APEC's Potential for Reducing Energy Intensity: The Research Evidence So Far

APERC Workshop at EWG 40

22 November 2010

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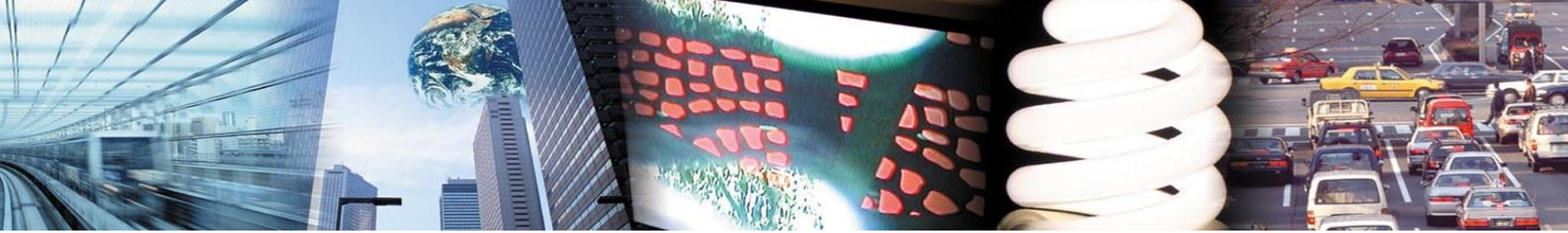
Asia-Pacific Economic Cooperation

Current Status of APEC's Intensity Goal

- 2007 Sydney APEC Leaders' Declaration on Climate Change, Energy Security and Clean Development –
  - "Agree to work towards achieving an APEC-wide regional aspirational goal of a reduction in energy intensity of at least 25 per cent by 2030 (with 2005 as the base year)"
- 2010 Yokohama APEC Leaders Growth Strategy –
  - "APEC will assess the potential for reducing the energy intensity of economic output in APEC economies between 2005 and 2030, beyond the 25 percent aspirational goal already agreed to by APEC Leaders in 2007

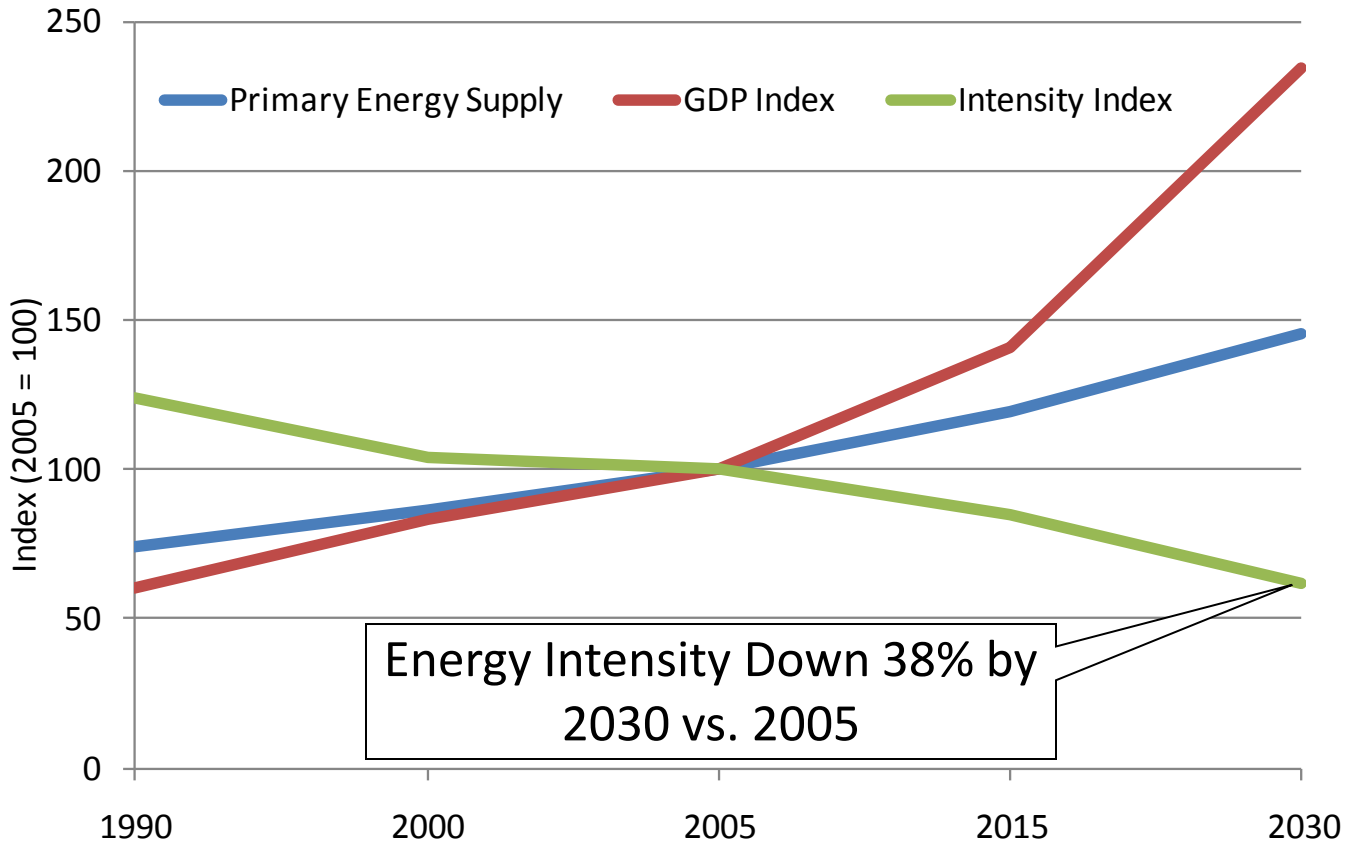
Intensity Goal: Key Research Questions

A. What intensity goal can APEC achieve under current policies?
B. What intensity goal does APEC need to achieve?
C. What intensity goal do APEC economies currently pledge to achieve?



