APEC’s greener energy outlook

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Abstract. The APEC member economies combined accounts for more than 50% of the world’s GDP and consume almost 60% of the world’s energy. Under the 2011 Honolulu Declaration, APEC Leaders have set an aspirational goal to reduce APEC’s aggregate energy intensity by 45 percent by 2035, compared to 2005 levels. This article summarises the results from an APEC-wide study on APEC energy demand and supply outlook from 2010 to 2035. Our business-as-usual projections show that by 2035, APEC energy demand will have increased by 40% of 2010 levels. We also found that historical trends for declining energy intensity will continue and that APEC will likely achieve its aspirational intensity reduction goal. However, our results also suggest that CO₂ emissions will continue to rise and energy security will become less assured. Recognizing these vulnerabilities, APEC has already initiated a broad range of activities to achieve its ‘green growth’ objectives. While these have been fairly successful in guiding APEC economies towards a path of more sustainable development, these efforts will need to be intensified further to avoid serious environmental degradation.

1. Asia-Pacific Economic Cooperation (APEC)
Asia-Pacific Economic Cooperation, or APEC, is a multi-lateral organization established in 1989 with the vision of achieving stability, security and prosperity for the region by reducing barriers to trade and investment, facilitating the exchange of goods, services, resources, and technical know-how, and strengthening economic and technical cooperation. APEC operates on the basis of non-binding commitments, open dialogue and equal respect for the views of all participants. All decisions made within APEC are reached by consensus and commitments are undertaken on a voluntary basis.

There are currently 21 member economies, all from regions bordering the Pacific Ocean, namely Australia; Brunei Darussalam; Canada; Chile; China; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States; and Viet Nam.

In 2010, APEC member economies collectively had real GDP in purchasing power parity terms of $35.8 trillion (about 53% of world GDP and a population of over 2.7 billion people (about 40% of world population) [1]. In terms of energy, out of the 8 316 Million tonnes of oil equivalent (Mtoe) of final energy consumed worldwide in 2009, about 56% was consumed in the APEC region [2].

All indicators point to further rise in APEC energy demand. This thirst for energy will have significant consequences regionally and globally, not just on the energy markets, but also on geopolitics, finances and the environment. This makes energy cooperation an important APEC agenda item. APEC Leaders are committed to addressing the region’s economic and environmental challenges by speeding the transition toward a global low-carbon economy in a way that enhances energy security and creates new sources of economic growth and employment.
The APEC energy supply and demand outlook

To foster a common understanding on regional energy issues, the APEC Leaders, under the Osaka Action Agenda, established the Asia-Pacific Energy Research Centre (APERC) tasked with conducting research on the APEC regional outlook, energy market developments and energy policy issues. APERC’s flagship project is the APEC Energy Demand and Supply Outlook project which is a long-term projection of energy supply and demand trends in APEC member economies and provides a statistically supported review of opportunities and challenges facing the APEC economies, individually and as a region. The fifth cycle of the Outlook project has just been successfully completed and the final report was published online in February 2013. This article presents some of the results and key findings from the APEC Energy Demand and Supply Outlook-5th Edition business-as-usual (BAU) scenario.

Historically, the past two decades have seen explosive growth in APEC’s GDP. This trend of rapid growth is likely to continue in developing member economies, particularly developing Asian economies like China, Indonesia and Viet Nam. In developed economies, more moderate trends are expected. Combined, APEC as a whole will see about 4% GDP growth annually (See Figure 1). Under our BAU assumptions, population growth will be much slower at 0.4% annually from 2010-2035, almost half of the 0.7% annual growth from 1990-2010. The continuing economic and population growth will drive energy demand in the future, as can be seen in Figure 2.

In 2009, APEC’s final energy demand amounted to 4640 Mtoe. The breakdown for final energy consumption by sector is shown in Figure 3(a) and breakdown by fuel is shown in Figure 3(b). Fossil fuels (coal, gas and oil) dominated the fuel mix for both the final demand and primary supply mix in 2009 (Figure 3), and based on our analysis this trend will continue in the long-term (Figure 4).

The good news is that while fossil fuels will still be the fuel of choice in the future, concern for environmental sustainability and energy security will see economies opting for cleaner fossil fuel applications and implementing more energy efficiency and conservation measures to moderate energy
demand growth. As a result, the APEC-wide aspirational goal of 45% reduction in energy intensity by 2035 will probably be met. The bad news is that BAU is still environmentally unsustainable – total CO\textsubscript{2} emissions from fossil fuel combustion, aggregated from 2010 to 2035, is projected to reach 575 billion tonnes of CO\textsubscript{2}, equivalent to 32% increase (Figure 5). This is the opposite of what we should be striving for, which is a reduction in CO\textsubscript{2} emissions \cite{4}. Therefore there is still much room for improvement if we are to prevent the damaging impacts of climate change.

