



## Mitigating Climate Change through U.S. Energy Diplomacy



Patrick E. Meyer, Ph.D.  
United States Embassy Science Fellow  
U.S. Embassy, Kuala Lumpur, Malaysia

United Nations University – International Institute for Global Health  
National University of Malaysia, Kuala Lumpur  
February 21, 2014

**What type of energy is used  
the most in Malaysia?**

**Natural gas**

**And Malaysia's reserves will last  
less than 40 years**

**Where is the world's largest solar panel manufacturing facility?**

**Kulim, Malaysia**

**But all of these panels are exported**

**What is Malaysia's most abundant energy resource?**

**Energy efficiency**

**You thought I was going to say "sunshine"**

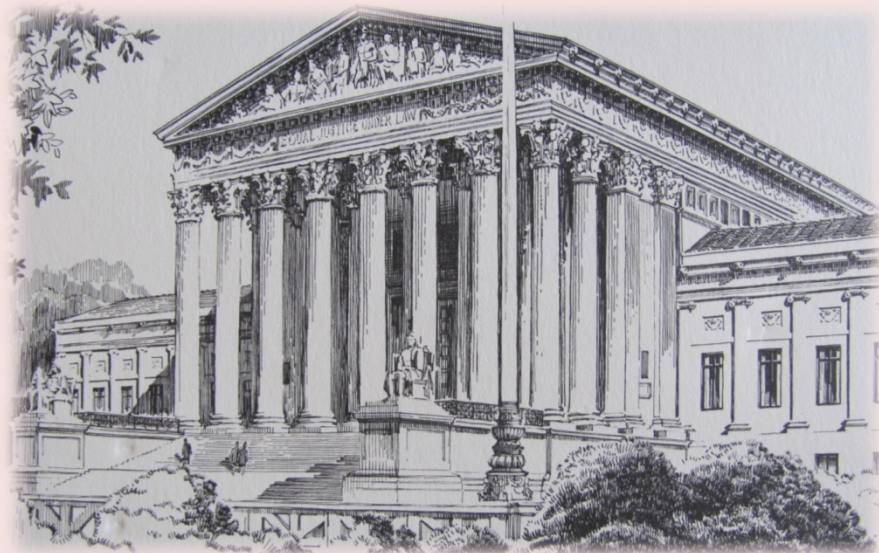
**How many branches does the U.S. government have?**

**Three**



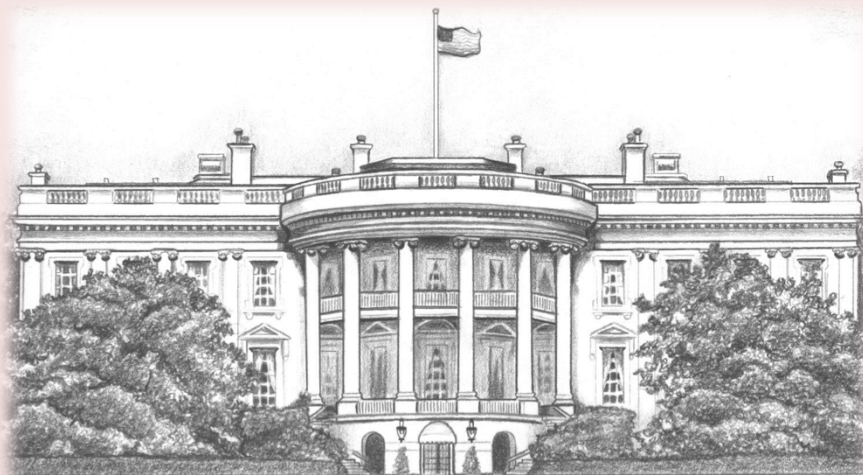
**Legislative**

Makes Laws



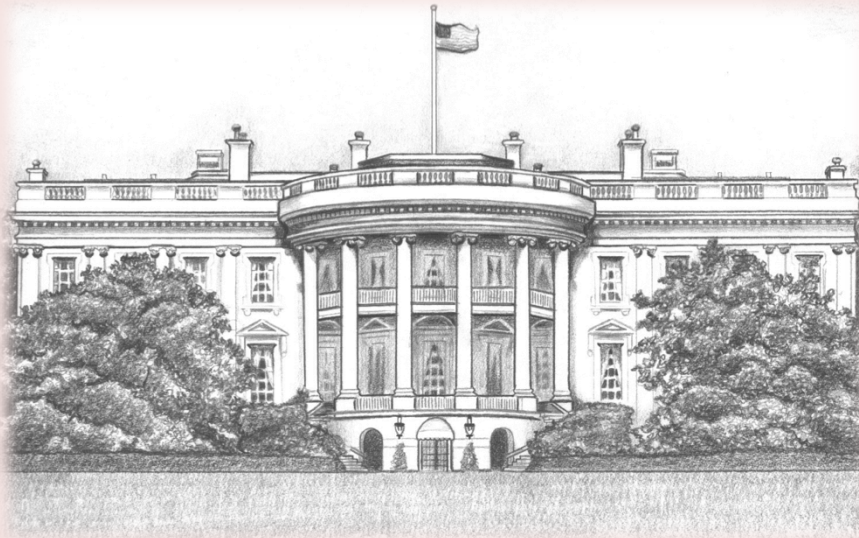
**Judicial**

Interprets Laws

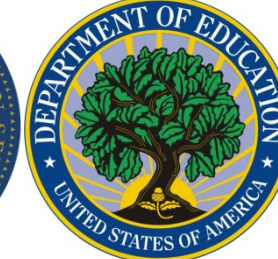


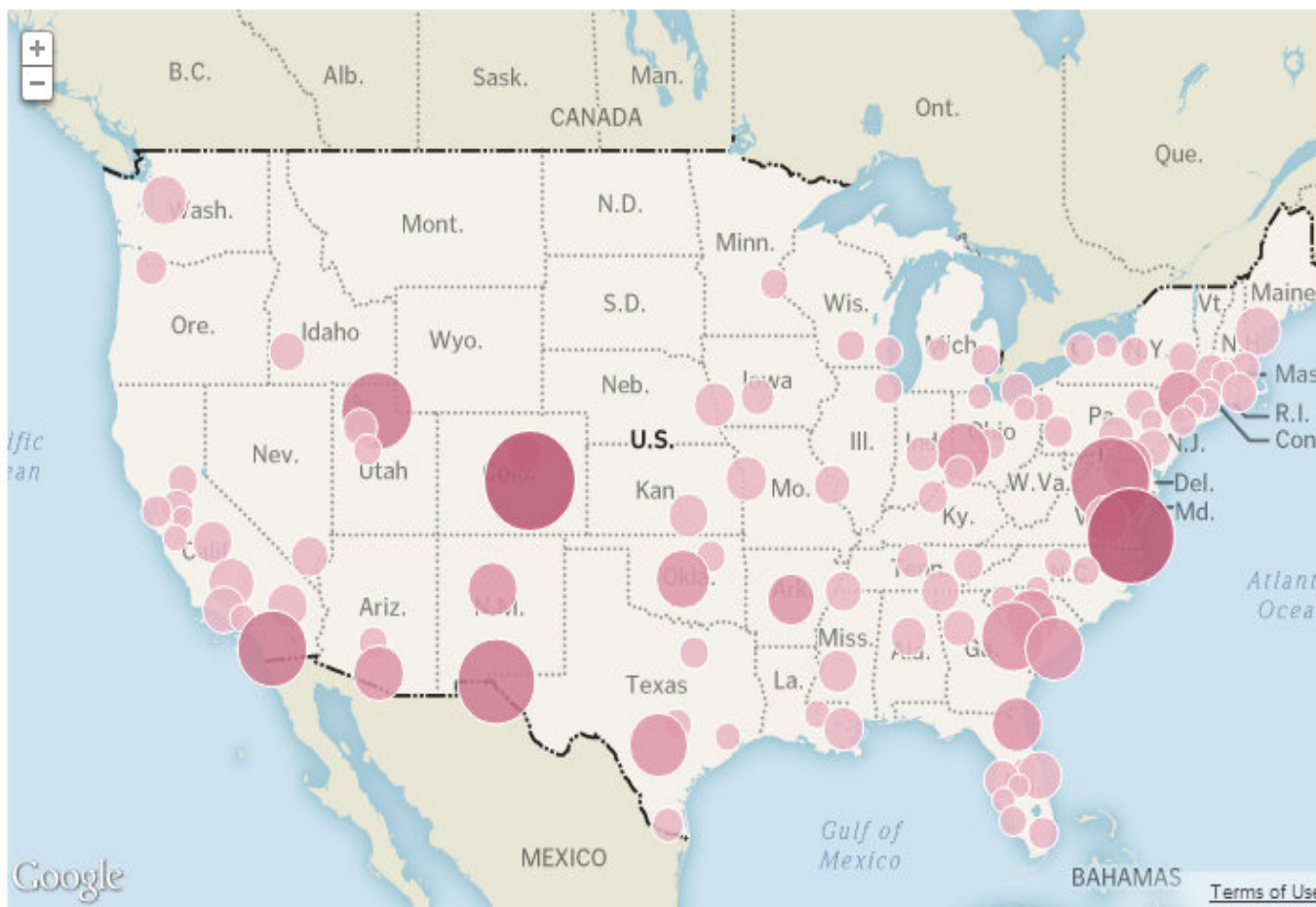
**Executive**

Implements Laws



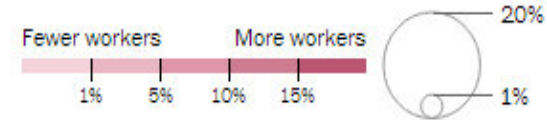
# Executive Implements Laws





## Top 100 metro areas with government and military workers

As a percentage of total employment, 2012



Click to view city

Percent of workers

1. Colorado Springs	18.8%
2. Virginia Beach-N.C.	17.2%
3. Honolulu	17.2%
4. D.C. region	14.3%
5. El Paso	13.6%
6. Ogden-Clearfield, Utah	11.5%
7. San Diego-Carlsbad-San Marcos	10.9%
8. Augusta, Ga.-S.C.	9.1%
9. San Antonio	7.8%
10. Charleston S.C.	7.6%

More than 3 million Americans are employed by the federal government and work in nearly every state. Colorado Springs, Virginia Beach, and Honolulu have a greater percent of federal workers by population than the Washington DC area.





# United States Department of State

Responsible for the international relations of the United States.

## Formed in 1789

- Oldest US gov't department

## Approx. 50,000 employees:

- 11,500 Foreign Service
- 7,500 Civil Service
- 31,000 Foreign Nationals

## Budget: \$56 billion

- Compare to Dept. of Defense:  
\$666 billion
- U.S. Gov't total budget:  
\$1.26 trillion

## Policy Issues:

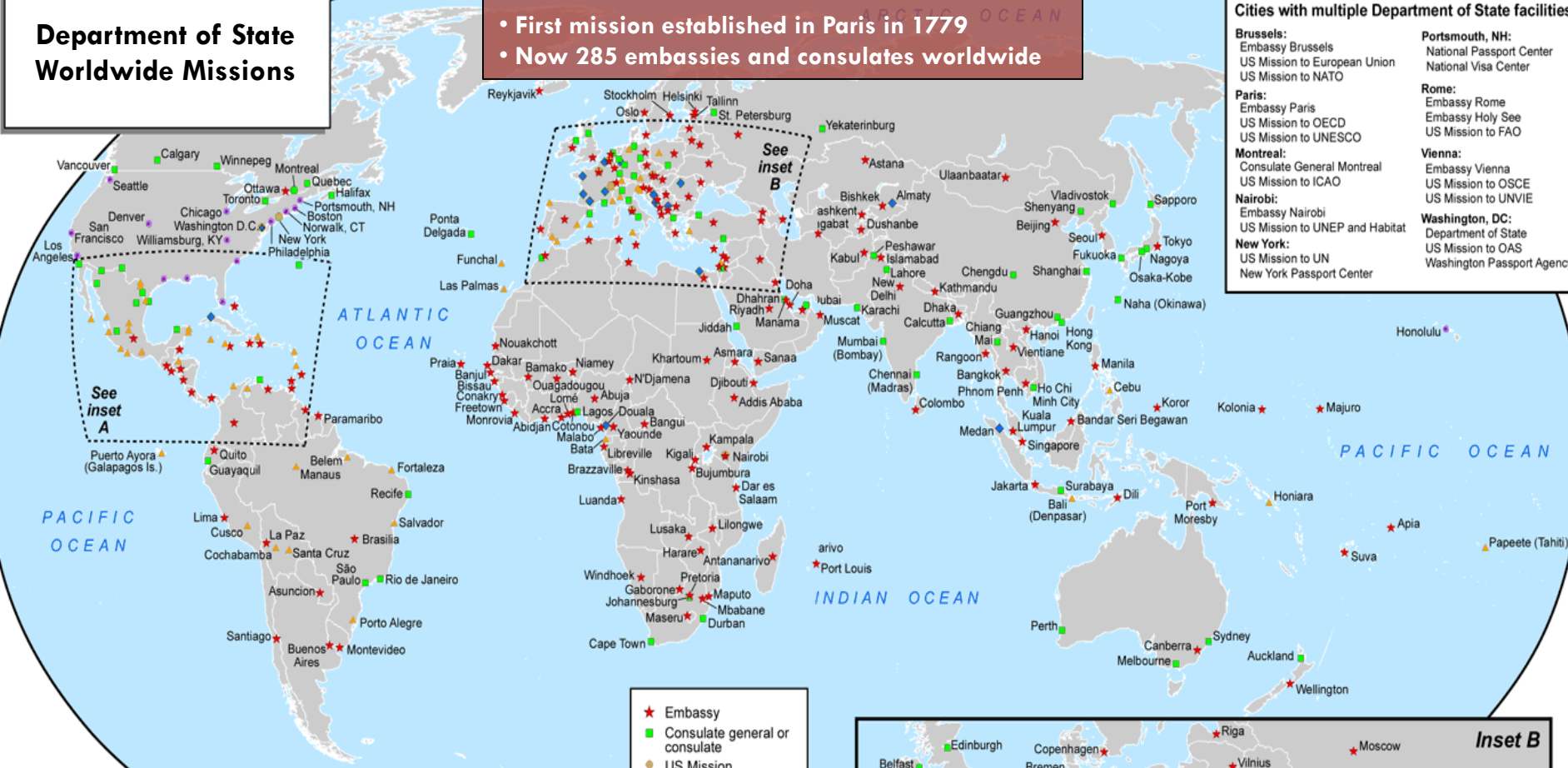
- Climate change
- Conflict & stabilization
- Counterterrorism
- Democracy & human rights
- Energy Security
- Food Security
- Health
- Narcotics
- Nonproliferation
- Privacy
- Trafficking in persons
- War crimes
- Women's issues
- Youth

# Department of State Worldwide Missions

• First mission established in Paris in 1779  
• Now 285 embassies and consulates worldwide

## Cities with multiple Department of State facilities

- |  |  |
|--|--|
| <b>Brussels:</b><br>Embassy Brussels<br>US Mission to European Union<br>US Mission to NATO | <b>Portsmouth, NH:</b><br>National Passport Center<br>National Visa Center                       |
| <b>Paris:</b><br>Embassy Paris<br>US Mission to OECD<br>US Mission to UNESCO               | <b>Rome:</b><br>Embassy Rome<br>Embassy Holy See<br>US Mission to FAO                            |
| <b>Montreal:</b><br>Consulate General Montreal<br>US Mission to ICAO                       | <b>Vienna:</b><br>Embassy Vienna<br>US Mission to OSCE<br>US Mission to UNVIE                    |
| <b>Nairobi:</b><br>Embassy Nairobi<br>US Mission to UNEP and Habitat                       | <b>Washington, DC:</b><br>Department of State<br>US Mission to OAS<br>Washington Passport Agency |
| <b>New York:</b><br>US Mission to UN<br>New York Passport Center                           |  |



- ★ Embassy
  - Consulate general or consulate
  - US Mission
  - ◆ Other post or location
  - ▲ Consular agency
  - ▲ US passport or visa center
- Map does not show Diplomatic Security field offices in US cities.



