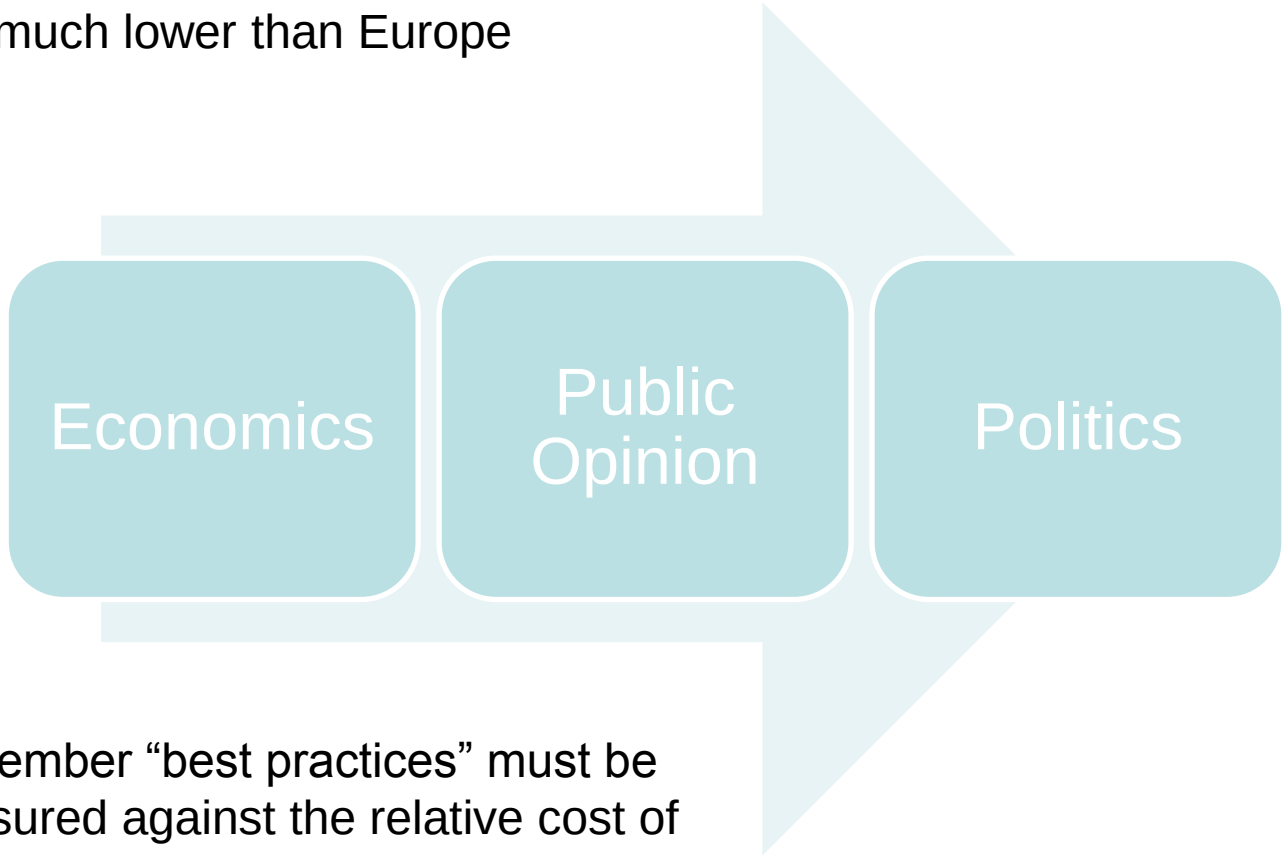
Ross Harding
Senior Advisor
rharding@herty.com
404 3863120

Georgia™
georgia.org

- What is driving change in the US market?
- Market View
- Best Practices
- Where to from here?

