

A world map is centered in the background, rendered in white against a blue sky with scattered white clouds. The map shows the continents of North America, South America, Europe, Africa, Asia, and Australia.

# Barriers and Challenges in Developing Energy Efficiency Programs and Projects

*Prepared by:*

Peter du Pont, PhD  
Vice-President, Nexant, Inc.

*Prepared for:*

ADB Energy Efficiency Training Seminar  
Central and West Asia Region

Kuala Lumpur, Malaysia  
29 May 2014



# Topics Covered

---

- **Clean Energy in Asia**
- **Energy Efficiency in Context**
- **Energy Efficiency Policies and Programs: The First Fuel**
- **Case Study: Thailand's 5 Conservation Power Plants**
- **Energy Efficiency at the Project Level**

# Clean Energy in Asia

# Profile of Nexant



- **Global company**

- consulting services and solutions across the entire energy sector
- 750 employees,
- 3,000+ energy industry assignments in 100+ countries



- **Software and data solutions**

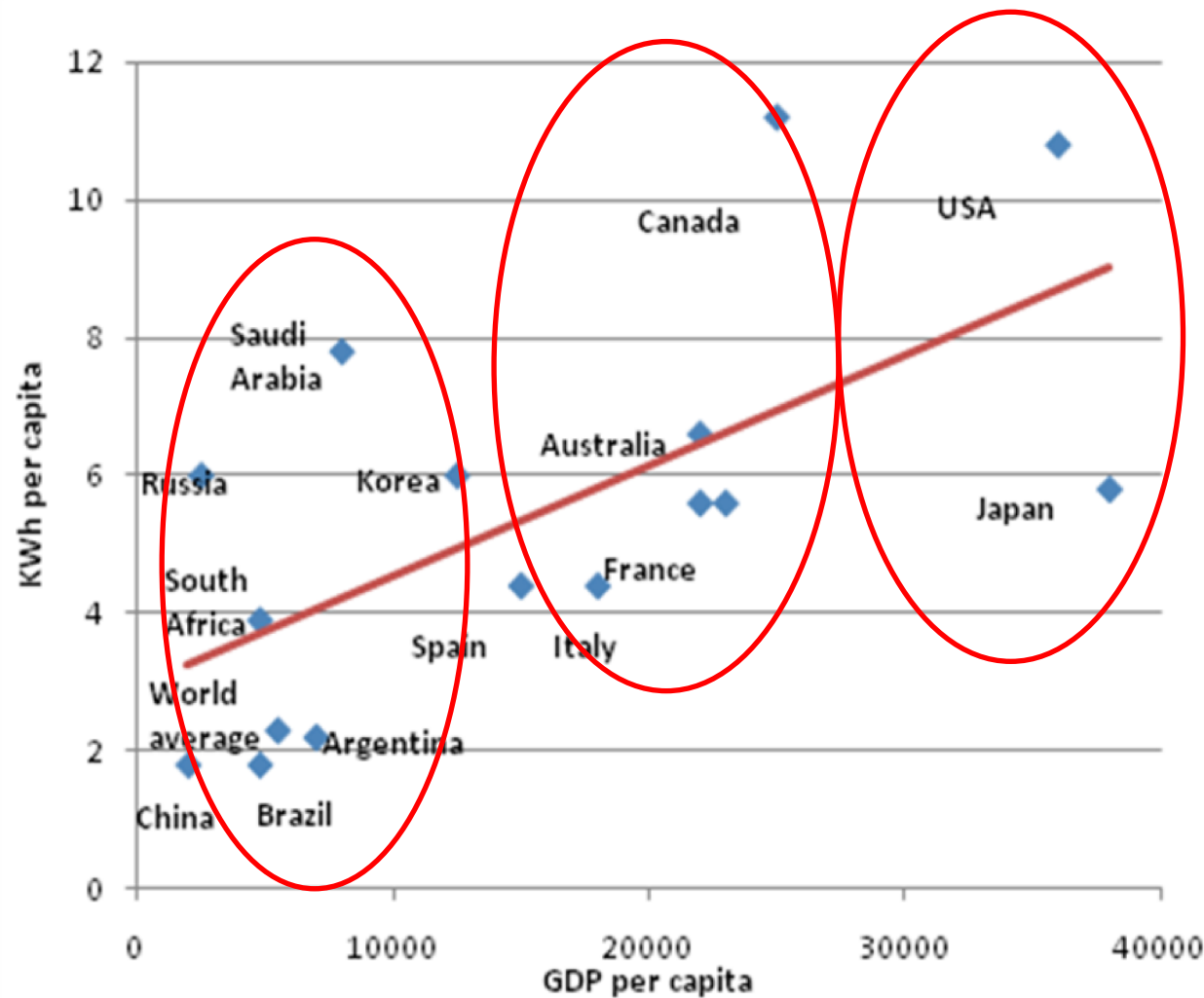
- iHedge and Grid360 for utility grid operation
- iEnergy platform for utility customer programs
- Chem Systems Online

- **Consulting services**

- Electric power
- Oil & gas
- Energy technology
- Energy efficiency and renewables
- Chemicals

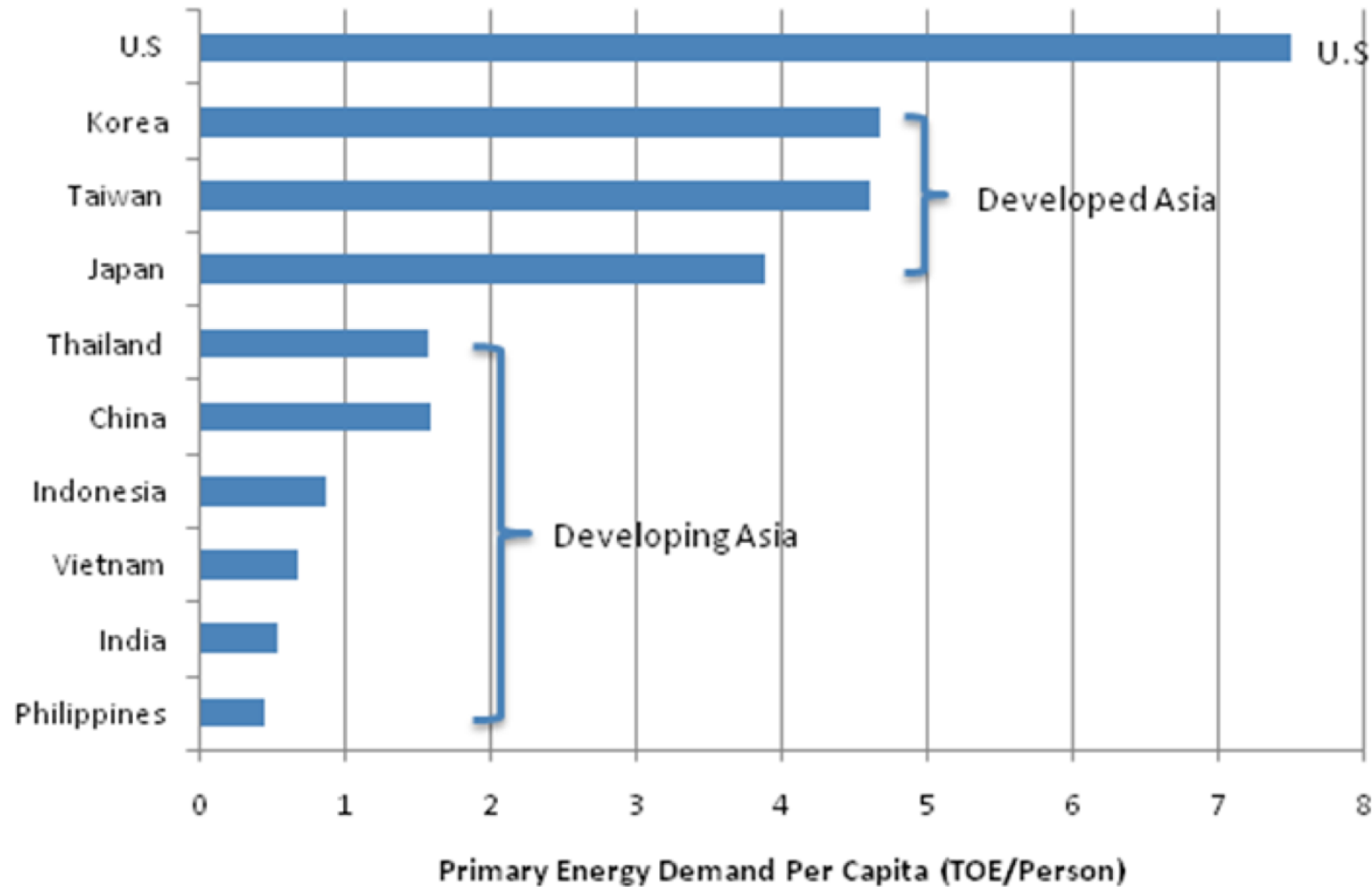
# GDP per Capita Drives Energy Demand

**BUT ... large differences at any income level**



Source: IEA (2006)