Boundary representation is not authoritative  
10422 10-06 STATE (INR)

## Embassy Science Fellowship

- Created in 2001 by Department of State, USAID & the National Science Foundation
- Enables scientists from U.S. Government agencies to provide expertise at Embassies
- More than 200 scientists from 12 Departments & Agencies have participated
- Heightened interest in U.S.-Malaysia cooperation:
  - Dr. Sonia Ortega: first fellow to Malaysia, Sept-Dec 2012, worked with MIGHT to promote science & technology education
  - Third fellow, late-2014, focus on health





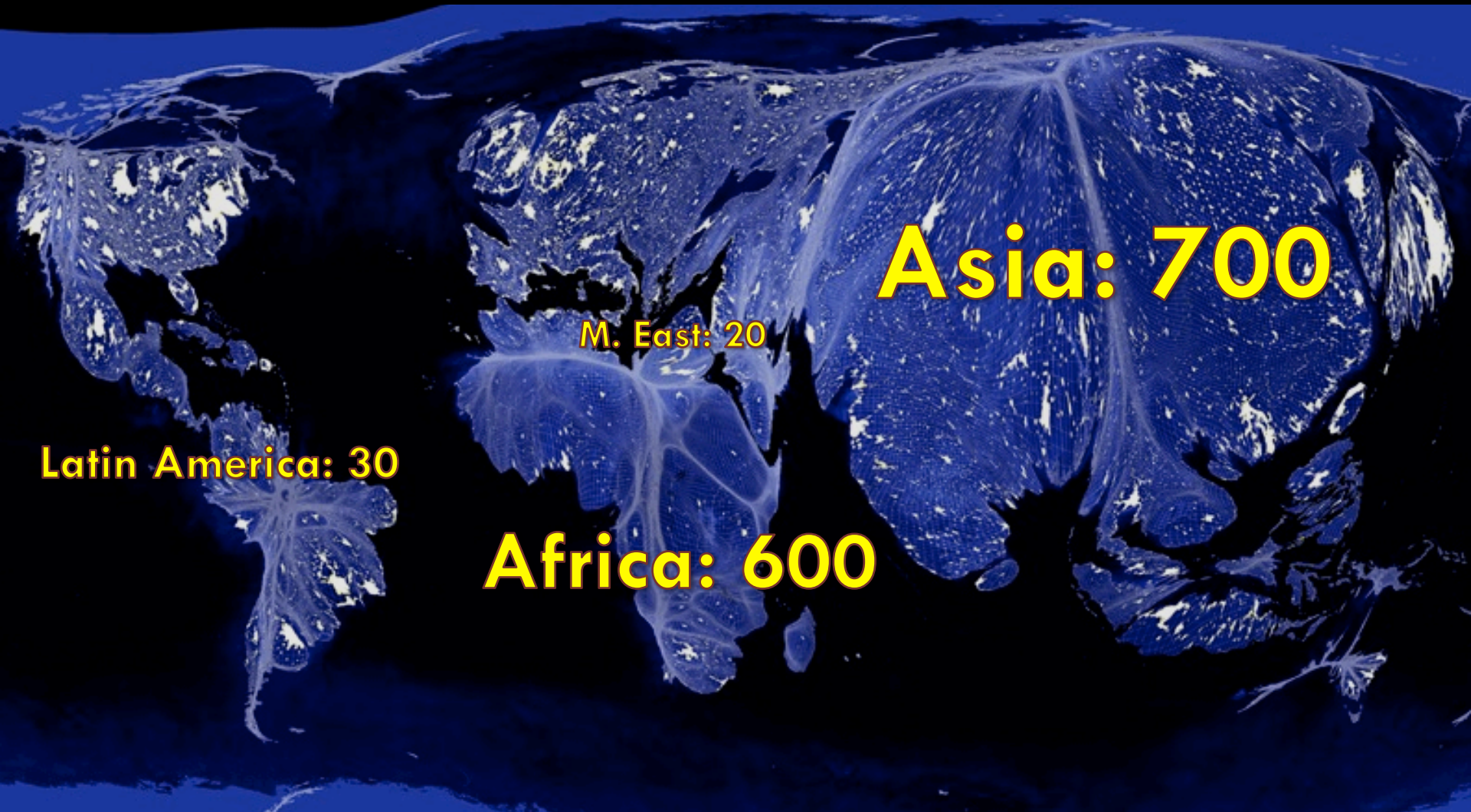
# Global Energy & Emissions Trends



“The Earth at Night”  
NASA Earth Observatory/NOAA NGDC

# THE REAL WORLD AT NIGHT

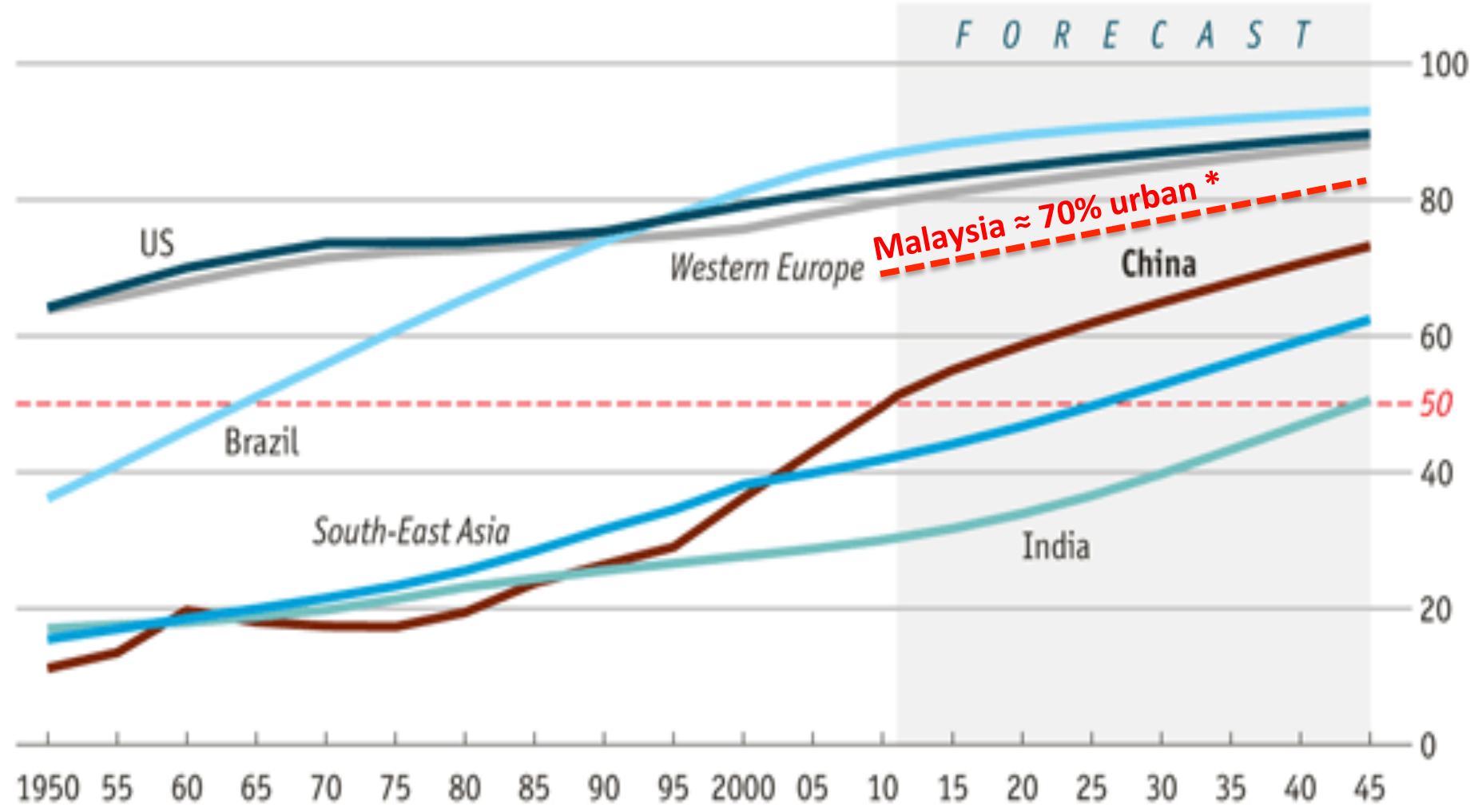
Night view in proportion to population distribution



Number of people without access (millions)

# Urbanization

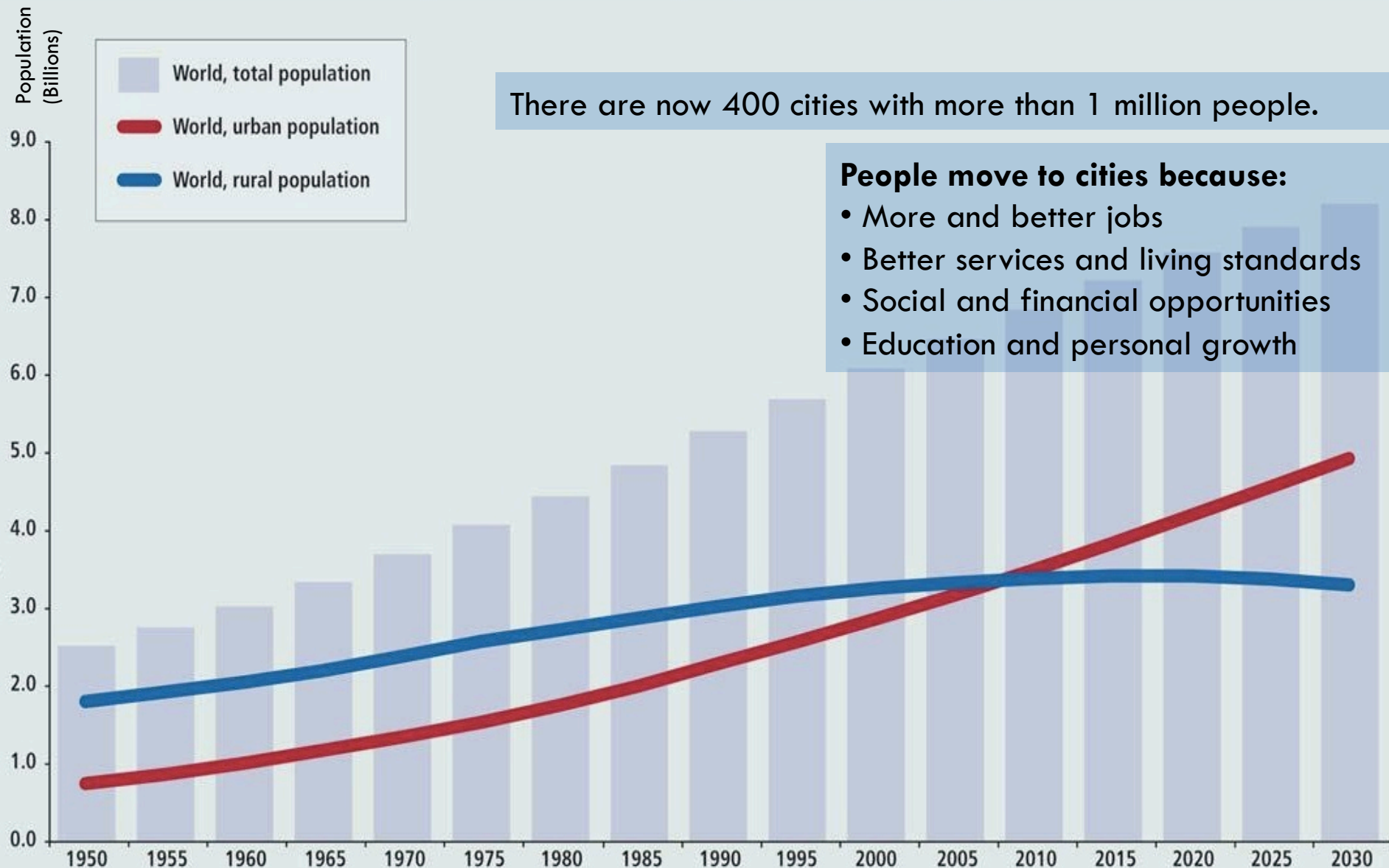
Population living in urban areas, % of total



