

## 5. PROMOTING CLEAN AND EFFICIENT ENERGY PRODUCTION & USE IN THE STATIONARY ENERGY SECTOR

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### PROCEDURE

Ministers will receive a presentation from the Energy Working Group (EWG) Lead Shepherd on the topic *Meeting our Energy Challenges Sustainably*. This presentation is drawn from the findings of the tabled report *APEC Energy Security & Sustainable Development through Efficiency & Diversity: Economic Issues in Technology R&D, Adoption and Transfer* (11:15 - 11:30).

The Chair to open the floor for discussion (11:30 - 12:30).

### OBJECTIVE

- To allow Ministers to discuss:
  - a) the challenges facing APEC economies in meeting growing energy demand in a secure and sustainable manner;
  - b) the achievement of greater efficiency and diversity in the stationary energy sector through;
    - (i) a supply-side response that supports energy efficiency and cleaner technologies for electricity generation, including through clean coal technologies, natural gas and LNG, renewables, and for interested economies, nuclear technologies,
    - (ii) a demand-side response that supports new and cleaner technologies to improve energy efficiency in the industry, buildings and commercial sectors, and
  - c) the necessity of identifying and addressing impediments to investment, cross-border energy trade and the development and deployment of policies and technologies towards cleaner energy and the improvement of energy efficiency in the APEC region.

- To allow Ministers to advance cooperative policy responses towards achieving energy security and environmental sustainability through consideration of:
  - a) *improving energy efficiency* - as a cost-effective way to enhance energy security and mitigate greenhouse gas emissions, noting the great potential for energy efficiency improvements in the power generation, industrial, transportation, public, residential and commercial sectors;
  - b) *developing and deploying cleaner and more efficient energy technologies* - to accelerate the deployment of new energy technologies that can address energy security and provide environmental benefits by avoiding greenhouse gases and other pollutants;
  - c) *attracting energy investment and facilitating cross-border energy trade* - in recognition that, according to the Asia Pacific Energy Research Centre (APERC), meeting energy demand in the APEC region will require new investment of at least US\$ six trillion to 2030 and that significant economic benefits can be gained by removing barriers to such investment; and
  - d) *the utility of peer review - through an APEC Energy Peer Review Mechanism* - as a tool towards assisting interested economies in developing policies that support energy security and environmental objectives.

## RECOMMENDATIONS

- That Ministers be guided by the conclusion of the EWG Lead Shepherd's report that:

*Through the Energy Security Initiative, the APEC forum has established a framework that enhances regional energy security and sustainable development prospects. However, there continue to be major policy challenges in achieving adequate, reliable, affordable and cleaner energy in APEC economies. Two important aspects of a cooperative policy response are improving the operation of energy markets and adopting more energy efficient and cleaner fuels and technologies.*

- That Ministers:
  - recognise the importance for our longer-term energy future of pursuing policies and technologies to promote the development of cleaner energy and the improvement of energy efficiency and conservation;
  - determine that addressing the challenges of energy security and sustainable development should be based on well-functioning markets that are progressively characterised by free and open trade, secure and transparent frameworks for investment, market-based price signals, market transparency, good governance and effective competition;

- recognise that the need to address environmental challenges - in particular air quality and climate change objectives - requires a concerted response to promote energy efficiency and conservation, develop and deploy cleaner and more efficient technologies, address barriers to energy investment and facilitate cross-border energy trade; and
  - discuss actions to achieve greater efficiency and diversity in the stationary energy sector and note how energy efficiency in industry, buildings and commerce and cleaner power generation technologies - including renewables, clean coal, natural gas/LNG, and for interested economies, nuclear technologies - can provide for more secure, diversified and environmentally sustainable systems of energy supply and use.
- That Ministers direct the EWG to:
    - a) improve energy efficiency, through
      - encouraging APEC economies to individually set goals and formulate action plans for improving energy efficiency on an overall and/or sector basis;
      - collaborating with the International Energy Agency to develop energy efficiency indicators and compile best practices that can be used to help formulate and track progress towards such voluntary goals and action plans;
      - strengthening efforts to share information on energy efficiency policies and measures, identify effective energy efficiency approaches and review progress towards efficiency goals; and
      - encouraging APEC economies to contribute to and utilise the APEC Energy Standards Information System (ESIS);
    - b) develop and deploy cleaner and more efficient energy technologies, through
      - encouraging the development of cleaner and more efficient power generation technologies, including renewables, clean coal, natural gas/LNG, and for interested economies, nuclear technologies;
      - progressing the development of clean fossil energy technologies, including carbon capture and storage;
      - encouraging EWG collaboration with the Renewable Energy and Energy Efficiency Partnership (REEEP) on financing, policy and regulation;
      - recognising the importance of progress in the uptake of new and renewable energy through the APEC 21<sup>st</sup> Century Renewable Energy Development Initiative; and
      - encouraging interested APEC economies to join the EWG's Ad-Hoc Group on Nuclear Technologies, to consider the establishment of a Regional Association of Nuclear Safeguards Authorities and to ensure that the safety, security, seismic, health and waste handling aspects, including

trans-border effects, of civilian nuclear energy, are adequately addressed;