# Primary Energy Demand Per Capita, by Country: 2008

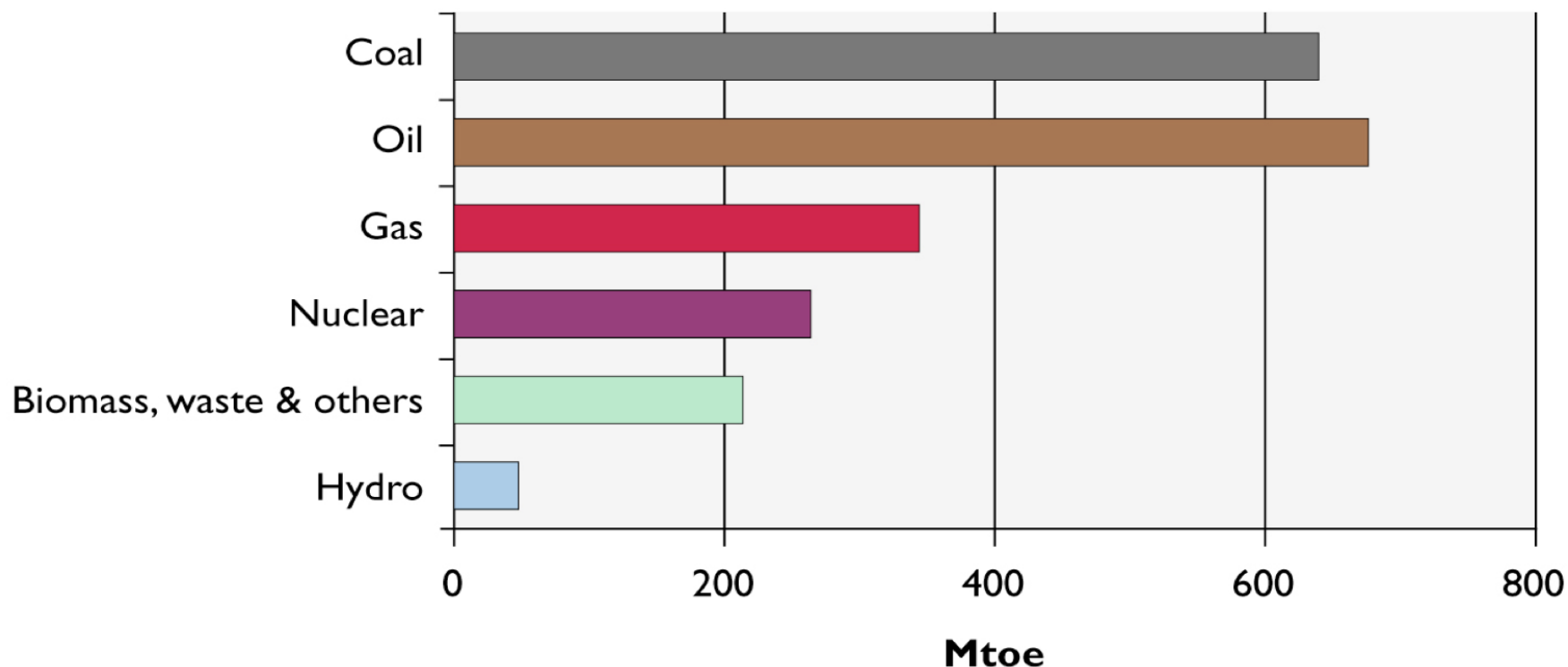


Source: International Energy Agency

# Overwhelming Momentum toward Fossil Fuels: New Demand in Developing Asia for 2008-2030 Will Come from Coal and Oil

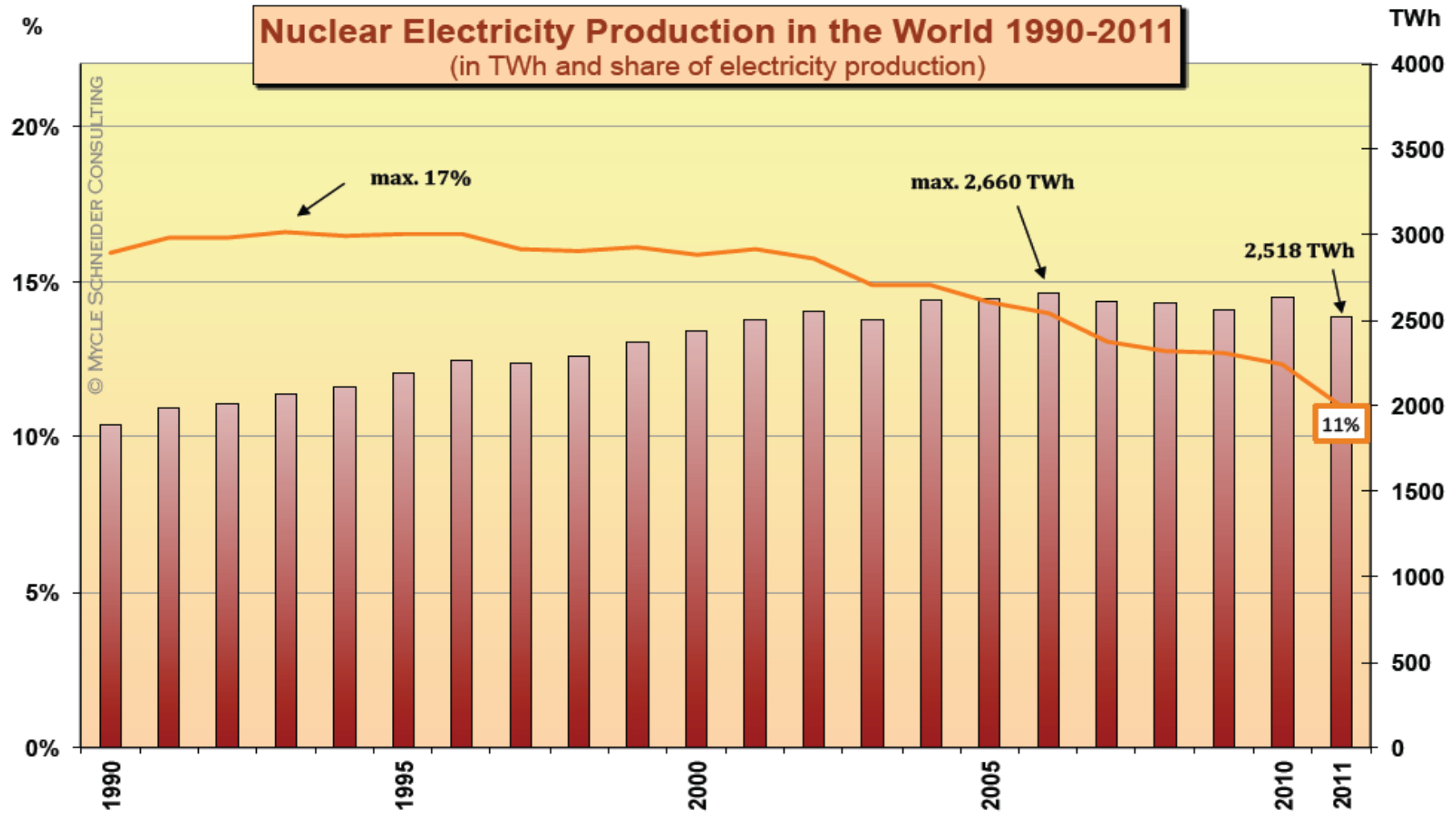


**Figure\_\_ Incremental Primary Energy Supply by Fuel Type for Southeast Asia, India, and China (2008 – 2030)**



Source: USAID, *Energy Trends in Developing Asia* (2011)

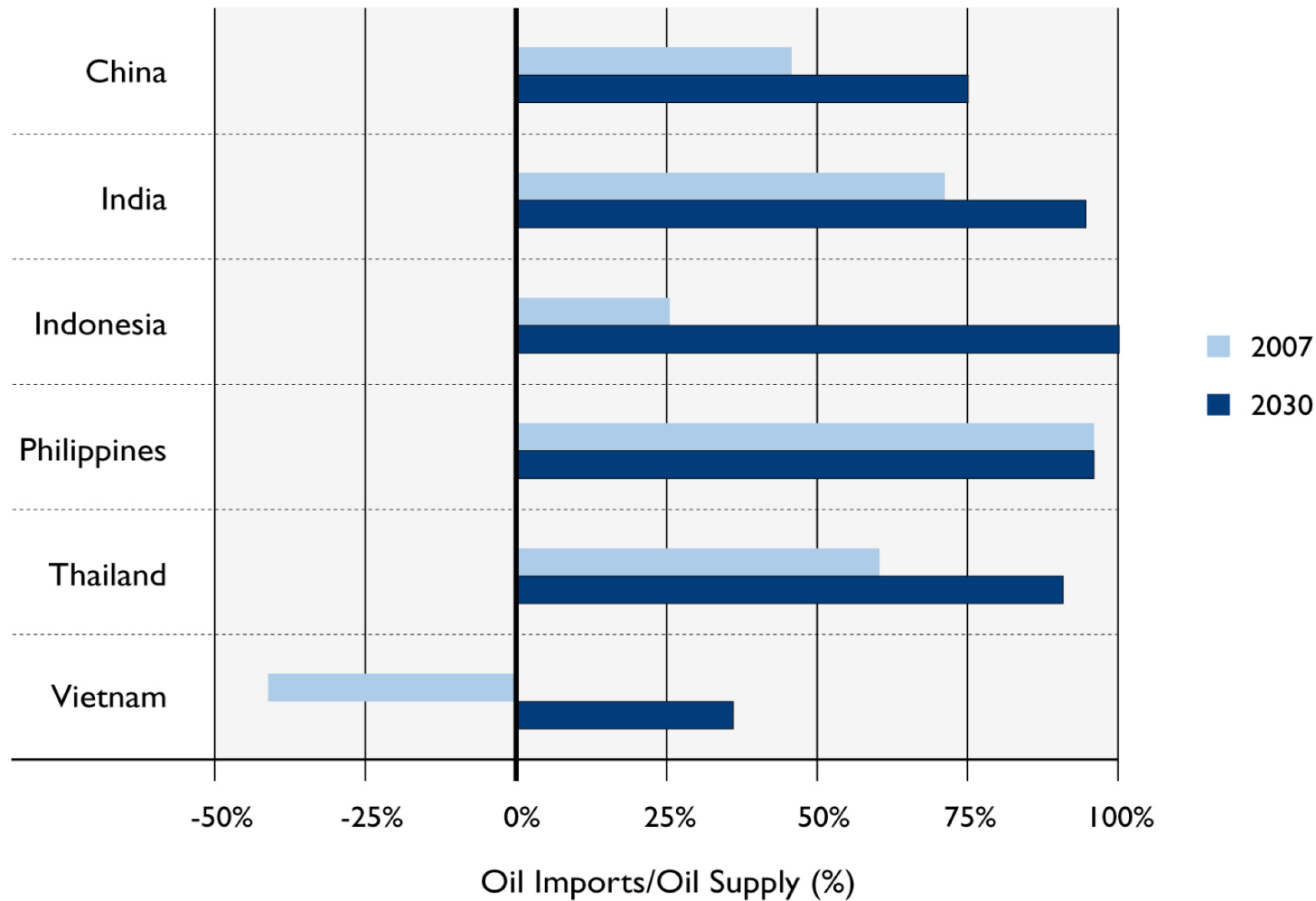
# What Nuclear Renaissance?