Base chart source: CEIC; UN Population Division; *The Economist*

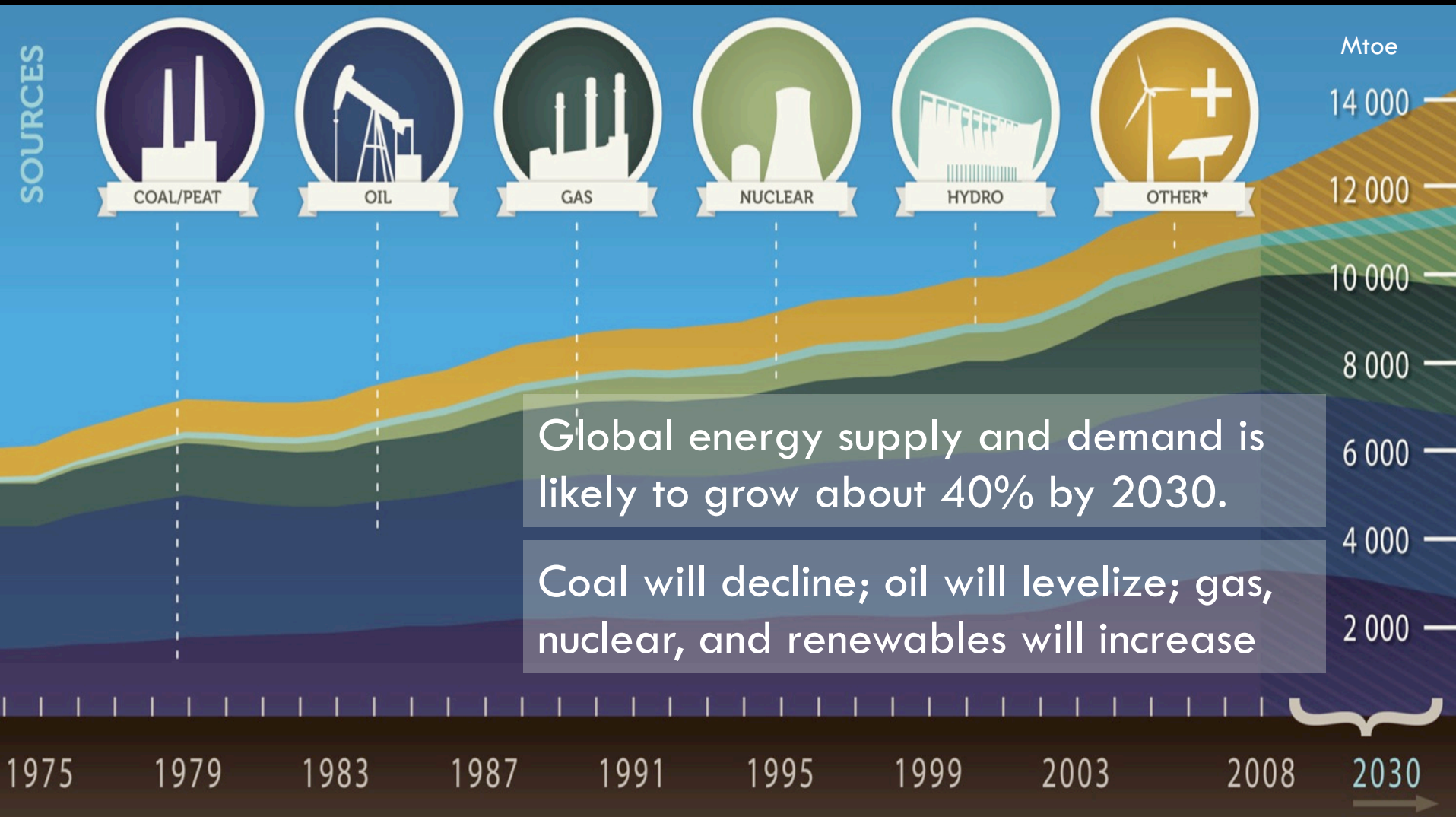
\* Malaysia estimation: Asia Pacific Energy Research Center & Malaysia Department of Statistics, 2011

## The urban and rural population of the world, 1950-2030



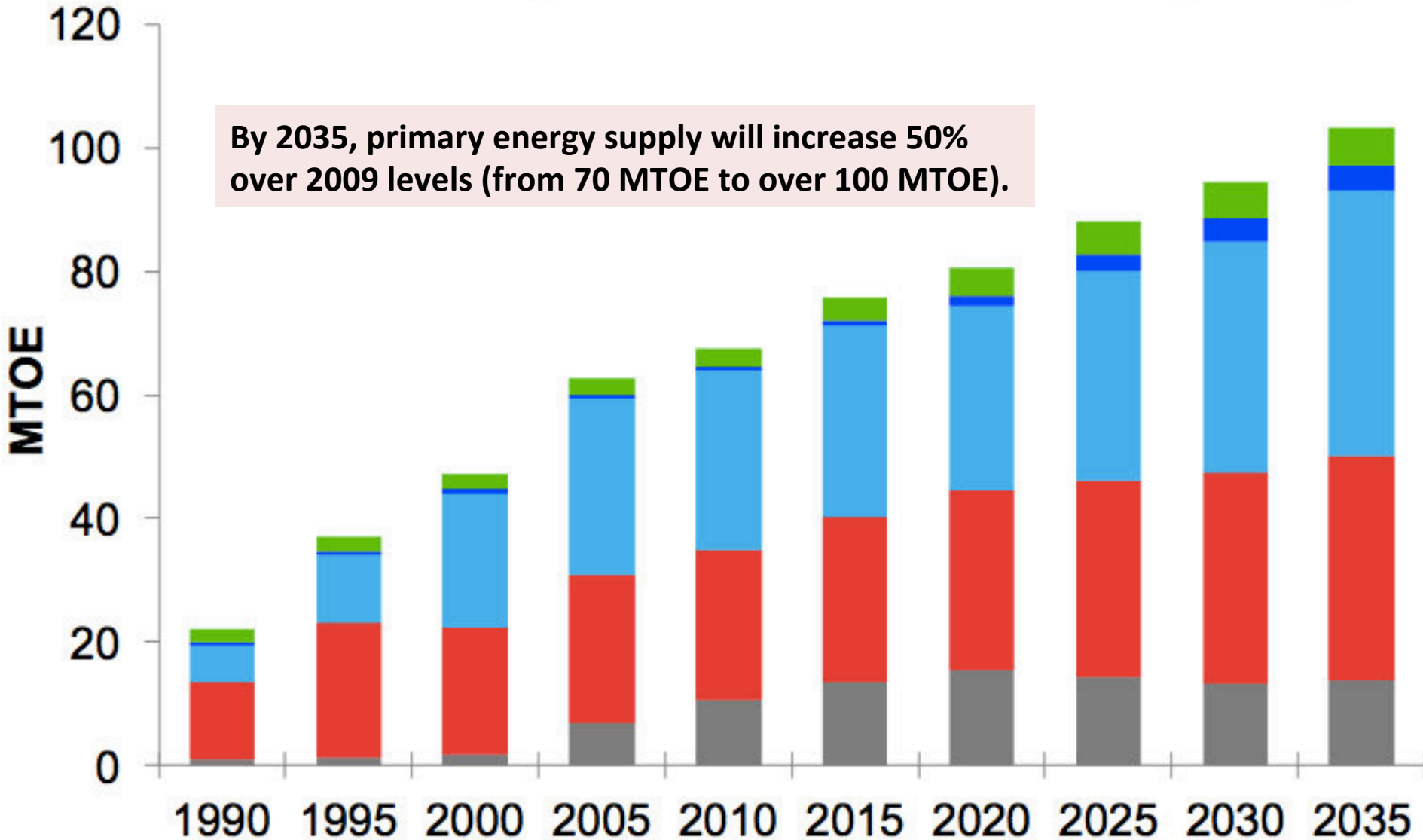


# Evolution of Global Energy Supply, 1975-2030



# Malaysia Primary Energy Supply

■ Coal ■ Oil ■ Gas ■ Hydro ■ NRE ■ Nuclear ■ Electricity-Net Import

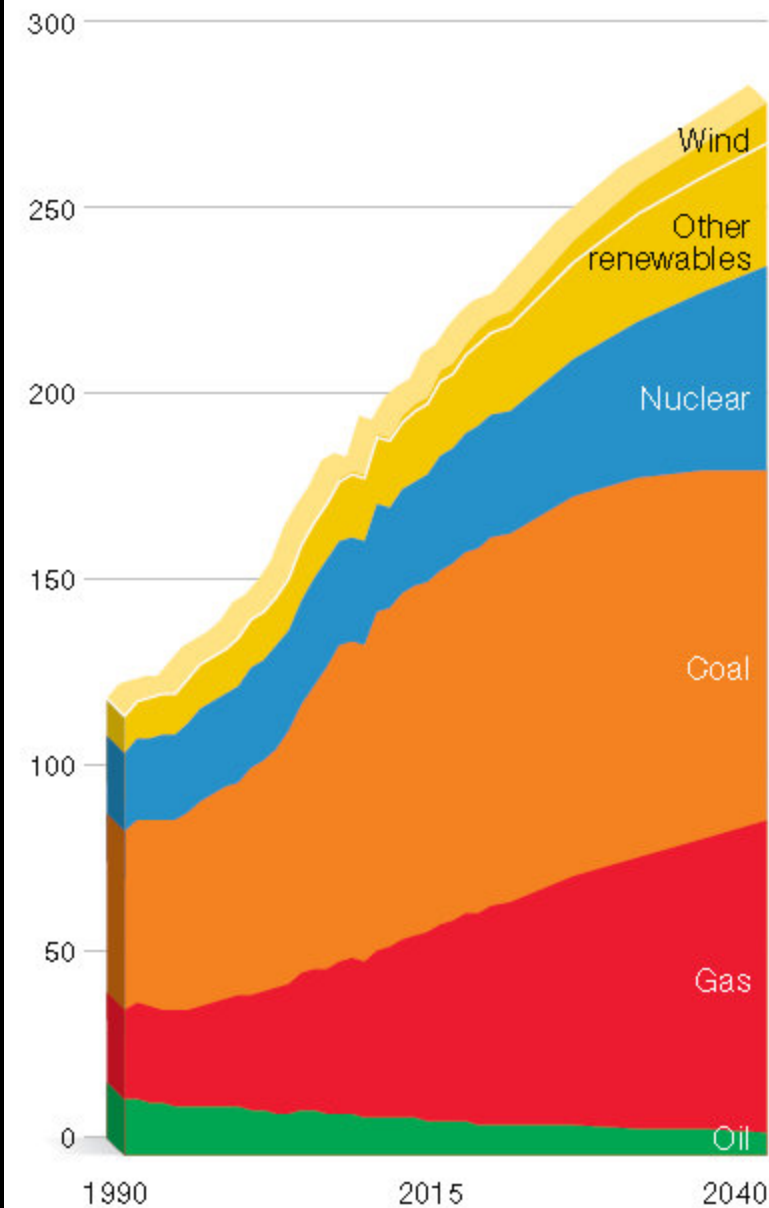


Source: APERC Analysis (2012)