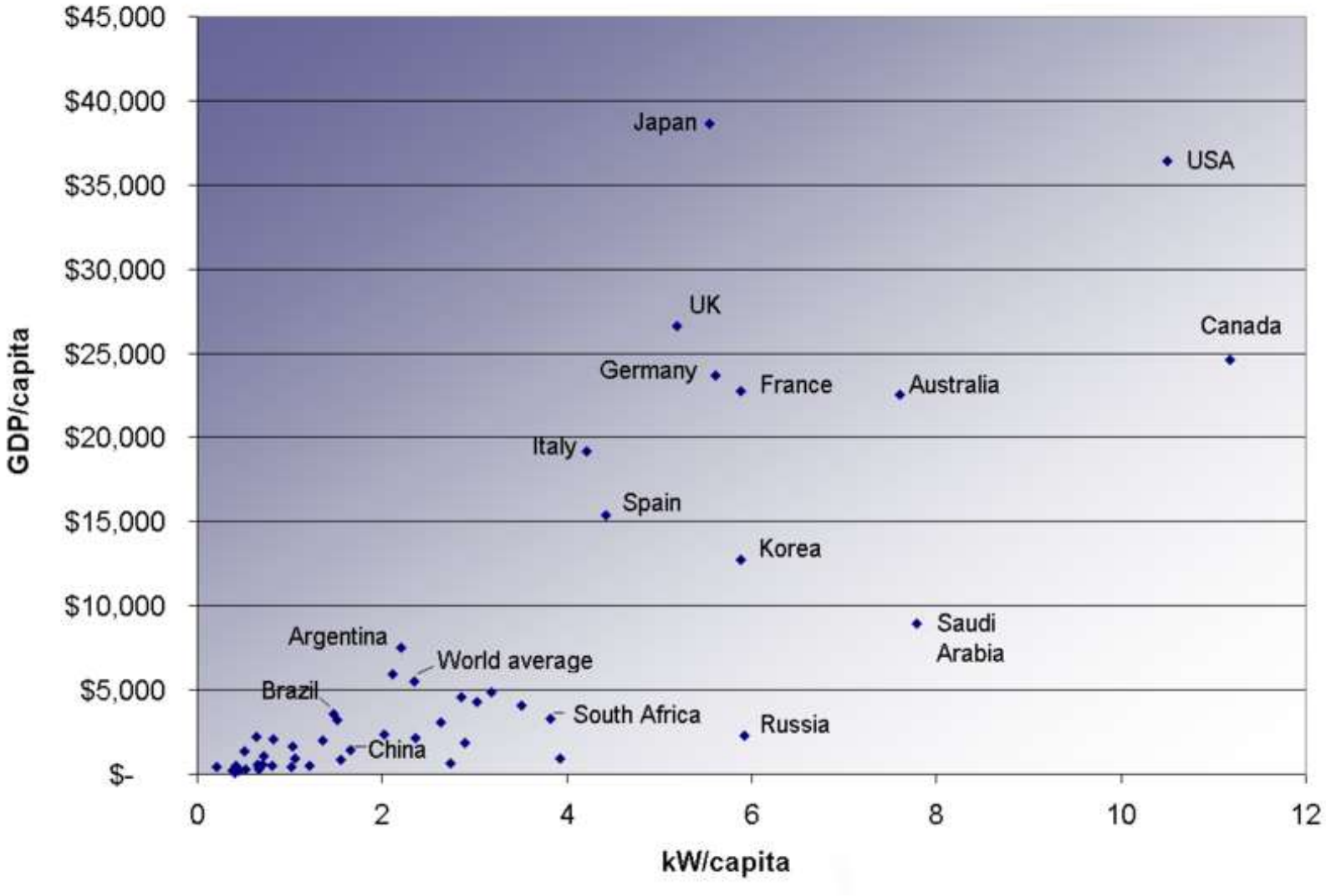
Key Drivers in the US Market

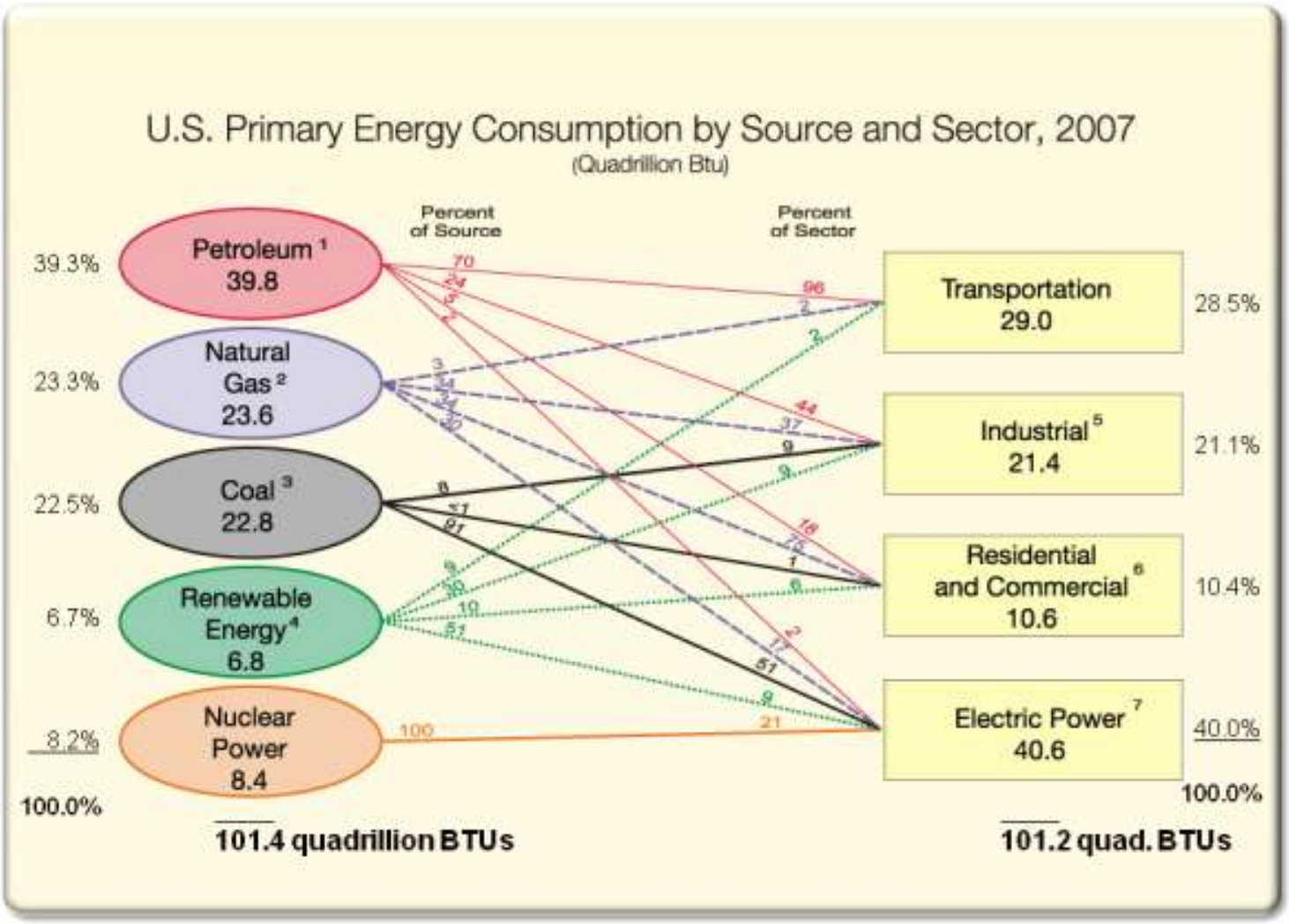
Environment is an increasing driver but much lower than Europe



Remember “best practices” must be measured against the relative cost of energy between the US and Europe and within different areas of the US

