# America's Energy Straightjacket

**R. Neal Elliott, Ph.D., P.E.**

**Industrial Program Director**

ACEEE

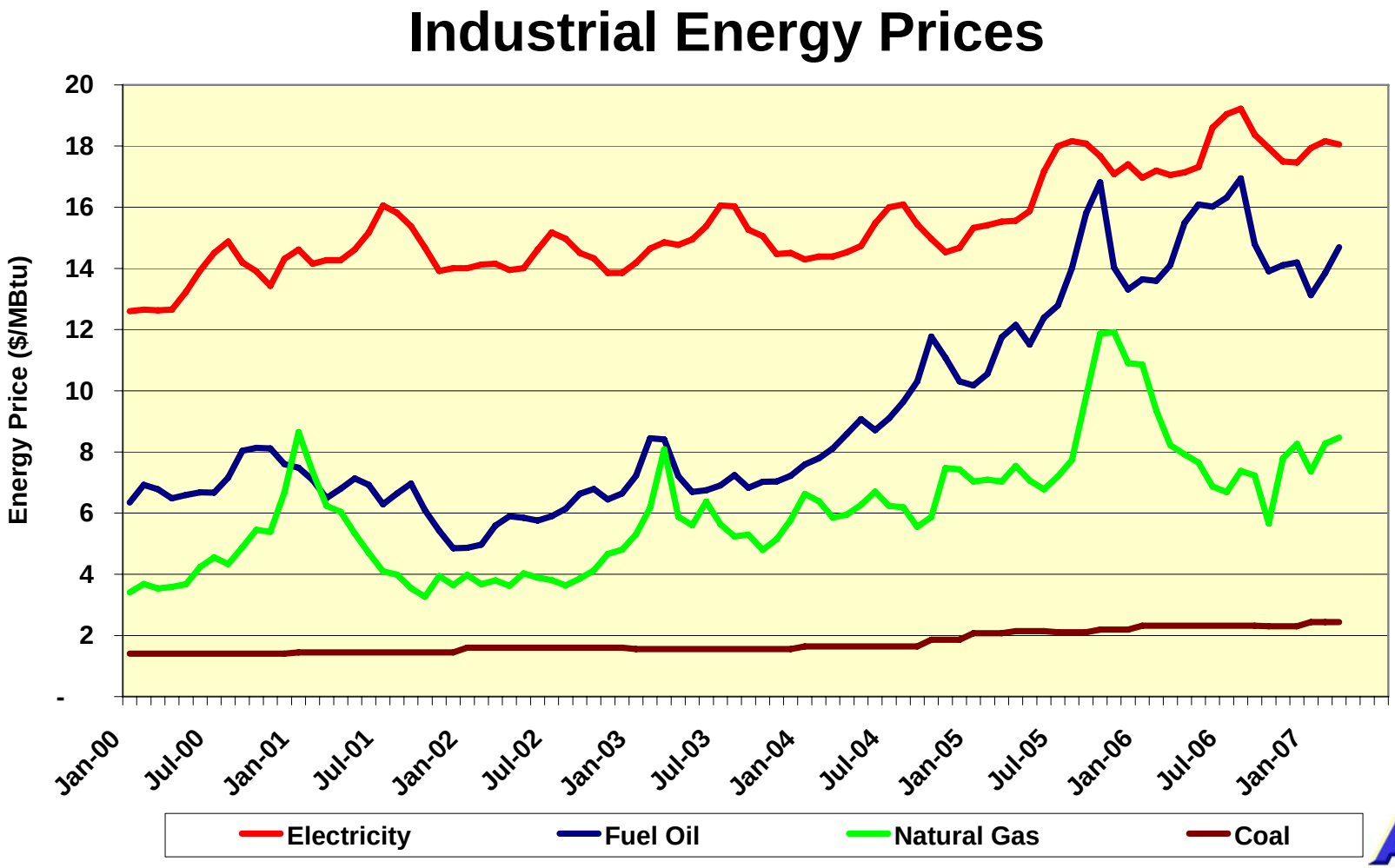
# America's Energy Straightjacket

*"Not Your Parents' Energy Crisis" **

- No current "supply" limitations – rather "deliverability" limitations in all energy markets
- Oil markets constrained by refining
- Coal markets constrained by mining and rail capacity
- Electricity constrained by available fuel and transmission – high demand taxes infrastructure
- Renewables limited by equipment manufacturing
- Fuel switching limited by tight markets

