

5th National Energy Forum - Malaysia

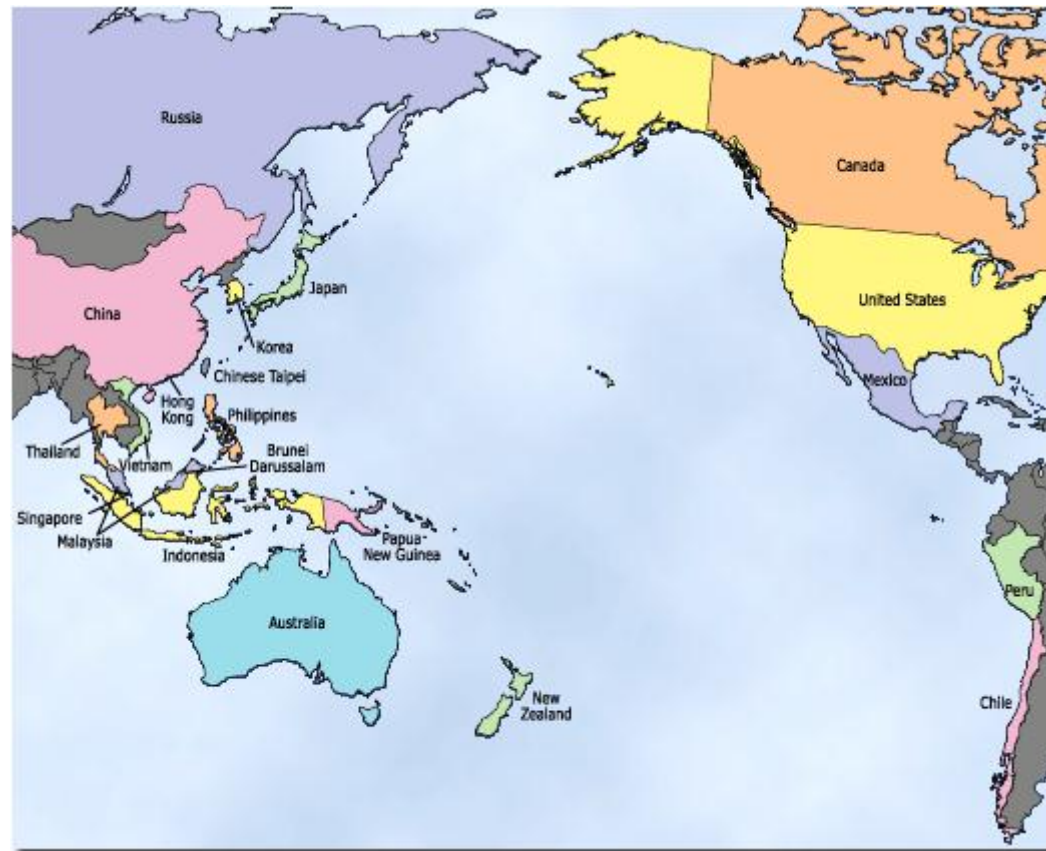
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# Delivering a Sustainable Energy Future for the World

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From APEC website, <http://hrd.apec.org/index.php/Image:APEC-map.gif>

# The World's Three Major Energy Challenges

1. Energy access for all
2. Energy security
3. Climate change



# 1. Energy Access for All . The Problem

- “ 1.3 billion people still lack access to electricity
- “ 2.6 billion people lack access to commercial cooking fuels



# 1. Lack of Energy Access for All . The Consequences

- “ 1.5 million deaths/year from indoor air pollution (WHO estimates)
- “ Barrier to school performance for children
- “ Barrier to economic development





# 1. Lack of Energy Access for All . Where Is the Problem?



- “ In APEC Asia,
  - “ Significant lack of access to electricity still exists in Indonesia, the Philippines, and Papua New Guinea
  - “ Significant lack of access to commercial cooking fuels still exists in the above plus China and Vietnam
- “ But biggest challenge is in Sub-Saharan Africa and Central Asia (India)

# 1. Lack of Energy Access for All . Is It Really an Energy Problem?

According to the UN Millennium Project,

- “ 2.7 billion people live on US\$2/day or less
- “ 1 billion people live on US\$1/day or less



# 1. Lack of Energy Access for All . Just One of Consequences of Poverty?

- “ Safe drinking water (1 billion people lack it)
- “ Food (800 million people go hungry)
- “ Basic healthcare (11 million children/year die of preventable diseases)
- “ Basic education (40% of women in Africa lack access)
- “ ã





# 1. Lack of Energy Access for All .

## Conclusions

- “ Lack of energy access is just one symptom of the larger problem of poverty
- “ Best way to provide energy access for all is therefore to lift people out of poverty
- “ Malaysia has been there and done that, and could have much to teach the rest of the world!