Historical Data: World Energy Statistics 2011, OECD/IEA 2011

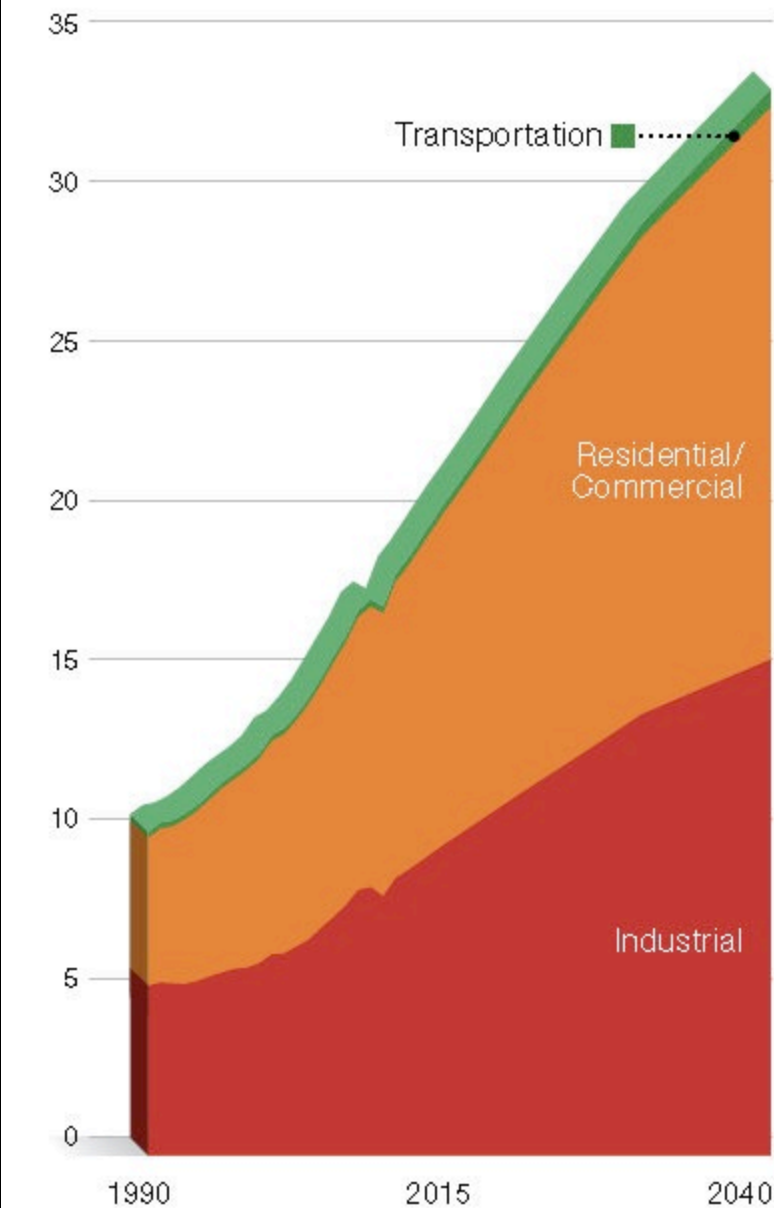
### World Electricity Mix, 1990-2040

Quadrillion BTUs

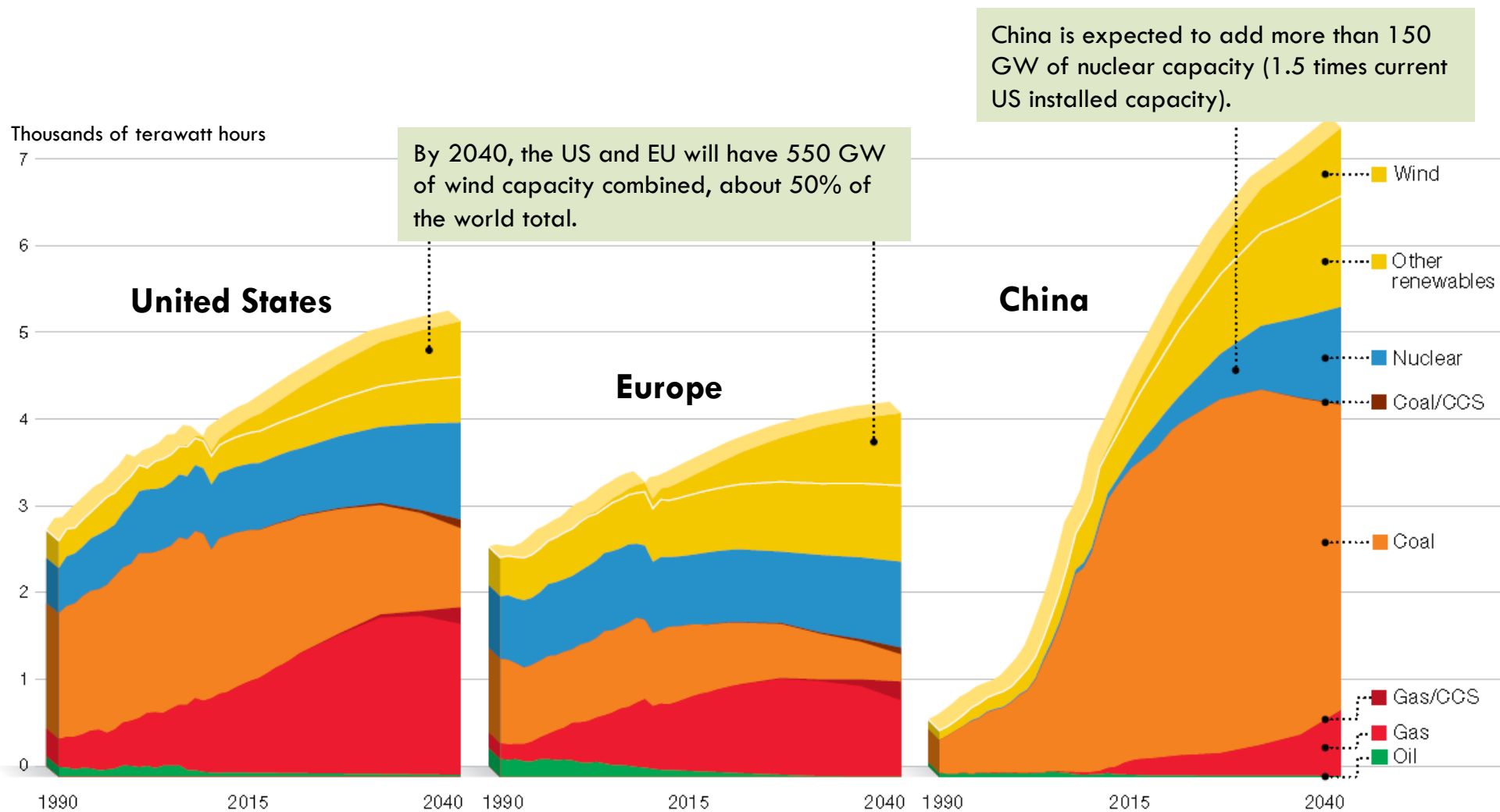


### World Electricity Demand by Sector, 1990-2040

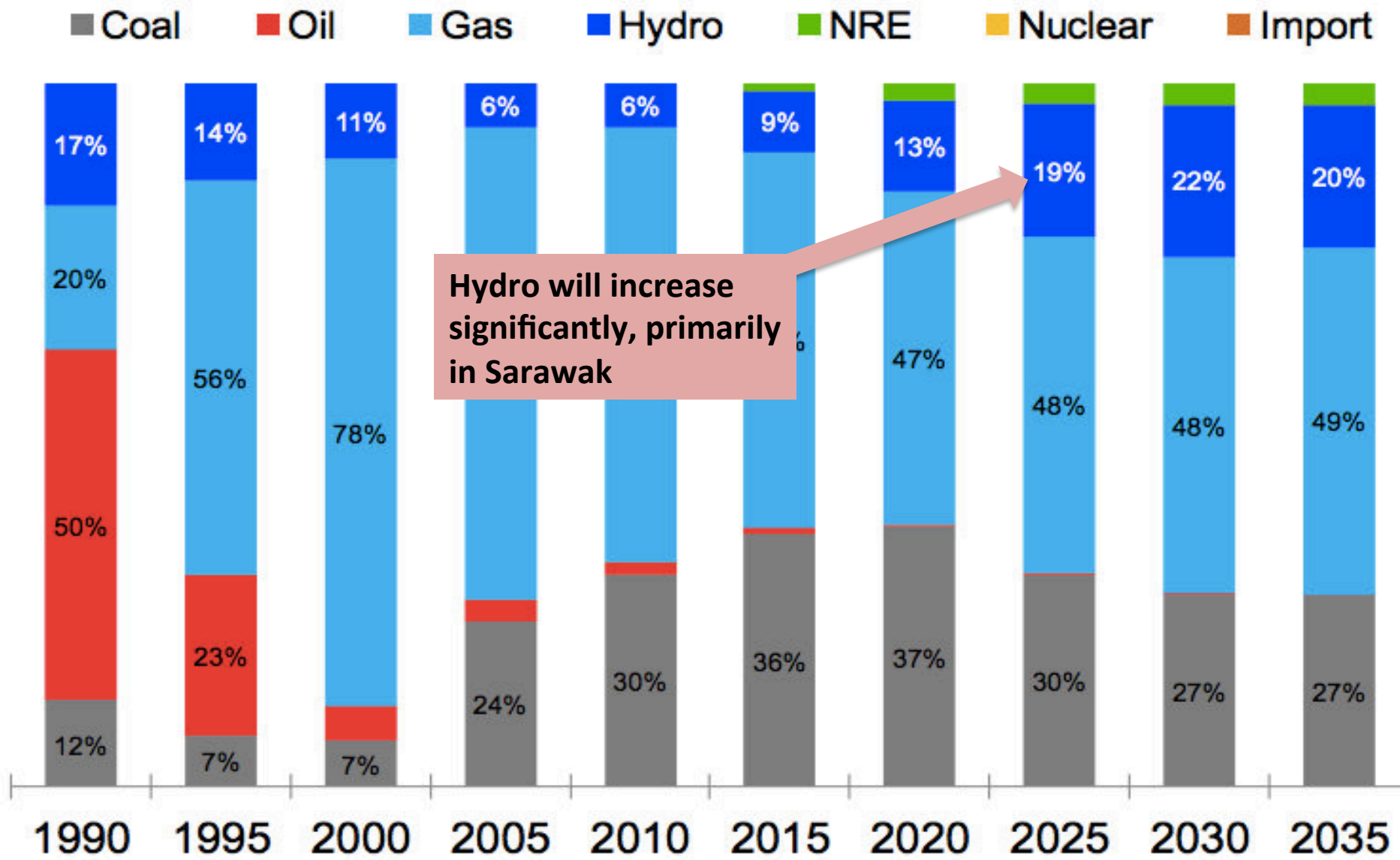
Thousands of terawatt hours



# Electricity Generation by Fuel in US, EU & China, 1990-2040



# Malaysia BAU Electricity Generation Mix



Hydro will increase significantly, primarily in Sarawak

Source: APERC Analysis (2012)

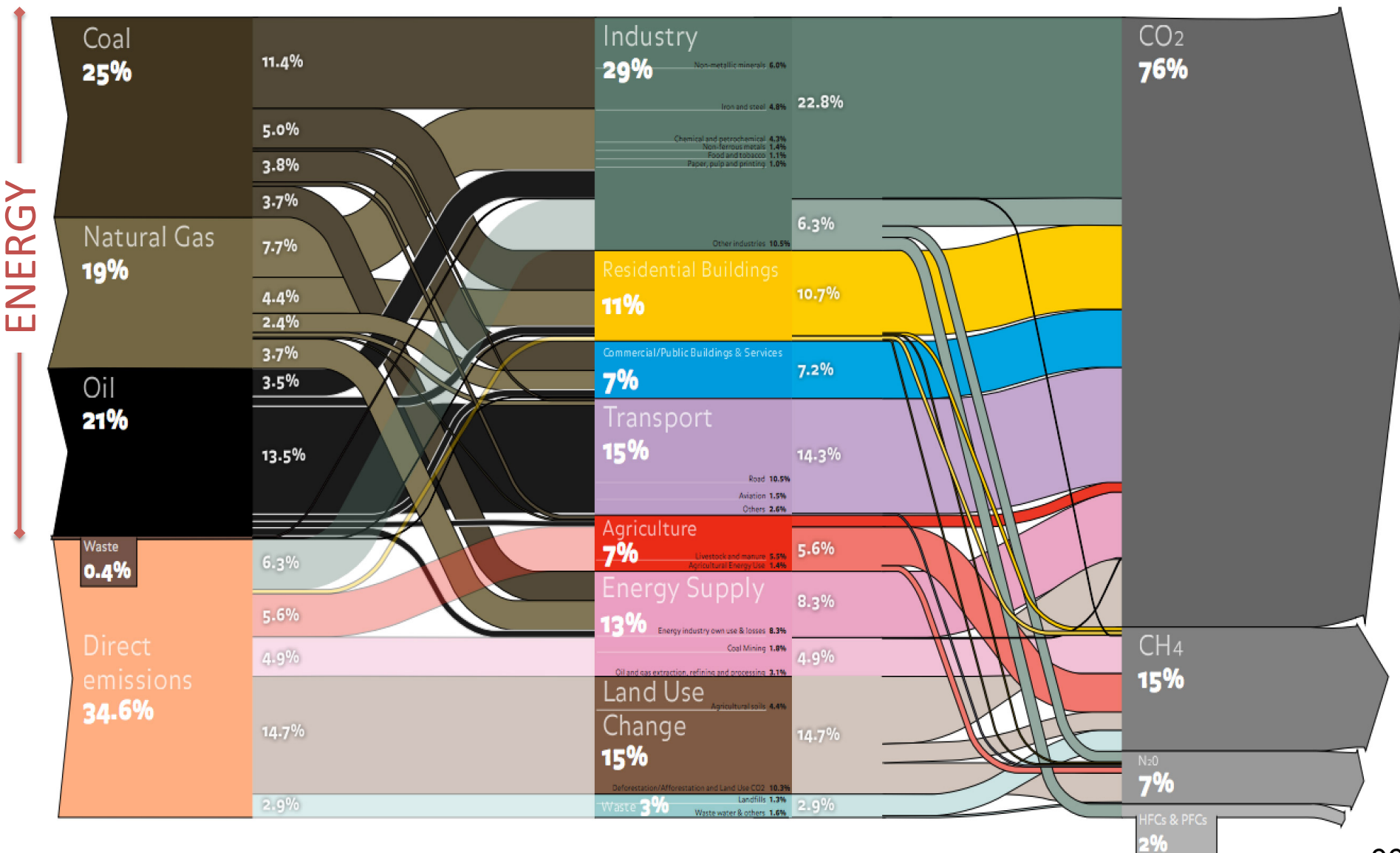
Historical Data: World Energy Statistics 2011, OECD/IEA 2011

# World GHG Emissions Flow Chart 2010

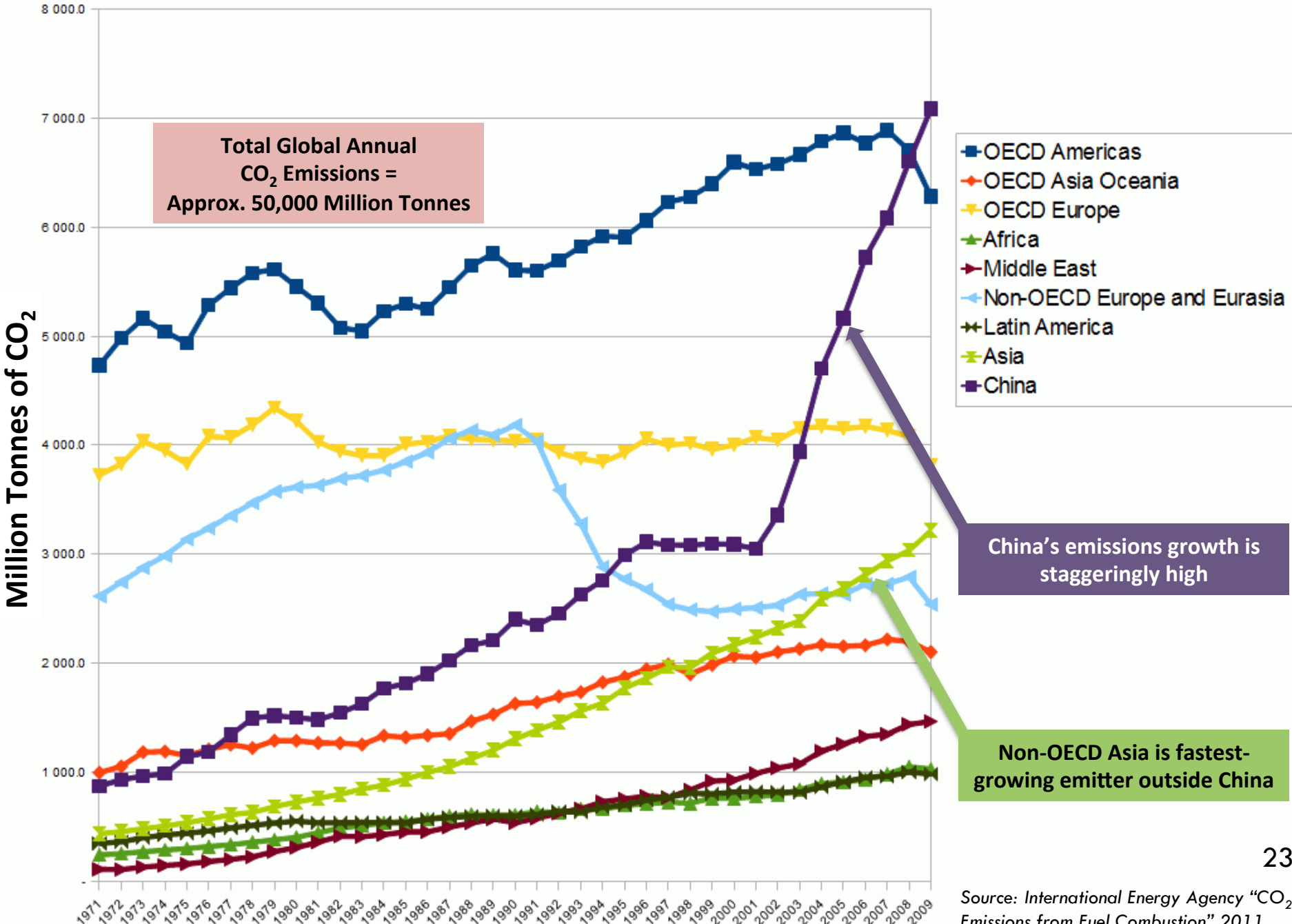
Total emission worldwide (2010)