- c) attract energy investment and facilitate cross-border energy trade, through
- encouraging continued efforts by the APEC Energy Efficiency and Renewable Energy Financing Task Force to help governments, businesses and financial institutions incorporate the value of energy savings in large-scale investment decisions;
  - reviewing the uptake and currency of Best Practice Principles on Accelerating Investment in Natural Gas Supplies, Infrastructure and Trading Networks in the APEC Region; Facilitating the Development of LNG Trade; Financing Energy Projects; and Natural Gas Trade;
  - contributing to the proposed APEC Energy Trade & Investment Study and Roundtable;
  - encouraging member economies to address the recommendations of the APEC Gas Forum;
  - continuing implementation of the LNG Public Education and Communication Sharing Initiative; and
  - continuing cooperative efforts to improve natural gas data collection;
- d) develop a voluntary Energy Peer Review Mechanism, with an initial focus on progress toward attaining energy efficiency goals.

## BACKGROUND

### *Objectives of the Presentation by the EWG Lead Shepherd*

The EWG Lead Shepherd's report moves on from the *Impact of Oil Prices on Trade in the APEC Region* study presented to Energy Ministers at their seventh meeting in 2005. The EMM8 study examines the long-term energy challenges facing the APEC region - challenges that will remain relevant regardless of the price of oil - and considers the stationary energy sector (including electric power generation, buildings, industry and commerce) and the role of energy efficiency and cleaner power generation technologies towards more secure, diversified and environmentally sustainable systems of energy supply.

The impetus for the Lead Shepherd's report is driven by the fact that the APEC region's energy use outside of transport is principally related to electric power generation, noting that:

- industry is increasingly reliant on electrical processes to manufacture products;
- lighting, office equipment and appliances in buildings are almost entirely electric;
- substantial amounts of heating, ventilation and air conditioning are electric; and
- a large share of non-electric heating and cooling is provided by natural gas, which is a major input to electric power generation and thus a driver of power costs.

It therefore follows that the region's energy security and sustainable development will be broadly affected by:

- the efficiency with which electric power is generated and distributed;
- the efficiency with which electric power is used in homes, offices and industry; and
- the diversity of fuels and technologies from which electric power is produced.

### *Conclusion of the Presentation by the EWG Lead Shepherd*

The EWG Lead Shepherd's report concludes that through the APEC Energy Security Initiative, APEC has established a framework that enhances regional energy security and sustainable development prospects. However, there continue to be major policy challenges in achieving adequate, reliable, affordable and cleaner energy in APEC economies. Two important aspects of a cooperative policy response are improving the operation of energy markets and improving energy efficiency and diversity, as described below.

### Recommendation → Improve the operation of energy markets

Reducing market impediments by facilitating regional energy trade and investment has the potential to significantly increase the efficiency of energy markets, providing both energy security and sustainable development benefits to the APEC region. For example, trade and investment liberalisation would improve access to new and enhanced energy technologies. In addition, more efficient energy markets would increase the flexibility of markets to adjust to temporary or sustained changes in supply and demand conditions.

A policy objective of energy self sufficiency within any given economy is not justified on energy security grounds since potential economic gains from trade would be lost under this policy approach – rather, the long term policy objective for governments in the APEC region is to ensure the provision of energy at least cost over time given energy technologies and resource availability and taking into account environmental impacts and economic and other risks in the outlook.

### Recommendation → Improve energy efficiency and diversity

A major policy challenge is to identify energy trade and investment barriers and assess in more detail options to address barriers to the improvement of energy efficiency and the development and deployment of cleaner fuels and technologies. A further policy challenge for the APEC forum is to enhance regional economic prospects through sharing information about energy policy analysis and experience, including information on energy efficiency.

Sharing energy policy experience is an effective means of developing policy ideas and superior policy strategies. Not all policy strategies will be easily transferable to other economies but many are, and improved understanding of what policies can succeed in different policy settings and environments is a valuable product of sharing policy experience.