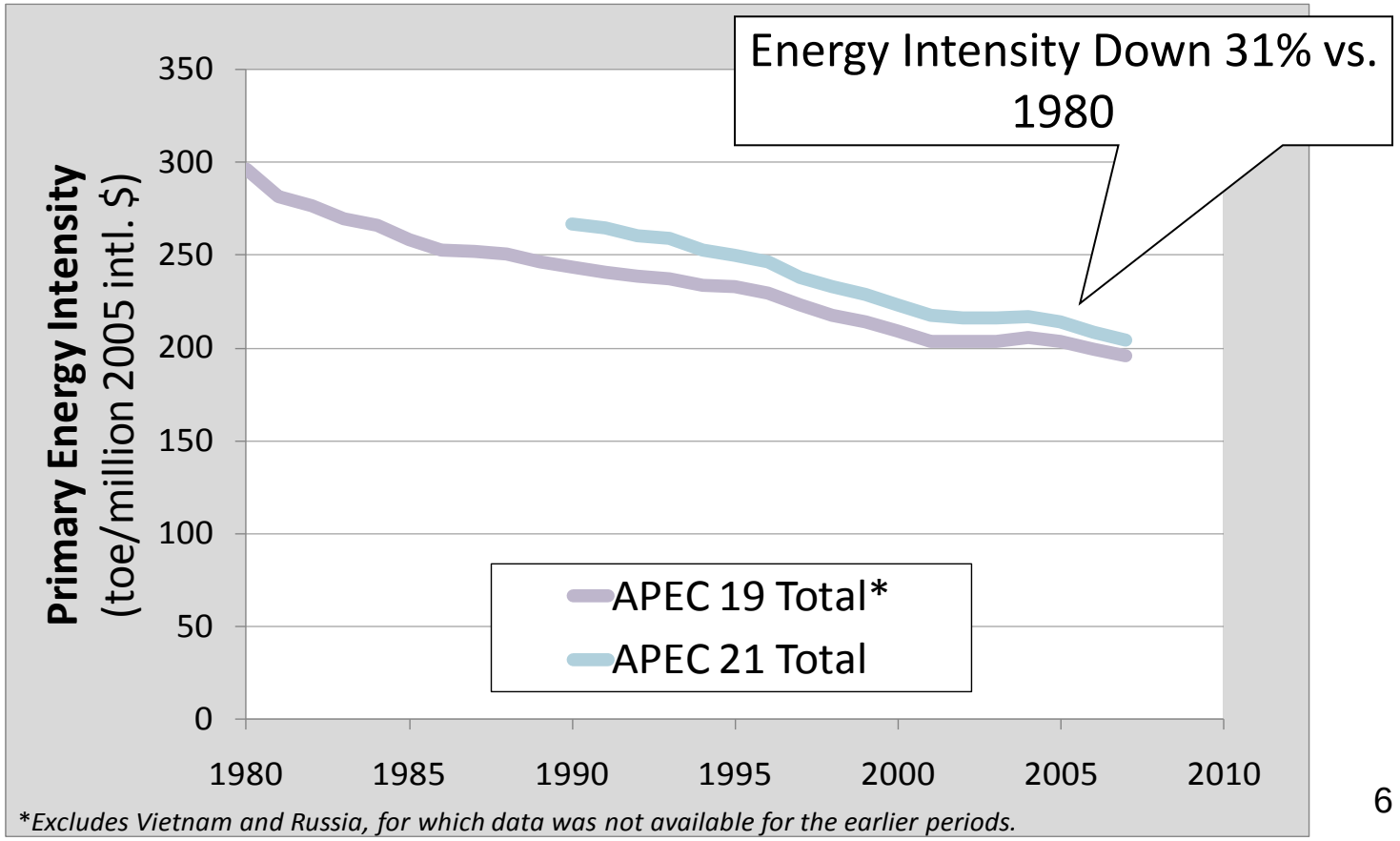
A. What Intensity Goal Can APEC Achieve Under Current Policies?

1. APERC's Business-As-Usual Outlook



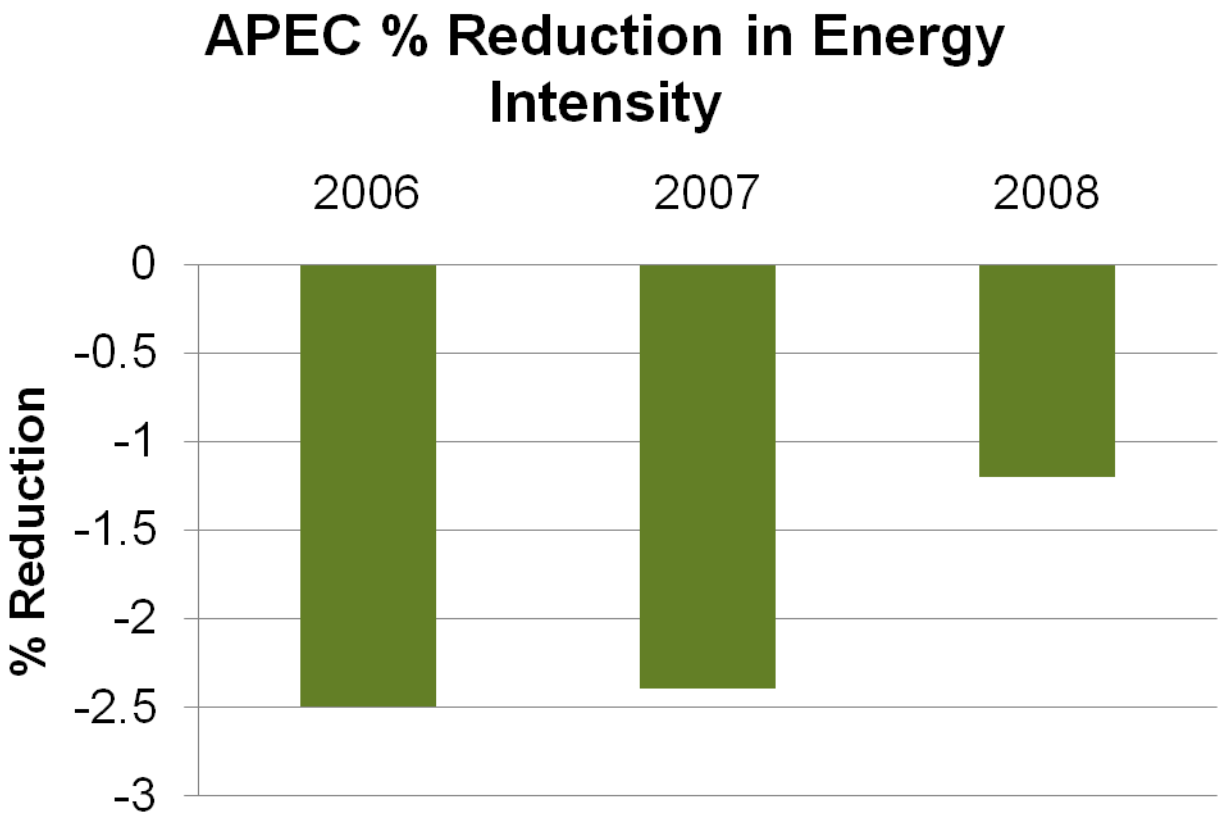
From APERC, *APEC Energy Demand and Supply Outlook 4th Edition,* Figure 1.5