Source: *World Nuclear Energy Status Report, 2012*



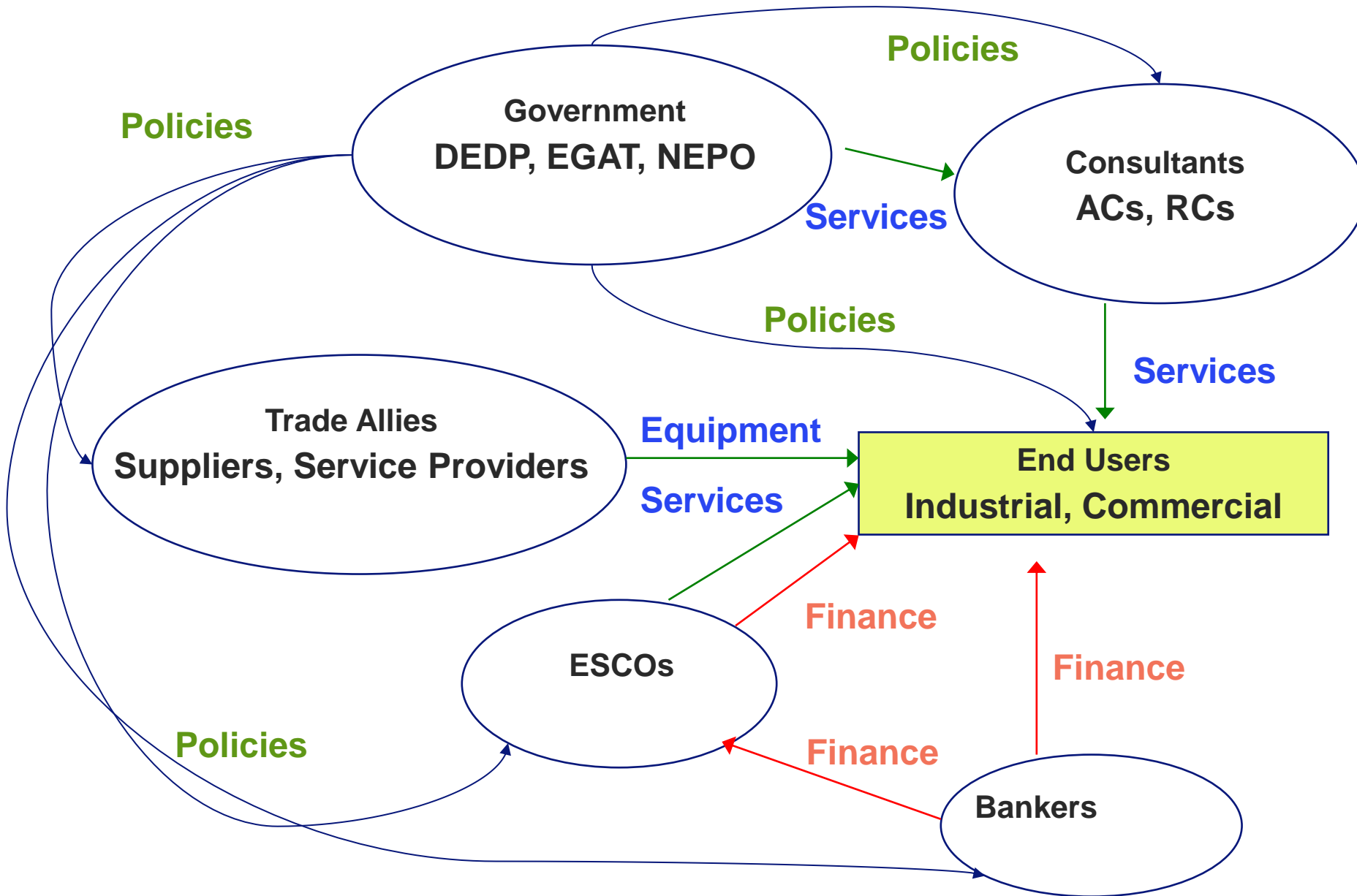
# Energy Security is a Key Driver for Energy Efficiency



Source: USAID, *Energy Trends in Developing Asia (2011)*

# **Energy Efficiency in Context**

# The Energy Efficiency Decision Landscape



# Characterizing Energy Efficiency Projects

---

## ■ WHAT?

- Appliances & equipment
- Buildings
- Factories

## ■ WHERE?

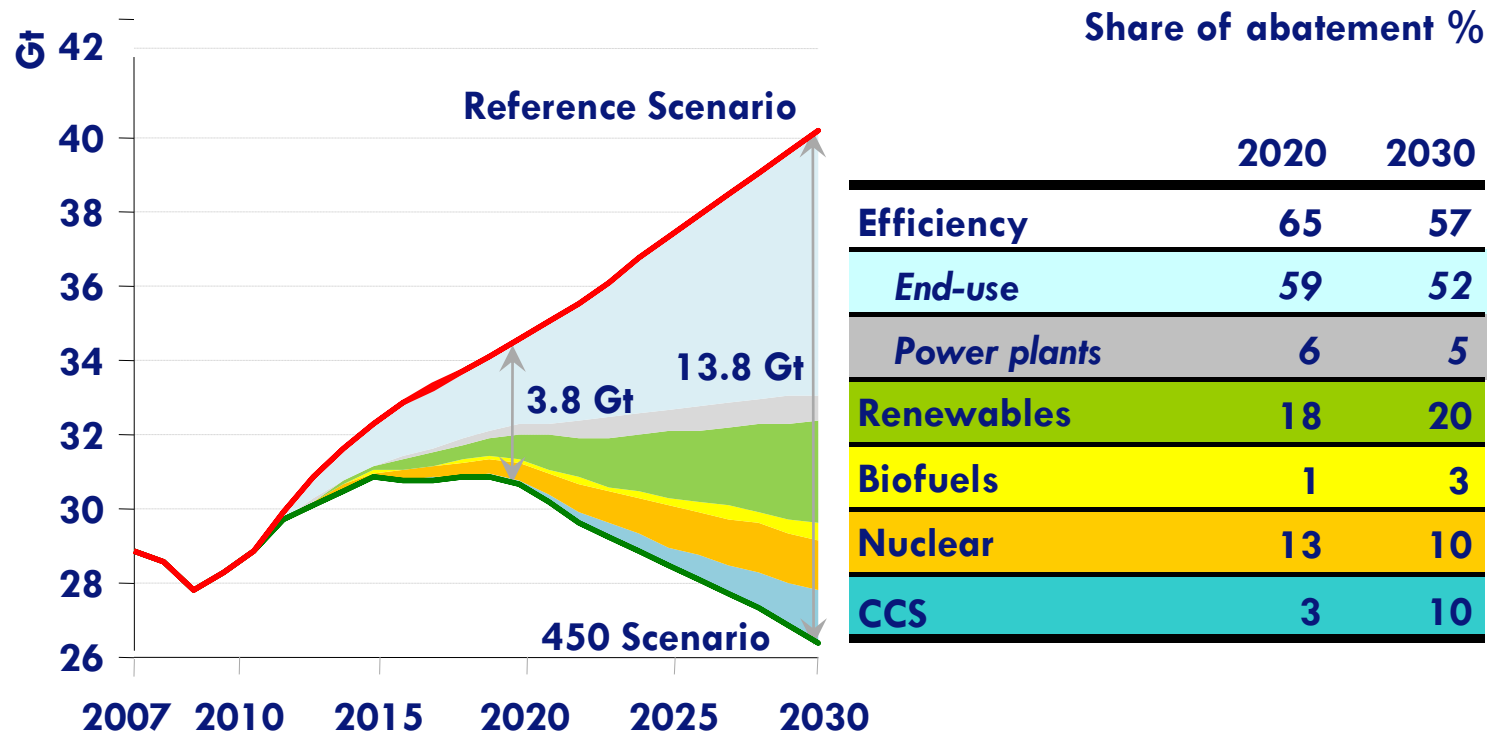
- Residential/mixed use
- Commercial
- Industrial
- Agriculture
- Transportation

## ■ HOW?

- Individual projects
  - Programmatic
    - Building codes & appliance/equipment standards
    - Utility or government incentive programs
-

# **Energy Efficiency Policies and Programs: The First Fuel**

# In Carbon Reduction Scenarios, There is an Energy Efficiency Gap

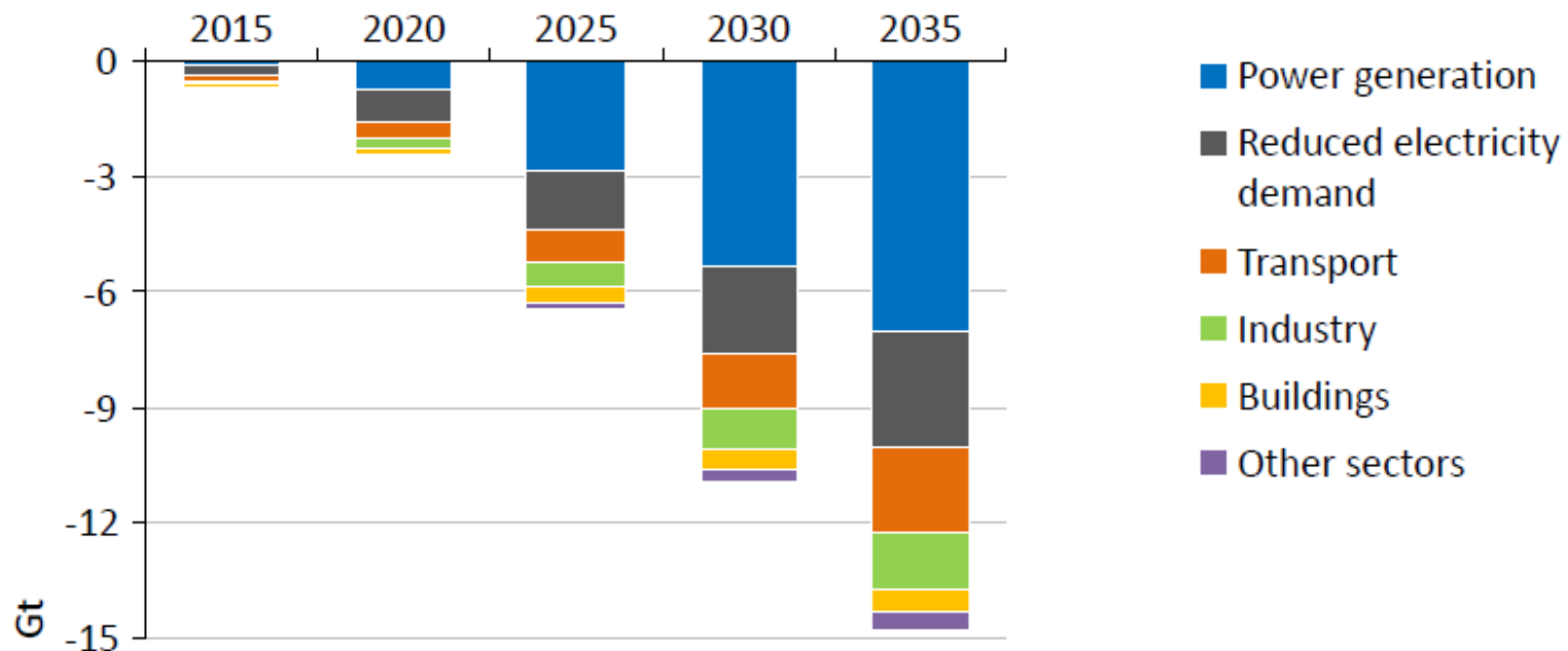


*Efficiency measures account for two-thirds of the 3.8 Gt of abatement in 2020, needed to meet the 450 ppm trajectory*

*Currently Efficiency is only capturing a small percentage of reductions – in the range of <1% to 10%*

