

10 PRIMARY ENERGY DEMAND AND SUPPLY

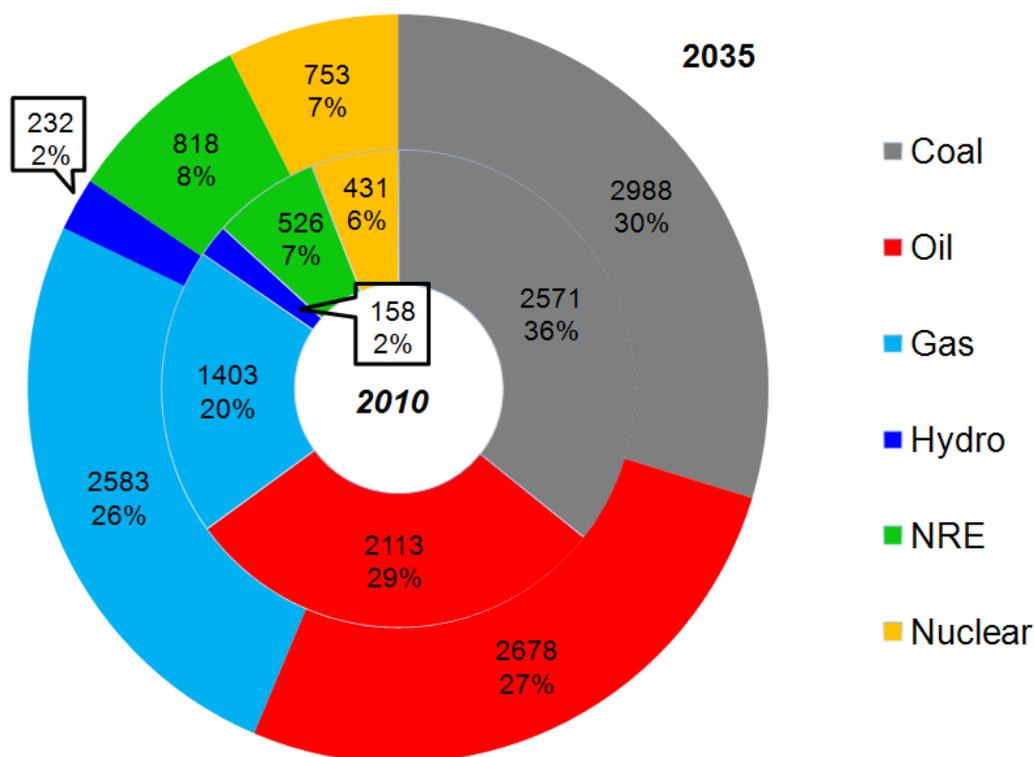
APEC contains some of the world’s largest energy producers, but also some of the world’s largest energy importers. Most coal, gas and nuclear fuels used in the APEC region are sourced within the region, while a considerable share of oil is sourced from outside APEC. Overall, APEC’s 2010 oil production was equivalent to nearly three-quarters of its primary oil demand.

This chapter discusses the outlook for the primary energy supply in the APEC region. ‘Primary energy’ refers to energy in its original form, before

the conversion of primary fuels to electricity and before the conversion of crude oil into petroleum products.

Given that demand must equal supply, the term ‘primary energy demand’ can be used almost interchangeably with ‘primary energy supply’. However, customary usage appears to favour ‘primary energy supply’, so that term is used in this chapter. Primary energy supply includes energy from both domestic and imported sources.

Figure 10.1: Total Primary Energy Supply, in Mtoe and Percent, 2010 and 2035



Source: APERC Analysis (2012)

TOTAL PRIMARY ENERGY SUPPLY

APEC’s total primary energy supply amounted to about 7204 Mtoe in 2010. Under business-as-usual (BAU) assumptions it is projected to grow 40% to reach 10 057 Mtoe by 2035. This amounts to an average annual growth rate of 1.3%.

Of all the energy sources that compose primary energy supply, gas will be the fastest growing in both