2. What Happened to Energy Intensity Over the 25 Years from 1980-2005?



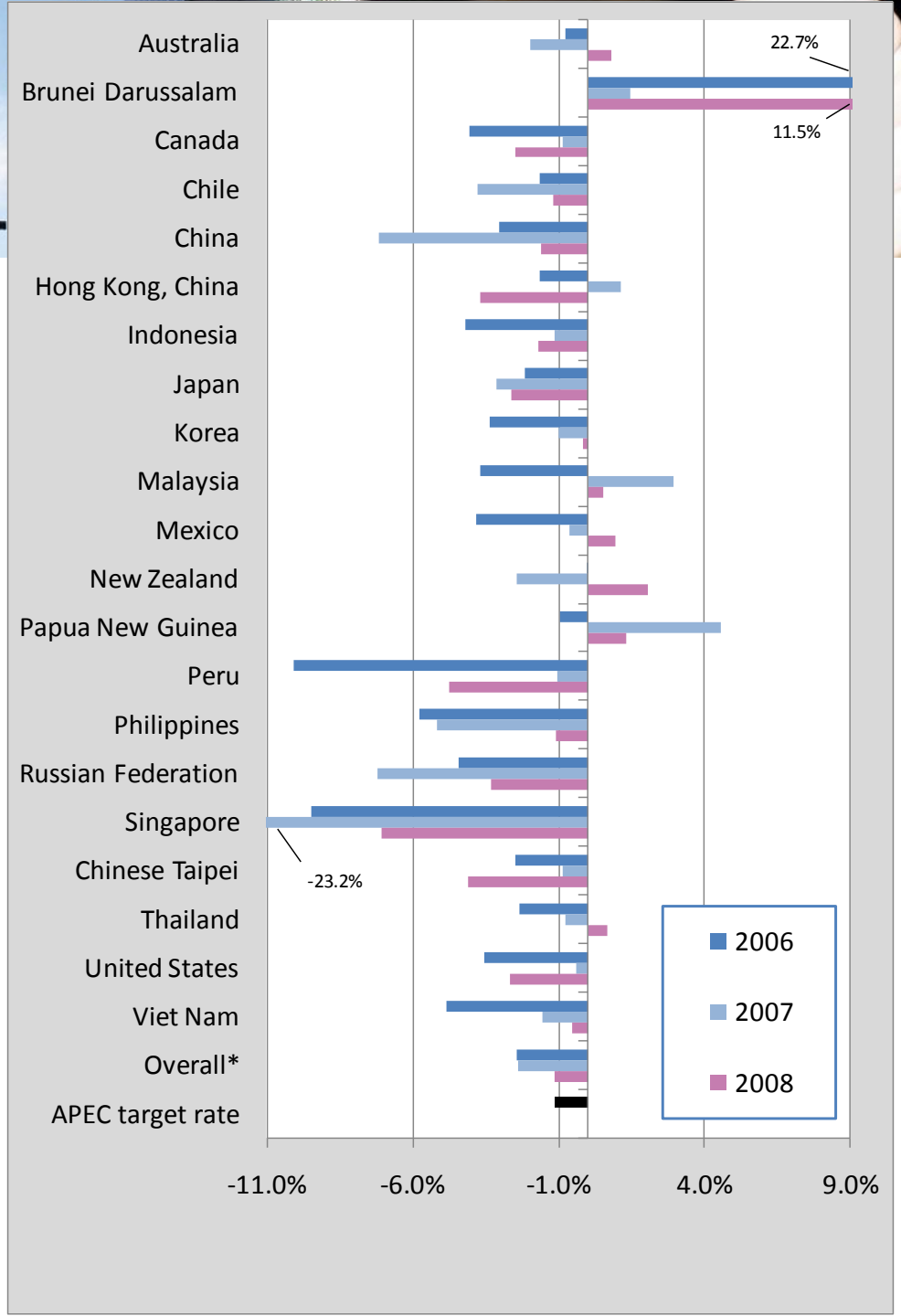
*Excludes Vietnam and Russia, for which data was not available for the earlier periods.