# End-use energy efficiency will lead the way to a sustainable power sector

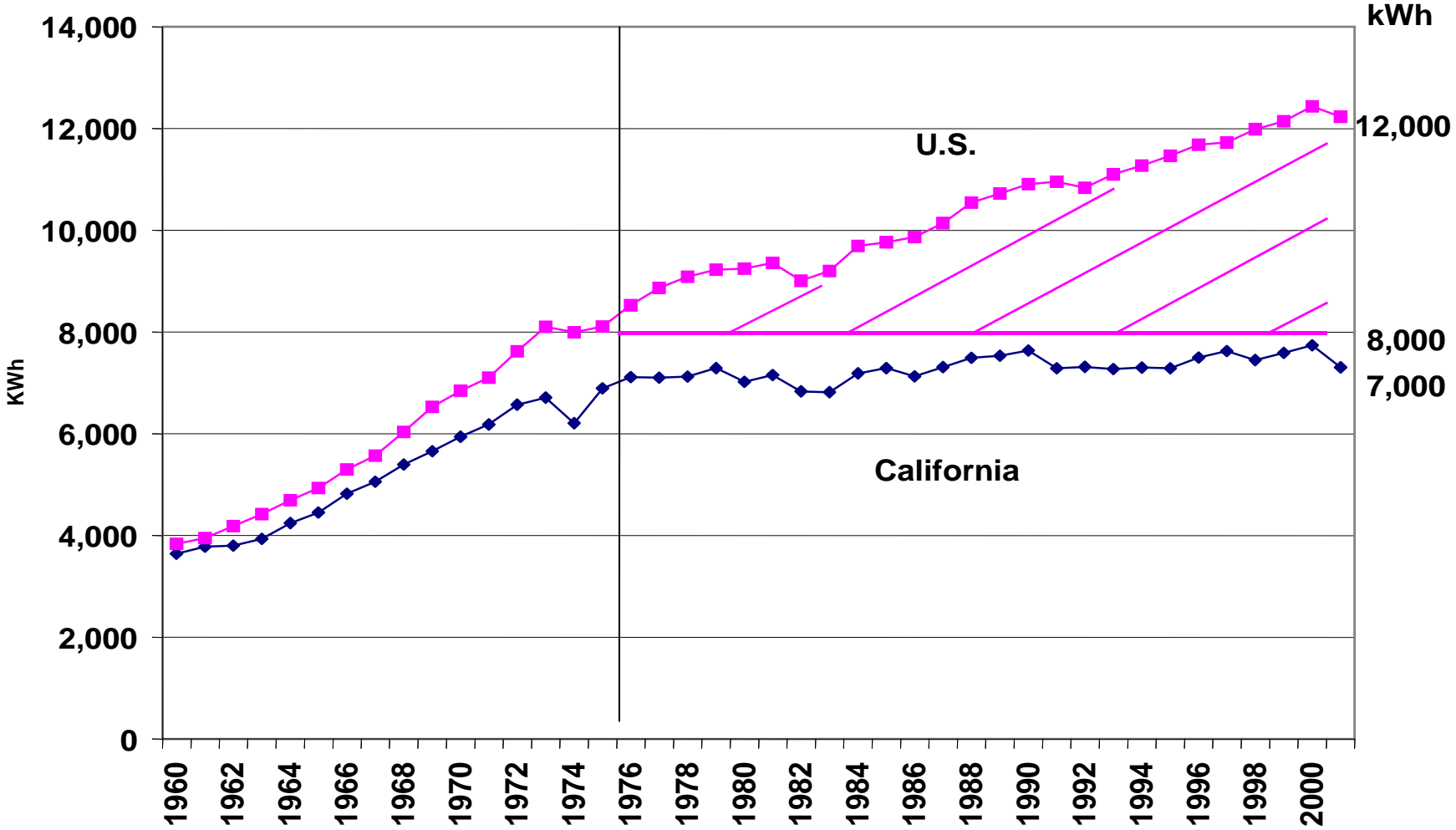
World energy-related CO<sub>2</sub> abatement by sector in the 450 Scenario compared with the New Policies Scenario



*The power sector accounts for 2/3 of cumulative emissions abatement to 2035, through switching to less carbon-intensive generation, more efficient plant & lower electricity demand*

Source: WEO 2011, IEA

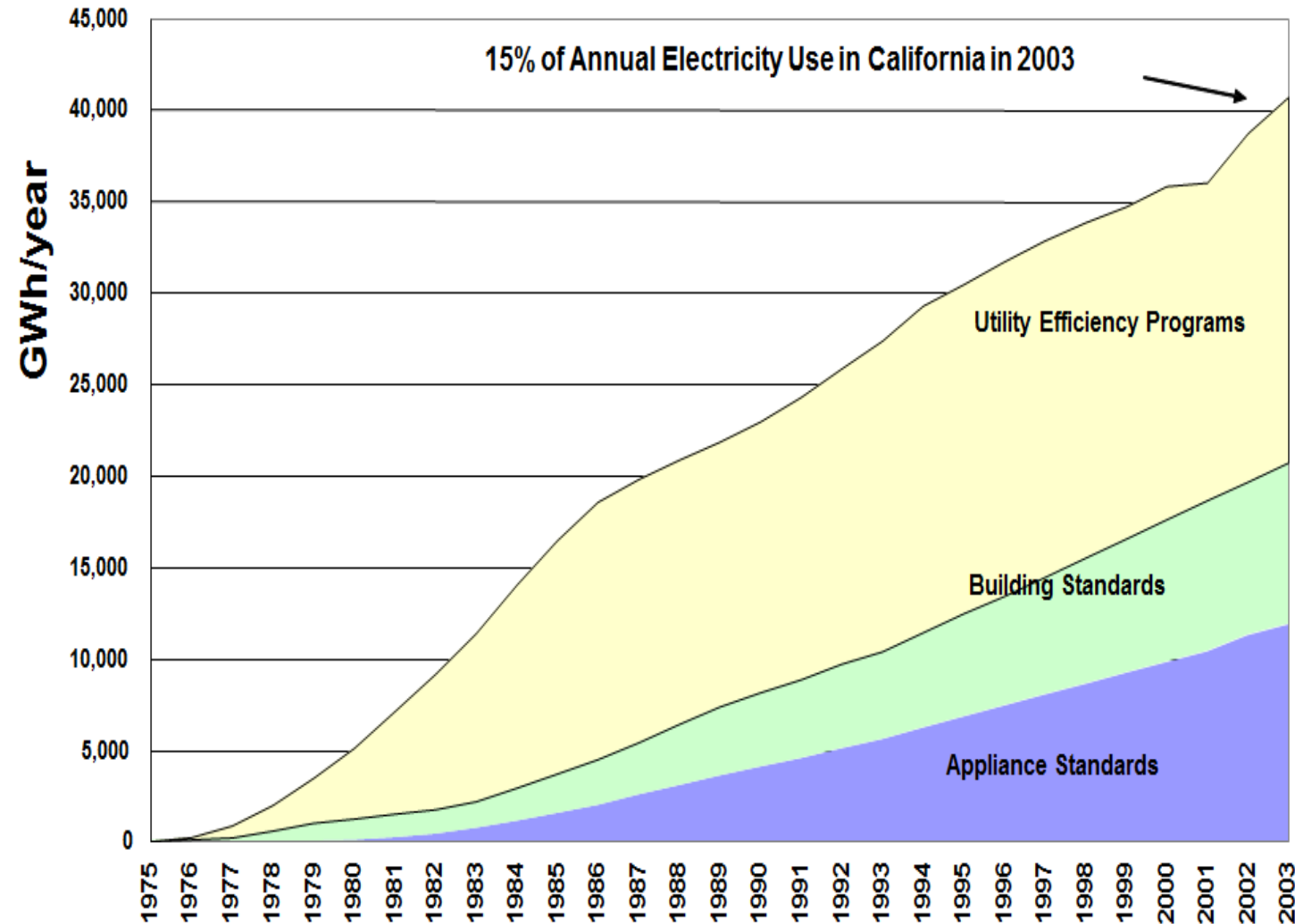
# US Experience: Policy Action on EE Can Clearly Make a Difference



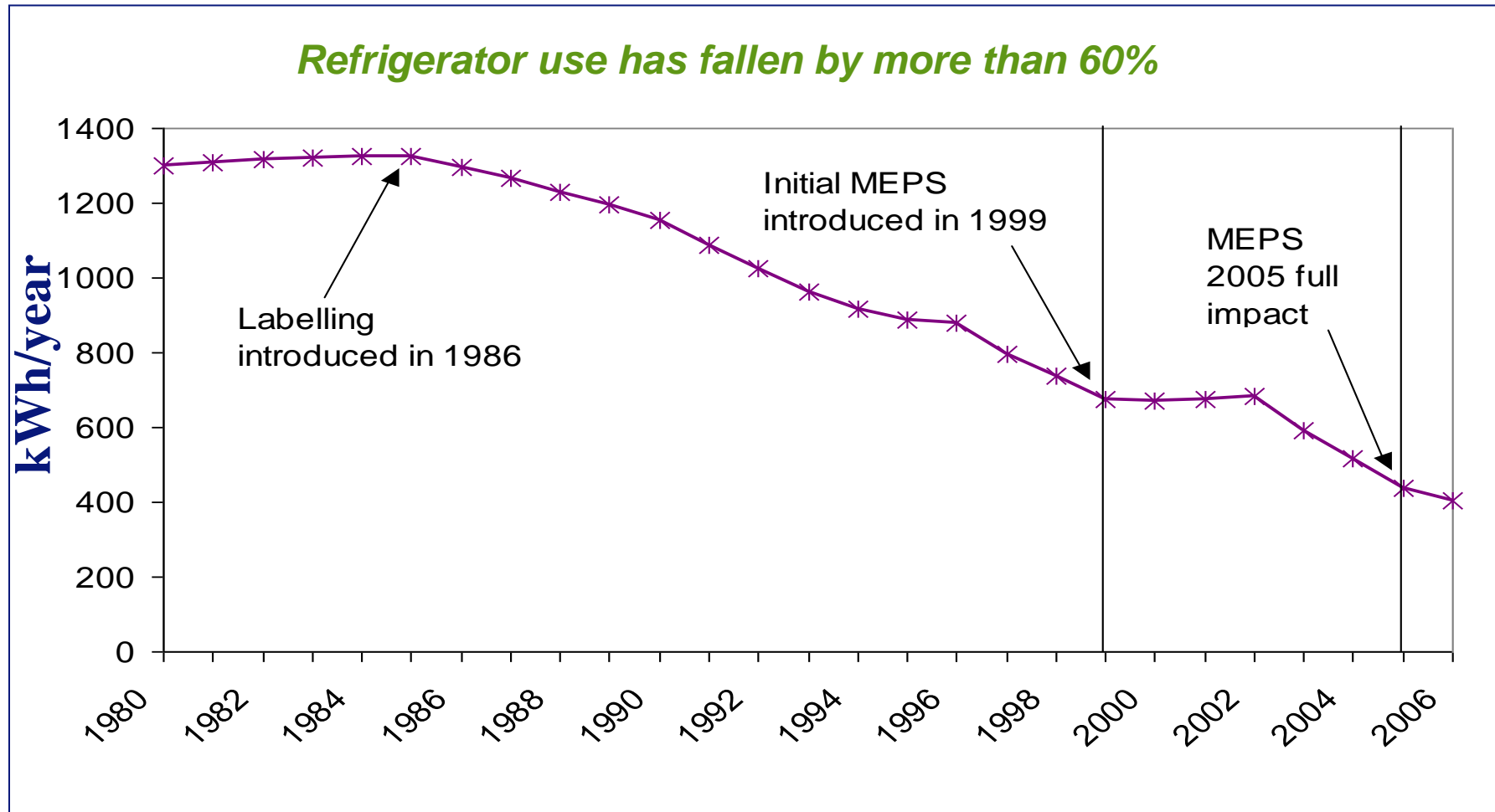
Total Electricity Use, per capita, 1960 – 2001