Cheap Energy Drove US Economy



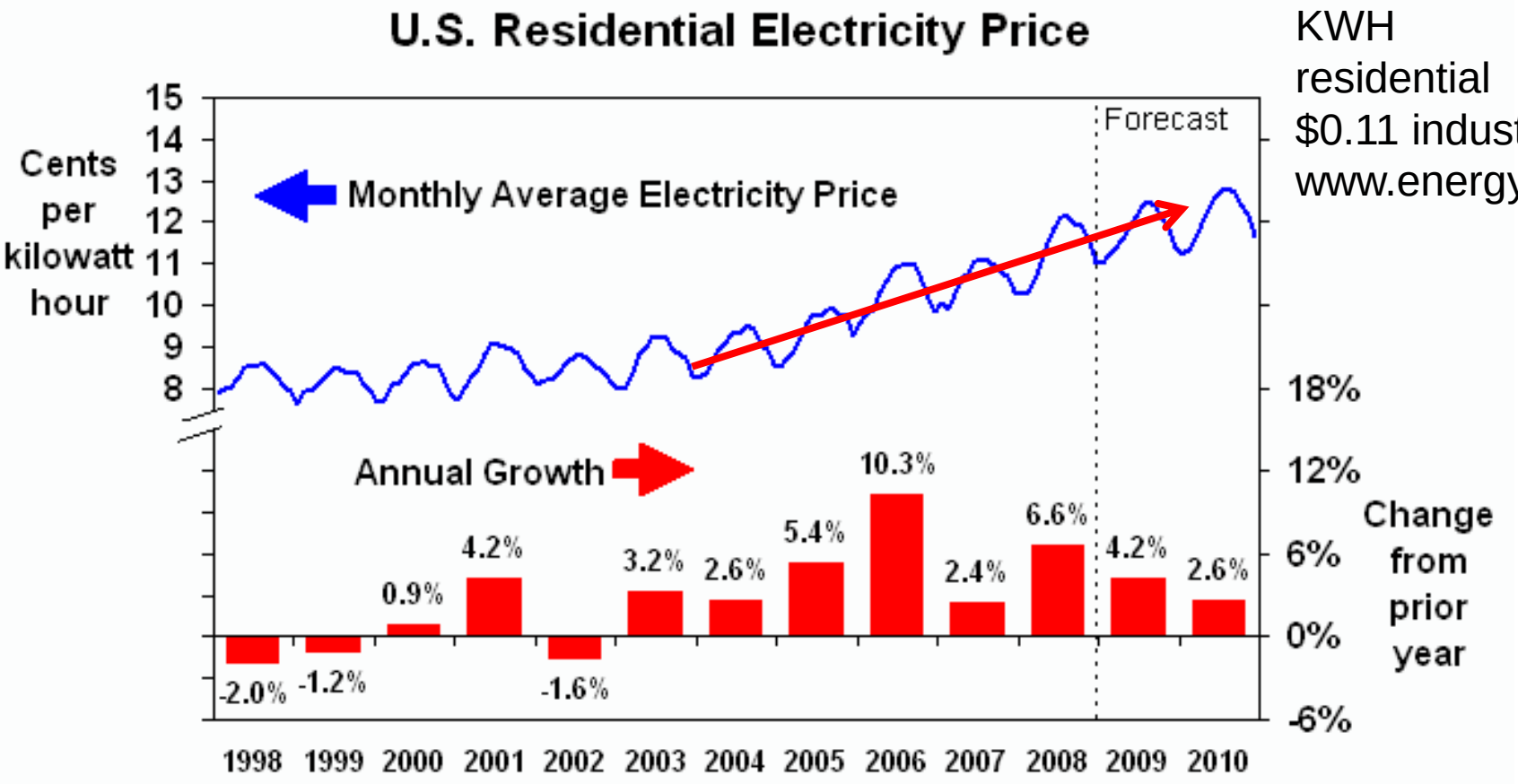


Source: US Department of Energy, Energy Information Administration (DOE/EIA)
http://www.eia.doe.gov/basics/energybasics101.html

Economics

Increases in demand and tougher development requirements are driving electricity costs up at 7-10% per year.