3. What Has Happened to Energy Intensity Since 2005?

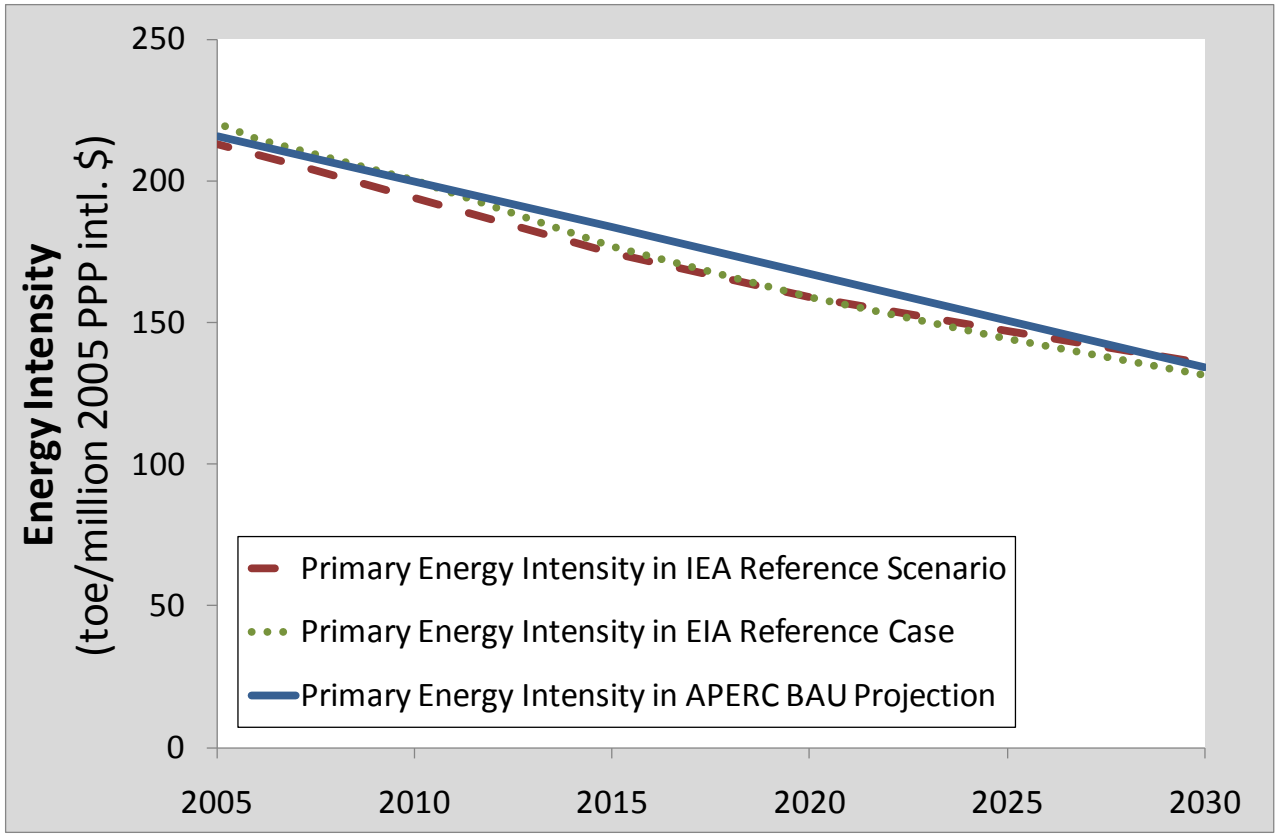


Total Reduction Since 2005 = 6.0%

Indicated Reduction 2005-2030 at Average Rate So Far = 40%


Australia
Brunei Darussalam
Canada
Chile
China
Hong Kong, China
Indonesia
Japan
Korea
Malaysia
Mexico
New Zealand
Papua New Guinea
Peru
Philippines
Russian Federation
Singapore
Chinese Taipei
Thailand
United States
Viet Nam
Overall*
APEC target rate
22.7%
11.5%
-23.2%
2006
2007
2008
-11.0%
-6.0%
-1.0%
4.0%
9.0%

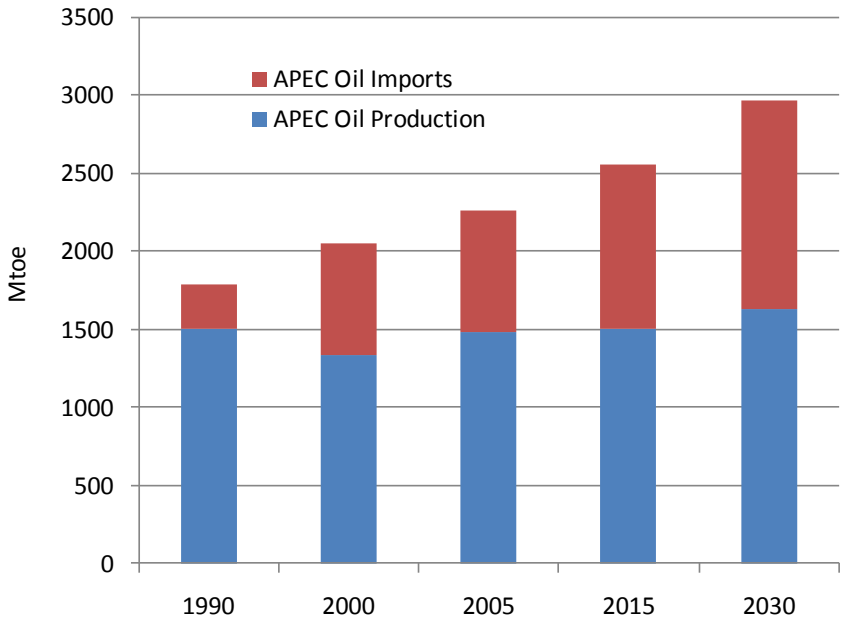
4. How Do APERC's Projections Compare to Other Organizations?



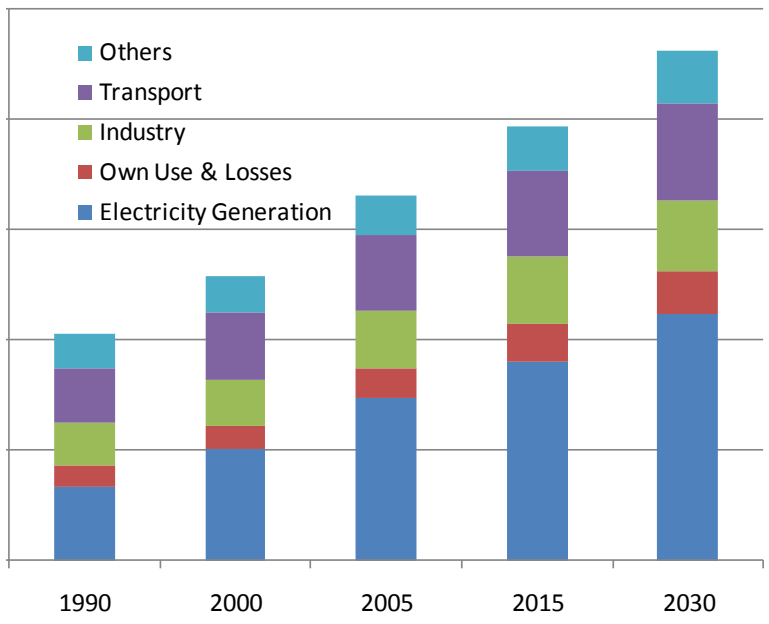
World Energy Outlook 2009 © OECD/IEA 2009