# The Policy Support Landscape for EE: How California has Achieved its Energy Savings



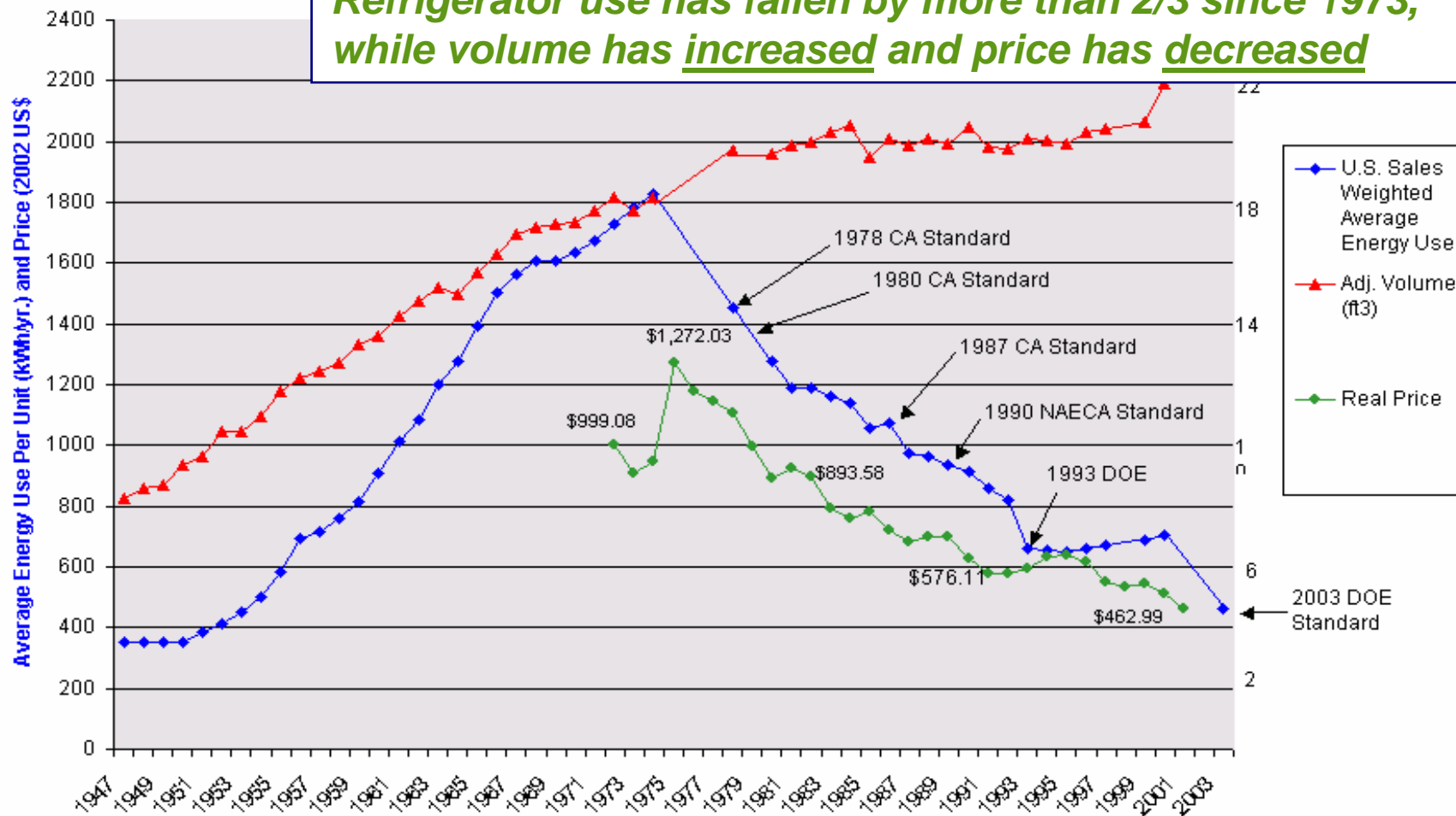
# Australia Example: Domestic Refrigerators, 1980 - 2006



Source: Australian Greenhouse Office

# U.S. Example: Domestic Refrigerators, 1947-2004

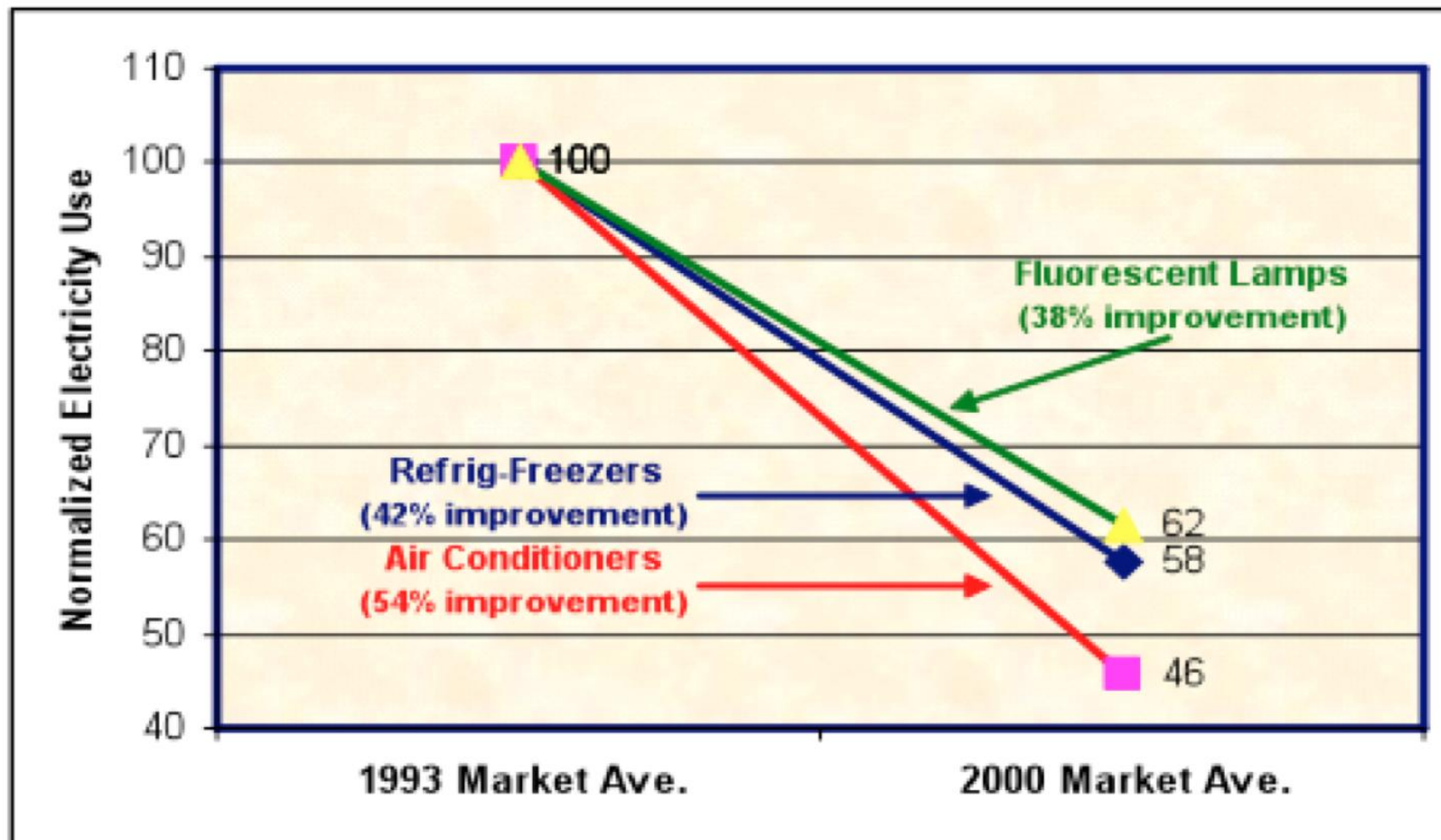
*Refrigerator use has fallen by more than 2/3 since 1973, while volume has increased and price has decreased*



**U.S. Refrigerator Energy Use vs. Time, with Real Price Changes.**

Source: Goldstein, NRDC 2005

# South Korea Example: Appliance Standards and Labeling



# **Thailand's 5 Conservation Power Plants**

# Market Transformation Programs Switching from FAT to THIN Tubes (1994-1995)

## ■ Achievement

- Successfully removed low efficient “fat tubes” from the market.
- Manufacturers stopped producing the fat tube in September 1995
- Create massive popularity for thin tubes among consumers all over the country.



Famous stars for  
The public campaigns



Source: Phumaraphand, EGAT (2011)

# Thailand's #5 Label: Focusing on the Residential Sector

อันดับที่ 1 2 3 4 5

**5** อันดับที่สองปี 2006

ฉลากแสดงระดับประสิทธิภาพอุปกรณ์ไฟฟ้า  
ประเภท : เครื่องปรับอากาศ (แบบแยกส่วน)

ประสิทธิภาพ (BTU/ชั่วโมง/วัตต์)	12.3
โซฟพลังงานไฟฟ้า (kWh/ปี)	
ค่าไฟฟ้า (บาท/ปี)	

เครื่องปรับอากาศ แบบ แยกส่วน  
ผู้ผลิต: สุนทรอิเล็กทรอนิกส์

กระทรวงพลังงาน DA 13365  
Ministry of Energy โทร. 0-2229-4103 โทรสาร 0-2438-1020



# Energy Labeling Programs by EGAT



- Refrigerator (1994)
- Air conditioner (1995)
- Compact Fluorescent Lamp (1996)
- Electromagnetic Ballast (1998)
- Electric Fan (2001)
- Automatic Rice Cooker (2003)
- Lighting Luminare (2003)
- T5 (2009)
- Electronic Ballast (2009)
- Double-oscillating Fan (2009)
- T5 Luminare (2010)
- Exhaust Fan (2010)
- Standby 1 Watt – Television (2010)



