

Australia's energy future in Asia

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Frank Jotzo¹

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Summary

Energy demand, supply and trade in Asia are set to undergo sweeping change in coming decades. Energy use in China, India and other countries is likely to keep growing fast as they develop. Climate change mitigation objectives as well as energy security and other policy concerns, coupled with technology change, may cause substantial shifts in patterns of energy demand in Asia. It is possible that coal demand will not keep growing but level out or fall over the medium to long term.

Australia could continue to benefit from energy exports, but only if energy supply systems can adapt to the changing structure of demand by our main trading partners. Australia has the potential to supply lower-carbon and zero-carbon energy for export, if future policy settings are appropriate and if suitable investments in infrastructure are made.

This requires Australian governments to put in place appropriate policy settings to avoid lock-in to existing technologies and industries, and to help realise Australia's renewable energy supply potential where this has economic promise. At the same time, Australia's vulnerability to climate change implies a national interest in strong global climate change mitigation. Complex challenges arise for Australia as a major coal exporter.

Asia's energy demand in the context of climate change mitigation

Although a new international climate treaty is not yet in sight, all major economies have taken on unilateral commitments or reduce their emissions or slow emissions growth following the Copenhagen climate accord (Jotzo 2010, McKibbin et al 2011). Many countries are implementing climate change mitigation policies irrespective of the lack of a global treaty (Productivity Commission 2011).

Energy investment decisions can be strongly influenced by climate change policy settings. For example, the International Energy Agency's (IEA 2011) projections have global coal use increasing by 60% from today to 2035 in a scenario without additional climate policies, but decreasing by 30% in a scenario with strong global climate change mitigation. Renewable energy in the two scenarios increases by 70% and 170% respectively.

Developments in China are crucial. China is now the largest global greenhouse gas emitter, and there is continuing strong growth momentum (Garnaut et al 2008). Its target to reduce the emissions intensity of its economy by 40-45% by 2020 will require policy effort to constrain emissions in the

¹ Director, Centre for Climate Economics and Policy, Crawford School of Economics and Government, Australian National University. Contact: frank.jotzo@anu.edu.au

face of this strong underlying momentum (Stern and Jotzo 2010). Significant policy efforts are underway in implementation of the 12th Five-Year Plan (Chinese Government 2011). However it is an open question as to how will expand its energy system and how its economic structure will change. Will China rely more strongly on imported coal, or accelerate the shift to renewable and nuclear power?

Similar questions apply for India, Indonesia, and other fast-growing countries in Asia.

The answers will depend on policy settings for climate change mitigation, energy supply security and other issues such as local air pollution. It will also depend on developments in energy technologies that change the relative cost of coal, gas, oil, and various renewable energy technologies, and that change the characteristics of technologies – for example through carbon capture and storage, or storage of energy from renewable technologies.

Modelling analyses such as those by the Australian Treasury and the International Energy Agency show a range of scenarios for global energy use. In Treasury's (2011, page 51) modelling scenarios of global climate change action, conventional fossil fuel technologies provide only between about 5% to 15% of global electricity by 2050, down from around 70% at the moment. Renewable technologies and fossil fuels with carbon capture and storage in turn increase their share.

The IEA (2011, p.356 and 374) meanwhile projects global coal demand increasing by over half between now and 2035 if there is no change to current policy settings; levelling out under a scenario with policies consistent with the Copenhagen Accord; and declining by about one third in a scenario of strong global climate change action. Most of the global difference would arise in China and India, where very large investments in power producing infrastructure are to be made in coming decades. International coal trade reacts very sensitively to such changes in demand. In the early 2000s, China accounted for around 15% of global coal exports; since 2009 it is a net coal importer, now accounting for almost 15% of global imports (IEA 2011, p.401).

The actual range of possible outcomes could be much larger than the scenarios in mainstream projections exercises suggest. Past experience has shown that changes in energy technology, markets and policy can occur much faster, and turn out much larger, than suggested by projection exercises.