**48 629**

MTCO<sub>2</sub> EQ



# Annual Regional CO<sub>2</sub> Emissions from Fuel Combustion, 1971-2009



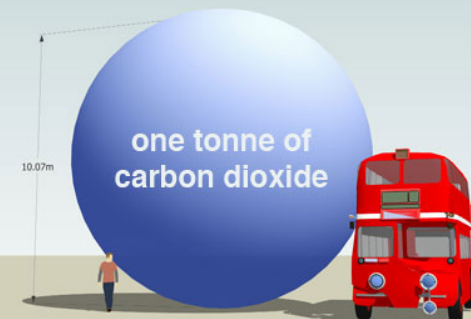
China's emissions growth is staggeringly high

Non-OECD Asia is fastest-growing emitter outside China

Total Global Annual  
CO<sub>2</sub> Emissions =  
Approx. 50,000 Million Tonnes

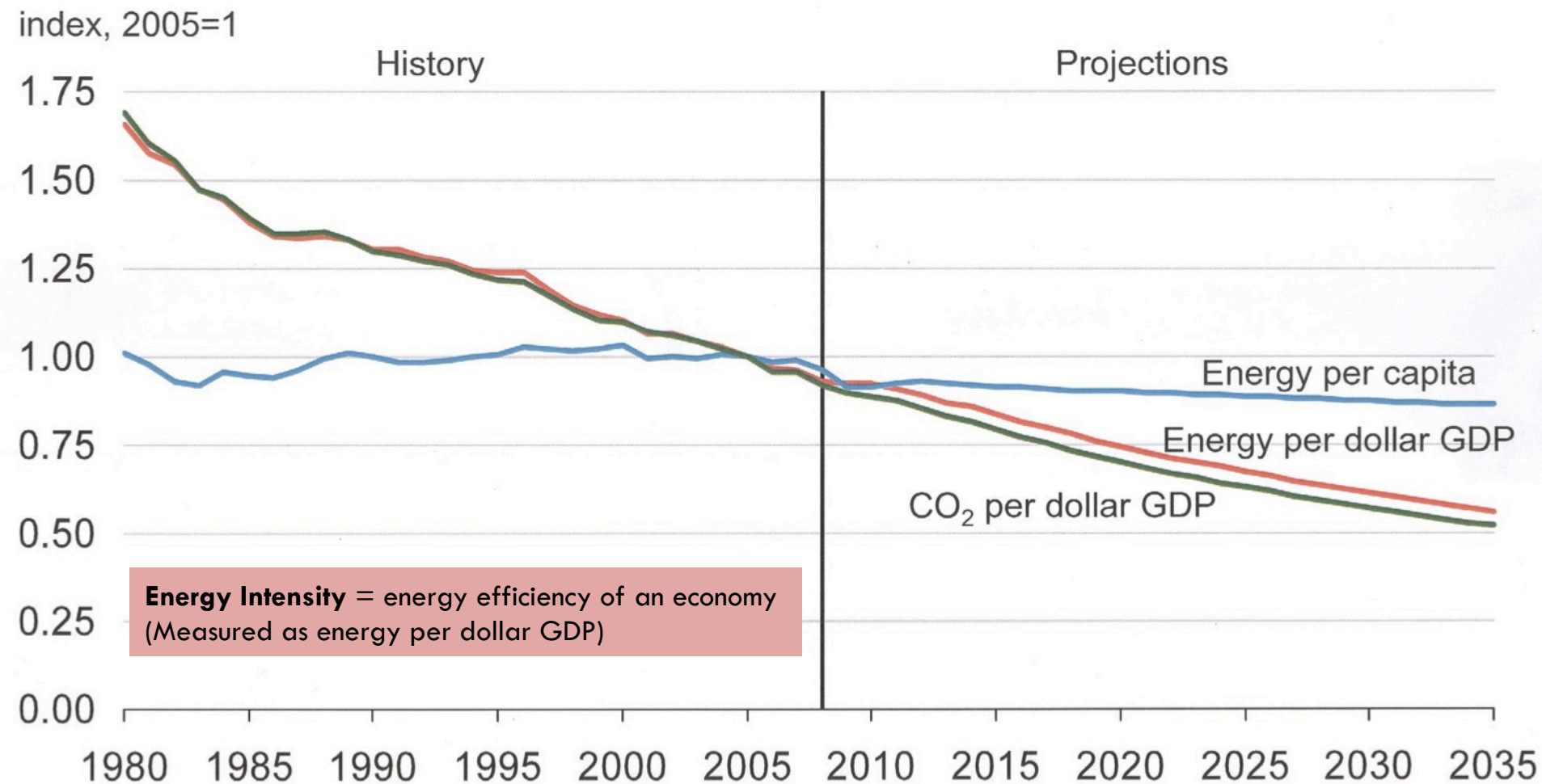
New York City's  
DAILY CO<sub>2</sub> EMISSIONS  
in one-tonne spheres  
(150,000 tonnes/day)

One tonne of CO<sub>2</sub> gas  
would fill a sphere over  
10 meters in diameter





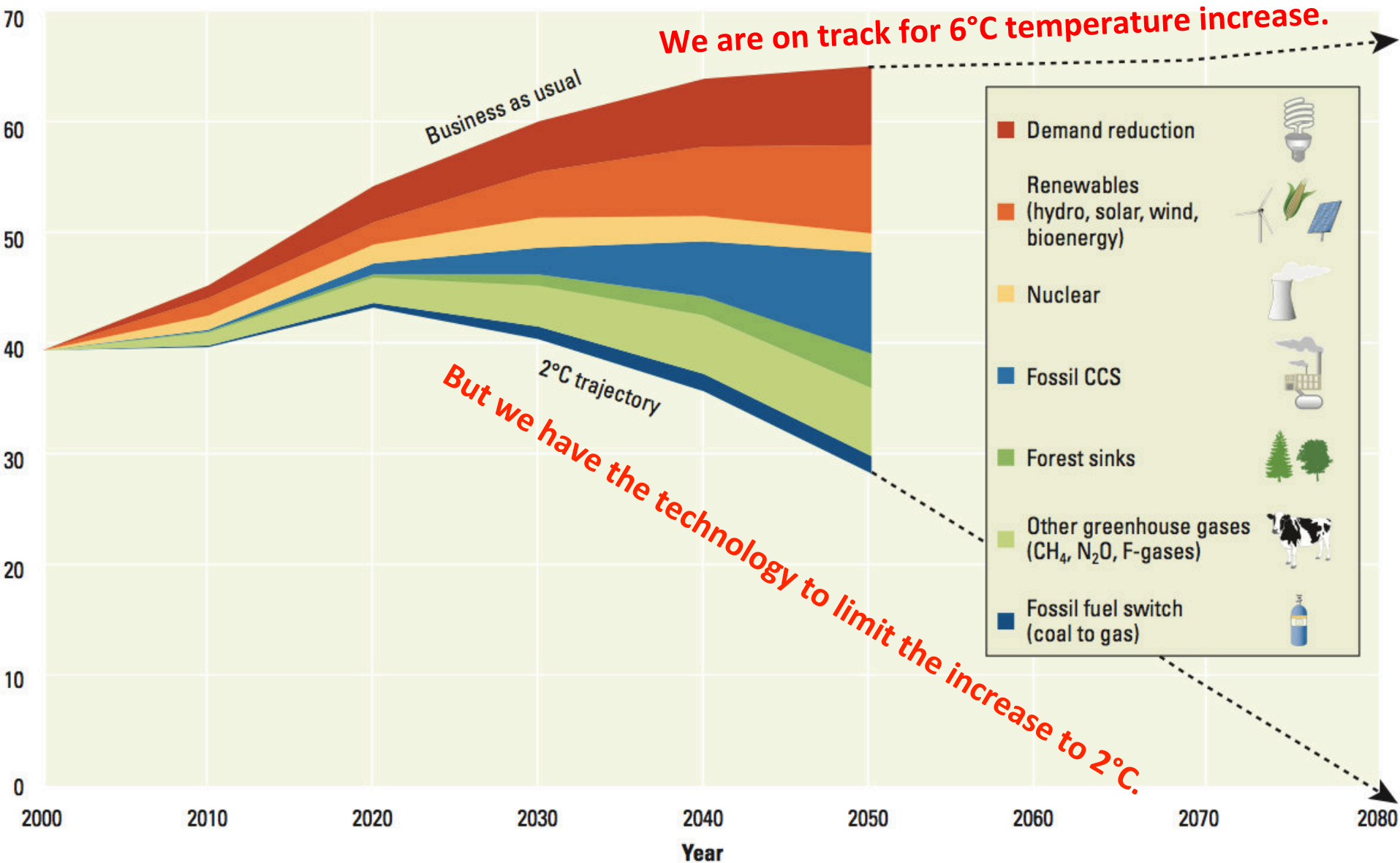
# Energy and CO<sub>2</sub> per dollar GDP, 1980-2035



**Energy and CO<sub>2</sub> per GDP continue to decline.  
Per Capita Energy use also continues to decline.**

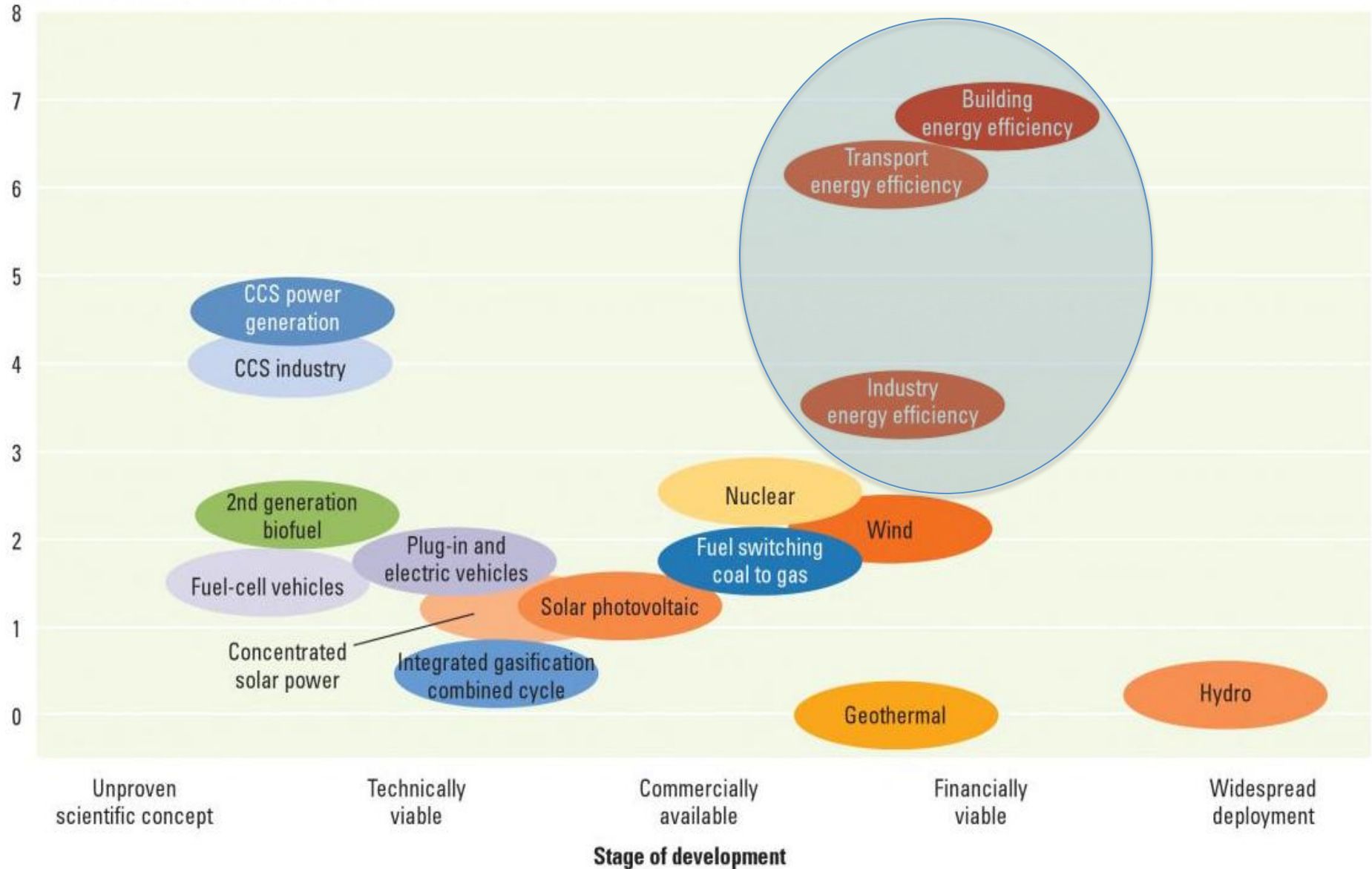
# BAU vs. 2°C Scenario

CO<sub>2</sub>e (gigatons)