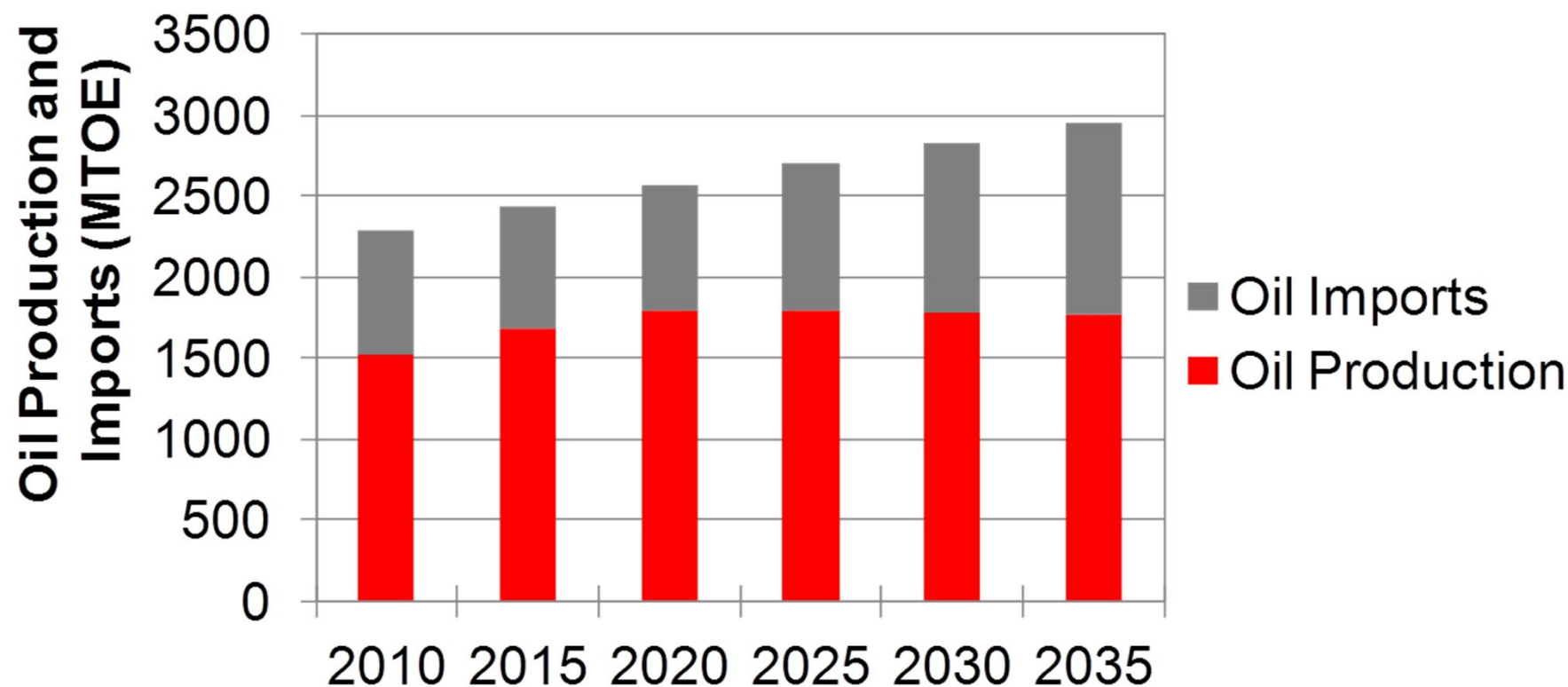


## 2. Energy Security . The Problem



- “ Mainly a problem for oil
- “ Oil demand growing rapidly, especially in developing economies
- “ Oil production has become more concentrated in a few countries in the Middle East and Africa