*** Tom Friedman 2006**

# Straitjacket Manifested by Increased Prices and Volatility

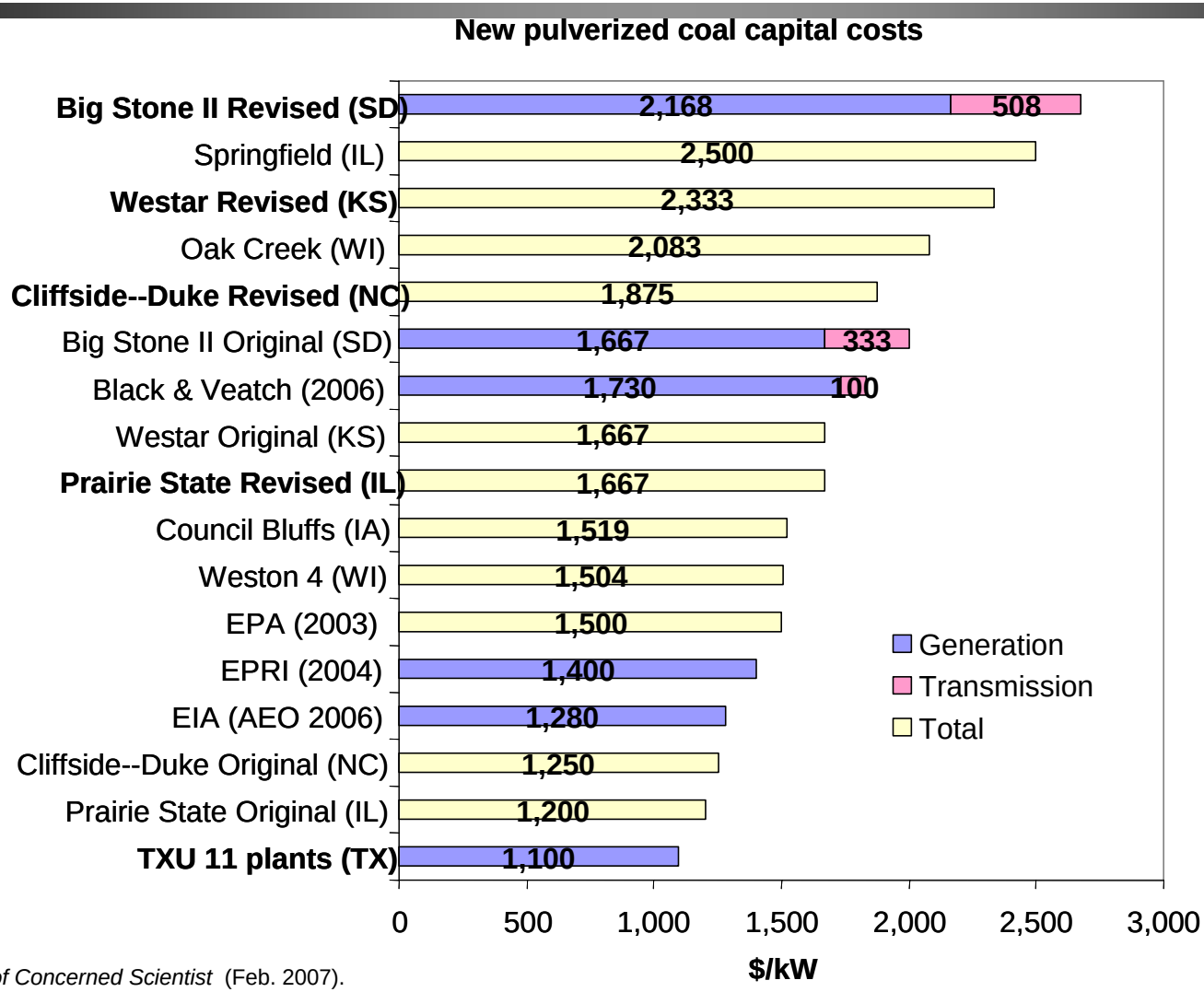



Source: ACEEE from EIA 2007

# Coal Markets Tightening

- Coal largely used to generate electricity
- Coal demand up on high NatGas prices
- Industrial consolidation reduced spare capacity – need major new investments
- Shortage of mining equipment globally
- Rail capacity limited – shortage of rail cars and congestion
- Inventories down – will take years to rebuild to “normal” levels

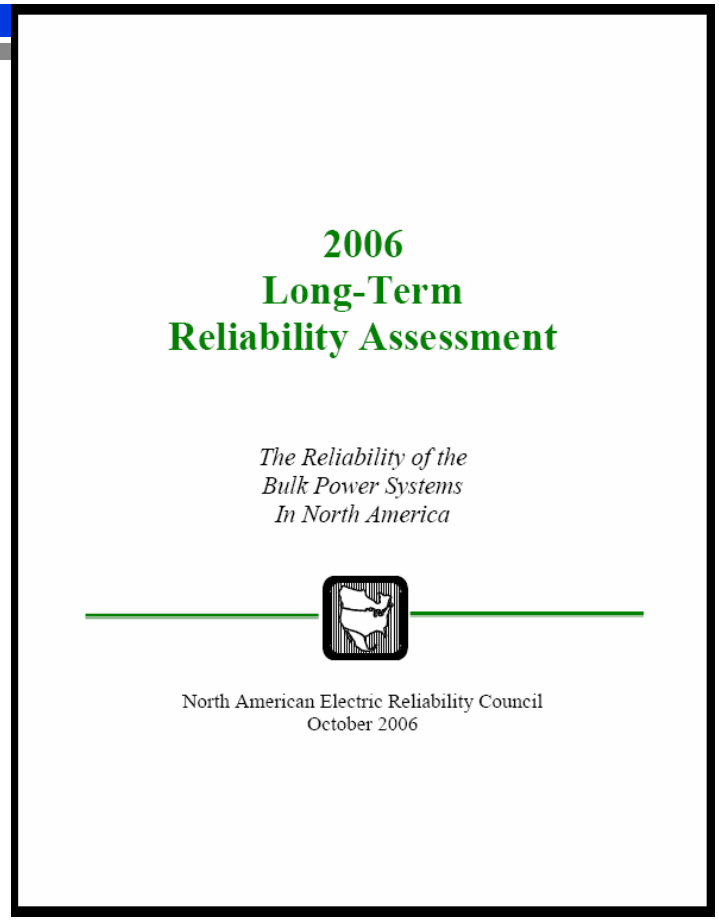
# As Plant Costs Rise Coal No Longer the Least-Cost Resource




Source: *Union of Concerned Scientist* (Feb. 2007).