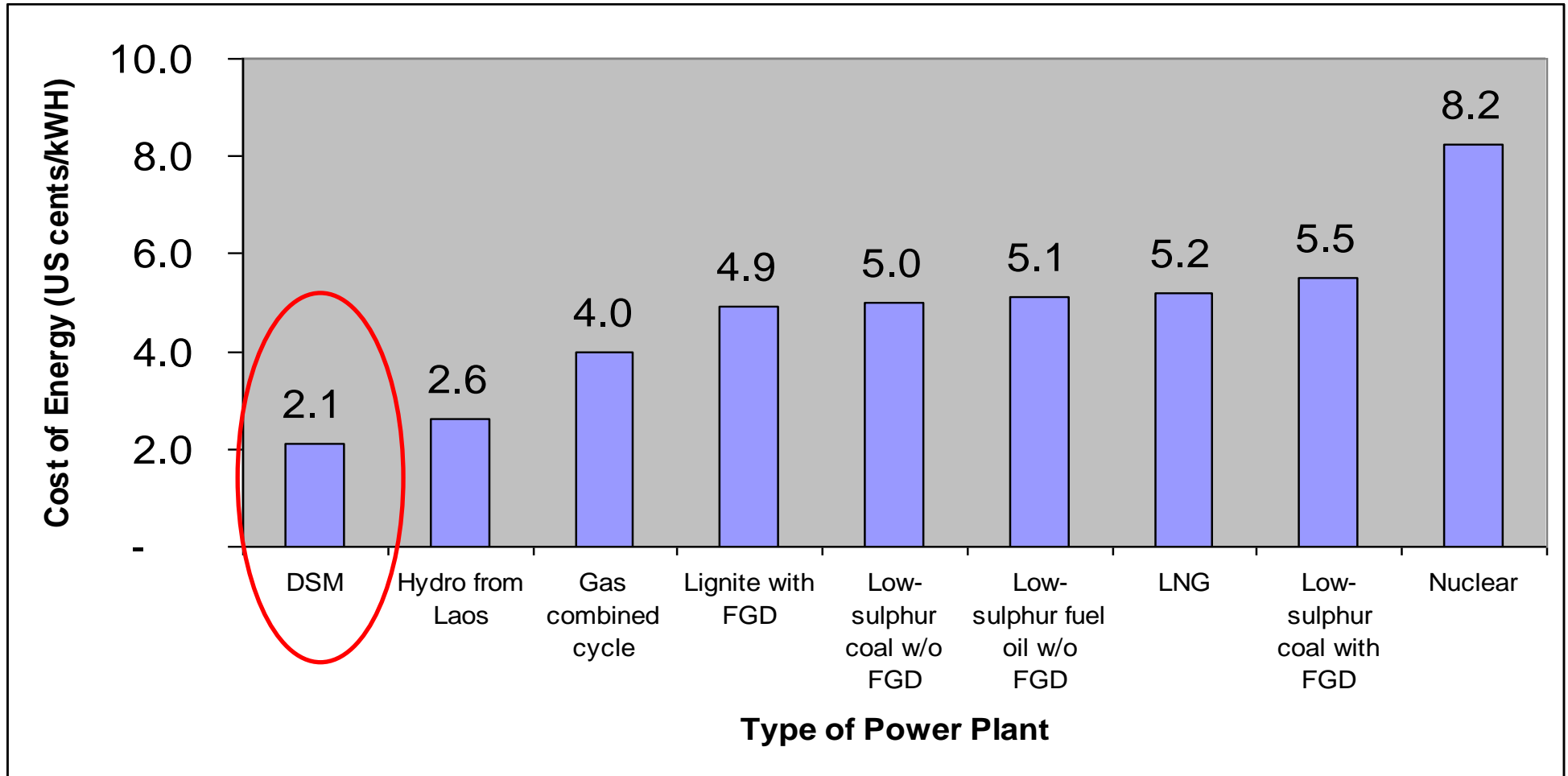


# Thailand has Avoided Construction of five (5) Power Plants

- Demand-Side Management (DSM) results:
  - 2,600 peak MW peak demand reduction
  - 15,700 GWh of energy savings
  - About 5% of current electricity is supplied by Negawatts

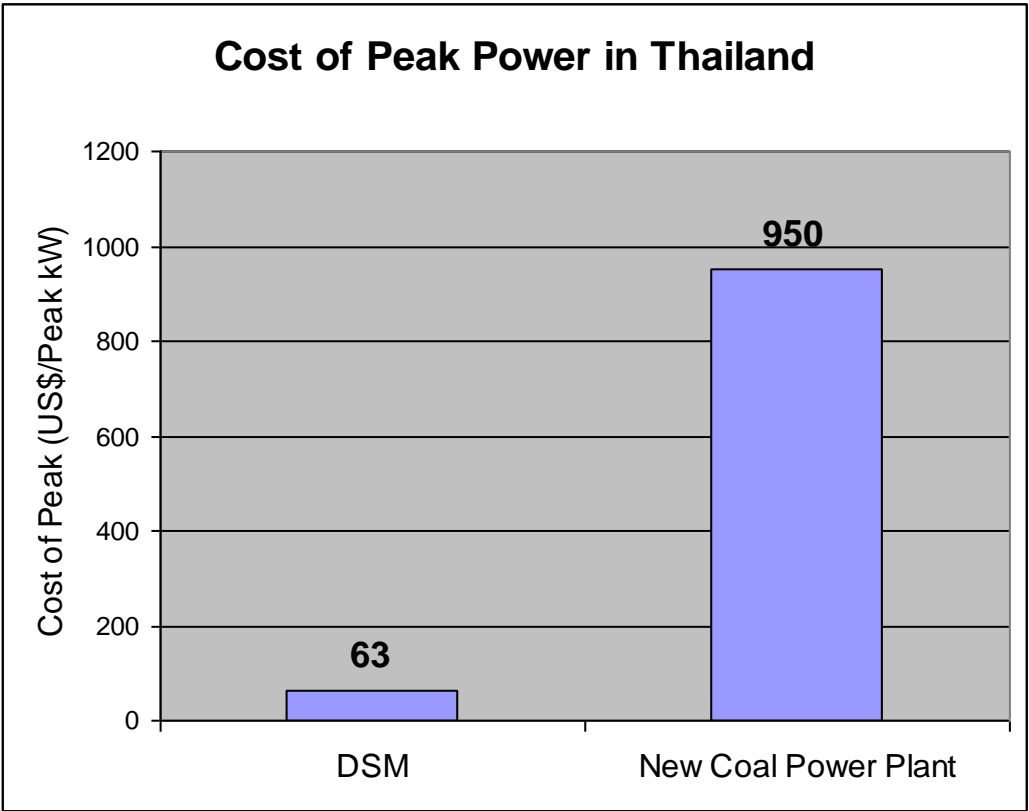
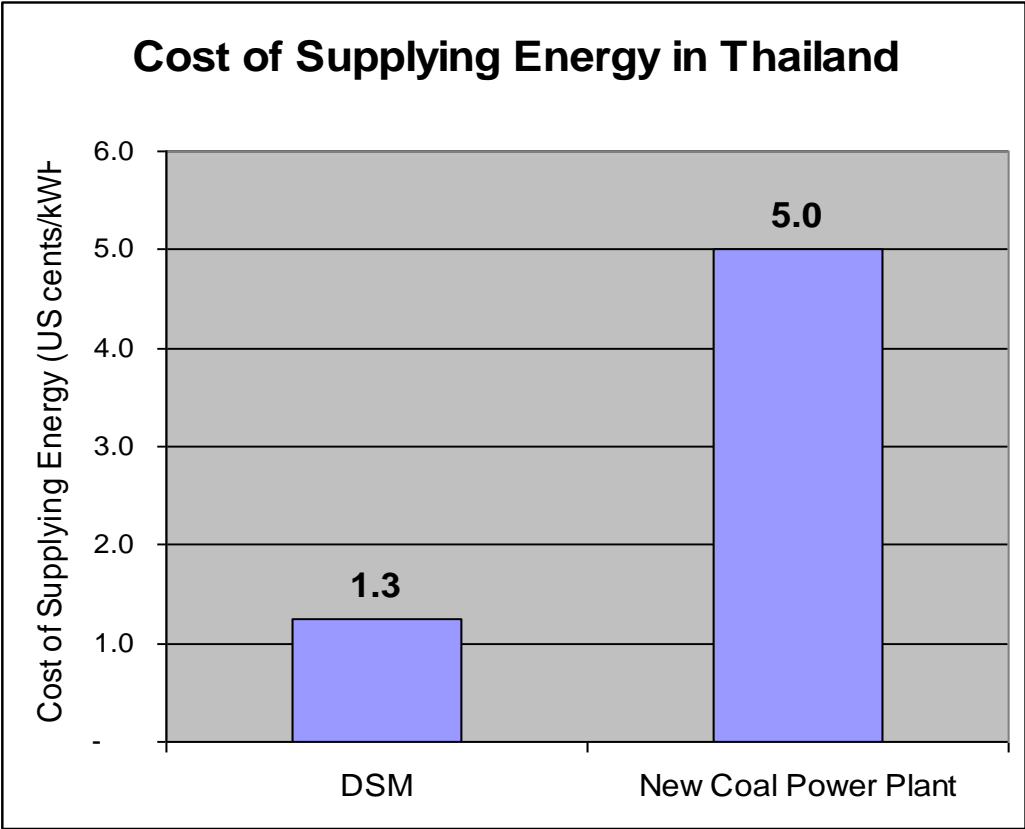


# World Bank Study of Fuel Options in Thailand



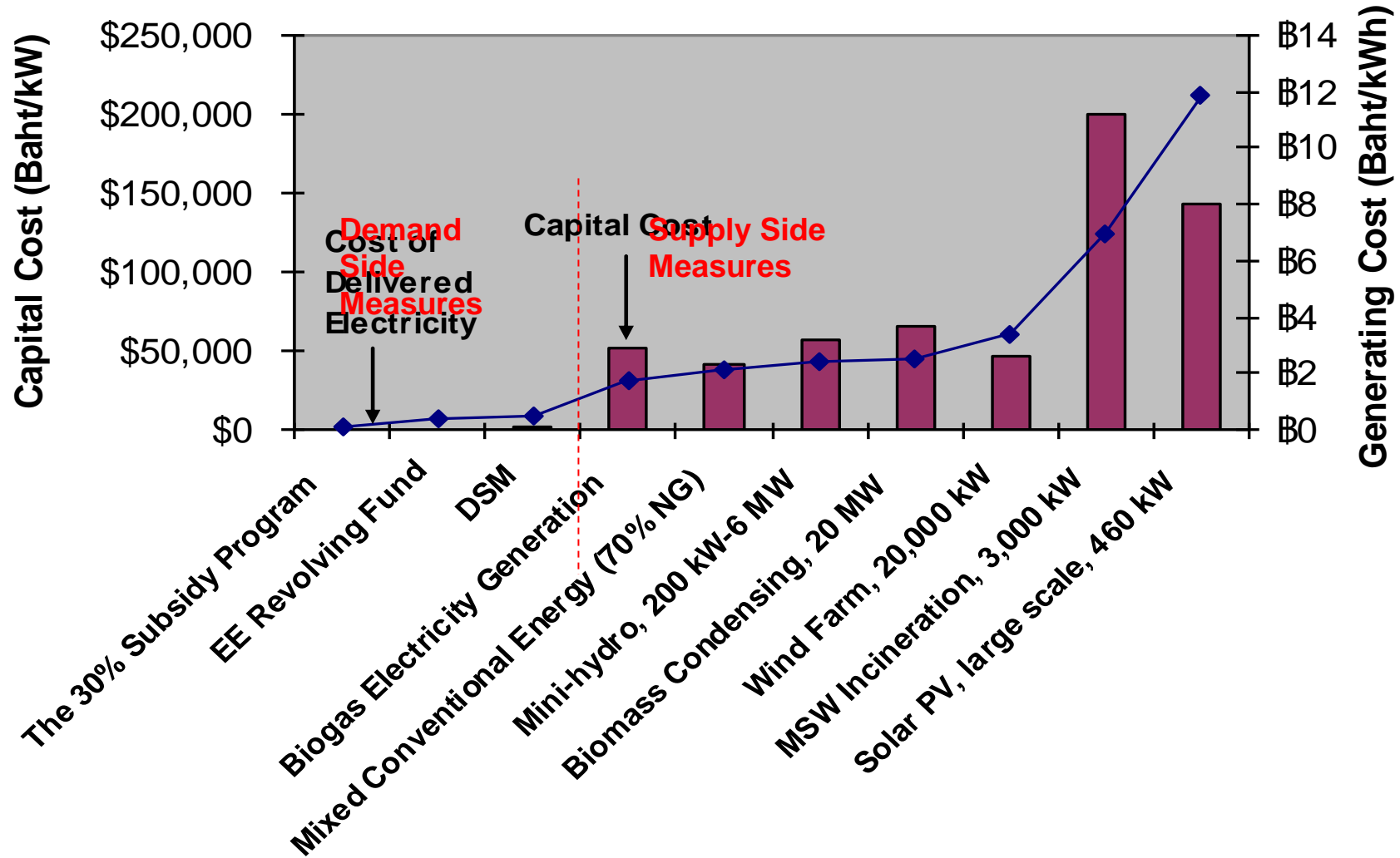
Source: The World Bank (1993)