Figure 4: Primary Energy Supply by Fuel, 1990-2035 \cite{2}\cite{3}

Figure 5: CO\textsubscript{2} Emissions by Sector, 1990-2035 \cite{2}\cite{3}

There are basically three methods for reducing CO\textsubscript{2} emissions: using less energy (through energy efficiency and conservation methods); capturing and sequestration of CO\textsubscript{2}; and switching to less-carbon-intensive energy sources like nuclear and renewable energy. Our analysis of government policies after the Fukushima Nuclear Accident of March 2011 show that while several APEC economies have reassessed their original policies for nuclear power deployment, over the long-term, nuclear energy will continue to play a modest but important role in the APEC electricity generation mix. Most economies with existing nuclear power plants, like China, are continuing operations but under much more stringent safety rules and review mechanisms. These same upgrades to safety standards, combined with negative public perceptions and increasing construction cost, will necessarily cause some delays and scaling back of new nuclear power plant development in the region.

Renewable energy development, on the other hand, will likely undergo explosive growth in the coming years, driven by supportive government policies and technical improvements which continue to reduce cost and improve system performance. We expect total primary energy supply from renewable energy sources to increase by about 53% from 2010 to 2035, with significant introduction of wind and solar power generation (almost 500% growth in total renewable energy capacity from 2010 to 2035), biofuels in the transport sector (about 130% growth in total bio-fuels use from 2010 to 2035) and commercial bio-energy in the residential, commercial and agricultural sector. At the same time, with growing affluence and better access to commercial energy, use of traditional residential biomass will probably decline.

3. APEC ‘green growth’ strategies

Recognizing the importance of protecting the environment and managing energy resources, APEC Leaders have consistently included sustainable development as part of the APEC agenda since 1993. This issue became a key focus in the 2011 Honolulu Leader Declaration, in which APEC Leaders committed to advancing the shared ‘green growth’ objectives. APEC defines ‘green growth’ as environmentally sustainable economic growth and development which help economies to successfully transition to a clean energy future. APEC has introduced several ‘green growth’ strategies, including:

- **APEC economies will aspire to reduce APEC’s aggregate energy intensity by 45 percent by 2035, compared to 2005 levels.** This target, established in the 2011 Honolulu Declaration, is an upward revision from the 2007 Sydney Declaration goal of 25 percent reduction \cite{1}. To assist economies in developing their energy efficiency policies, two mechanisms are being implemented – the Peer Review for Energy Efficiency (PREE) mechanism in which economies invite a team of experts to
analyse their policies and provide objective feedback and the Cooperative Energy Efficiency Design for Sustainability (CEEDS) mechanism in which interested economies participate in knowledge-sharing and capacity building workshops on improving energy efficiencies in selected sectors [3]. APEC also has a dedicated Expert Group on Energy Efficiency and Conservation (EGEE&C) that promotes energy conservation and the application of energy efficiency practices and technologies in the APEC region. This includes maintaining the APEC Energy Standards Information System (APEC-ESIS) database that provides up-to-date information about energy efficiency standards and labelling that apply to products in the APEC region [5].

- **Reduce applied tariff rates on environmental goods and services.** It is expected that the lower tariff rates will decrease cost, and thus facilitate deployment across the region.

- **Rationalize and phase out inefficient fossil-fuel subsidies that encourage wasteful consumption, while recognizing the importance of providing those in need with essential energy services.** Realizing that inadequate information about existing subsidies is frequently an impediment to reform; APEC Leaders have agreed to continue building regional capacity for the reform of subsidies and initiated an annual voluntary report mechanism to assess the progress of reforms in each APEC economy [1].

- **Promote technology development and deployment of low-emission energy supply.** This will be facilitated through economic and technical cooperation between member economies and capacity building activities by APEC organizations. Some examples of cooperation are the Biofuels Task Force analyzing the issues related to the introduction of biofuels in APEC economies, the APEC Expert Group on New and Renewable Energy Technologies (EGNRET) that promotes activities and implements projects that facilitates the use of new and renewable energy technologies in the APEC region and the Peer Review on Low Carbon Energy Supply (PRLCE) mechanism that is focused on identifying and overcoming barriers to introducing Low Carbon Energy Supply in a host economy.

- **Promote the creation of low-carbon communities in the region.** Under this initiative, APEC aims to provide a guiding principle on how to define and develop a low-carbon town that successfully integrates the use of smart grids, renewable energy and energy efficient technologies to mitigate rapidly growing energy demand in urban areas and thus reduce fossil fuel consumption. The first low-carbon model town case study was the Yujiapu Central Business District project in China.

4. **The way forward**

The ‘green growth’ strategies being implemented have prompted APEC economies to pursue a more sustainable economic development pathway. Since 2007, several energy efficiency initiatives have been introduced, particularly for appliances, buildings, industry and transport. At the same time, energy supplies have gradually become more diversified. Our business-as-usual analysis shows that with the current policies in place, APEC economies will likely be able to meet the APEC wide energy intensity reduction goal; however, the projected increase in CO₂ emissions remains a threat to environmental sustainability. Therefore, APEC economies are strongly urged to intensify efforts to meet this challenge in its quest for a clean energy future. APEC as an organization can assist in these efforts through the sharing of best practices, conducting voluntary peer reviews and supporting the education and capacity development for managing climate change challenges in the region.

**References**

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