# Energy Efficiency is More Financially Viable than Other Options

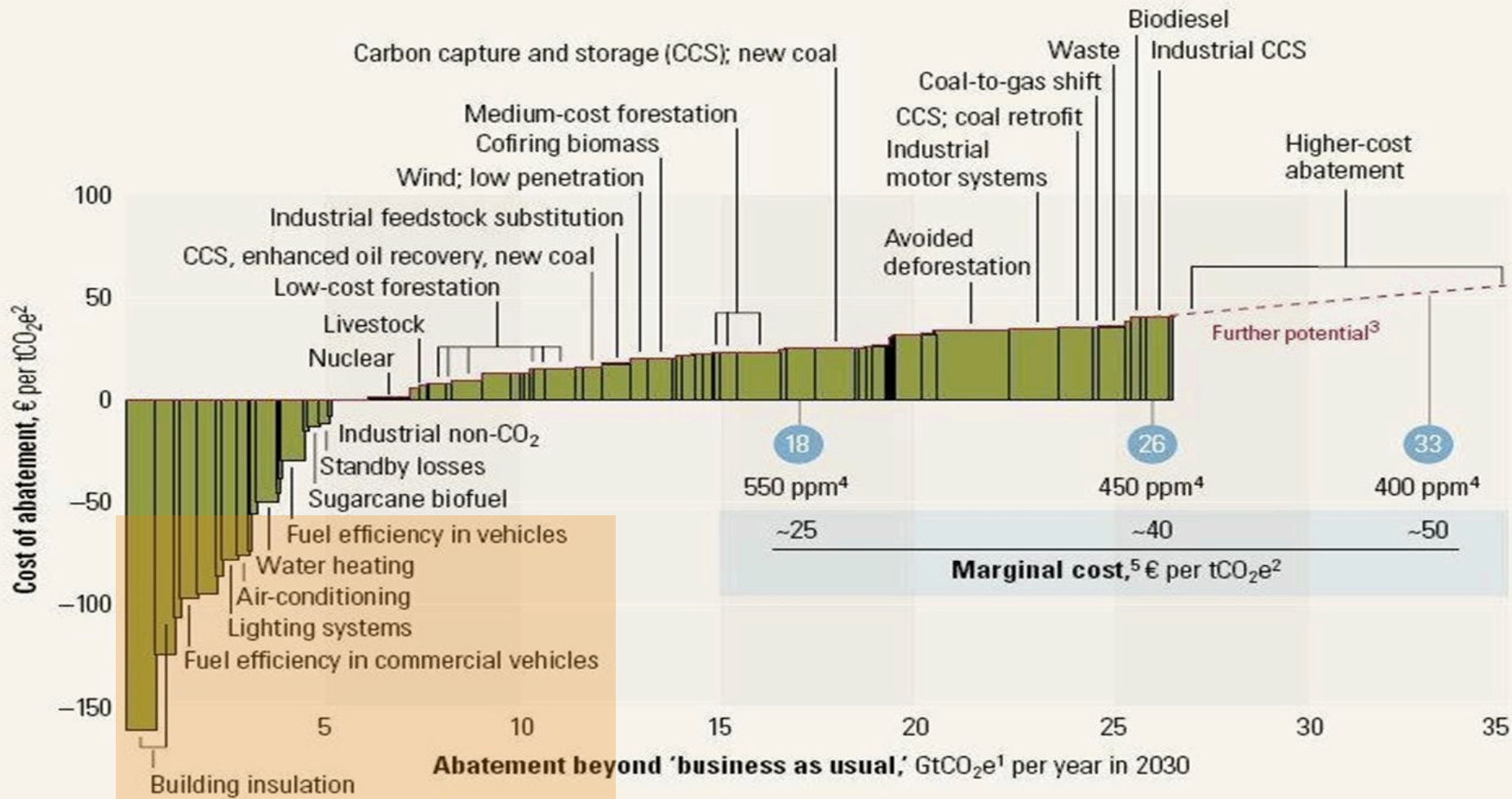
CO<sub>2</sub> emission reduction potential (Gt/year)



# What might it cost?

Global cost curve for greenhouse gas abatement measures beyond 'business as usual'; greenhouse gases measured in GtCO<sub>2</sub>e<sup>1</sup>

● Approximate abatement required beyond 'business as usual,' 2030



<sup>1</sup> GtCO<sub>2</sub>e = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly by increasing demand for energy and transport around the world and by tropical deforestation.

<sup>2</sup> tCO<sub>2</sub>e = ton of carbon dioxide equivalent.

<sup>3</sup> Measures costing more than €40 a ton were not the focus of this study.

<sup>4</sup> Atmospheric concentration of all greenhouse gases recalculated into CO<sub>2</sub> equivalents; ppm = parts per million.

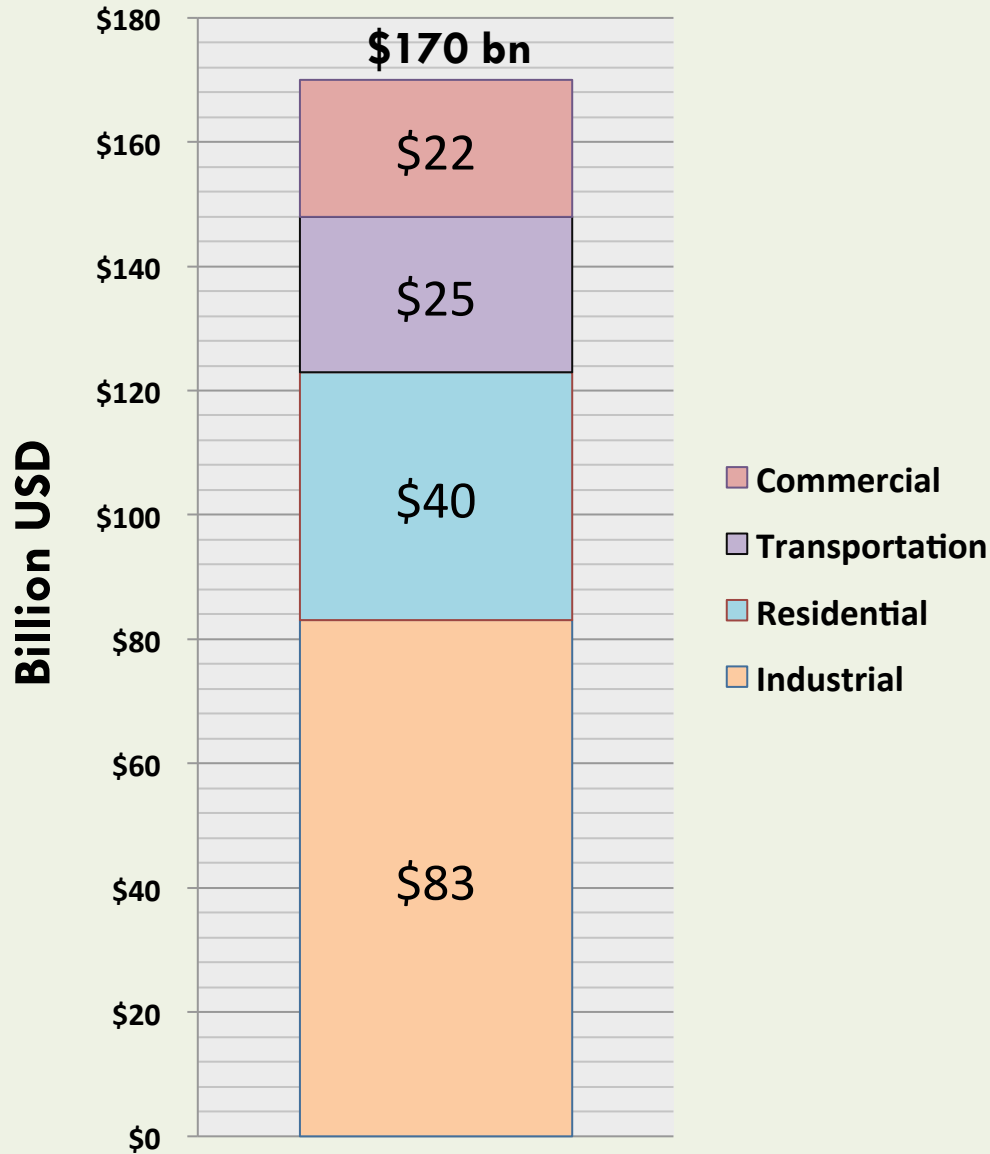
<sup>5</sup> Marginal cost of avoiding emissions of 1 ton of CO<sub>2</sub> equivalents in each abatement demand scenario.

# Aggressive investment in energy efficiency in all sectors worldwide starting today could by 2030...

Reduce annual CO<sub>2</sub> emissions by 8 gigatonnes or  
**1.5 times current U.S. annual CO<sub>2</sub> emissions**

Reduce annual energy consumption by 82 exajoules or  
**17% of the current annual  
worldwide energy consumption**

## Investments of \$170 Billion/Year are Needed to Capture Profitable EE Opportunities



Bezdek, R., American Solar Energy Society, 2007

By 2030, global **annual** efficiency market could total **\$700 billion**, and total additional investments over the period 2008-2030 of nearly **\$7 trillion**.

Laitner, J., American Council for an Energy-Efficiency Economy (ACEEE), 2008



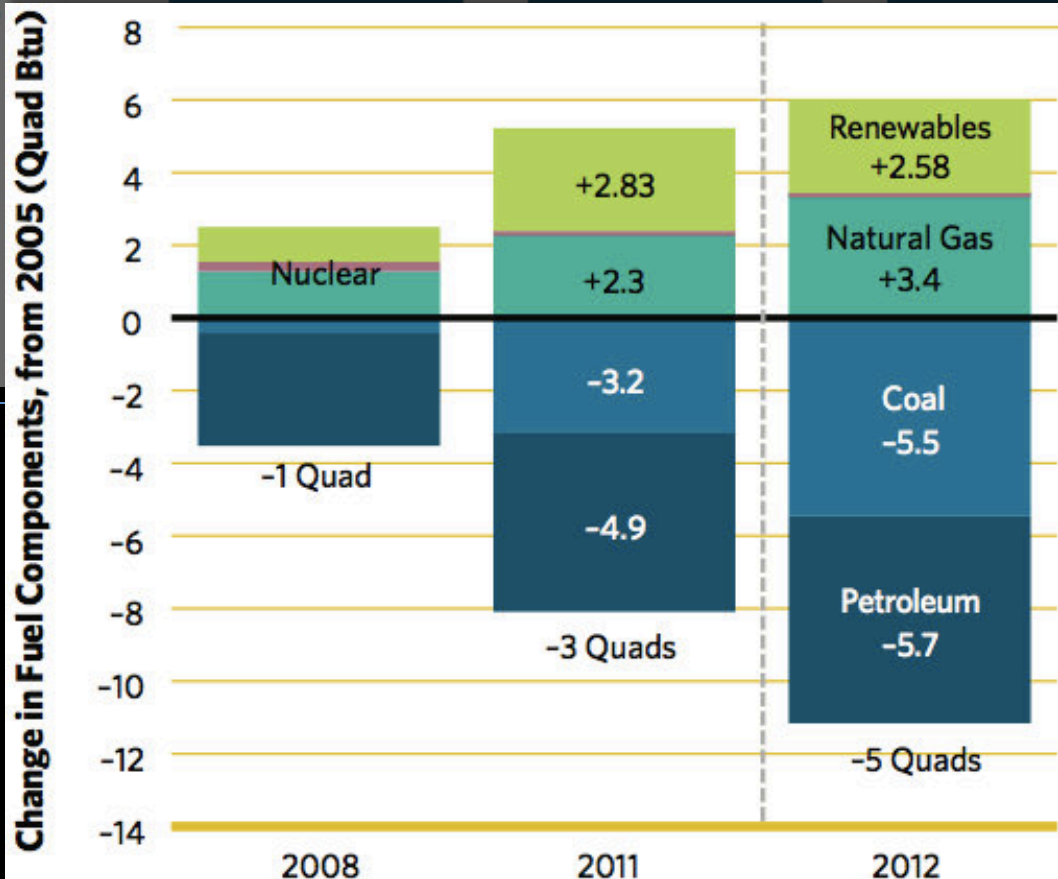
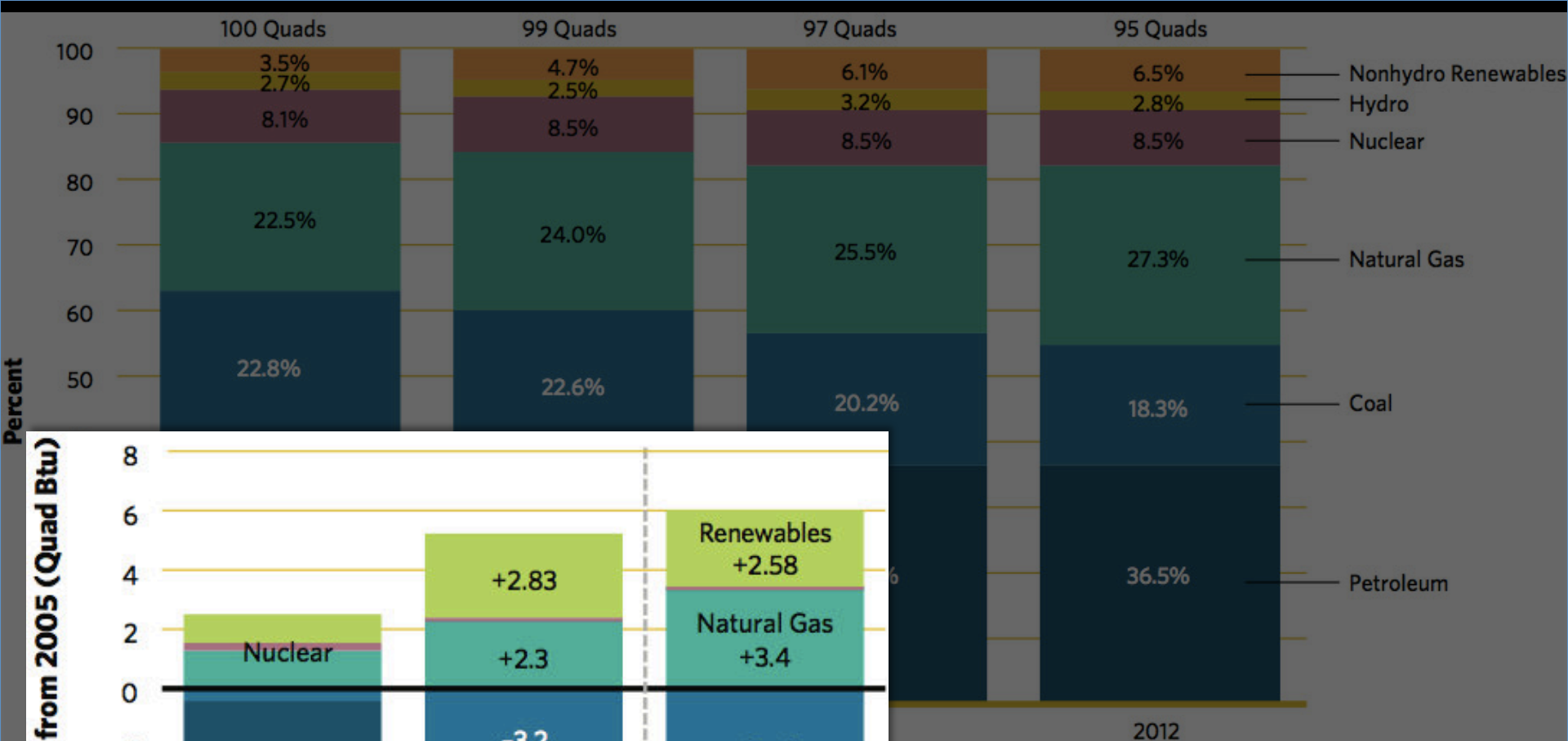
**U.S. Domestic Developments**