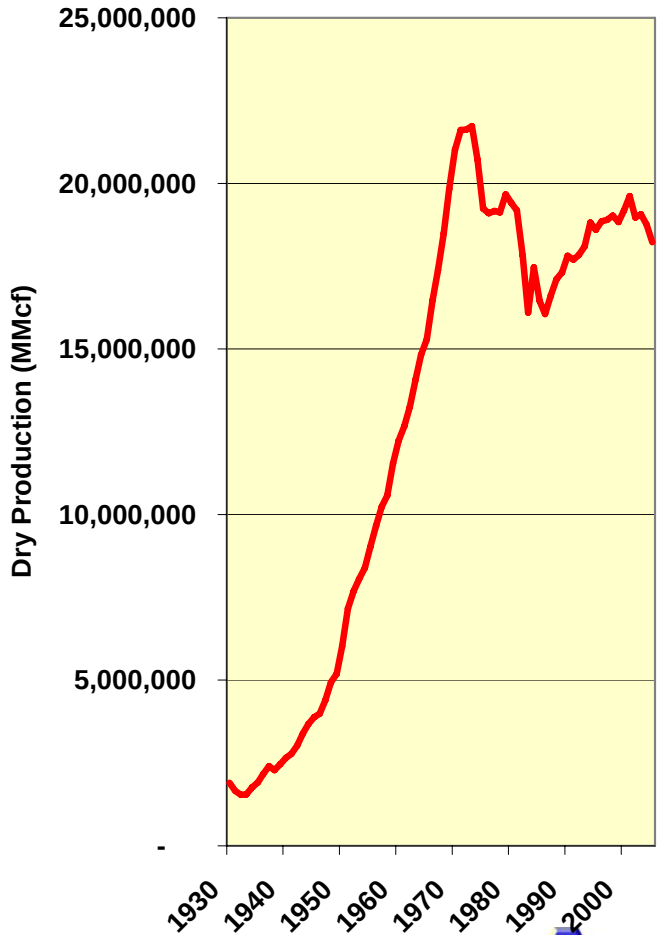
# Concerns about Electric Adequacy

- Reserve margins falling – CC-GT's no longer economic
- Concerns about gas supplies continue
- LNG imports down
- Electric demand surging
- Rate caps coming off
- Prices increasing rapidly
- Public discontent growing
- Pressure for new coal plants



# Tight Natural Gas Markets

- U.S. Production Peaked in 1973
- Increasingly dependent on imports – mostly Canada
- Emissions regulations and equipment cost make gas attractive
- Demand driven by electric power generation – over 140,000 MW installed in last 10 years
- Limited new domestic resources
- Average well lasts 18 months – need to drill to stay even

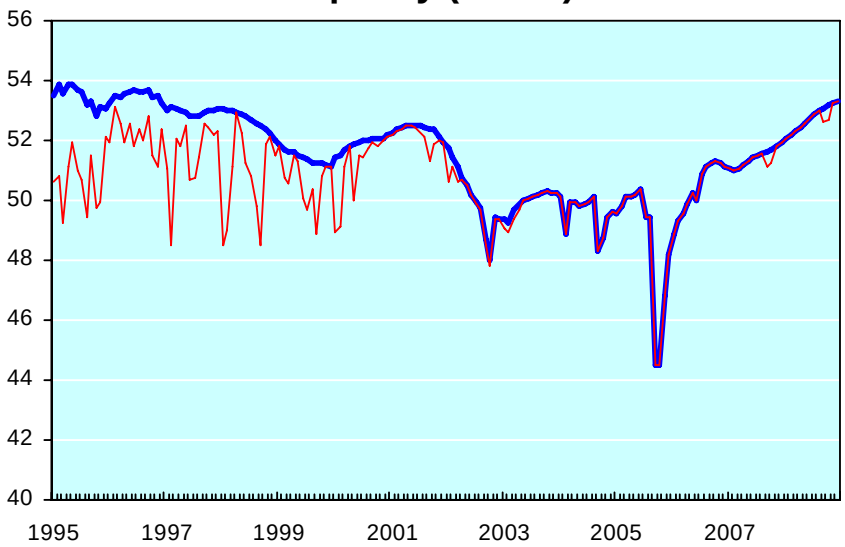



**Source: EIA 2006**

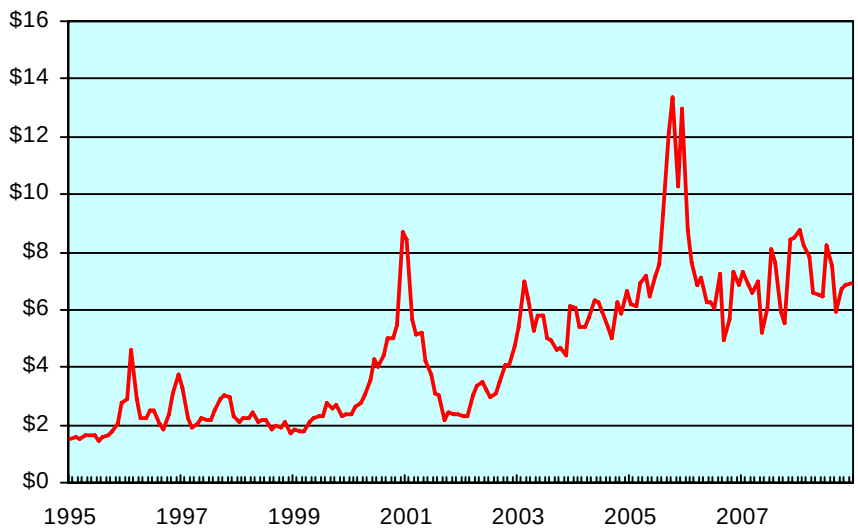
# NatGas Markets Limited by Capacity

Industry operating at deliverability limits – tight markets result in price volatility