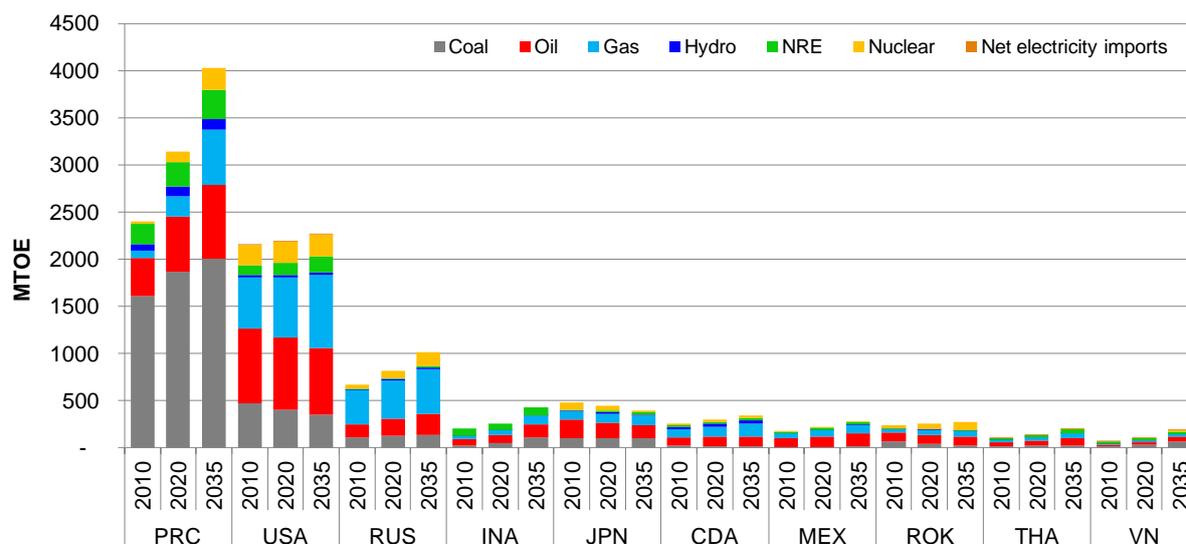
absolute and percentage terms in the outlook period. Gas will grow 84%, while nuclear will grow 75%, new renewable energy (NRE) will grow 55%, hydro will grow 46%, and oil will grow 27%. The slowest growing primary energy supply source will be coal, which is expected to grow about 16%. As discussed in Chapter 14, despite concerns about nuclear

energy’s safety in light of the accident at Japan’s Fukushima Daiichi Nuclear Power Plant in 2011, APERC’s analysis of member economy’s policies suggest that nuclear development in the APEC region will continue under BAU scenario. Only in Japan and Chinese Taipei is nuclear power production projected to decline.

As shown in Figure 10.1, projections indicate that by 2035 the total APEC primary energy supply

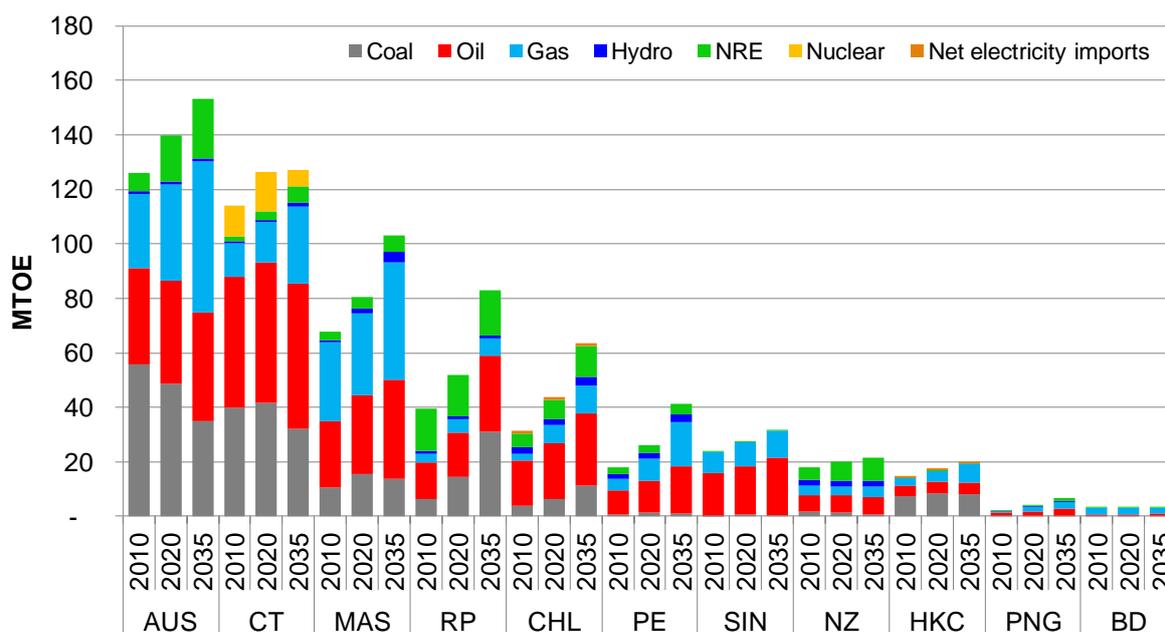
will be made up of coal (30%), oil (27%), gas (26%), NRE (8%), nuclear (7%) and hydro (2%). The most significant changes from 2010 will be within the fossil fuels—coal will decrease its share considerably while gas will expand its contribution. Nuclear and NRE are also likely to increase their role in the primary energy supply by 2035. Many APEC economies are striving to lower their CO₂ emissions by shifting away from coal and oil in favour of gas, NRE and nuclear.