## President Obama's Climate Action Plan

- By 2020:
  - Renewable energy for 6 million homes
  - 100 MW of renewables on low-income housing
  - Reduce building energy consumption by 20%
- New standards for heavy-duty vehicles
- New carbon pollution standards to reduce emissions by 3 billion metric tons
- New bilateral initiatives with China, India, and other major polluters
- Climate-resilient investments and strategies
- \$8 billion for next-gen cleaner fossil energy
- New rules for investing in coal overseas

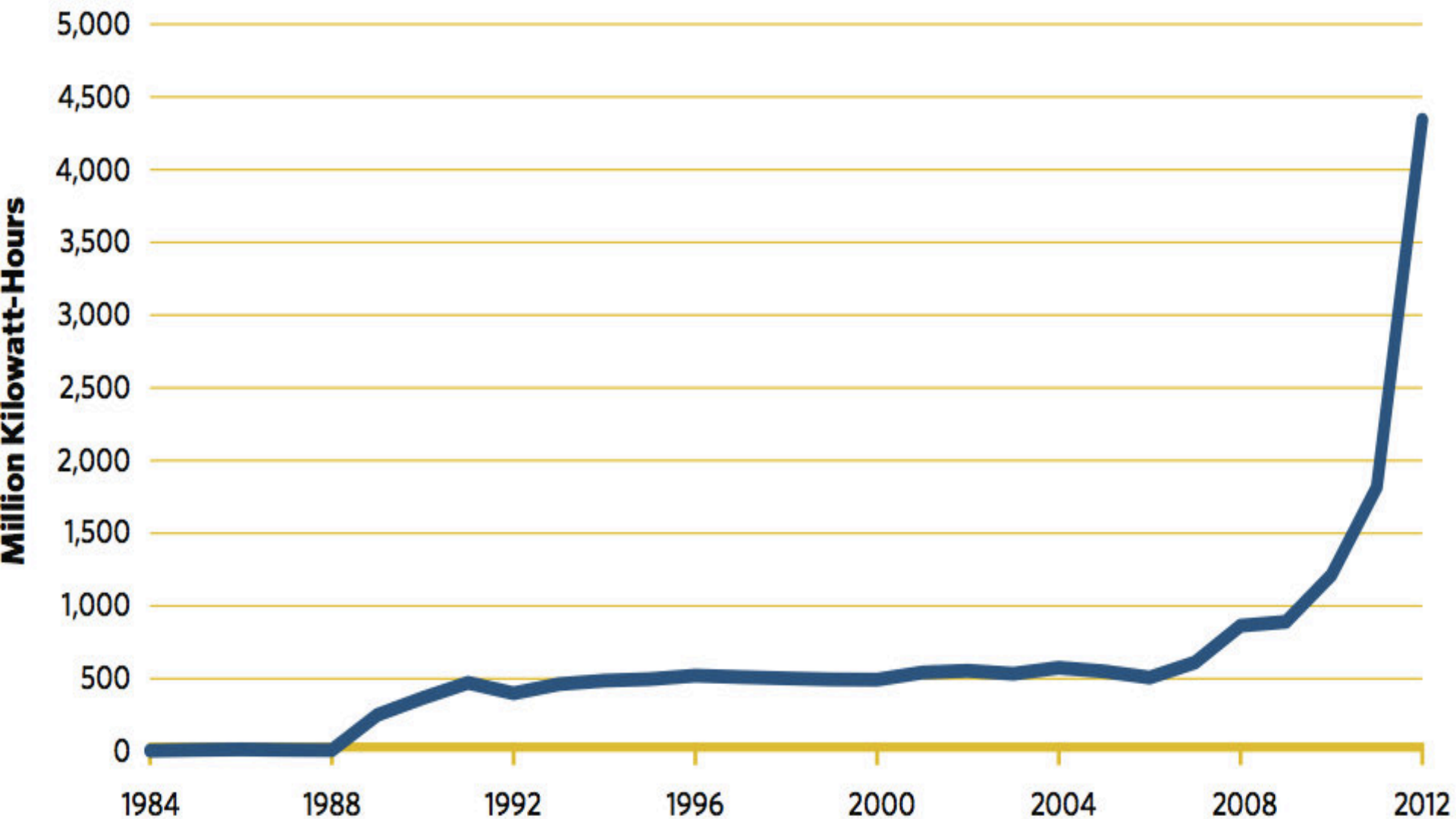






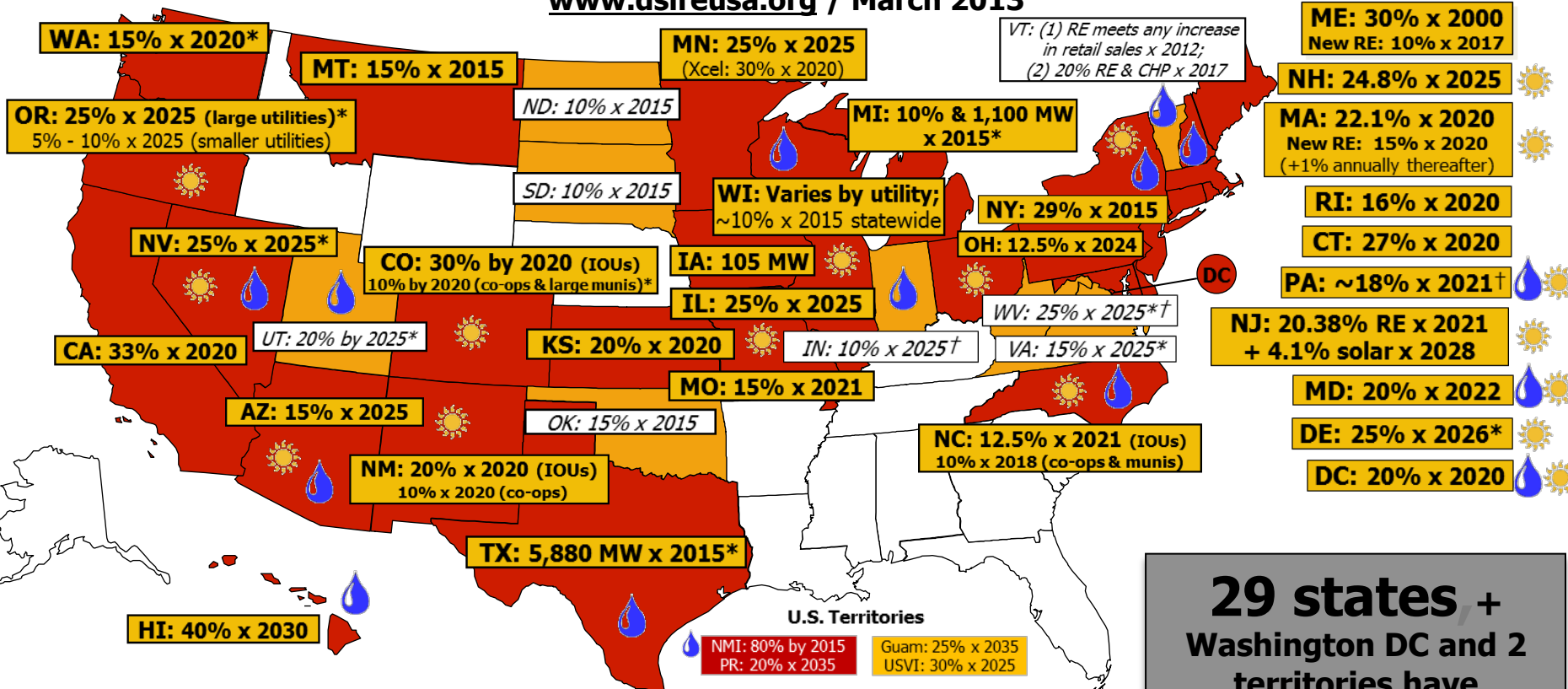
# Significant Recent Changes in U.S. Primary Energy Mix

# U.S. Solar Electricity Generation, 1984-2012



## Renewable Portfolio Standard Policies

[www.dsireusa.org](http://www.dsireusa.org) / March 2013



- Renewable portfolio standard
- Renewable portfolio goal
- 💧 Solar water heating eligible
- ☀️ Minimum solar or customer-sited requirement
- ✳️ Extra credit for solar or customer-sited renewables
- † Includes non-renewable alternative resources

**29 states + Washington DC and 2 territories have Renewable Portfolio Standards**  
*(8 states and 2 territories have renewable portfolio goals)*



**Involves more than 20,000 private and public sector organizations**

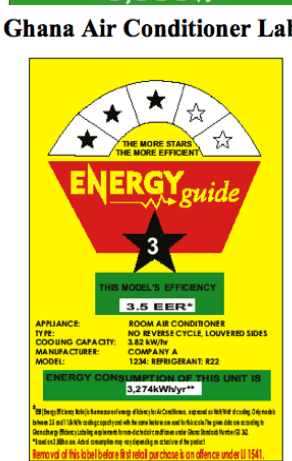
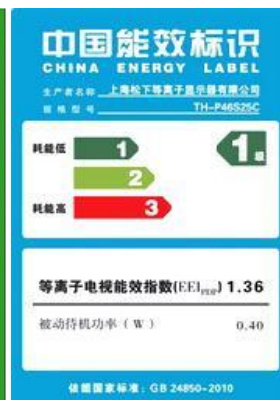
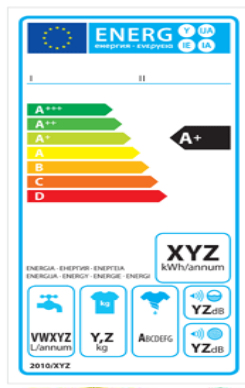
**Saved \$18 billion in 2010 alone**

**Provides labels for more than 60 product categories**

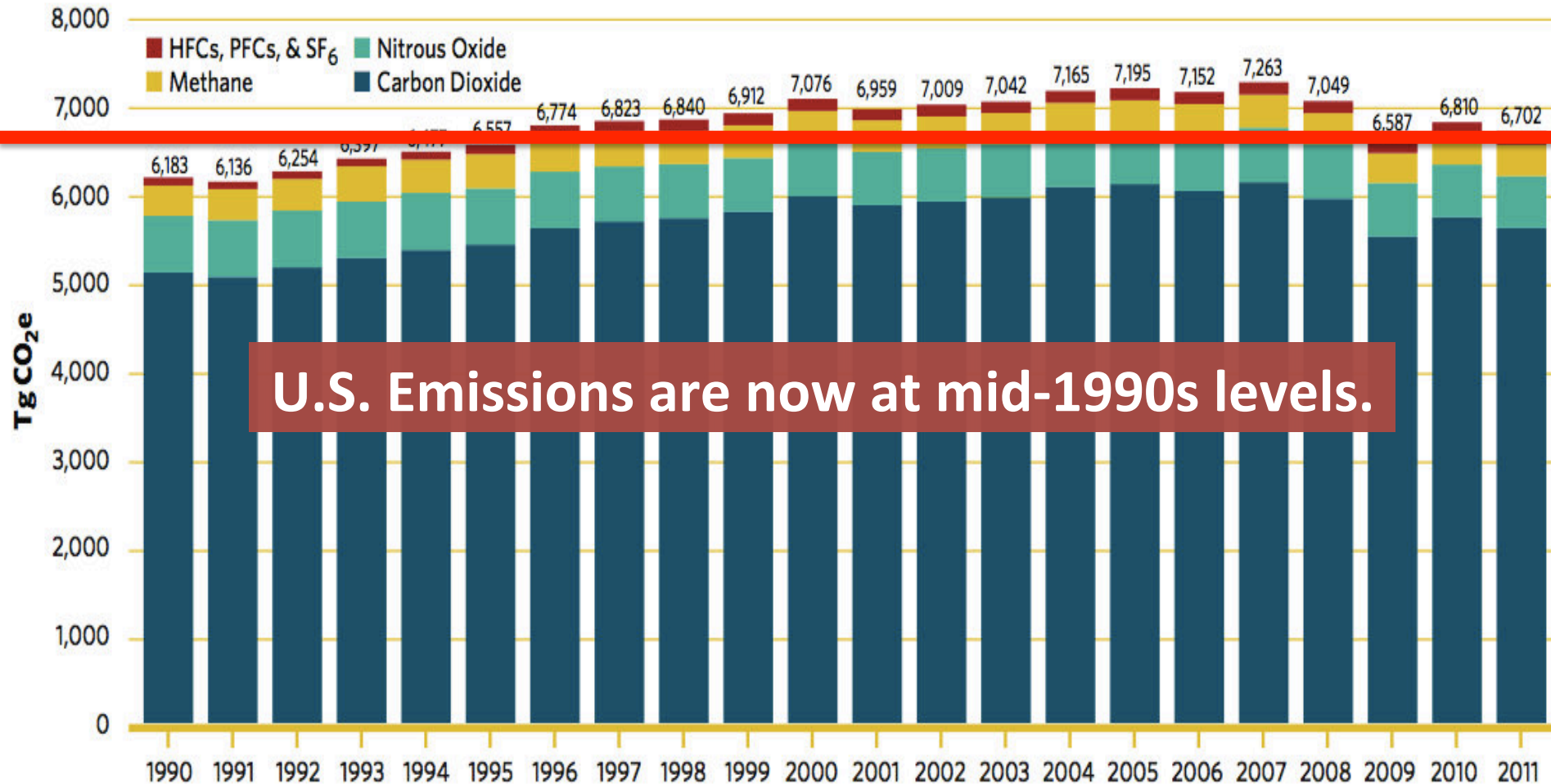
**DOE issued 13 new standards from 2009-2012 and 9 more in 2013; will save \$300 billion through 2030**

# Over 40 countries and regions have adopted energy efficiency standards or labels, many built on the US Energy Star standard

# Over 80 types of products and billions of items are covered under these programs



# U.S. Greenhouse Gas Emissions by Gas, 1990-2011





# Spotlight: Malaysia

## 2009 Climate Change Summit, Copenhagen:

- PM Razak pledged to “voluntarily reduce CO<sub>2</sub> emission intensity of GDP up to 40% by 2020 as compared to 2005 levels”

Subsequently the National Green Technology Policy was formulated:

- Attain energy independence;
- Minimize environmental impacts;
- Enhance economic development; and
- Improve quality of life.