**Lower-48 Dry Gas Production Vs. Dry Gas Capacity (BCFD)**



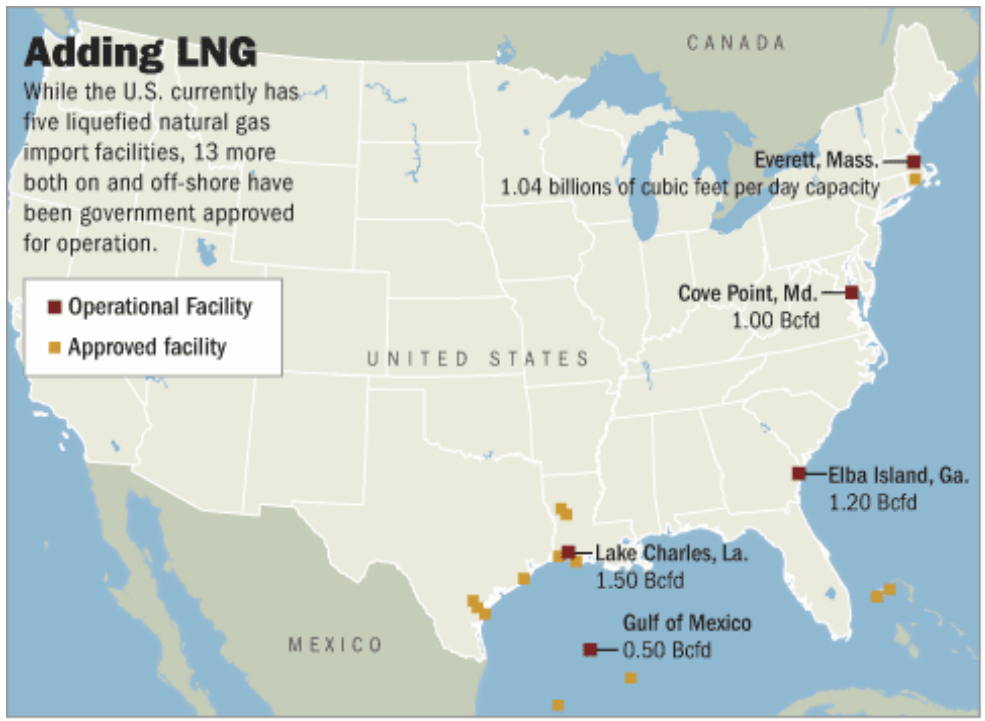

**Historical Gas Price at Henry Hub ($ per MMBtu)**




**Source: EEA 2007**

# LNG Not a “Field of Dreams”

- Terminals 1/3 of supply chain
- Should be enough tankers
- Need additional liquefaction capacity
- U.S. competes with Europe, Japan, China and India for deliveries
- Global forces affect markets – e.g., Russia and Indonesia