Note: The EWG Lead Shepherd's presentation is based on the findings of a report commissioned by Australia, endorsed by the EWG and prepared by the Australian Bureau of Agricultural and Resource Economics (ABARE).

### *The Stationary Energy Sector*

The stationary energy sector includes electricity generation and the direct combustion of fuels for purposes other than transport. These direct combustion activities include:

- non-electricity industries, such as petroleum refining and the manufacture of solid fuels;
- manufacturing and construction industries, including metals; chemicals; pulp, paper and print; non-metallic minerals; food and beverages; and

- small combustion, such as home heating, on-site diesel generation, and on-farm machinery.

In 2004, the stationary energy sector accounted for 62 per cent of total final energy consumption in the APEC region. There are a number of sources of energy supply for the APEC stationary energy sector. The sources predominantly used to generate electricity are:

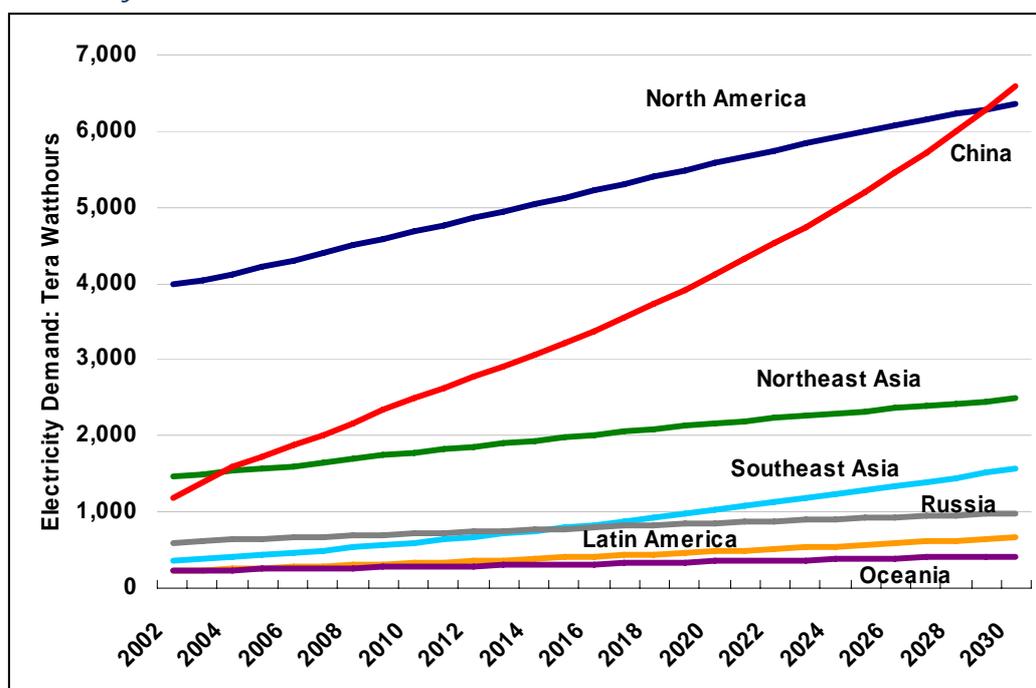
- the combustion of fossil fuels;
- nuclear energy; and
- renewable sources of energy, including biomass combustion and harnessing hydro, geothermal, wind and solar power.

As electricity increases its share of the APEC stationary energy consumption mix, accordingly much of the international effort to provide cleaner energy supply options will focus on improving conversion technologies in the electricity generation sector.

### Outlook

According to APERC, electricity is the fastest-growing stationary energy sector. During the past two decades, demand for electricity in APEC grew at four per cent per year. By 2030, APEC's electricity demand is projected to grow at an annual rate of three per cent.

#### Electricity Demand Outlook, 2002-2030



Source: APERC (2006)

Electricity is a key component of industrialisation and the improvement of living standards. As economies industrialise, their growth increasingly requires electricity. As income levels rise, people seek greater convenience and comfort in their life, which adds to electricity demand. As developing economies industrialise, their electricity demand is expected to grow rapidly.

The share of coal used in electricity production should increase from 51 per cent in 2002 to 58 per cent in 2030. In many economies coal is the preferred fuel, based on price competitiveness and resource availability. However, natural gas also remains an important source for electricity generation, in part because of environmental advantages.