Focus on energy, buildings, waste, and transportation.





# National Green Technology Policy

- Restructured GreenTech Malaysia
- Established annual International Greentech and Eco Products Conference (IGEM)
- Planned for Putrajaya and Cyberjaya to be pioneer townships in green technology
- Established the MYR 1.5 billion Green Tech Fund



## Malaysia Green Labeling Program

- Established Eco Labeling Program to certify eco-friendly products
- Established Green Building Index (GBI)



## National Renewable Energy Policy

- Incentivizes indigenous renewable energy resource development through the Renewable Energy Act 2011 and Sustainable Energy Development Authority Act of 2011

## Tenth Malaysia Plan (2011-2015), New Energy Policy

- Ensures economic efficiency and security of energy supply while meeting social and environmental objectives

# TENTH MALAYSIA PLAN

2011-2015



# **Challenge: Fossil Fuel Subsidies**

**More than \$500 billion worldwide in 2011**

**\$2 billion in Malaysia in 2009**

**Account for 4% of government expenditure (MOF, 2011)**

**Discourage Energy Efficiency**

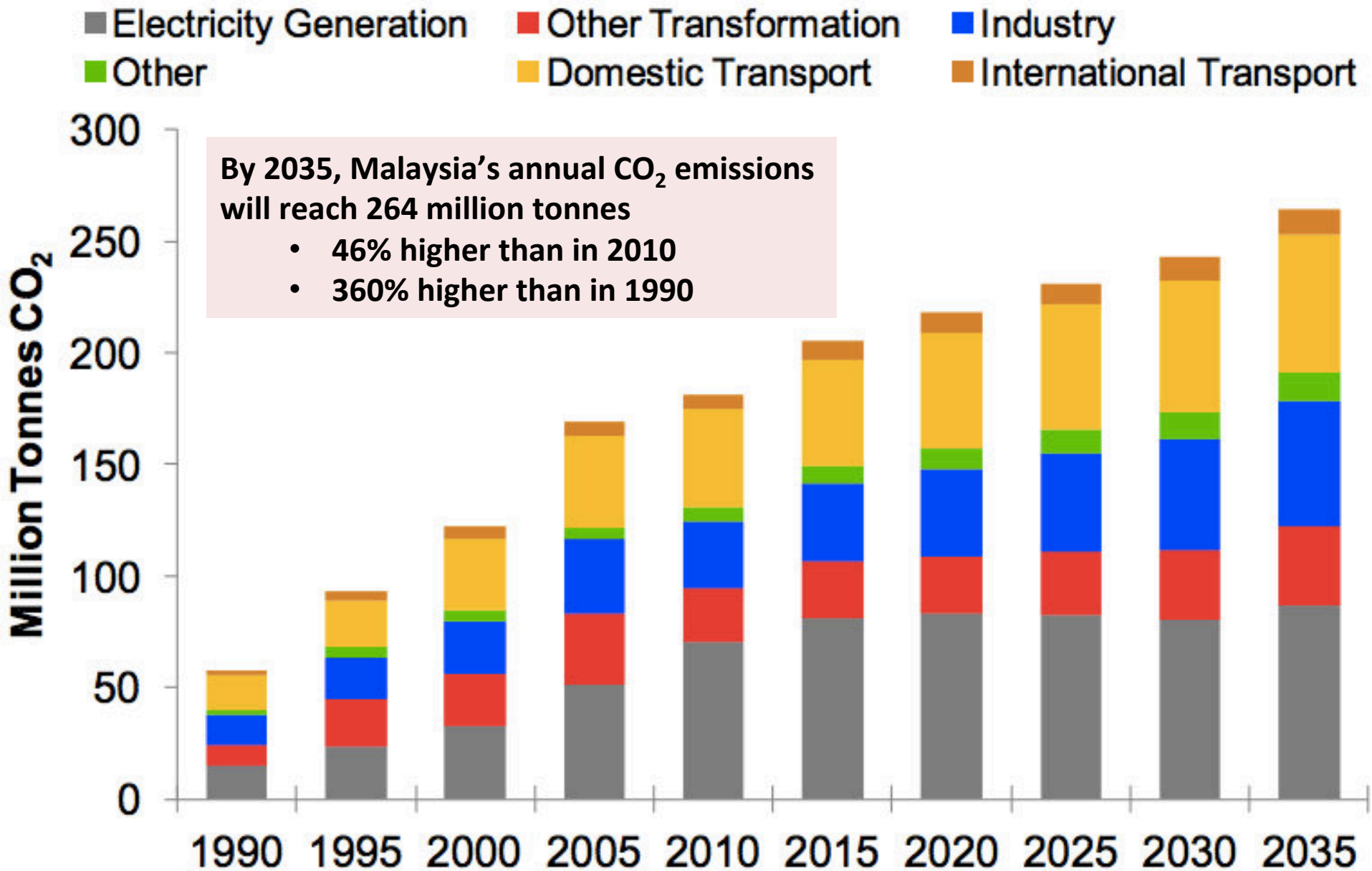
**Defer Investment**

**Impede long-term growth**

**Ineffective Spending**

**Malaysia is restructuring subsidies on natural gas for power generation with the goal of reaching real market price; but vehicle subsidies remain unchanged.**

# Challenge: Emissions Growth





“Energy Diplomacy”



**“We have an interest in promoting new technologies and sources of energy – especially including renewables – to reduce pollution; to diversify the global energy supply; to create jobs; and to address the very real threat of climate change.”**

*Secretary of State Hillary Clinton at  
Georgetown University*

*October 19, 2012*

**“Today’s energy market is a \$6 to \$9 trillion market with 4 to 5 billion users and it will go up to some 9 billion users as the population grows in the next 40 years. Investment in the energy sector is expected to reach nearly \$17 trillion between now and 2035.”**

*Secretary of State John Kerry at the D.C. Greening Embassies Forum*

*October 29, 2013*



# Bureau of Energy Resources

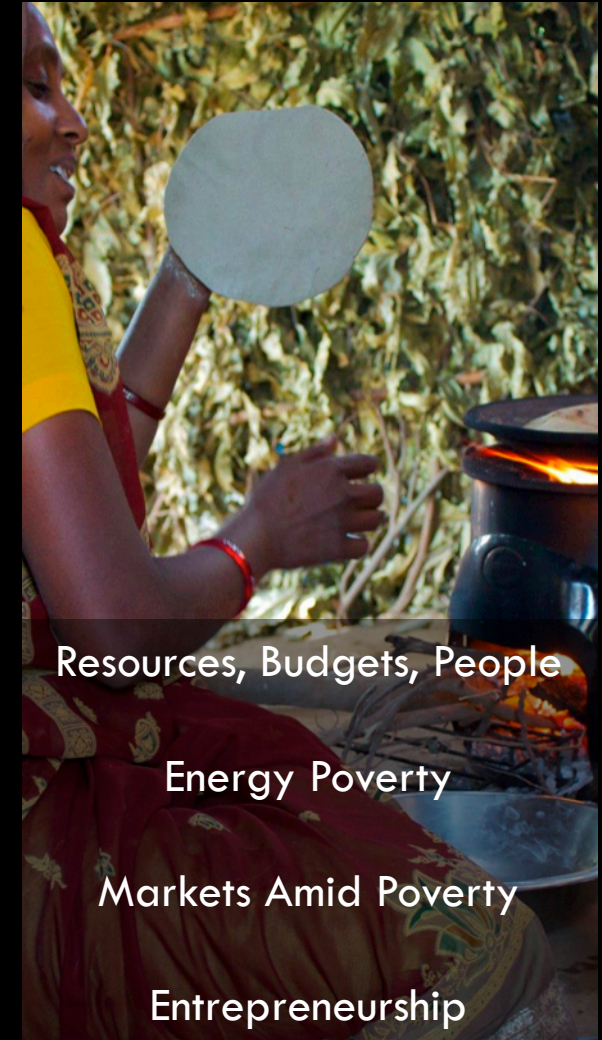
Managing the  
Geopolitics of Energy



Stimulating Markets for  
Energy Transformation



Ensuring Transparency,  
Governance, and Access





# Bureau of Energy Resources: Strategic Goals in Green Technology

- Overcome **policy and technical barriers**
- Utilize cross-cutting **mechanisms and tools**
- Engage in **commercial matchmaking**
- Support viable commercial **project ideas**
- Facilitate regional **energy markets**
- Promote bilateral and regional **policy dialogues**
- Create, host, and participate in **workshops and symposia**



# Asia-Pacific Economic Cooperation



**21 Pacific Rim countries promoting free trade and economic cooperation**

**Goal to reduce APEC-wide energy intensity by 45% by 2035**

**US Departments of State and Energy are major contributors, facilitating specific projects in:**

- **Smart grid**
- **Green roofs**
- **Low carbon model towns**
- **Measurement, verification and evaluation**
- **Technology and knowledge exchange**
- **Trade missions**



# 2012 INTERNATIONAL YEAR OF SUSTAINABLE ENERGY FOR ALL



1 ENSURE  
*universal access*  
TO MODERN ENERGY SERVICES.



2 DOUBLE THE GLOBAL RATE OF  
IMPROVEMENT IN  
*energy efficiency*



3 DOUBLE THE SHARE OF  
*renewable energy*  
IN THE GLOBAL ENERGY MIX.

**Led by UN Secretary-General Ban Ki-Moon, seeks to mobilize action from all sectors**

**US is providing \$2 billion in grant, loan, and loan guarantee resources**

## **Department of State Support:**

- Technical assistance for improving enabling environment
- Participation in clean energy technology partnerships
- Financing and mobilization of private capital

# Connecting the Americas 2022



Announced at Sixth Summit of the Americas in Cartagena, Colombia in 2012.

Aspires to increase access to reliable, clean, and affordable electricity for 31 million people.

Department of State is providing grants to support multilateral policy dialogues, overcome barriers to trade, increase technical assistance, and develop smart grid technologies.

## Lower Mekong Initiative

Established by Secretary Clinton in 2009 to facilitate sub-regional capacity building in environment, health, connectivity, education, and energy

## New "Energy Pillar"

- Energy efficiency and conservation
- Regional energy market development
- Power interconnection
- Transparency and good governance
- Energy research and development

2012-2013: United States and Thailand Co-Chair the Creation of an LMI "Energy Pillar"

Malaysia has hosted LMI meetings and provided input on LMI objectives



# U.S.-Asia Pacific Comprehensive Partnership for a Sustainable Energy Future

**Announced by President Obama at the East Asia Summit in Cambodia, 2012**

**U.S. commitment of \$6 billion in export credit financing for energy efficiency, grid modernization and infrastructure, renewable energy, and unconventional gas**

**Ongoing developments:**

- **New Asia Pacific Clean Energy Center opening in Bangkok, first quarter 2014**
- **Financing wind farm development in Vietnam**
- **Proposed geothermal energy workshop in Indonesia focusing on Indonesia, Malaysia, Myanmar, and Philippines**



# **“Draft” Recommendations**

# 1: Increase the flow of information

- Increase collaboration between Malaysian government entities
  - There are more than 10 Malaysian government entities that work on clean technology issues
- Learn from domestic evidence and case-study analyses
- Engage in campaigns to overcome green technology predispositions within government



## 2: Engage the private sector

- Use public-private partnerships to increase availability of funds while mitigating risk
- Institute innovative funding mechanisms to increase borrowing capacity
- Incentivize entrepreneurship and innovation

### **3: Increase international collaboration**

- Through ASEAN, APEC, LMI, USACEP, and bilateral initiatives with the U.S., EU, and other advanced technology partners
- Exchange international best practices in measurement and verification and codes and standards

## 4: Prioritize energy efficiency

- Consider energy efficiency the foremost “energy source”
  - It is the cheapest way to reduce energy demand and emissions
- Develop a more advanced Energy Service Company (ESCO) industry by collaborating with ESCOs abroad to engage in larger and more easily-replicable projects

## **5: Explore renewable energy beyond solar**

- Wind, geothermal, ocean thermal, wave and tidal, and storage
- Incentivize the already-strong solar manufacturing industry to sell their products to domestic markets

## 6: Educate and advocate

- Encourage and assist local education and awareness groups
- Use the existing world-class high-tech workforce as a catalyst
  - Get them interested in being green

## **7: Significantly reduce fossil fuel subsidies**

- While ensuring a social safety net for the poor
- Use the freed money to fund the six previous recommendations

**Thank you. Questions?**

**Patrick E. Meyer, Ph.D.  
United States Embassy Science Fellow  
U.S. Embassy, Kuala Lumpur, Malaysia  
MeyerPE@State.Gov**

**Keep Malaysia beautiful.**