**Source: Wall Street Journal 2006**

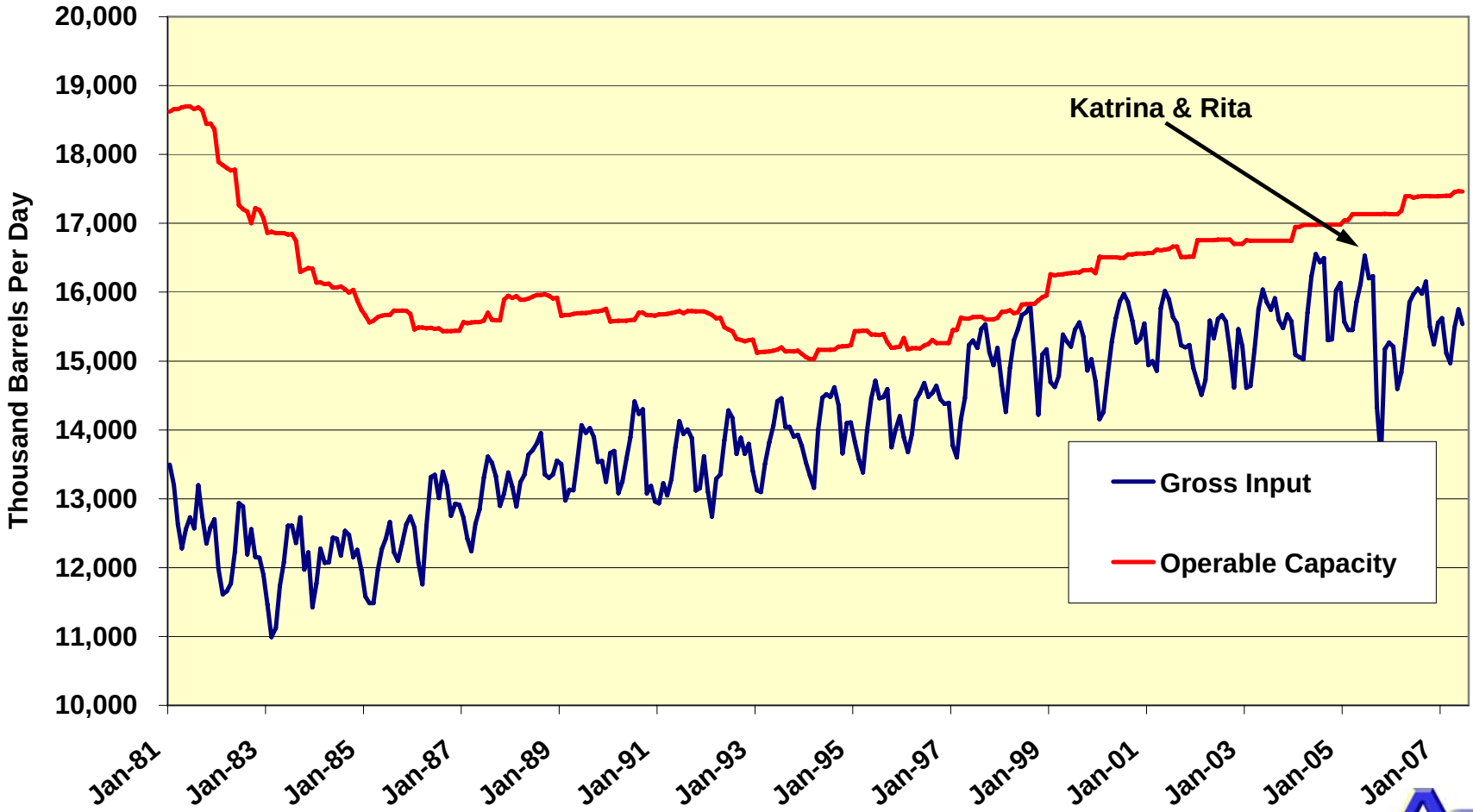
# Oil Markets Tight

- Crude Production Near Capacity
- Refined Products Very Tight
- Limited Refining means Competition between Refined Products – Gasoline and Distillate
- Markets Vulnerable to Disruptions – Storms, instability, terrorism
- Global Price Driven by Increasing Demand in U.S., China and India

**Thunder Horse**

# Refining Constrains Markets not Crude

## Refining Capacity vs. Production




Source: EIA 2007

# Infrastructure Crisis

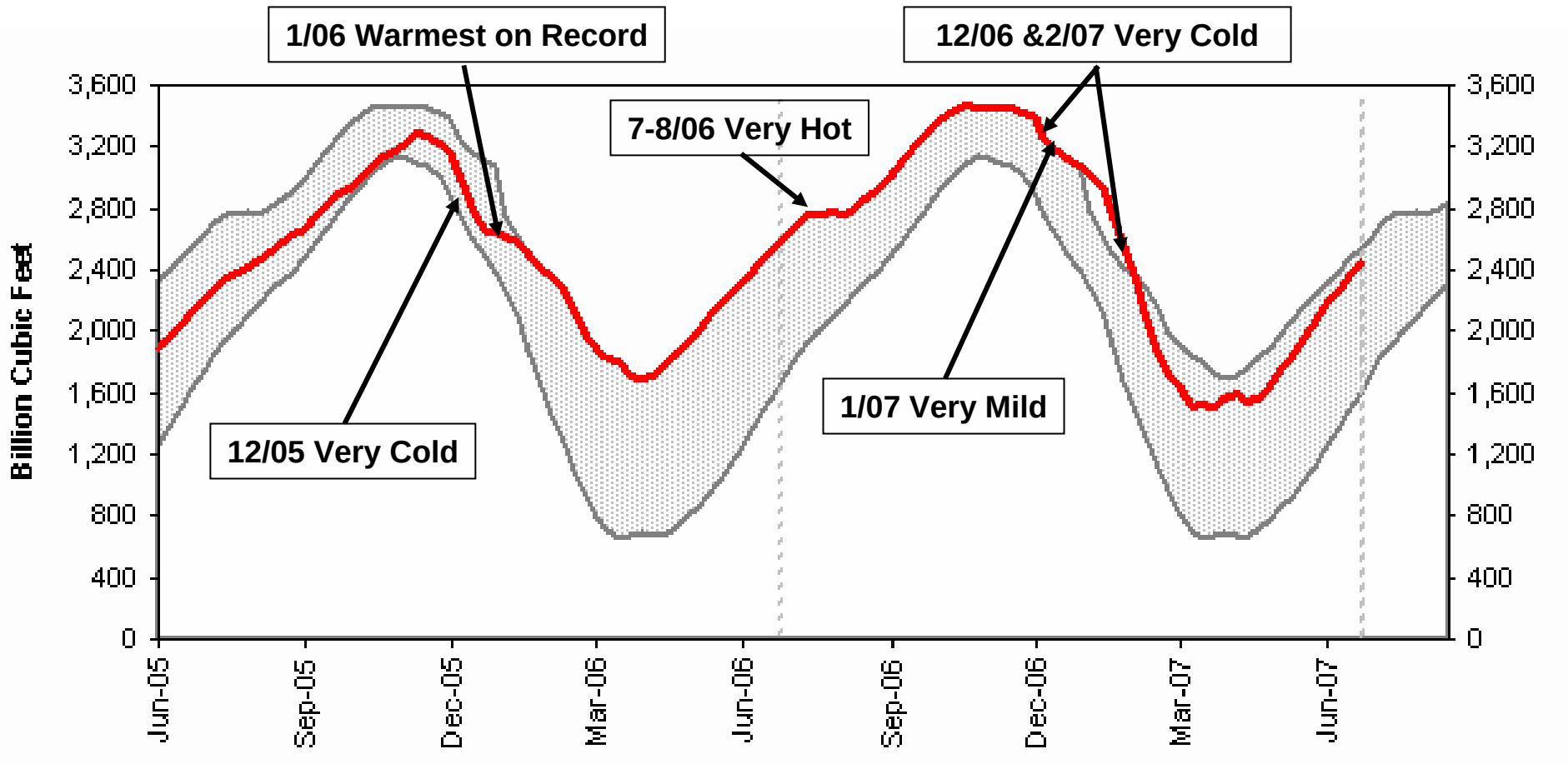
- Rail capacity limited by cars and rail-bed – competition between coal, manufacturing, biofuels and ag products
- Limited oil and gas storage capacity
- Switch to ethanol means increased demand on rail and truck since can't use pipelines – will result in greater congestion/costs

- Little investment in response to August 2003 black-out – need for major transmission infrastructure investments for reliable grid

# The Weather Wild Card

- Extreme weather affects fuels production
  - Late winter snows disrupted western coal
  - Hurricanes disrupted oil and gas production & processing in 2004 & 2005
- Extreme weather affects demand
  - 3 cool summers and 5 warm winters
  - Summer 2005 ~4% above “normal”, but >75% warmer than 2004
- GHGs affecting Weather Patterns