## 2. Energy Security . APEC's Oil Production and Imports



Source: APERC, *APEC Energy Demand and Supply Outlook 5<sup>th</sup> Edition*

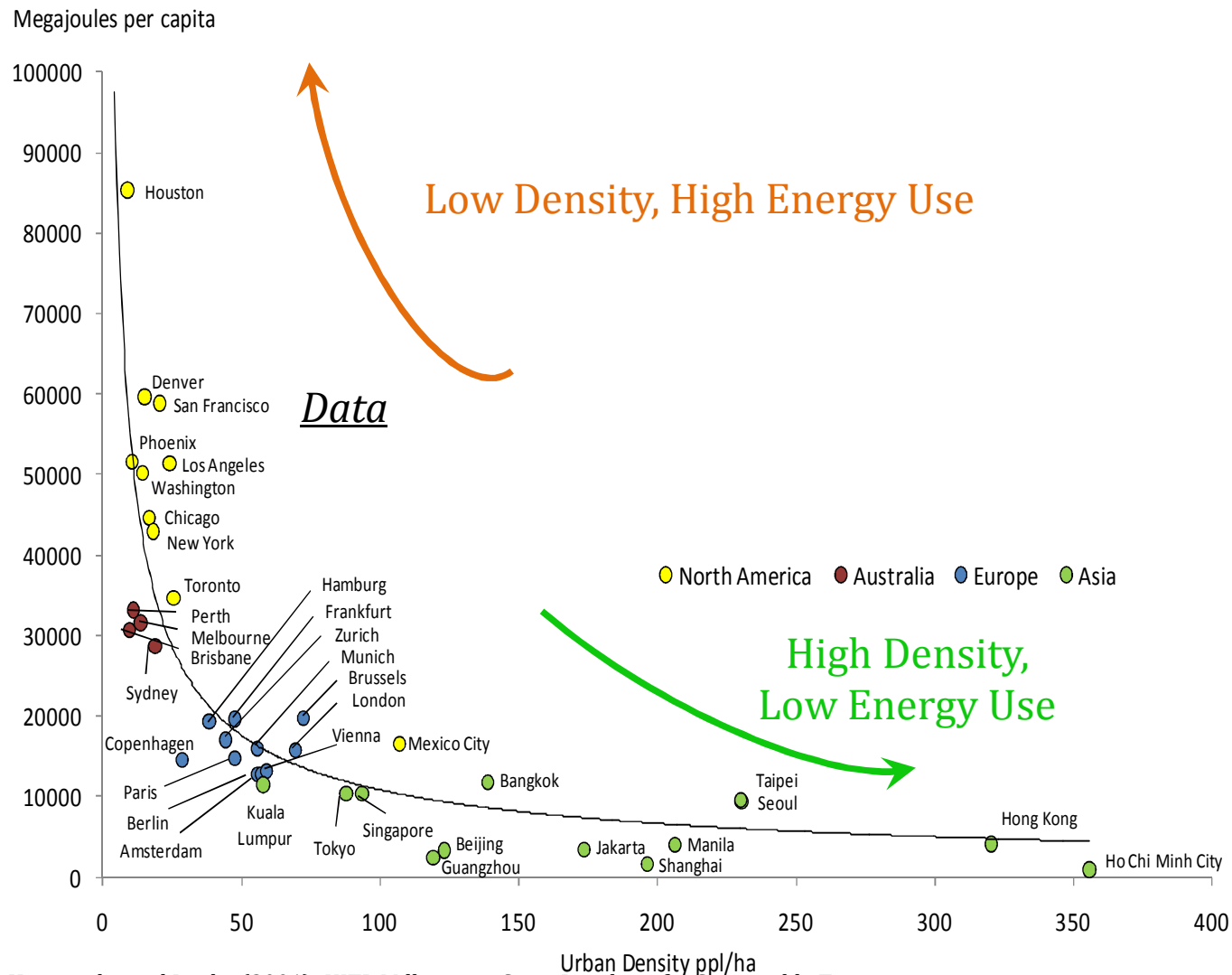
## 2. Energy Security . Possible Solutions



1. Have peace and stability in the Middle East and Africa!
2. Crisis planning
3. Increase oil production elsewhere?
4. Improve oil efficiency
  - “ Vehicles
  - “ Public Transport/Bicycling/Walking
  - “ Urban Planning
5. Find environmentally-friendly alternatives to oil



# 2. Energy Security – Better Urban Planning Reduces Oil Demand



Source: Adapted from Kenworthy and Laube (2001), *UITP Millennium Cities Database for Sustainable Transport*

# 3. Climate Change . The Problem



- “ Consequences of climate change could be catastrophic for humanity
- “ The best science is saying we need to cut greenhouse gas emissions dramatically and soon
- “ Yet emissions continue to grow

# 3. Climate Change . The Impacts

- “ Water . Reduced availability, more frequent droughts
- “ Ecosystems . Major extinctions, ocean coral destroyed
- “ Agriculture - Reduced agricultural productivity
- “ Coasts . Rising sea levels, loss of low-lying lands
- “ Health . Increase in tropical diseases
- “ Singular Events . Floods, heat-waves, etc.