Sweden $0.2 KWH residential $0.11 industrial www.energy.eu



Short-Term Energy Outlook, August 2009

www.eia.doe.gov

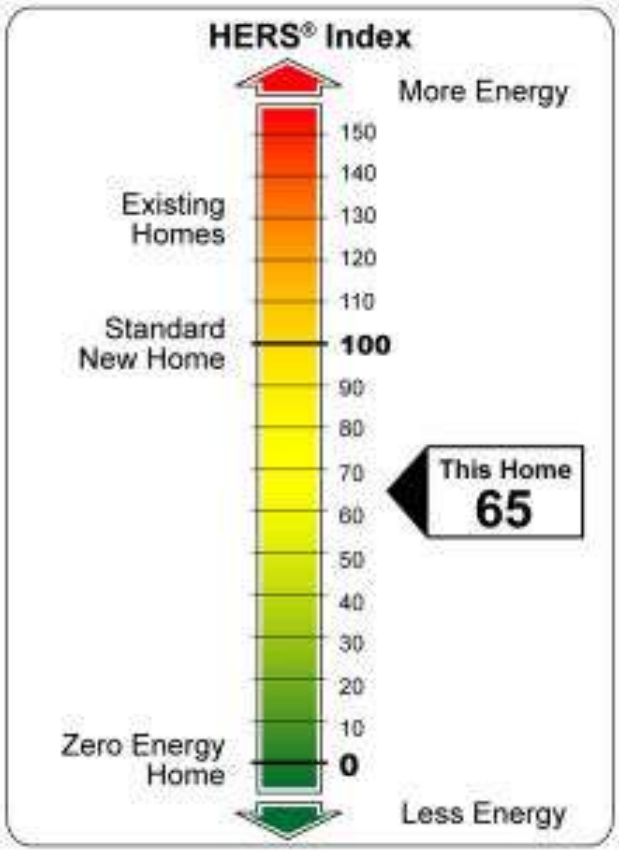
Public Opinion and Politics

- A change in focus at the top
  - Bush
    - National security
      - Develop Ethanol (and local oil and nuclear) to reduce reliance on imported oil
  - Obama
    - Efficiency and Jobs
      - Reduce consumption through weatherization, national renewable standards and develop renewable electricity
  - Next President ?
    - Competitiveness
      - Energy for quality of life and global competiveness

Public Opinion and Politics

- Market View
  - A tendency to “Green Wash” every project and product is balanced by measurement and certification programs
  - A complex patchwork of national and regional programs
  - National
    - US Green Building Council
      - Leadership in Energy and Environmental Design LEED
        - Commercial, Industrial and Residential
          - Points based integrated
          - Health, Comfort, Durability, Cost, Environment
    - Environmental Protection Agency and Department of Energy
      - Energy Star and HERS
        - Product, New Homes, Renovations, Design
          - Energy Use
          - Measurement Based
          - Software simulation

Home Energy – for Energy Star



LEED

LEED 2009:
100 Base Points, plus 10 for innovation and regional emphasis.

USGBC has four levels of LEED.

Public Opinion and Politics

LEED for Homes Alliances

National Programs

ENERGY STAR HOMES

green communities

Building America U.S. Department of Energy

ENVIRONMENTS FOR Living

Local and Regional Programs

SENSIBLY BUILT FOR THE ENVIRONMENT – EARTH CRAFT HOUSE – THE ENVIRONMENT

alliance for environmental sustainability

earth advantage Portland General Electric

fgbc

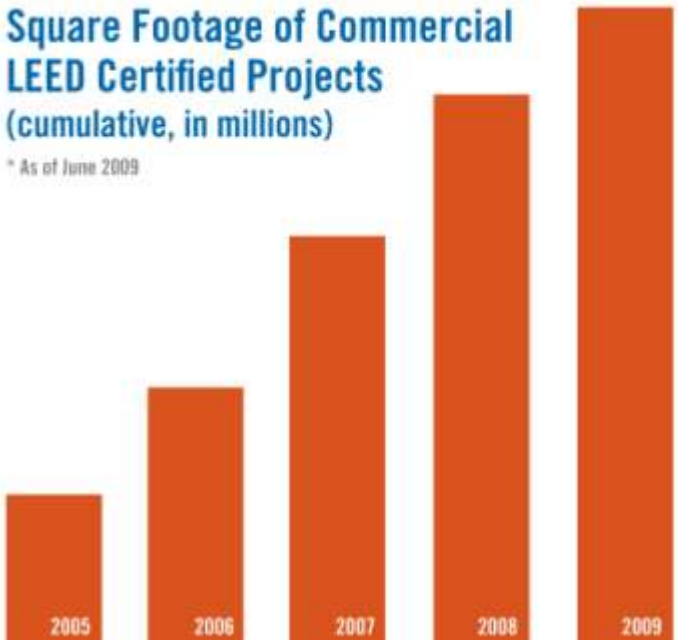
BUILT GREEN.