Figure 10.2: Primary Energy Supply by Energy Source, Higher Primary Energy Supply Economies



Source: APERC Analysis (2012)

Figure 10.3: Primary Energy Supply by Energy Source, Lower Primary Energy Supply Economies



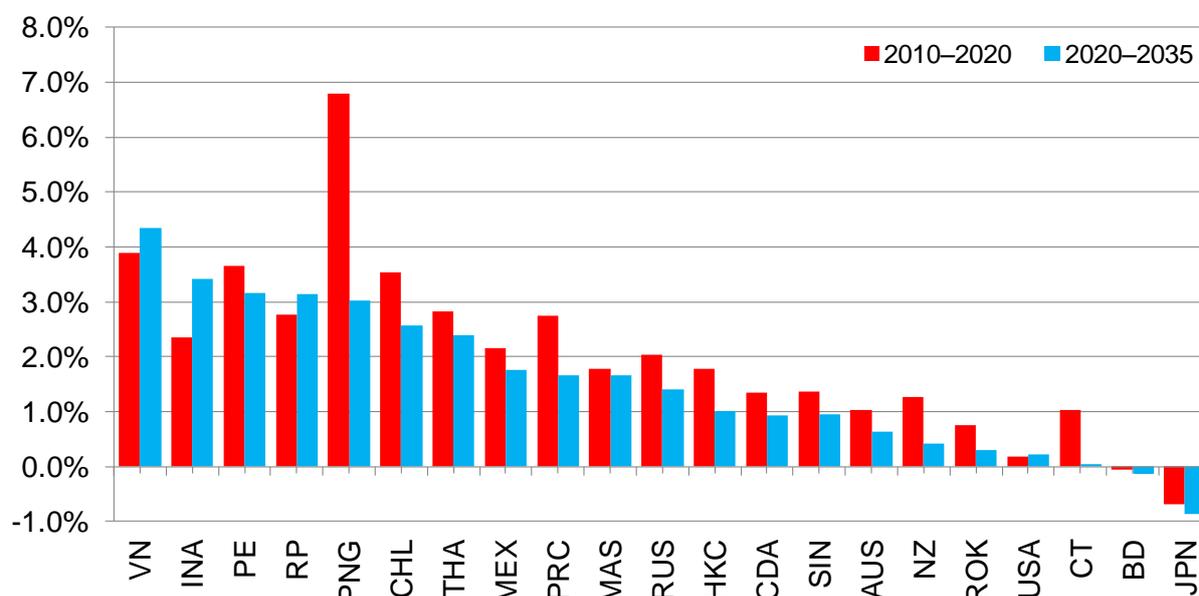
Source: APERC Analysis (2012)

On an economy basis, China, the US and Russia will represent more than two-thirds of APEC’s primary energy supply by 2035. Figures 10.2 and 10.3 show the projected primary energy supply by economy—note the different scale used in the two figures.

Figure 10.4 presents the estimated primary energy supply growth rates for all APEC economies. The largest increases are expected in developing economies, particularly in Viet Nam, Indonesia, Peru, the Philippines, and Papua New Guinea.

Estimates of primary energy supply growth in China and other developing economies are lower. Growth is generally moderate in the developed economies. In Brunei Darussalam and Japan, the primary energy supply will decrease over the outlook period—in Brunei by 2.5% and in Japan by 18%. In the case of Brunei, the replacement of its electricity generation infrastructure with more efficient combined-cycle plants will improve the efficiency of gas utilization, while in the case of Japan, population shrinkage and energy efficiency improvements are the main drivers.

Figure 10.4: Primary Energy Supply Average Annual Growth Rate by Economy, 2010–2020 and 2020–2035



Source: APERC Analysis (2012)

APEC'S GOAL TO RATIONALIZE AND PHASE OUT FOSSIL FUEL SUBSIDIES

Subsidies for fossil fuels have many adverse impacts. For the economies concerned:

- (where subsidies are government funded) they drain government budgets
- (where subsidies take the form of price controls on energy producers) they discourage investment and reduce domestic production
- they encourage wasteful consumption
- consequently, they threaten energy security by reducing fossil fuel exports and/or increasing fossil fuel imports
- they increase CO₂ emissions and local pollution.