Dual Threats to the APEC Economies

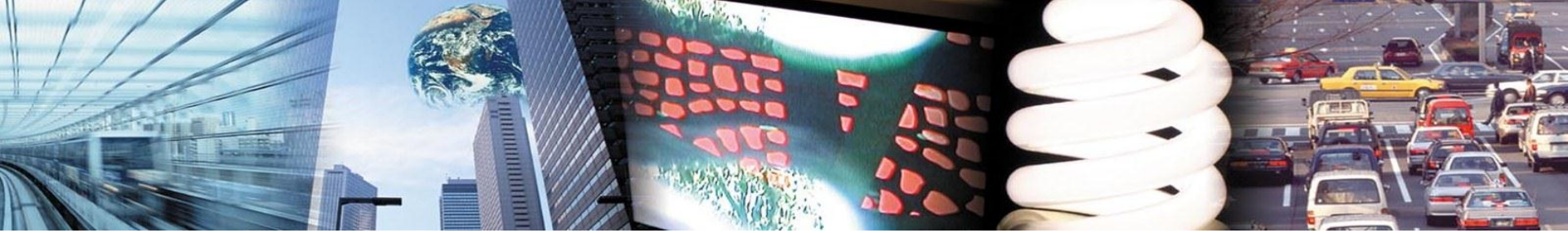
APEC Oil Production and Imports



CO_2 Emissions from Fuel Combustion

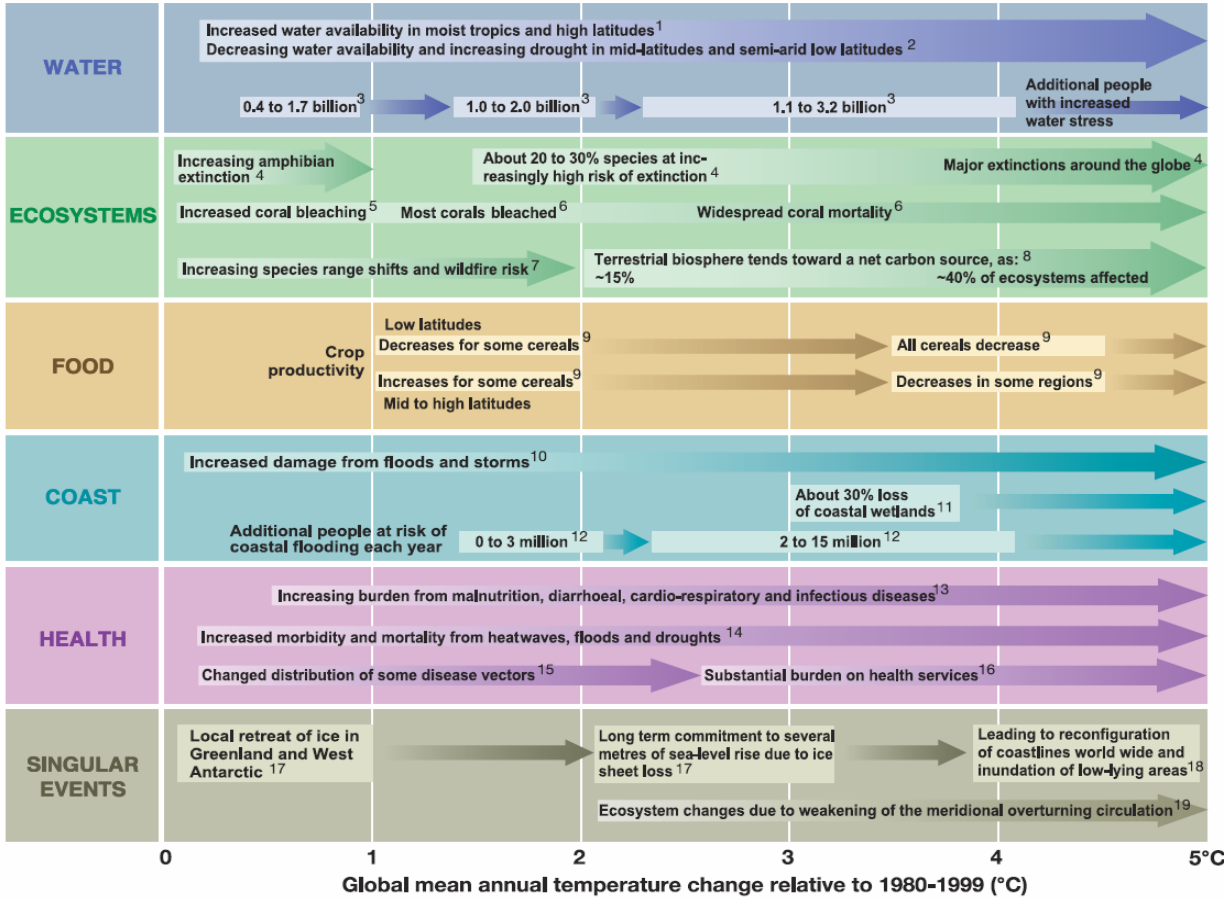


From APERC, *APEC Energy Demand and Supply Outlook 4th Edition,* Figures 1.4 and Figure 1.7



