

INTRODUCTION

The APEC region firmly forms the backbone of the world economy; in 2004, the GDP of APEC's 21 economies collectively amounted to approximately US\$29 trillion or 55 percent of world GDP. APEC contains the world's two largest economies – the US and Japan – and the rapidly expanding economies of China, Russia and Southeast Asia. The population of the APEC region at approximately 2,600 million is likewise large by world standards, accounting for 42 percent of the world total, and APEC contains five of the world's ten most populous nations.

This economic and population growth has driven energy consumption in the APEC region, which has increased significantly over the period from 2000 to 2003. Total Primary Energy Demand for the APEC region has increased at an annual average growth rate of 3.0 percent from 5,820 Mtoe in 2000 to 6,170 Mtoe in 2003, which represents 57 percent of total world energy demand during the same period. The share of incremental demand for the APEC region to total world energy demand was 58 percent between 2000 and 2003. By energy source, the share of incremental demand attributed to the APEC region was 84 percent for coal, oil (68 percent), natural gas (32 percent) and new and renewable energy (7 percent) over the same period.

RECENT TRENDS AND CHARACTERISATION

Robust growth in the economy's of China and the US over the past five years, in addition to remarkable economic recovery in Southeast Asia have contributed to a significant increase in energy consumption within the whole APEC region. However, this increased energy consumption has placed pressure on already tight international energy markets, which has in turn led to an increase in energy prices. It is under these conditions/factors that the current APEC outlook has been undertaken.

Since 2002, China's economy entered a fast and extended period of growth, with GDP growing at an annual average rate of 9.5 percent during the same period. The per capita GDP of households in both urban and rural areas has also increased at an annual average rate of 11.2 percent and 8.3 percent respectively over the past five years. The main driver of this economic growth has been the rapid expansion and industrialisation of the eastern seaboard. As industrialisation has progressed the transfer of labour from rural to urban areas has accelerated, with the percentage of the population

living in cities increasing by almost 10 percent since the year 2000.

Accelerated industrialisation, urbanisation, and improvement in living standards, has resulted in China's energy consumption surging in recent years, with double digit growth in coal, gas and electricity consumption. Between the years 2002-2005, total primary energy, gas, coal and electricity consumption have grown at annual average growth rates of 11.6, 12.5, 13.7 and 13.9 percent respectively. In addition, motorisation of the economy, rising vehicle ownership and industrial development have resulted in a greater increase in oil consumption, with an annual average growth rate of 9.5 percent over the same period, which has increased oil imports and pushed China into second place in terms of world oil consumption.

Likewise the economic performance of the US economy has shown stable growth of over 3.0 percent over the past two years, in spite of the recent high energy prices. In addition, energy demand does not appear to have appreciably slowed down as a result of the continuous high energy prices. In fact, over the same period, US oil consumption sustained growth of 2.2 percent per year. On the other hand although natural gas consumption declined at an average annual rate of 1.5 percent between 2002 and 2004, this decline has been augmented by a shift to more cost competitive and domestically produced coal consumption, which grew from 1,067 million tonnes in 2002 to 1,107 million tonnes in 2004. Despite a suite of successful efficiency improvement programmes US energy demand shows no sign of letting up over the short-term.

Finally, many of the Southeast Asian economies that were mired in economic recession in 1998 as a result of the Asian Financial Crisis have begun to show strong recovery. In addition, progress in economic reform and expanding industrialisation has also helped to drive the recovery from recession. On the back of high energy prices (especially oil and gas), renewed investor confidence and expanded business activity, the economies of Southeast Asia have experienced robust economic growth in the period 2001 to 2003, which has boosted energy consumption in the region by 8 percent or 30 Mtoe. The growing energy consumption has predominantly been met through the expansion and development of energy resources within the region.

As a result of the aforementioned economic growth in China and the US, in addition to economic

recovery in Southeast Asia, energy consumption has been boosted much higher than projected and may continue to do so in the foreseeable future. In contrast, on the supply-side within a climate of “resource nationalism” through which government/national energy companies are scrambling to limit foreign participation in the ownership of energy resources, the energy producing economies and oil majors alike are not making sizable investment in either the upstream or downstream sectors, sufficient to improve the demand and supply balance as there is little incentive to jump the gun. With the two oil crises during the 1970s’ and 80’s these companies learned an invaluable lesson that high oil prices tend only to be short-lived and should supply capacity be increased prematurely, the resulting glut of oil on the market could lead to precipitous decline in price. Therefore, since the 1980’s the major players in the oil market have taken a very wary stance with respect to investment decisions as a result of the price collapse in the wake of previous oil crises.