From Intergovernmental Panel on Climate Change, Fourth Assessment Report: *Working Group II Report, Impacts, Adaptation and Vulnerability (2007)*, Technical Summary, Table TS.3

# 3. Climate Change . 2° C Limit Needed

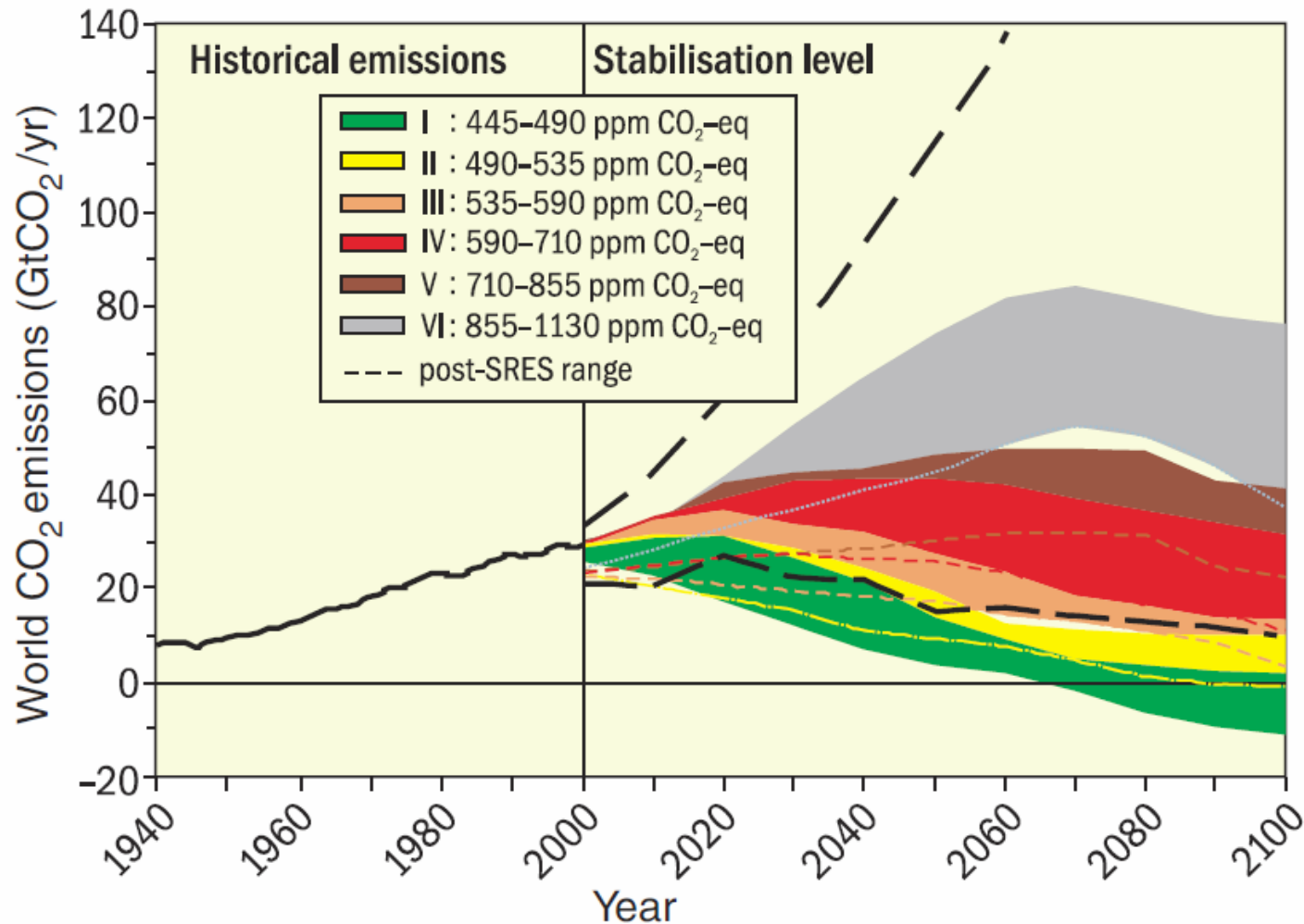
From Copenhagen Accord with 139 Parties Agreeing:

We agree that deep cuts in global emissions are required according to science, as documented by the IPCC Fourth Assessment Report with a view to reduce global emissions so as to hold the increase in global temperature below 2 degrees Celsius +