B. What Intensity Goal Does APEC Need to Achieve?

Impacts of Rising Temperatures



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

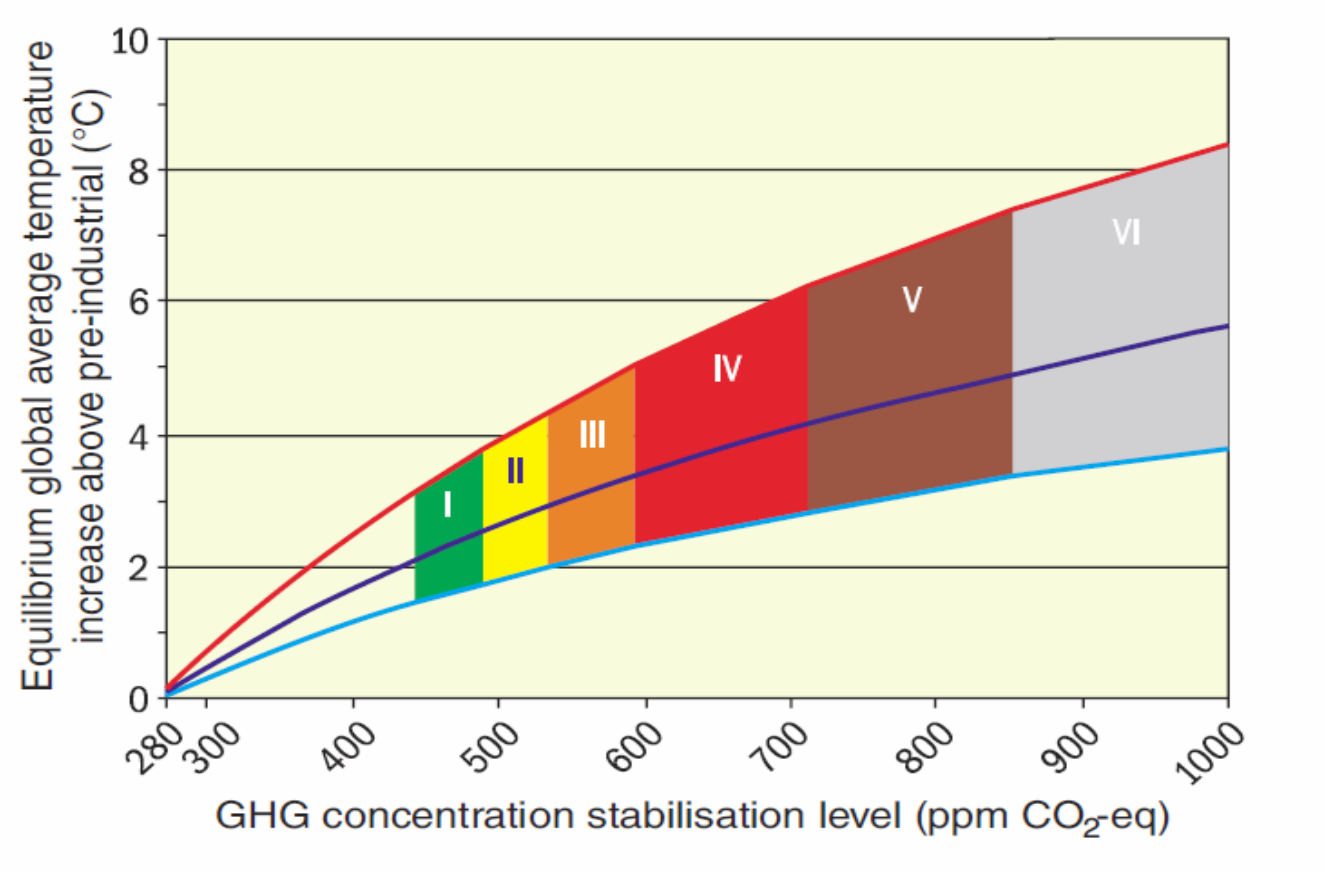
2º C Limit in the Copenhagen Accord (with 139 Parties Agreeing as of 14 October 2010)

Have agreed on this Copenhagen Accord which is operational immediately.

1. We underline that climate change is one of the greatest challenges of our time. We emphasise our strong political will to urgently combat climate change in accordance with the principle of common but differentiated responsibilities and respective capabilities. To achieve the ultimate objective of the Convention to stabilize greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, we shall, recognizing the scientific view that the increase in global temperature should be below 2 degrees Celsius, on the basis ofequity and in the context of sustainable development, enhance our long-term cooperative action to combat climate change. We recognize the critical impacts of climate change and the potential impacts of response measures on countries particularly vulnerable to its adverse effects and stress the need to establish a comprehensive adaptation programme including international support.

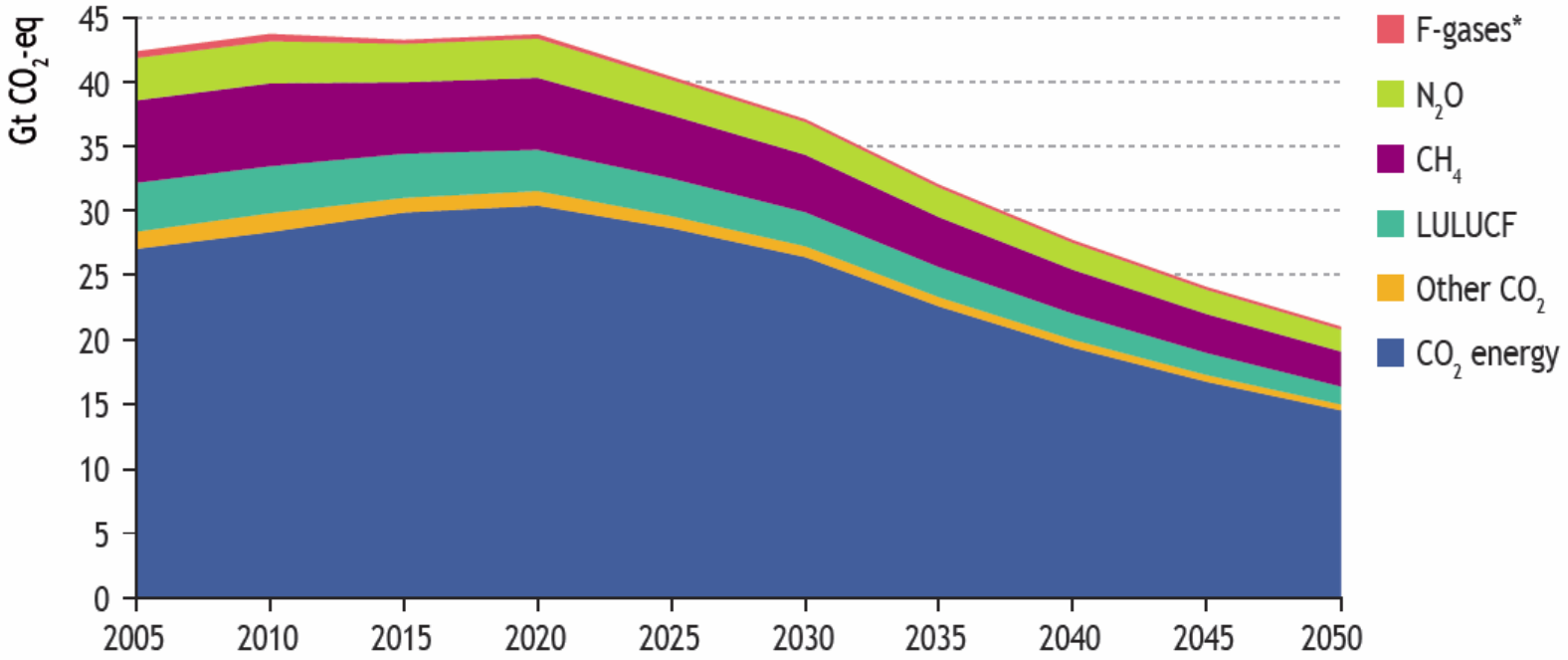
2. We agree that deep cuts in global emissions are required according to science, and as documented by the IPCC Fourth Assessment Report with a view to reduce global emissions so as to hold the increase in global temperature below 2 degrees Celsius, and

Why 450 PPM?