# Weather is Story on Natural Gas




Source: EIA 2007

# What Does the Future Hold

- Longer-term outlook cloudy – many uncertainties
- Markets will be driven by global forces – particularly China and India

- Alaska gas and oil at least a decade off
- Renewables limited by manufacturing capacity and project formation capacity

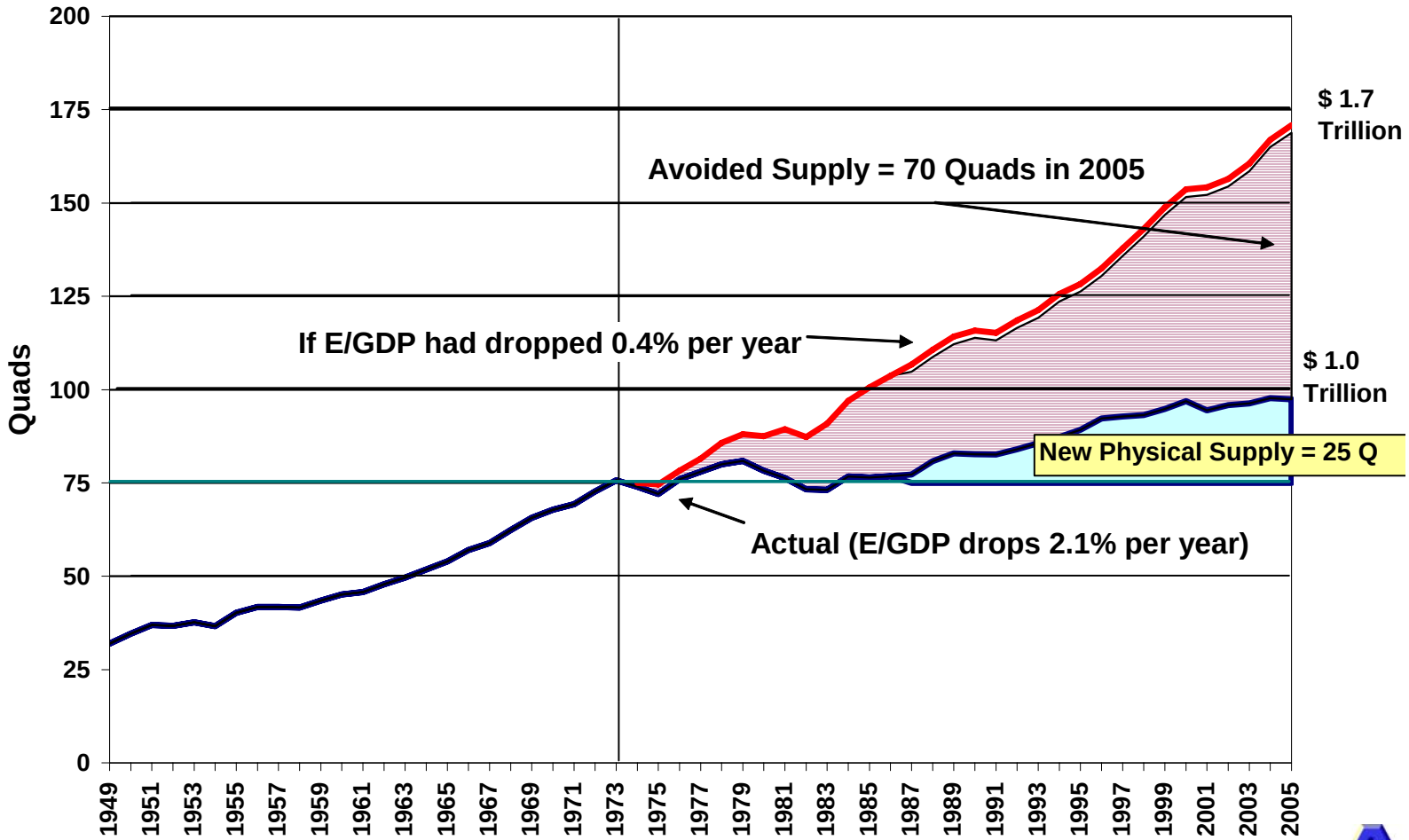
# Energy Efficiency: a Way Out of the Straitjacket

- Market fundamentals show no signs of changing for ~10 years
- Efficiency can bring balance to energy markets—reduce electricity and gas prices
- Efficiency enables clean tech—without demand reduction, clean supplies can't catch up
- Climate trumps all—efficiency is the best down payment on climate stabilization