### *Towards Energy Efficiency and Cleaner Energy Technologies*

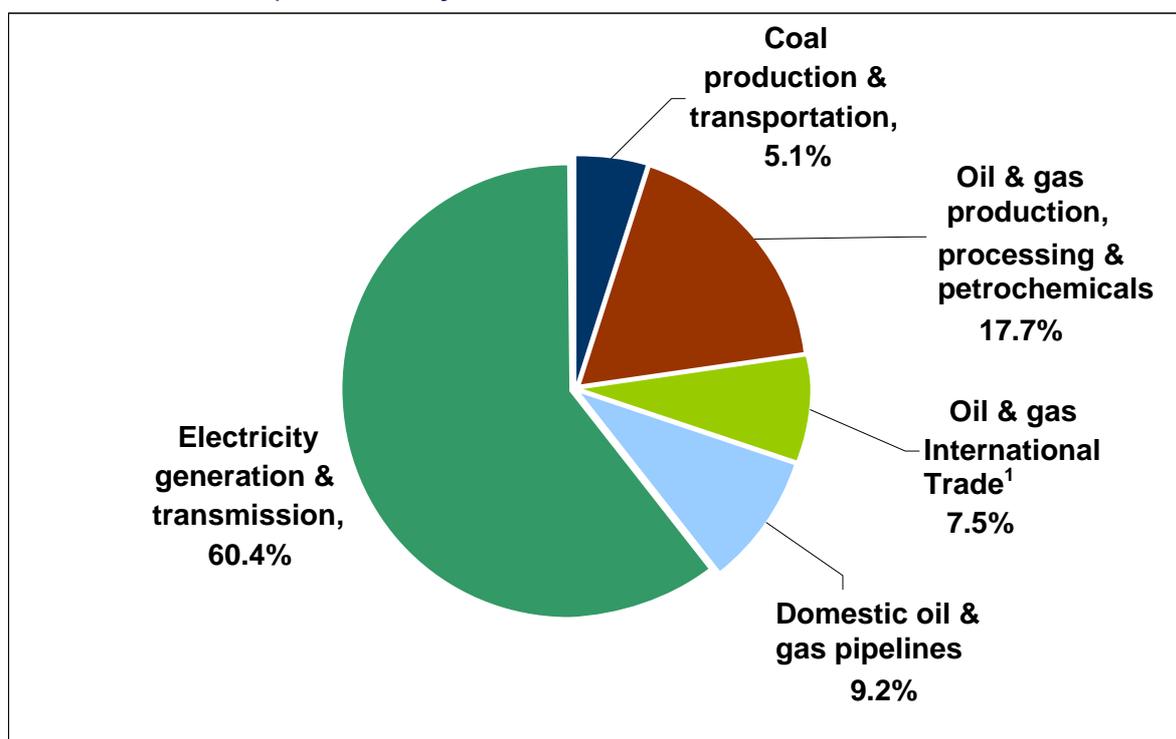
Governments in the APEC region have a key role in accelerating the adoption of energy efficiency and conservation measures in the industry, residential and commercial sectors.

Developing and newly industrialised economies account for much of the growth in APEC's energy consumption, driven largely by strong economic growth and expanding populations. It is therefore increasingly recognised that improving energy efficiency and using cleaner energy technologies can bring substantial benefits to economies. For example, energy efficiency investments in the industry, residential and commercial sectors can deliver positive economic benefits, improve energy security through lower levels of energy use, reduce environmental impacts (both local and global), and increase local manufacturing and trade opportunities (such as through the production and export of energy efficient appliances).

### *Energy Investment Needs*

To meet its rapid energy demand growth, APERC estimates that APEC economies require at least US\$ six trillion of future investment in energy infrastructure to 2030. As the figure overleaf shows, electricity generation and transmission are projected to account for 60 per cent of projected total investment requirements. Oil and gas production, processing and petrochemicals account for 18 per cent, oil and gas pipelines for nine per cent, investment for the international trade of oil and gas for eight per cent and coal production and transportation for five per cent of the total investment requirements.

### Total Investment Requirements by Sector to 2030



Source: APERC (2006)

<sup>1</sup> Oil & gas international trade includes the costs of tankers, LNG facilities and pipelines used for international trade.