# DSM vs. Cost of New Supply in Thailand (ACTUAL)



Source: Electricity Generating Authority of Thailand (2001)

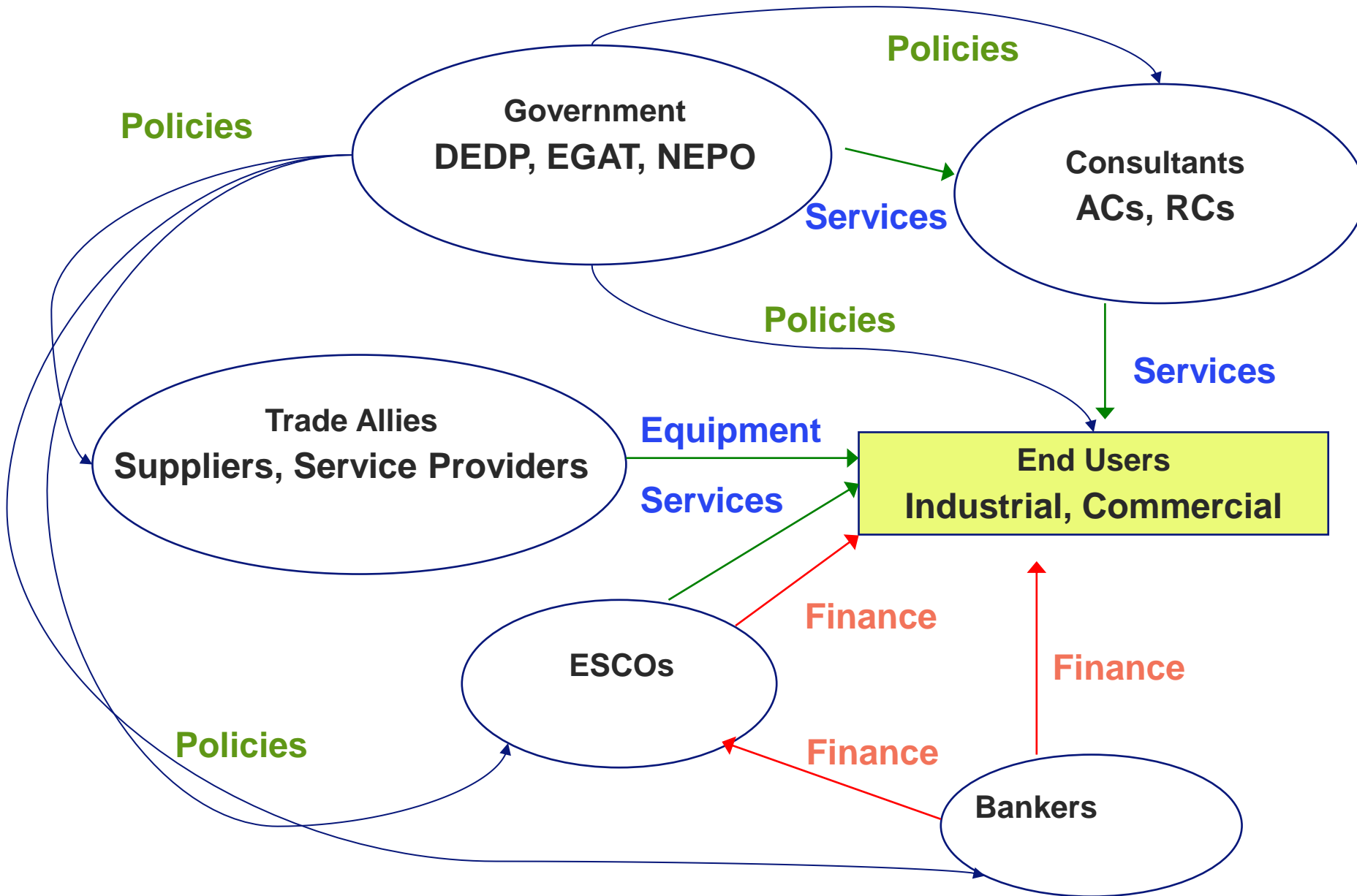
# Cost Comparison of Energy Options in Thailand



Source: Thailand Department of Alternative Energy Development and Efficiency (DEDE) (2001)

# **Energy Efficiency at the Project Level**

# The Energy Efficiency Decision Landscape



# Typical Concerns of Top Management

- Need to reduce operating costs
- Focus on core business
- Limited availability of funds
- Competing demands for internal capital
- Perception of risk of new technologies
- Staff knowledge and capabilities
- Quality of work
- Trust and confidence in service providers
- Payback/Returns on investment



# Why Energy Efficiency Services?

- Reduced cost and improved efficiency
- Little or no capital investment required from host
- Guaranteed equipment performance and energy savings
- Access to new energy efficient technologies
- Modern capital equipment
- System-wide approach to implementation
- Flexibility in implementation options
- High quality installation, operation and maintenance
- Reduced maintenance costs
- Staff training



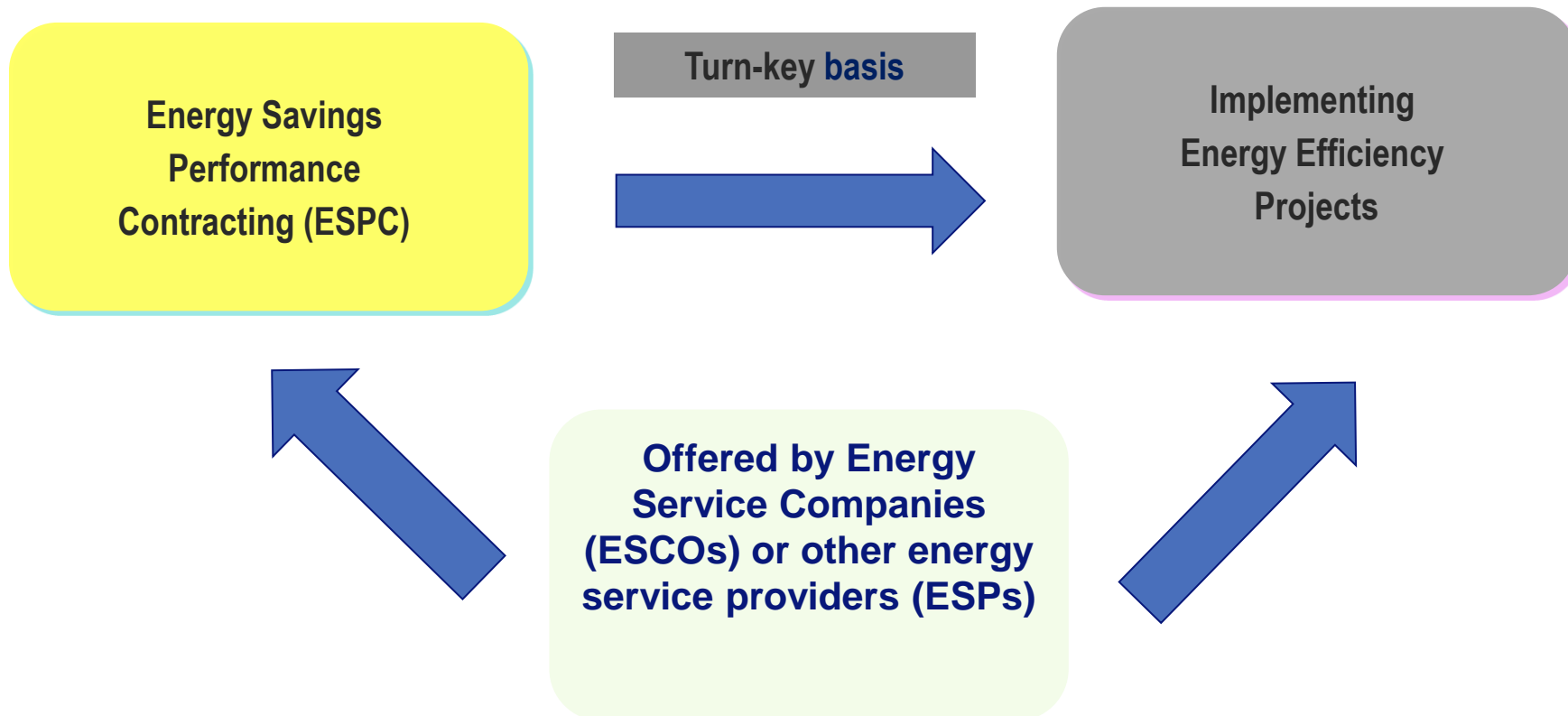


# What is an Energy Services Business?

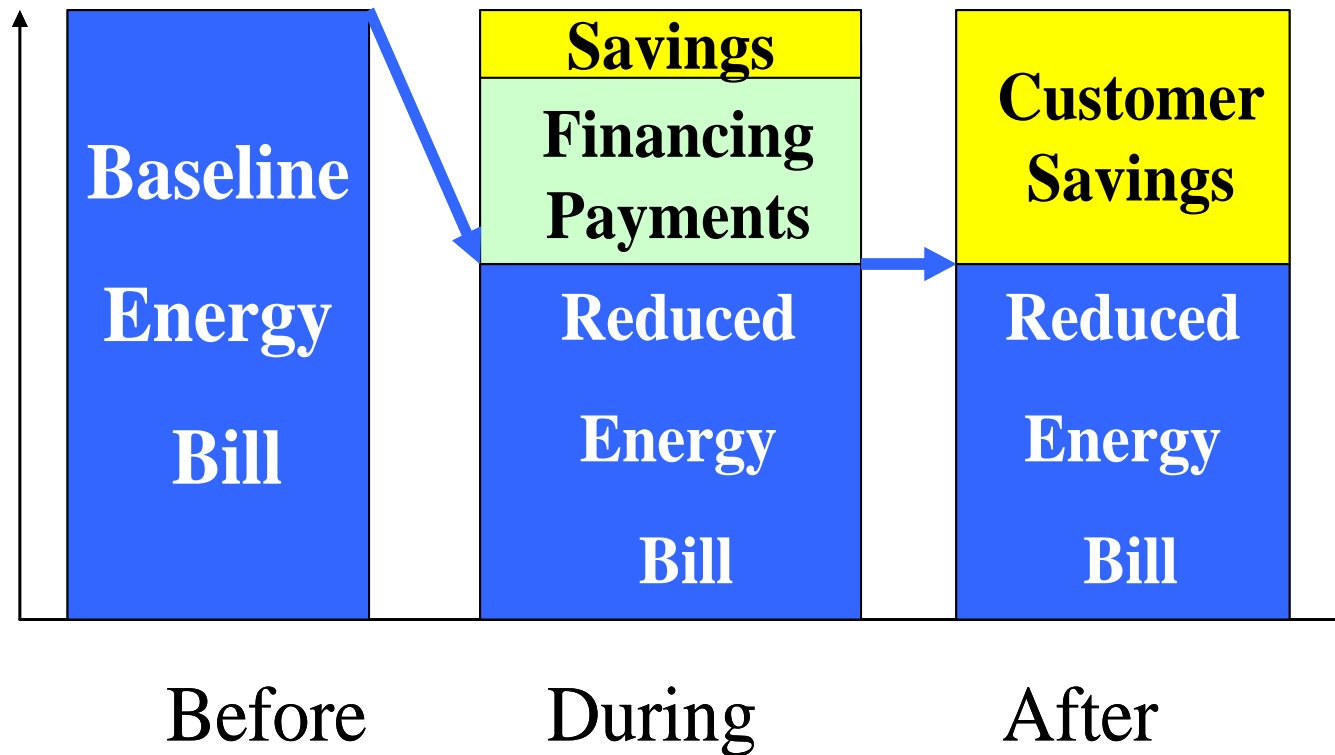
- Provides a wide range of services for design and implementation of energy efficiency projects and related services to energy users
- Provides these services using a performance contracting approach with guarantees
- Wide range of organizations may operate as energy service businesses (Energy Service Providers)
- Commonly referred to as an Energy Service Company or ESCO