# Energy Efficiency as a Resource

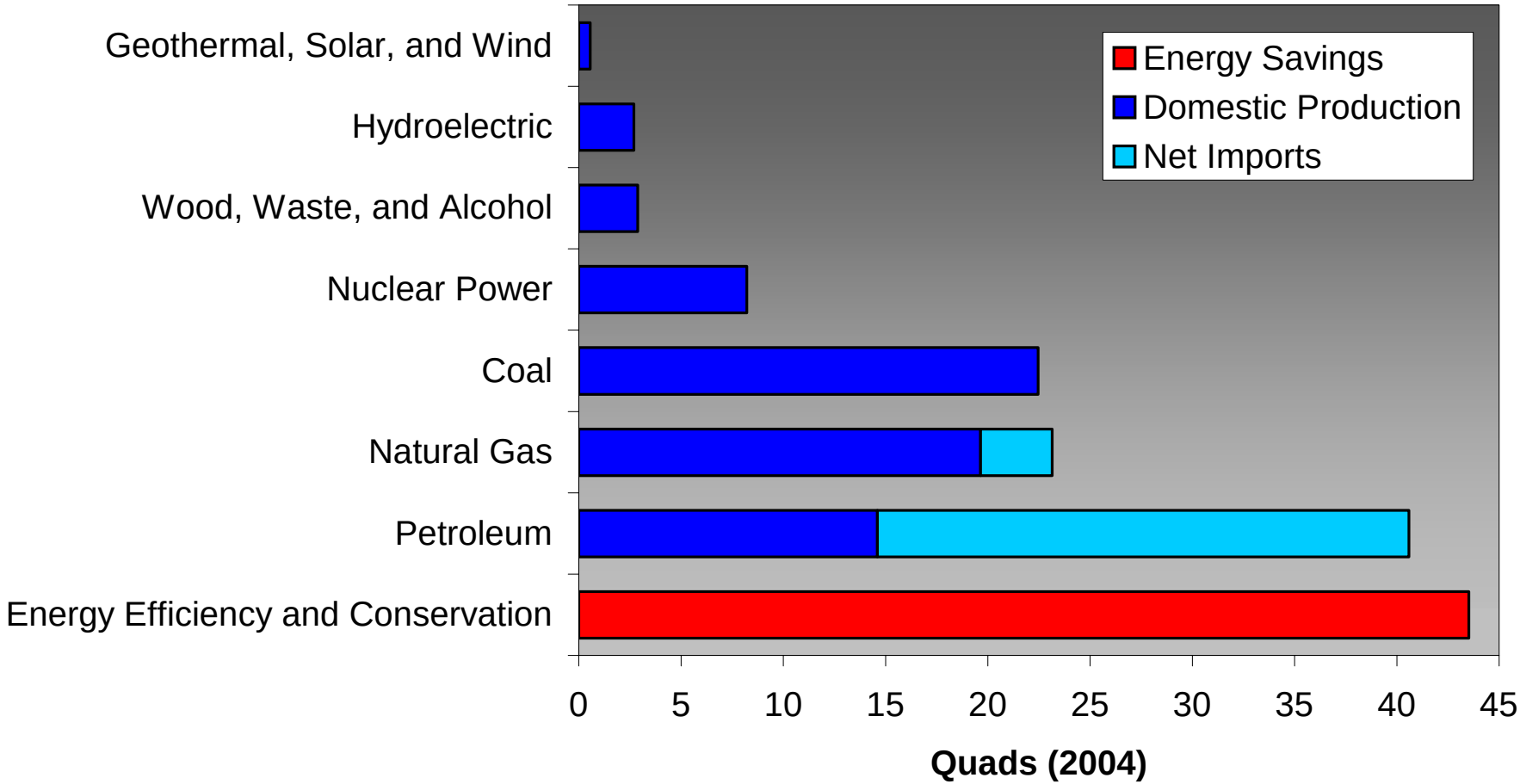
- Can be quickly deployed
- Is cost effective – less than 4¢ / kWh
- Large potential available – most states haven't tapped more than a fraction
- Many states achieving impressive results – CA, WA, OR, TX, MN, NY, VT, MA
- State efforts leading national policy