SCOTTSDALE GREEN BUILDING PROGRAM

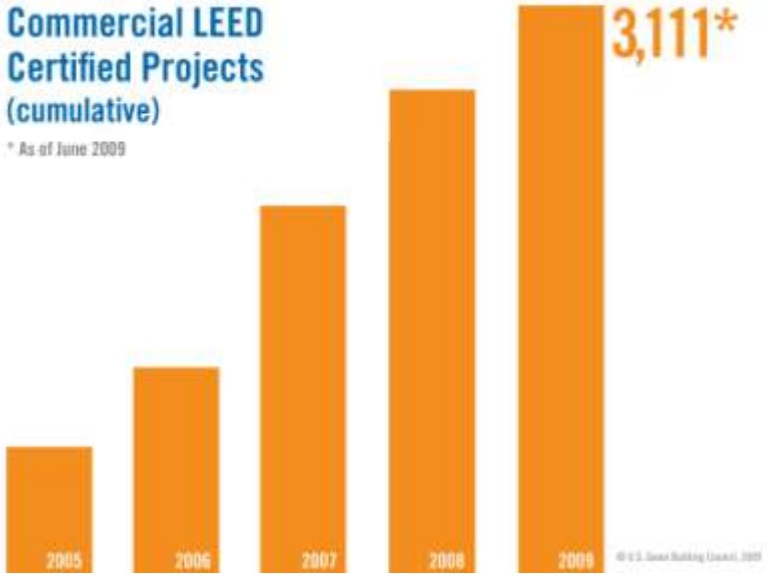
BUILD SAN ANTONIO GREEN

VERMONT vbg builds greener

- Government as a customer
  - Mandates all new and remodels Federal facilities be LEED certified
  - Building Codes drive towards increasing requirements to meet Energy Star



385* million



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WOOLPERT

Federal Requirements
Guiding Principles Best Practices

Guiding Principles for Best Practices
Federal Leadership in High Performance and Sustainable Buildings MOU

- Signed by heads of 21 Federal agencies (including the DoD), Jan 2006
- Voluntary commitment among federal agencies

Federal Requirements
Guiding Principles Best Practices

- Employ Integrated Design Principles
  - Integrated Design
    - Integrated project team for all stages of project
    - Establish performance goals for siting, water, energy, materials, and indoor environmental quality; ensure incorporation of goals
    - Consider all stages of the building
  - Commissioning
    - Total building according to size and complexity of building systems
- Optimize Energy Performance
  - Energy Efficiency
    - 30% reduction of energy cost budget relative to ASHRAE 90.1-2004
  - Measurement and Verification
    - IAW EPAct 05
    - Compare energy design target with actual performance, initial and at 1 yr
    - Enter lessons learn in DOE Federal High Performance Buildings Database

Federal Requirements

Guiding Principles Best Practices

- Protect and Conserve Water
  - Indoor Water
    - 20% reduction relative to EPAct 1992
  - Outdoor Water
    - 50% reduction of potable water
- Enhance Indoor Environmental Quality
  - Ventilation and Thermal Comfort
    - ASHRAE 55-2004
  - Moisture Control
    - prevent damage and mold
  - Daylighting
    - Daylight factor 2% for 75% occupied space
  - Low-Emitting Materials
    - Adhesives, sealants, paints, carpet, and furnishings
  - Protect Indoor Air Quality during Construction
    - SMACNA, 72-hr flush-out, max 60% humidity

Federal Requirements
Guiding Principles Best Practices

- Reduce Environmental Impact of Materials
  - Recycled Content
    - 10% (post-consumer plus ½ pre-consumer content)
  - Biobased Content
    - USDA recommendations
  - Construction Waste
    - Recycle or salvage 50% construction, demolition and land clearing waste
  - Ozone Depleting Compounds

- US Best Practices Summary
  - Use points based system and incorporate measurement systems and computer simulation
  - Focus on existing building stock and new construction
  - On going focus on 10-25% improvement from current baseline through policy and building codes
  - Invest in basic research for materials and generation
  - Offer end user incentives of 30-60% for installation and upgrades
  - Existing Residential
    - Focus on basic weatherization
  - Existing Industrial
    - Focus on basic weatherization
    - CHP
    - Lighting refits
  - Use Military bases as case studies
  - Many resources examples
    - Department of Energy: http://www1.eere.energy.gov/industry/bestpractices/
    - Air Force: http://www.afcesa.af.mil/shared/media/document/AFD-081029-038.pdf

