

## The Increasing Role of Coal in the Energy Balance of APEC Economies for the Period till 2040

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With the continuation of economic turbulence, APEC is needed a stable energy supply of energy to continue achieving fairly high economic growth, in the long run. The region faces some significant energy challenges even in the period of non-tight oil and gas markets we observed in late 2014-early 2015.

Too many uncertainties including constraints on infrastructure to deliver energy sources to the market, geopolitical instability in some key energy exporting regions and threats of possible natural disasters bringing acute misbalance of supply of certain energy sources have all resulted.

Coal with development of clean coal technology and more efficient coal production and utilization is becoming an energy source which allow to provide the stability on energy markets in the APEC economies, taking into consideration that coal has the advantages of being widely available and relatively inexpensive in many APEC economies.

With the primary objective of the Asia Pacific Energy Centre (APEREC) to conduct studies to foster understanding among APEC members of regional energy outlook, market developments and policy issues, in 2014-2015 APEREC has conducted the 6th edition of the APEC Energy Demand and Supply Outlook, representing a 28 year look-ahead (2012-2040) assuming business-as-usual and several alternative cases.

This study summarizes findings of the Outlook on development of coal industry and it includes an economy-by-economy projection of APEC's energy demand and supply for the years 2012 to 2040 in the business-as-usual case and the role of coal in energy balance. 'Business-as-usual' means no major changes in policy except for changes required by existing law. The special attention in the Study is given to the economics of the prospects of clean coal technology and more efficient coal production in APEC region.

APEREC has used its model to project energy demand and supply by economy and for APEC as a whole. APEC-wide results are simply sums of results for the relevant economies. The modeling process included assembling a database of key assumptions for each economy, including historical data base of the coal industry. Four sub-models (transport demand model, industrial demand model, electricity supply model and other sector demand model) estimate energy demand in key sectors. The result tables put together the results of all four sub-models and present them in an organized fashion.

In 2012, coal was the largest energy resource in energy balance of APEC economies, accounted for around 36% of total primary energy supply in APEC, up from nearly 27.9% in 1990, which is equivalent to a growth rate of 3.2% per year. The share of coal in the energy mix continue to increase and expected to reach 38% in 2040.

Coal is and will be a largest energy source in APEC, almost two times bigger than natural gas (19% in 2040). In absolute value, coal supply will increase by 1.7 during the forecast period.

Advantages of coal in power generation will allow the coal base generation to experience significant growth: from 6094 terawatt-hours (TWh) in 2011 to 12477 TWh in 2040. Growth in China's output of electricity from coal accounts for most of this growth (4632 TWh), while coal generation in the United States is projected to decrease.

Under business-as-usual assumptions, coal production in the APEC region will continue to grow by about 1% per year during the outlook period. It will amount to 4466 million tonnes of oil equivalent (Mtoe) in 2040 or about 46% more than in 2011. All 15 existing coal producing APEC economies will continue to produce coal while Papua New Guinea may start some minor production. China will continue to be the major coal producing economy not just among the APEC economies, but worldwide. Production in China will be 2234 Mtoe in 2040 or about 50% of the APEC region's production; it was 58% in 2012.

By 2040, there will be seven net coal exporting economies in APEC, and 13 more APEC economies that are net importers of coal. Brunei Darussalam is projected to have no production, consumption, imports, or exports of coal during the outlook period. Coal currently accounts for more than half of the CO<sub>2</sub> emissions from fuel combustion in the APEC region, and we project in our business-as-usual scenario that these CO<sub>2</sub> emissions from coal will grow by more than 45% between 2012 and 2040.

However, it is expected that APEC economies continue their policies of accelerating the deployment of advanced coal combustion technologies, coal beneficiation technologies and coal mine methane recovery and utilization technologies.

Special attention should be made to improving economics of coal liquefaction

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technologies and integrated gasification combined cycle for power generation. These measures will allow to decrease the impact of the coal industry to the climate change.

After 2020, APEC economies will need further development of carbon capture and storage development in economic evaluation for an integrated CO<sub>2</sub> transport, utilization and storage infrastructure in the region.

### **Conclusions**

According to the results of the Study, APEC region continues to be a major player in the global coal industry. Even in the period of “Golden age for natural gas”, the coal industry continues to be the main fossil fuel based industry in the region.

Driving forces in the coal sector of APEC include those with positive impacts, such as economic growth, urbanization, market development, and technology breakthroughs. Among others, and those that have negative impacts like environment and social concerns.

Coal industry should accelerate the deployment of advanced coal combustion technologies, coal beneficiation technologies and coal mine methane recovery and utilization technologies. Improving economics of coal liquefaction technologies and integrated gasification combined cycle for power generation will allow to decrease environment and social concerns.

Depending on the strength of these driving forces, APEC coal development industries and utilization policies may undergo different transformations, even that APEC may see a Renaissance of the coal industry in the forecasting period.

**Lise Skovsgaard and Henrik Klinge Jacobsen** (continued from page 32)

### **References**

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