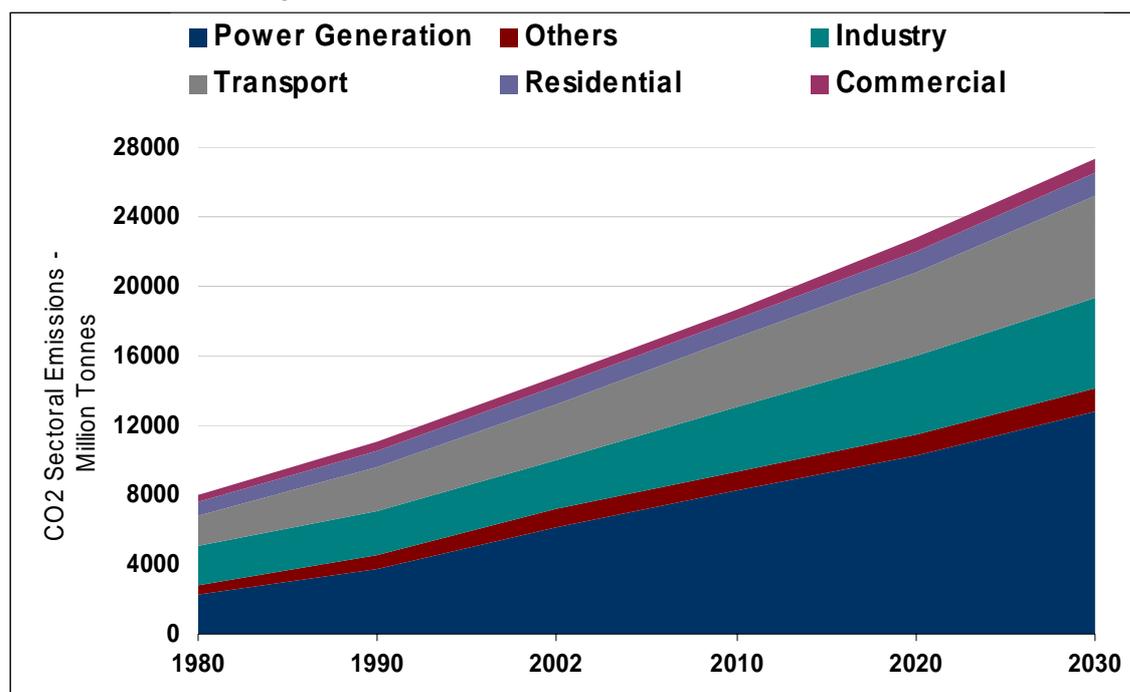
The energy sector remains highly regulated in many APEC economies and there are significant opportunities to increase economic benefits from further trade and investment liberalisation. The best route to energy security, for both energy importing and energy exporting economies, is through efficient, well-functioning markets characterised by free and open trade, secure and transparent frameworks for investment, clear price signals, market transparency, good governance and effective competition. It is only if these conditions are in place that firms will receive the appropriate price signals and adapt their behaviour, be it in terms responding to new supply opportunities or in terms of their environmental impact.

Well-functioning markets will support and encourage cross-border trade in energy products. This is important given the geographic concentration of energy endowments and the projected rise in energy import dependency in many APEC economies. Significant levels of investment will also be required to promote the cleaner use of fossil fuels (which will remain APEC's primary energy source into the foreseeable future) and to reduce greenhouse gas emissions.

## Environmental Challenges

According to APERC, the energy sector and environmental problems are intimately related since the production and utilisation of energy almost always results in some environmental effects. The negative impacts can be broadly categorised as global (primarily from CO<sub>2</sub> emissions) and local (from emissions such as SO<sub>2</sub>, NO<sub>x</sub> and soot particulates).

### APEC CO<sub>2</sub> Emissions by Sector, 1980-2030



Source: APERC (2006)

CO<sub>2</sub> emissions in the APEC region have grown by two per cent over the last three decades - representing a two-fold increase since 1972 and reaching 14 billion tonnes of CO<sub>2</sub> in 2002. The large increase is mostly related to robust economic growth, population increase and improvements in living standards throughout the APEC region.

The electricity sector is the major contributor to CO<sub>2</sub> emissions, maintaining a share of more than 30 per cent of total emissions from 1983 onwards. CO<sub>2</sub> emissions from the electricity sector have grown at four per cent annually from 1972 to 2002, increasing three-fold to reach five billion tonnes of CO<sub>2</sub> in 2001. This increase is partly due to the greater utilisation of fossil fuels in the electricity sector.

For the coming three decades, the average per capita CO<sub>2</sub> emissions in the APEC region are projected to grow at almost two per cent per year, increasing from six tonnes per person in 2002 to nine tonnes per person by 2030.

## MEETING PAPERS

- Presentation by EWG Lead Shepherd - to be tabled.
- *APEC Energy Security and Sustainable Development through Efficiency and Diversity: Economic Issues in Technology R&D, Adoption and Transfer*. A report by the Australian Bureau of Agricultural and Resource Economics (ABARE) and commissioned for EMM8.