A great place to enter the US market SEDA – Savannah Economic Development Authority

A great place to enter the US market

Demographics

- Population
  - 3-county MSA with 2008 population of 334,353
- Workforce
  - 11-county labor draw area
  - Total population of 692,659
  - Labor pool of 336,256 within 45-minute drive
- Education
  - 17 colleges and universities
  - Total enrollment over 50,000
  - Graduating over 7,500 individuals annually
- Herty Advanced Materials Development Center
  - World leaders in fiber based commercilization

A great place to enter the US market

Port of Savannah

Surpassed 2.6 million TEUs in 2007

A great place to enter the US market

Culture and Entertainment

Creative and cultural city with the largest historic district in the nation.

Beautiful beaches, pristine barrier islands and more than 420 miles of navigable waters

As many as 60 area golf courses

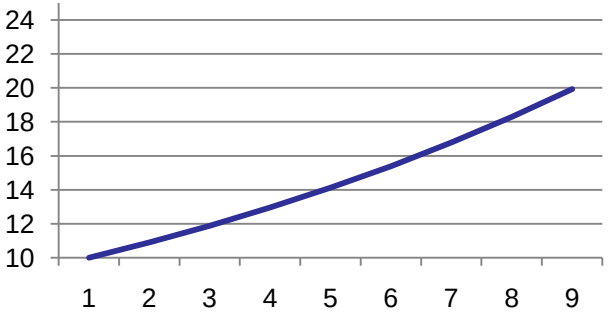
Museums, theaters and a year round schedule of festivals

Where to from here for the US?

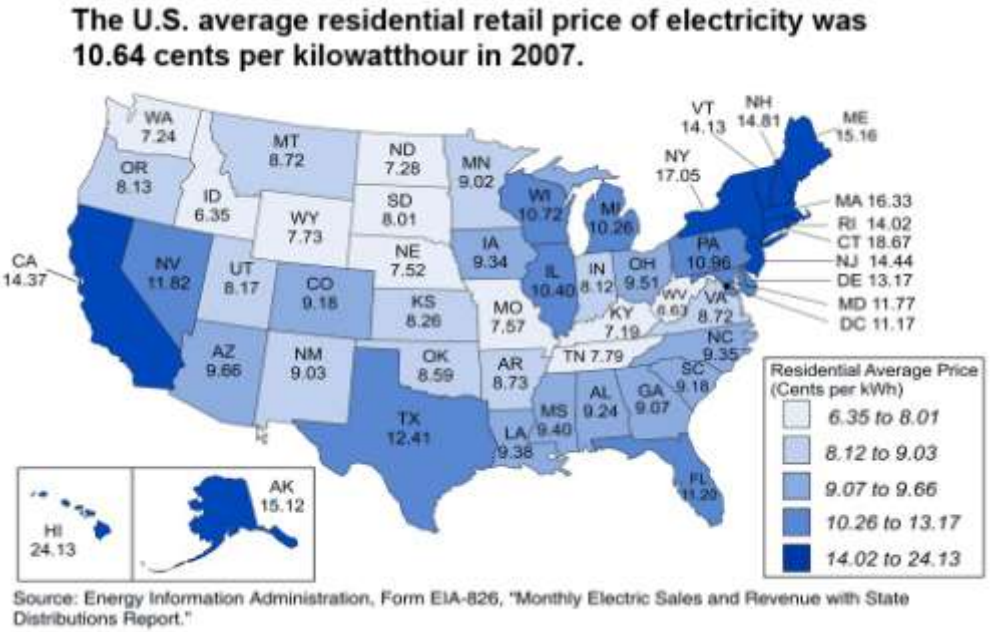
The Largest Market Opportunity in the World

McKinsey and Co predict that by 2020 end use consumption in the US could be reduced 23% in NPV positive investments and deliver 9.1 quadtrillion BTUs of reduction

http://www.mckinsey.com/clientservice/electricpowernaturalgas/downloads/US_energy_efficiency_full_report.pdf