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

A Worldwide 450 PPM Scenario



F-gases include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) from several sectors, mainly industry.

From IEA, *World Energy Outlook 2009,* p. 200, based on analysis using MAGICC and ENV-linkages model.

What Worldwide Emission Reductions Would 450 PPM Require?

- Total CO_2-equivalent greenhouse gas emissions
  - Peak just before 2020 at about 3% above 2005 levels
  - Then decline to 12% below 2005 levels by 2030
  - Then continue to decline reaching about 50% of 2005 levels by 2050
- Energy-related CO_2 emissions
  - Peak just before 2020 at about 14% above 2005 levels
  - Then decline to 2% below 2005 levels by 2030
  - Then continue to decline reaching about 46% below 2005 levels by 2050

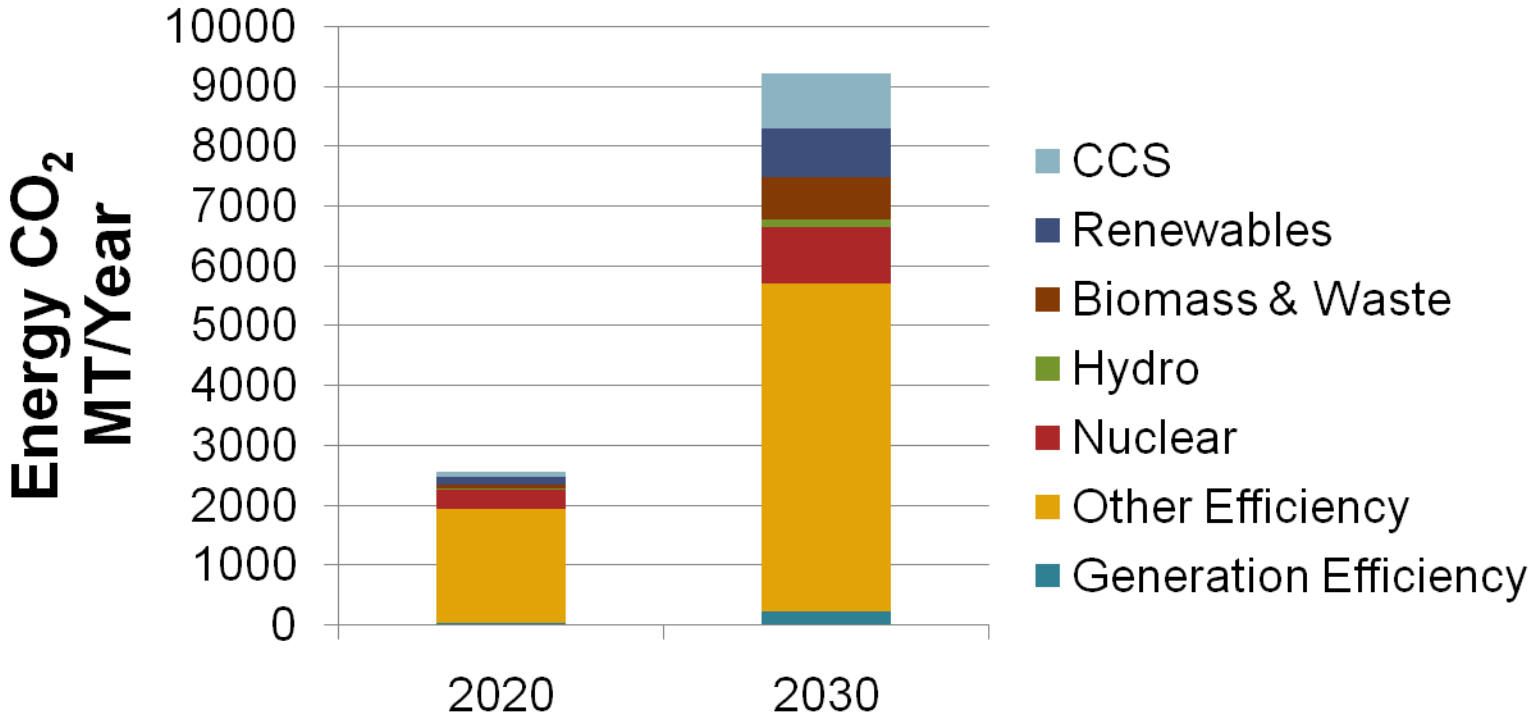
The IEA's Model

- Very detailed and sophisticated
  - 16,000 equations
  - Developed over a 16 year period
- Comprehensive--modeling takes into account:
  - Highly disaggregated demand
  - Specific supply technologies
  - Investment costs
  - Macro-economic impacts
  - Field-by-field oil production
  - Vehicle stock model
  - Refinery model
  - Electricity access