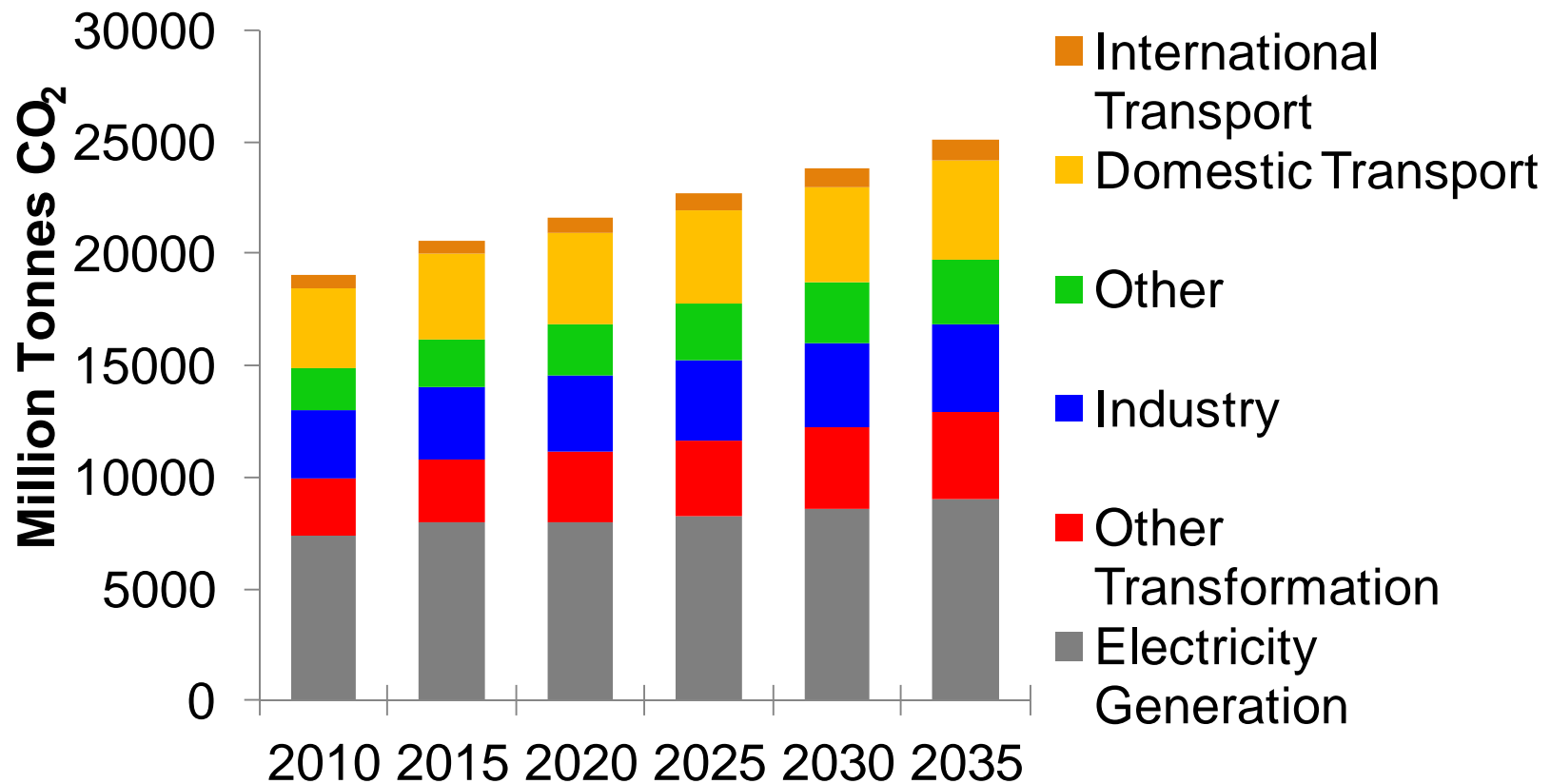
# 3. Climate Change - What We Need to Do



From: Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report*, Figure 5.1, p 66.