BASIS FOR THIS OUTLOOK

As in the 1970’s, international oil prices have recently surged and since the first quarter of 2004 oil prices – in addition to other energy prices – have escalated to the record high price of \$78 per barrel in the second quarter of 2006. The current and 1970’s oil price hikes are different largely in two aspects: their durations and volatilities. It is becoming evident that the latest hike has longer duration with lower volatility than the previous one. Arguably a structural shift may have occurred in the energy market during the last few years. Few economic and energy indicators signal that the price would fall in the near future. As outlined in the preceding section, three major factors that characterise the current trend of international energy prices are: robust energy demand growth in most economies irrespective of the price hike, little incentive for major energy producers to expand production and export capacity coupled with intensifying resource nationalism in natural gas/oil producing economies, and an ostensibly worsening geopolitical situation in the Middle East.

The “APEC energy outlook, 2006” – the third time this publication has been undertaken by APERC – is being carried out under the auspices of these changing market conditions and rising prices. Both of these factors are expected to have a profound impact on the approaches through which APEC economies formulate future energy policy and endeavour to secure energy supply over the outlook period. Therefore, it is important to pursue an updated energy outlook at this time given the fundamental changes in international energy markets

and how these changes will influence the future energy demand and supply picture.

BRIEF SUMMARY OF FINDINGS

A key result of the outlook is the **dramatic expansion in the trade of energy resources** through to 2030, especially for the major oil and gas consuming economies. This increasing trade will expand the overall **import dependency** of the APEC region from 10 percent in 2002 to 20 percent in 2030. For the major fossil fuels, the import dependency of oil will swell from 36 percent in 2002 to 52 percent in 2030; likewise natural gas will escalate from a major net export position in 2002 to a net import position of 14 percent in 2030. This increasing import dependency will have serious consequences for supply security.

As the production of oil and natural gas resources are concentrated in an ever smaller number of geographical regions, **supply security** surrounding energy transportation issues and the inherent risk of supply disruption are expected to become the prominent policy focus of governments. This in turn is likely to precipitate the re-evaluation of **increased utilisation of domestic resources** – especially, coal and nuclear energy – for electricity generation to enhance both self-sufficiency and reduce reliance on imported energy.

The implications of future fuel choice and increased coal utilisation are expected to have repercussions on how each economy pursues **environmental policy** in a world ever-increasingly focused on global environmental concerns and **carbon dioxide (CO₂)** reduction. To this end, ambient pollution from fossil fuel use has taken center-stage in various international dialogues including Climate Change, the G8 and the recent six party talks constituting the founding framework of the Asia Pacific Partnership for Clean Development and Climate.

STRUCTURE OF REPORT

Following this introduction, the report describes the **energy demand and supply** in the APEC region **for each major energy source** – oil, natural gas, coal, nuclear and alternative energy sources – including a discussion on a number of key areas prevalent to each of these energy sources, for example, requirements for refining capacity expansion in the oil section and information in relation to evolution of the LNG market environment in natural gas.

After this section on individual energy sources, the **energy demand by sector** will be summarised. For each sector, the historical trends, characterisation

and major assumptions will be outlined to present a snapshot of the current situation. Subsequently, the output of the model by region and economy, in addition to a brief discussion on the implications of these results for each sector through 2030 will be detailed. Next, an **investment outlook** detailing the amount of money required to finance the expansion and capacity building of energy infrastructure in the APEC region will be presented, including discussion on the major bottlenecks for financing within the sector. Finally, over the outlook period it is expected that the importance of the **environment** and concerns surrounding the control and abatement of emissions from the energy sector will gain prominence. Of particular importance will be the reduction of CO₂ emissions and internalising of costs – such as **Carbon Offset Price**.

In the final several chapters, the report will examine a number of the issues that are likely to arise as a result of the robust energy demand growth projected through to 2030. On the **demand side**, the nexus/interaction that exists between industrialisation, urbanisation and energy demand will be highlighted, especially in relation to developing economies in the APEC region just starting to climb the development ladder. In relation to the **supply side**, those themes that are expected to play a significant limiting/constraining role over the outlook period have been investigated, including resource constraints, energy transportation, water resource limitations, reduced human capital/knowledge and energy efficiency and technology. Finally, a short section describing the issues prevalent to the environment in an ever increasingly globalised economy will be introduced.