# Energy Efficiency's Past Success



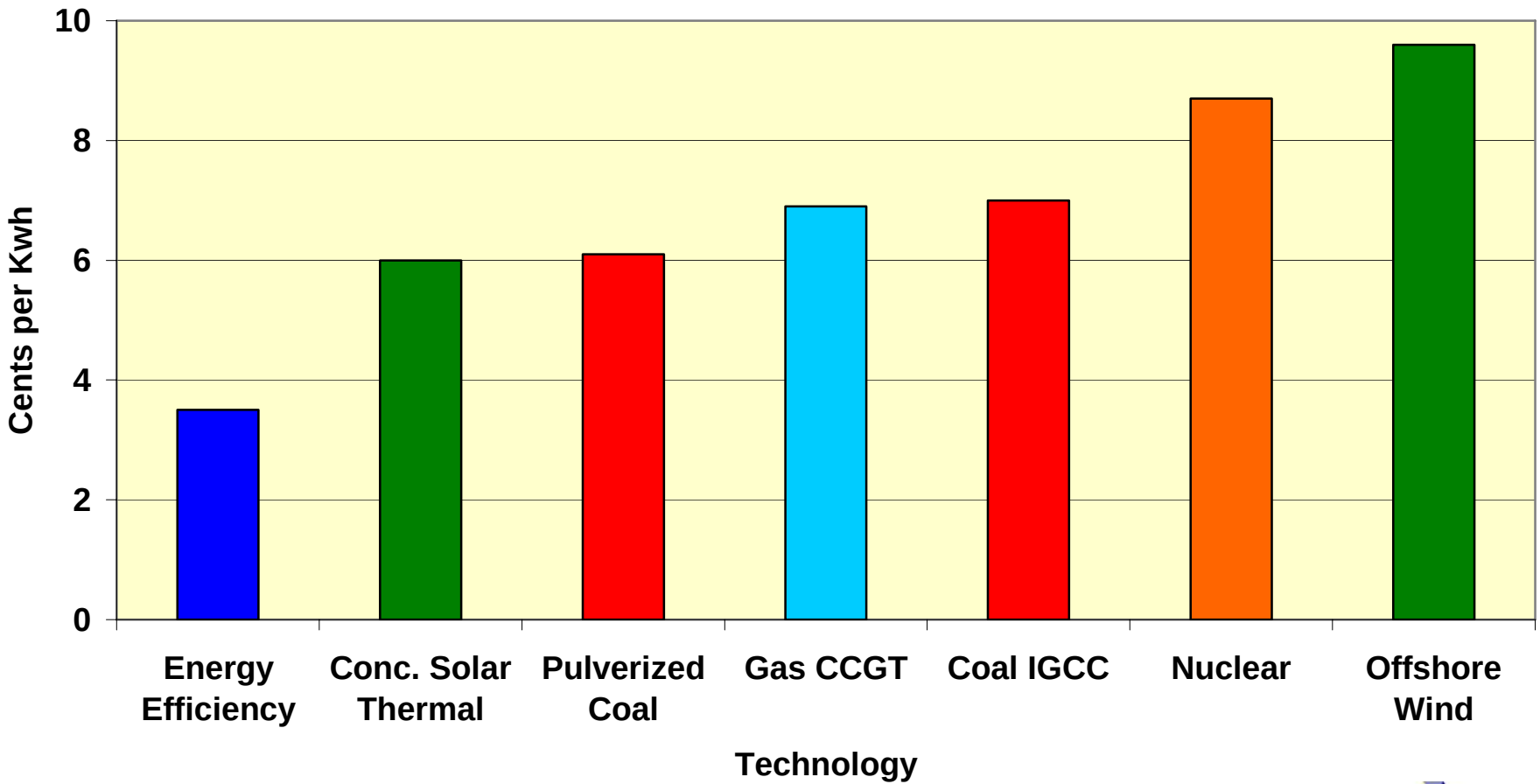

Source: Art Rosenfeld, CEC

# Efficiency: America's 1st Energy Resource



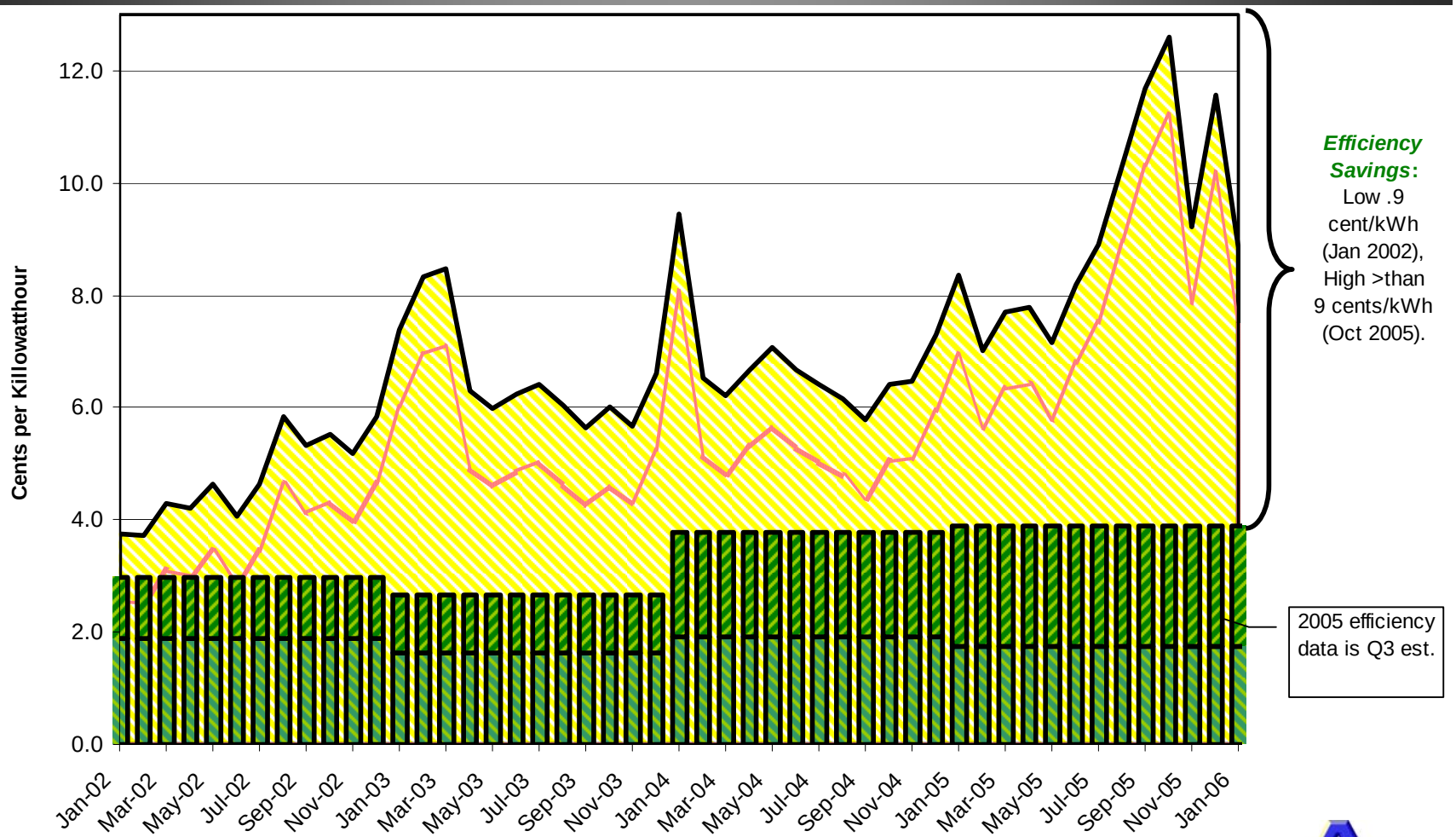

**Source: Alliance to Save Energy**

# Cost of Electricity Resources




Source: ACEEE 2006 & EPRI 2006

# How Much Does it Cost?




**Source: Dworkin 2007 from VT-PSC data**

# Efficiency Program Approaches

## DSM

- Funded through PBF
- Funding allocated to programs
- Programs evaluated for cost-effectiveness
- Lost revenues collected by utility

## Resource Acquisition

- Resource target set
- “Least-cost” savings sought from resource providers
- Savings verified
- Cost are recovered and incentives paid for exceeding targets

# Contact Information

**R. Neal Elliott, Ph.D., P.E.**

Industrial Program Director

**ACEEE**

1001 Conn. Ave, NW, Suite 801

Washington, DC 20036

202-429-8873

rnelliott@aceee.org

For more information visit:

http://aceee.org/energy