# 3. Climate Change . Where We Seem to Be Headed

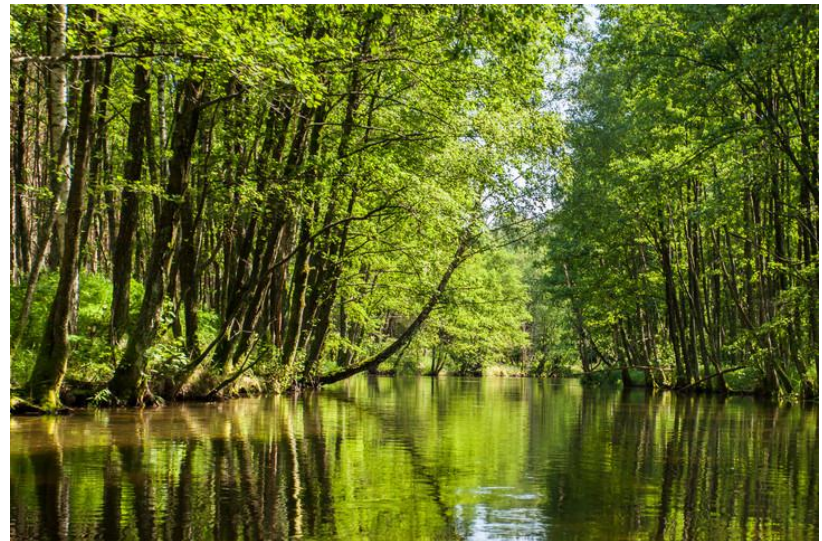
## APEC CO<sub>2</sub> emissions from fuel combustion



Source: APERC, *APEC Energy Demand and Supply Outlook 5<sup>th</sup> Edition*

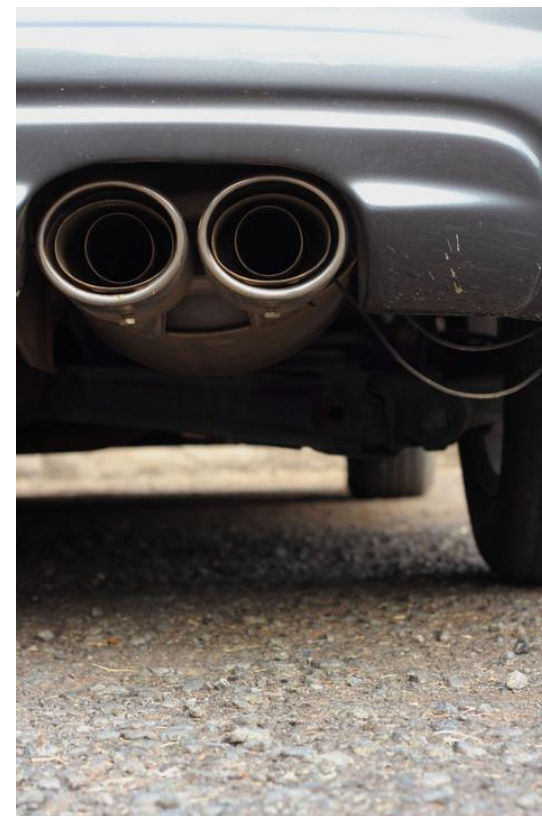
# 3. Climate Change . What We Need to Do

- A. Rationalize and phase out fossil fuel subsidies . to reduce fossil fuel demand in the short term
- B. Replace coal with gas . to reduce emissions in the medium term
- C. Put a price on emissions . To promote development and implementation of low-carbon energy technology



# A. Fossil Fuel Subsidies . Why Are They Harmful?

1. They encourage waste
2. They have huge costs to the economy and to government budgets
3. They mostly help the middle class and the wealthy- little goes to help the poor
4. They promote smuggling and corruption
5. They discourage investment in low-carbon energy supply