They also:

- encourage fuel smuggling
- discourage low-carbon energy investment.

While often justified as assistance for the poor, in practice fossil fuel subsidies disproportionately benefit the middle-class and the rich, who can afford the appliances and vehicles that consume fossil fuels. The IEA estimates that of the USD 409 billion spent on fossil fuel subsidies worldwide in 2010, only USD 35 billion, or 8%, reached the poorest 20% of the population (IEA, 2011, p. 519).

Despite their adverse impacts, fossil fuel subsidies are widespread around the world and in the APEC region. Politically, they are difficult to remove, as the benefits to individual consumers are easy for them to see, while the adverse impacts on society as a whole are less obvious. Intensified educational efforts and greater transparency about the costs of subsidies may be helpful.

There are many ways to measure the cost of fossil fuel subsidies. The IEA has used a 'price gap' approach to measure consumer-oriented energy subsidies. This approach measures the difference between the prices paid by consumers and the full cost of supply. Based on this approach, the IEA has identified fossil fuel subsidies in 11 APEC economies. These are shown in Table 10.1. This approach measures only subsidies that result in prices below those that would prevail in a competitive market. There are numerous other subsidies targeted at encouraging production that are not reflected here, and these exist in additional APEC economies not listed in the table, including Australia, Canada, and the United States (IEA, 2011, p. 511).

Because of their adverse impacts, APEC leaders, beginning with their Singapore Declaration of 2009, have committed the APEC economies to "rationalise and phase out over the medium term fossil fuel subsidies that encourage wasteful consumption, while recognising the importance of providing those in need with essential energy services" (APEC, 2009). The Leaders 2011 Honolulu Declaration added the call for a voluntary reporting mechanism on progress, which they will review annually (APEC, 2011). This mechanism is currently under development by the APEC Energy Working Group.

Table 10.1: Estimated Consumer-oriented Fossil Fuel Subsidies in 2010

Economy	Subsidy as Percent of Full Cost of Supply	Subsidy in USD/person	Subsidy as Percent Share of GDP	Subsidy by Fuel (Billion USD/Year)			
				Oil	Gas	Coal	Electricity
Brunei Darussalam	31.9	840	2.6	0.19	0	0	0.15
China	3.8	16	0.4	7.77	0	2.01	11.54
Indonesia	23.2	66	2.3	10.15	0	0	5.79
Korea	0.4	4	0	0	0	0.18	0
Malaysia	20.0	200	2.5	3.89	0.97	0	0.81
Mexico	12.5	84	0.9	9.34	0	0	0.16
Philippines	7.3	12	0.6	1.10	0	0	0
Russian Federation	22.6	274	2.7	0	16.95	0	22.26
Chinese Taipei	1.8	25	0.1	0.24	0	0	0.34
Thailand	20.7	123	2.7	2.11	0.48	0.44	5.44
Viet Nam	14.4	33	2.8	0	0.23	0.01	2.69

Source: IEA (2012)

MODELLING FOSSIL FUEL PRODUCTION

In our projections of the future supply of fossil fuels in the APEC region, APERC has relied primarily on official government or government-sponsored projections from each economy. For economies where these are not available, APERC sought to find reliable independent sources. However, very few economy governments or independent sources make projections 25 years ahead, so a good deal of judgement on the part of APERC was required for the later years of the projection. Typically, we based projections for the later years on trends in the earlier years and on available estimates of the extent of the economy's resources. These long-term projections are, therefore, subject to a high degree of uncertainty.

Most APEC economies have not been well explored for oil and gas, so the full extent of their resources is not known. Furthermore, oil and gas exploration and production technology continues to improve (see the discussion of unconventional oil in Chapter 11 and unconventional gas in Chapter 12), and by 2035 this progress could allow production of resources not currently considered economic. APERC's oil and gas production estimates should, therefore, be viewed as conservative.

REFERENCES

- APEC (Asia-Pacific Economic Cooperation) (2009), '2009 Leaders' Declaration: Singapore Declaration – Sustaining Growth, Connecting the Region' website page, www.apec.org/Meeting-Papers/Leaders-Declarations/2009/2009_aelm.aspx
- (2011), '2011 Leaders' Declaration: The Honolulu Declaration – Toward a Seamless Regional Economy' website page, www.apec.org/Meeting-Papers/Leaders-Declarations/2011/2011_aelm.aspx
- IEA (International Energy Agency) (2011), *World Energy Outlook 2011*, Paris.
- (2012), 'World Energy Outlook, Fossil Fuel Subsidies Database' website page, www.iea.org/subsidy/index.html