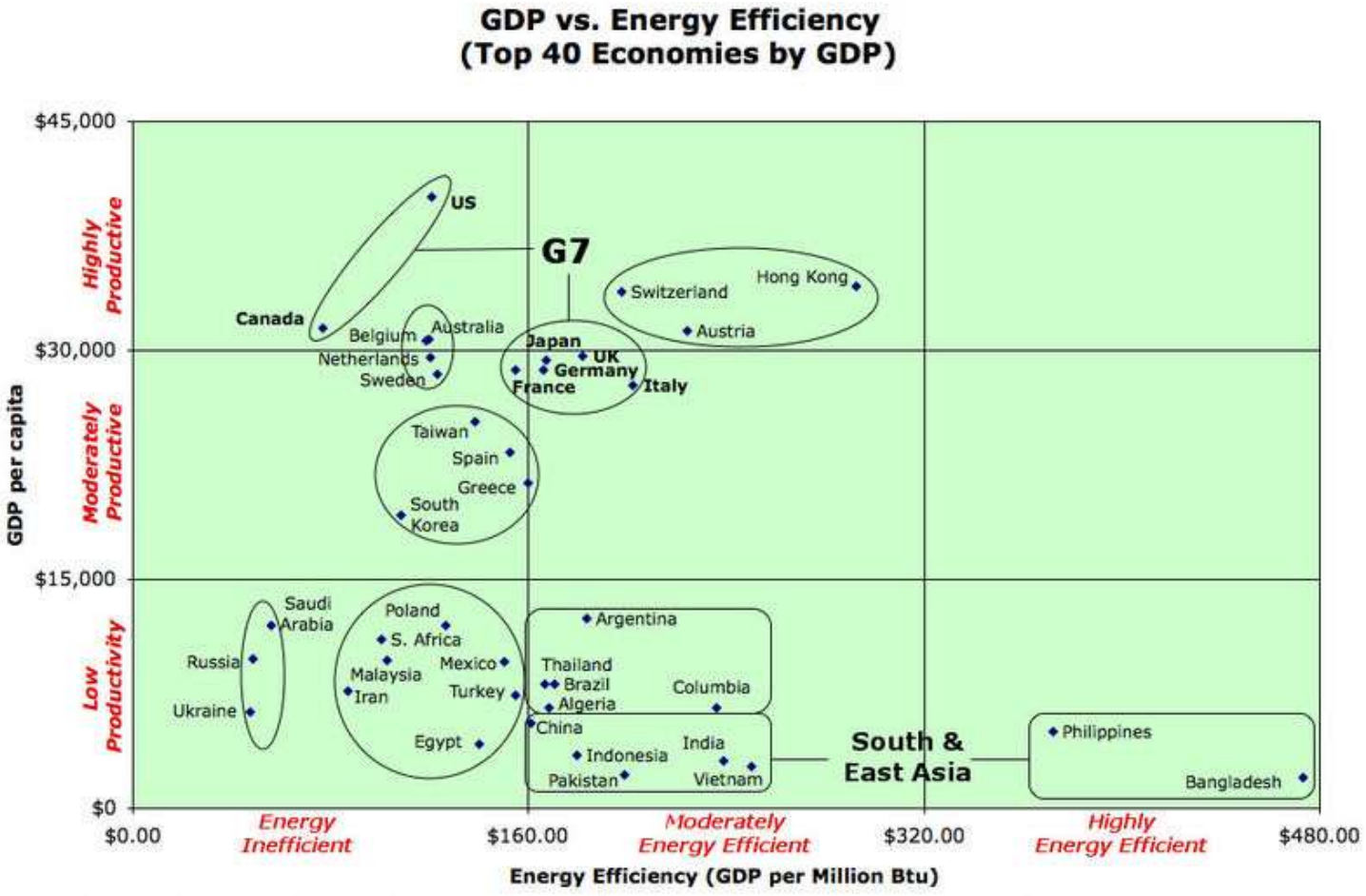


9% Increase per year projection



Ultimately it will be about competitiveness – US major trading nations use much less energy for each dollar of GDP produced.

US used energy as a free resource – much like developing countries use labor



When energy gets very expensive the US be at a significant disadvantage? The race is on……..

THANK YOU

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