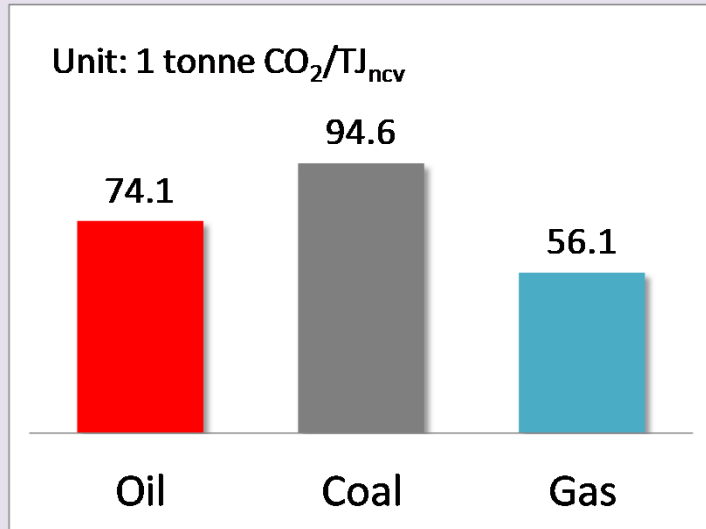


# A. Fossil Fuel Subsidies . Dealing with Political Reality

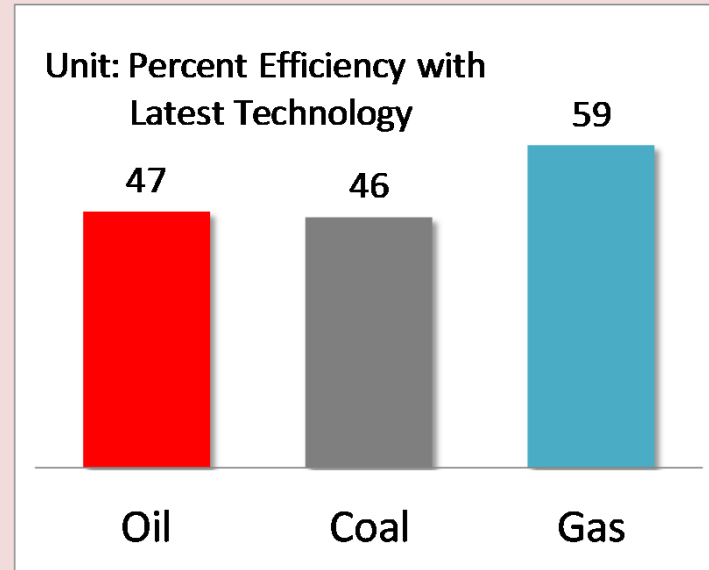


1. Educate, educate, educateõ .
2. Link rationalizing subsidies to popular things the government will be able to afford only if the subsidies are ended, such as:
  - “ Tax cuts
  - “ Cash payments
  - “ Improving the quality of specific government services
3. Make sure those who are truly in need have access