Fairness

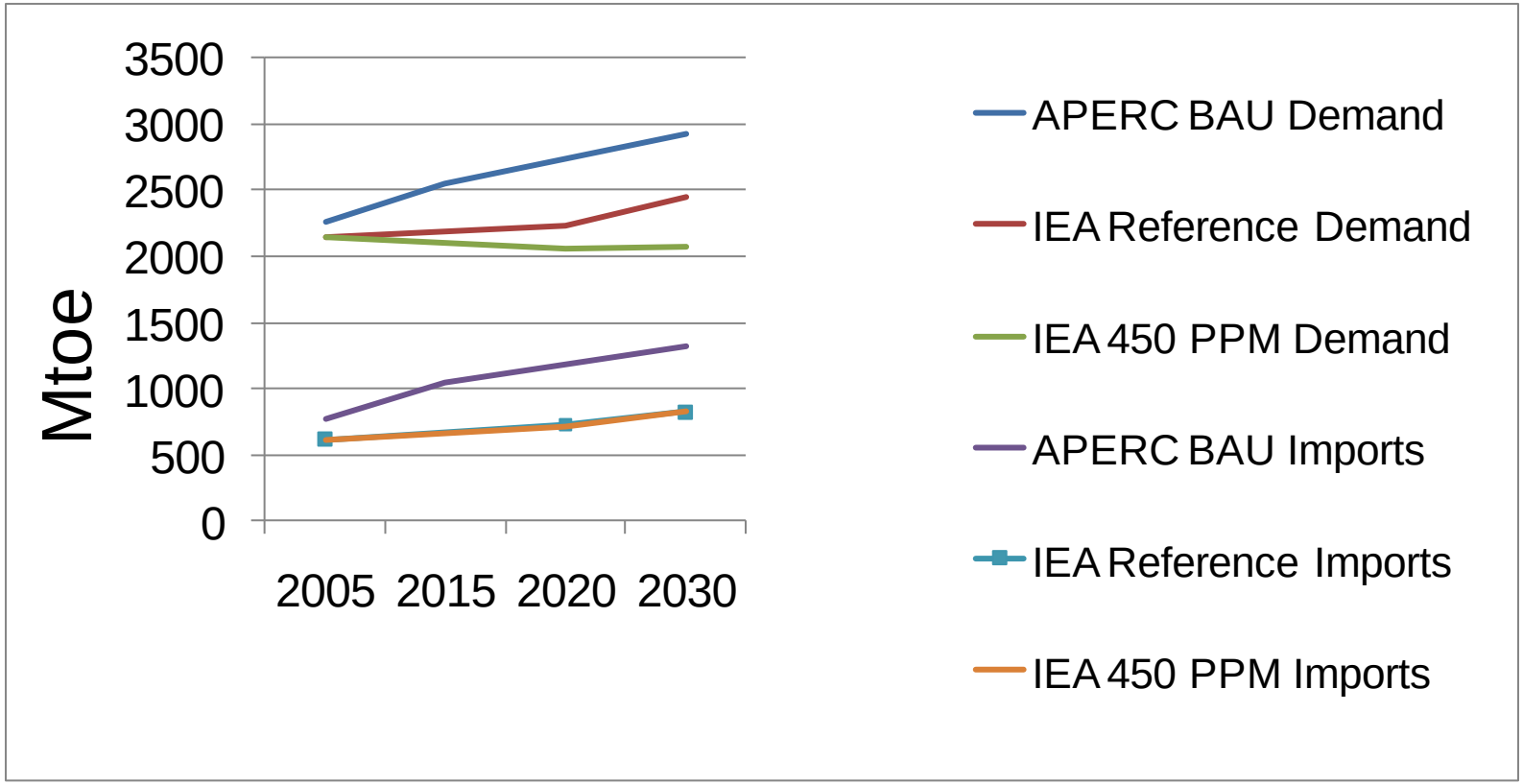
- Our work is focused on overall goals which APEC economies could pursue voluntarily
  - This is just one example of how to move toward sustainability
- Please bear in mind:
  - Any allocation of emissions between economies is potentially fair given the ability to offer compensation in other ways

APEC Region Mitigation Results by Measure (vs.IEA Reference)



Raw Data © OECD/IEA 2009; calculations by APERC

APEC Region Oil Demand and Oil Import Results



Raw Data for IEA Cases © OECD/IEA 2009; calculations by APERC

APEC Key Indicators (1)

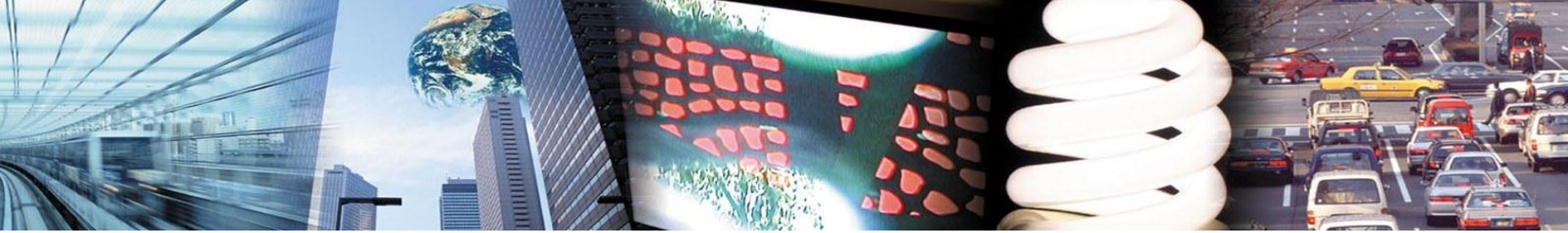
- Energy Intensity Improvement 2005-2030 (primary energy/constant $ GDP)
  - Sydney Leaders Aspirational Goal: 25%
  - APERC BAU: 38%
  - IEA 450 PPM: ~50%
- Non-Fossil Primary Energy Share
  - 2005 Actual: 16%
  - 2030 APERC BAU: 18%
  - 2030 IEA 450 PPM: 30%

APEC Key Indicators (2)

- 2030 Low-Carbon Electricity Output Share ('Low-Carbon' Means Non-Fossil + CCS)
  - 2005 Actual: 29%
  - APERC BAU: 33% (No CCS Included)
  - IEA 450 PPM : 59% (52% Non-Fossil+7% CCS)

Economics - Worldwide

- GDP Impacts of IEA 450 PPM case compared to IEA Reference Scenario
  - GDP down 0.1% to 0.2% in 2020
  - GDP down 0.9% to 1.6% by 2030
  - However, these impacts would be offset by reduced climate change mitigation costs and health benefits from reduced pollution
  - Net effect on GDP hard to quantify
- Additional investment 2010-2030 of $10,500 billion
  - Offset by lower energy bills of $8,600 billion 2010-2030 ($17,100 billion over life of investments) and other benefits



C. What Intensity Goal Do APEC Economies Currently Pledge to Achieve?

What If Every APEC Economy Kept Their Pledges?

- Complex question to answer:
  - Diverse nature of pledges: emission reductions; emission intensity reductions; energy demand reductions; energy intensity reductions; specific actions
  - Contingencies
  - What happens after pledge expires?

Pledges: The Bottom Line

- Making optimistic assumptions that:
  - Each economy effectively implements their mitigation actions
  - Everyone cooperates so contingencies can be met
  - Economies renew their current pledges when they expire with pledges to continue improvement at a similar rate to 2030
- 2030 emissions would be close to those required for a 450 PPM scenario

Impact of Pledges