# Basic Model - Energy Saving Performance Contracting



# Energy Savings from Energy Efficiency Projects

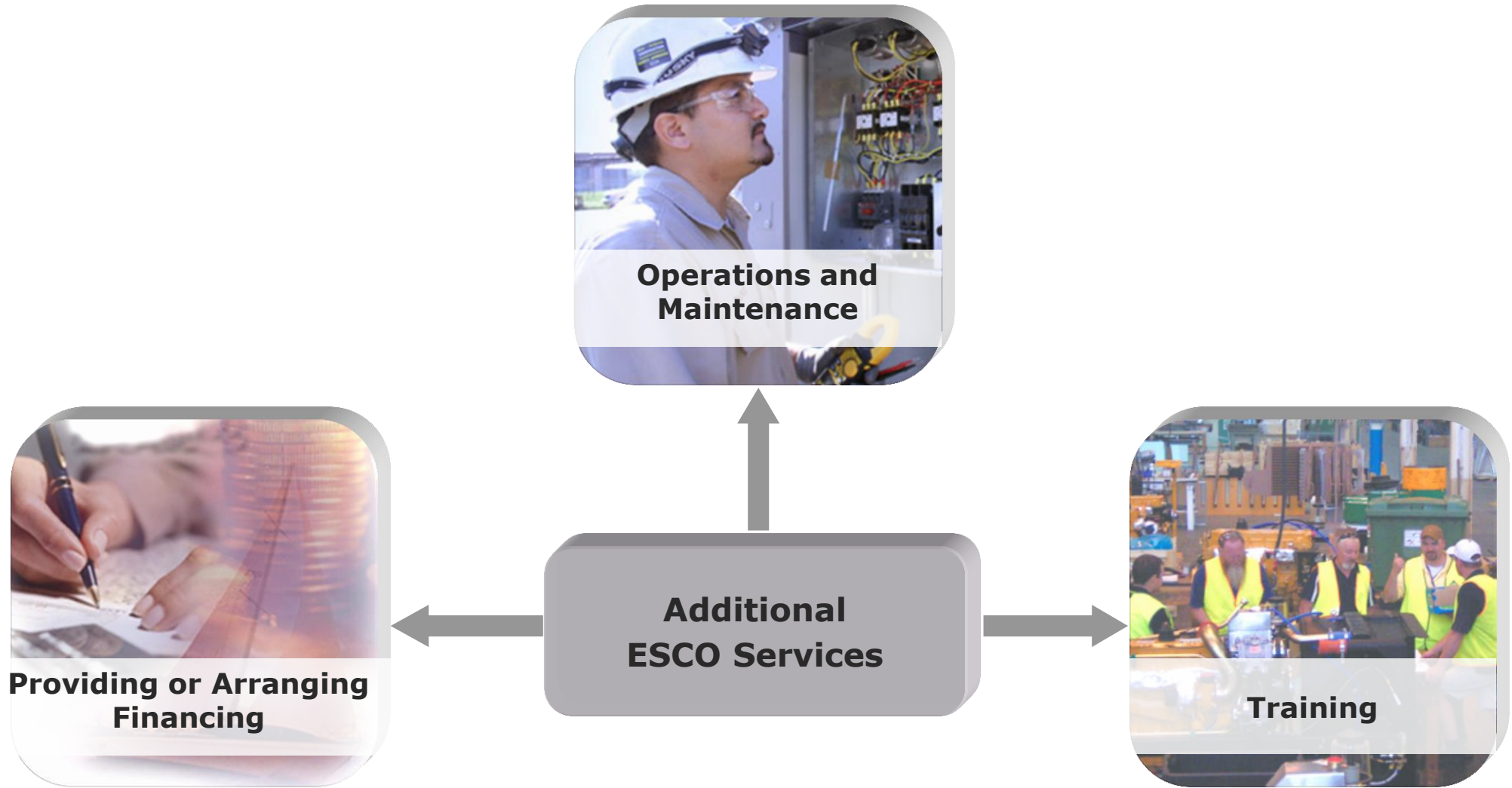


**Energy Services Project Implementation**

# Range of ESCO Services



# Additional ESCO Services



# Key Attributes of ESCO Services

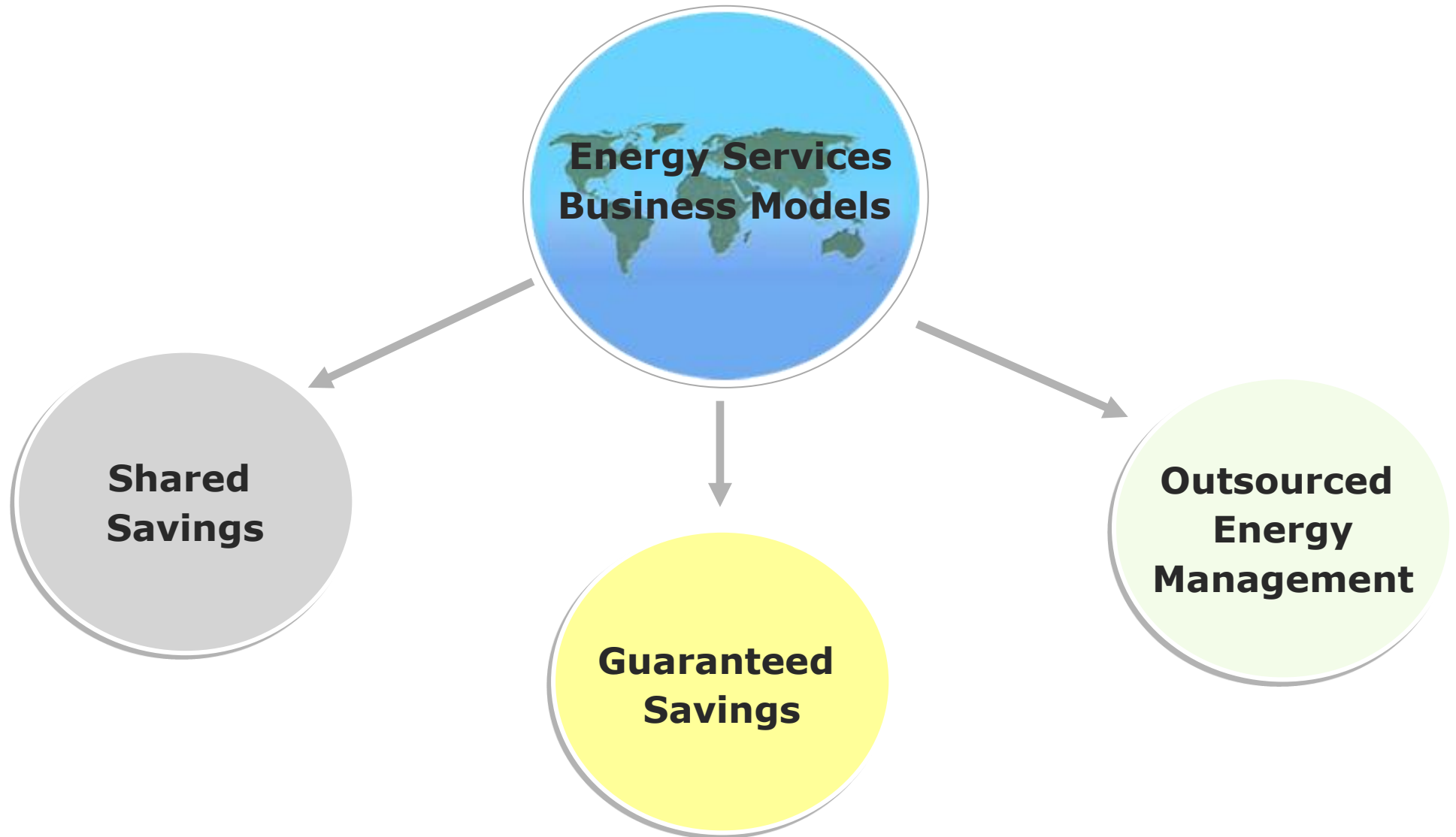
---

## Energy Service Companies:

- Provide or arrange a complete package of services, including energy analysis, design, installation, financing, and maintenance of the energy management (and other) technologies
- Offer business and financing models under which customers effectively pay for the energy services from a portion of actual energy savings achieved
- Payments to the ESCO are based on demonstrable results (that satisfy the performance guarantees provided by the ESCO)
- Most of the project risks are assumed by the ESCO.

# Energy Services Business Models

---



# How Will We Pick Up the \$20 Bill Lying on the Ground?

---



## Drivers and Policies

Cost of oil imports

Competitiveness and ASEAN open market

Climate change

Energy Efficiency as a Resource

Feed-in Tariff for energy efficiency

## Business Mechanisms

Energy service companies (ESCOs)

EE insurance products

Performance guarantees

Innovative financing mechanisms



# How Will We Pick Up the \$20 Bill Lying on the Ground?

---

## Drivers and Policies

- Cost of oil imports
- Competitiveness
- Climate change

## Policies

- Energy Efficiency as a Resource/Demand Side Management (DSM)
- Codes and Standards

## Business Mechanisms

- Individual actions (residential)
- Energy service companies (ESCOs)
- EE equipment providers (appliances, equipment)
- Performance guarantees
- Innovative financing mechanisms



# Thank you!

Dr. Peter du Pont  
Vice-President  
International Development Consulting  
Nexant Asia Ltd., Bangkok  
[pdupont@nexant.com](mailto:pdupont@nexant.com)  
Asia Tel: +66 2 793 4642

Nexant, Inc.

San Francisco  
New York  
Houston  
Washington  
London  
Frankfurt  
Bahrain  
Bangkok  
Shanghai  
Singapore  
Kuala Lumpur

[www.nexant.com](http://www.nexant.com)

e-mail: [info@nexant.com](mailto:info@nexant.com)