## B. Replacing Coal with Gas . Why Do It?



Gas combustion **produces less CO<sub>2</sub>** per unit of heat



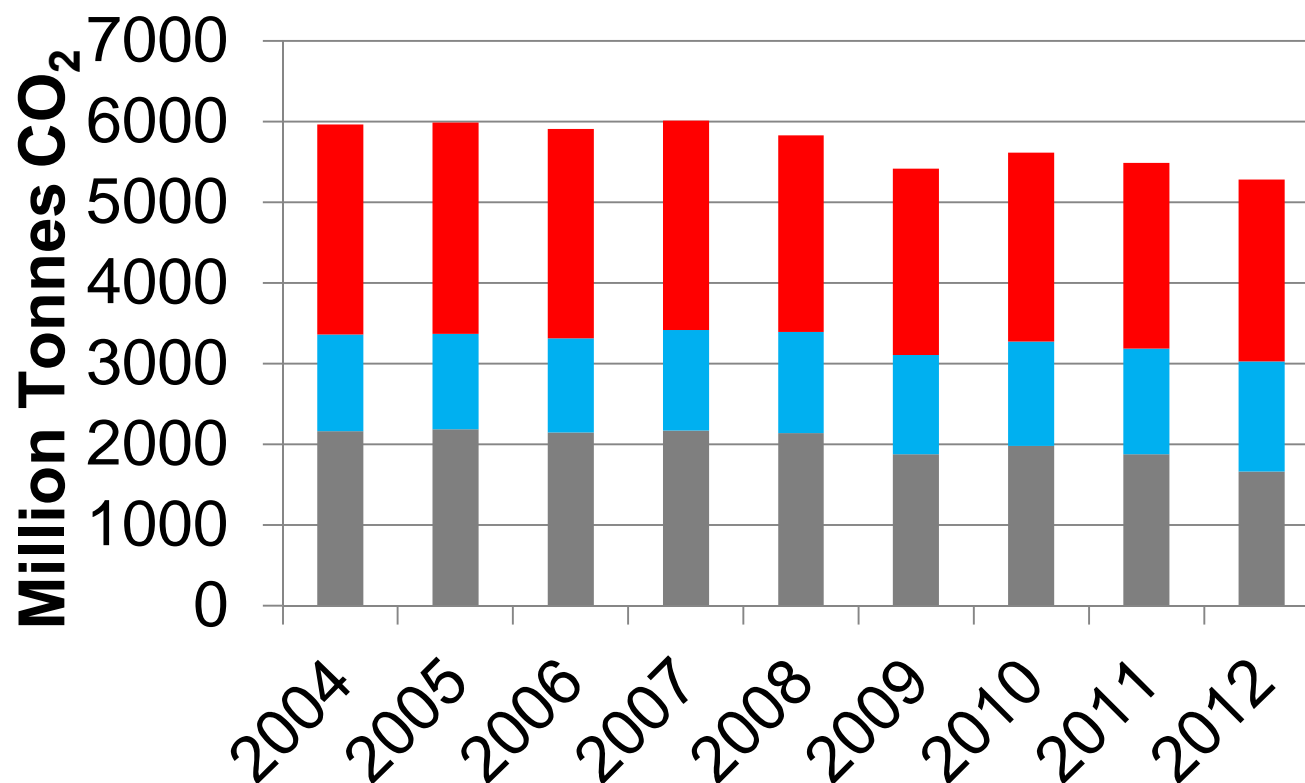
Gas power plants are **more efficient**

- When efficiently burned:
  - ✓ Gas produces much **less local air pollution** than coal
  - ✓ Gas production is typically **less damaging to land and water resources**
- Gas electricity generation can be rapidly cycled on and off,  
→ **nicely complements wind and solar generation**

# B. Replacing Coal With Gas . The Impacts

## United States CO<sub>2</sub> Emissions

■ coal ■ natural gas ■ petroleum



Source: United States Energy Information Administration,  
<http://www.eia.gov/todayinenergy/detail.cfm?id=10691>

# B. Replacing Coal with Gas . The Resources Are There

APEC Economy	Technically Recoverable Resources (MTOE)			2009 Production (MTOE)	Years of Production
	Conventional Gas	Shale Gas	Conventional+ Shale Gas		
United States	30750	21550	52300	515	102
Canada	8650	9700	18350	140	131
Mexico	2375	17025	19400	45	431
Russia	86125	N/A	86125	475	181
China	5225	31875	37100	73	512
Australia	5700	9900	15600	43	326
Chile	87	1600	1687	1	>1600

Recoverable with today's technology

Availability > 100 years

Sources: Conventional Gas :- MIT, The Future of Natural Gas, 2011  
 Shale Gas :- USEIA, World Shale Gas Resources, 2011 24  
 Production:- BP Statistical Review of World Energy 2011

## B. Replacing Coal with Gas - Some Potential Constraints

1. Policies requiring a domestic price of gas below market levels (a form of subsidy)
2. Policies restricting the export of gas
3. Policies granting a monopoly on gas development to certain domestic firms,
4. Slow and cumbersome regulatory approvals and land access processes for gas producers





## C. Putting a Price on Emissions . Why Is It Needed?

- “ Right now, no one has to pay for the damage their emissions do the environment
- “ So no one has a financial incentive to reduce emissions
- “ Emission pricing would fix this problem!



# C. Putting a Price on Emissions . Why Is It Better than Command and Control?

- “ Emission pricing costs less
  - “ With command and control the government tells producers and consumers what they must do to reduce their emissions
  - “ With emission pricing, producers and consumers find the lowest cost way to reduce their emissions
- “ Emission pricing rewards technical innovation



## C. Putting a Price on Emissions Promotes Technical Innovation

- “ Government needs to support research on low-carbon energy technologies
- “ But without the right commercial incentives, these technologies may never get out of the laboratory
- “ Emission pricing also provides an incentive for companies and entrepreneurs to do their own research and development



# C. And Putting a Price on Emissions Really Works!

An early example- the U.S. Acid Rain Program to reduce SO<sub>2</sub> emissions

- “ A cap-and-trade program which effectively put a price on SO<sub>2</sub> emissions
- “ By 2002, SO<sub>2</sub> emissions reduced 40% compared to 1980
- “ Estimated cost of \$1-2 billion was 25% of the original government estimates

Source: United States Environmental Protection Agency,  
<http://www.epa.gov/capandtrade/documents/ctresults.pdf>



## C. Putting a Price on Emissions . Did Someone Say Tax?

- “ Emission pricing not necessarily a tax *increase*
- “ Right now, income taxes discourage people from working and investing
- “ So replace taxes on work and investing with taxes on emissions!





## C. Putting a Price on Emissions . What About Economic Competitiveness?

- “ Competition would be made more fair if each country imposed their emission price on imported as well as domestic products, and refunded it on exported products
- “ Next step in global cooperation on climate change should be to clarify these rules



# Delivering a Sustainable Energy Future for the World - Conclusions

- “ Policies to promote a sustainable energy future are sensible, affordable, and could help promote economic growth and prosperity
- “ Gaining political acceptance is the main challenge
- “ But with the right efforts to educate stakeholders and the public, it can be done







**Thank you!**

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