For example, energy supply projections of ten years ago did not foresee the possibility of the global boom in unconventional natural gas that we are witnessing now, while oil price projections from the early 2000s did typically not foresee the possibility of the oil price rising to over \$100 per barrel as has been the case at various times since 2008. Technology development also brings frequent and large surprises. Progress towards commercially viable carbon capture and storage technologies has been much slower than anticipated just a few years ago, while on the other hand the cost of solar power facilities has declined dramatically.

It is impossible to predict the future conditions in global and Asian energy markets. There is, however, a distinct possibility that the growth in demand for coal will tail off, and that prices achieved for coal exports could fall significantly – in particular for thermal coal used for electricity generation, which accounts for around one third of Australia's coal exports by value and around half by volume (BREE 2011). In the medium term, natural gas is likely to gain market share. Longer term, there is a possibility that demand for low- and zero-carbon energy sources will increase greatly.

Australia's energy supply options

Australia's future as an energy exporter is at the crossroads: business-as-usual would see coal exports continue to increase, whereas strong global mitigation may allow Australia to exploit a comparative advantage in renewable energy. Other countries' climate change policies could thus pose a long-term threat to Australia's position as an energy exporter, but they could equally turn out to be opportunities to put Australia's energy future on a new footing.

Australia has enjoyed large export revenues from fossil fuel energy exports. Coal is currently Australia's largest export by value (\$43 billion, over 3% of GDP in 2010-11), buoyed by historically high prices. Exports of both coal and natural gas are set for continued expansion in the medium term, with large infrastructure investments committed, but terms of trade are likely to come down from their current exceptionally high levels (Syed et al. 2010).

Australia has vast and diversified opportunities for renewable energy generation, including wind, hydro, solar, geothermal, wave, tidal and bioenergy. Except for hydro they are largely undeveloped and could make a large contribution to Australia's future energy supply (Geoscience Australia and ABARE 2010). Most renewables are not cost competitive at the moment in the face of cheap fossil fuel supplies, but could become so in future (Yusaf et al. 2011).

The Australian Treasury (2011) projects that with a carbon price, over 20% of Australia's electricity could come from geothermal power at 2050. The International Energy Agency (IEA 2010) meanwhile sees Australia in a bracket of countries where 40% of electricity could come from concentrated solar power plants by the middle of the century, with solar electricity cost competitive with fossil fuel generated power within decades (IEA 2010).

A possible large scale shift to renewable power in the context of international action on climate change could also have profound implications for export competitiveness. Under long term scenarios of strong climate action in all countries, it is conceivable that Australia might again become a cost-competitive producer of energy intensive commodities such as aluminium or steel, using renewable energy sources rather than coal. It may also become possible and cost effective to produce and export synthetic liquid fuels using renewable energy, and export these to Asia.

Implications for domestic policy and international strategy

The challenge for Australia is to position itself to harness the country's natural advantages in the context of pervasive uncertainty about future international policies and technological advances.

In setting domestic policy, Australian governments need to be mindful of the possibility that demand for coal may wane, and that renewable energy could become a new area of comparative advantage for Australia. The Australian economy has successfully undergone large scale structural changes before, such as the transition from agricultural to minerals and energy commodities exports, and from manufacturing to services industries. Market forces drive such transitions, but regulatory frameworks, microeconomic policies and fiscal settings are crucial in allowing and facilitating structural change.

Government is supporting R&D and commercialisation in new energy technologies. There may be a case to provide such support (where it can overcome market failure) not just to advanced clean

energy generation technologies for domestic power supply, but also for R&D towards a renewable energy export industry.

Provision of infrastructure for energy supply projects and the regulatory framework for energy industries also matter. In many cases, established regulations and practice at both the Federal and State level are geared more towards facilitating expansion of existing industries, rather than to facilitating the emergence of new technologies and industries.

Australia's international strategies have faced a tension between protecting established interests in fossil fuel exports on the one hand, and promotion of climate change mitigation on the other (Jotzo 2007).

Under a scenario of relatively weak global mitigation, this poses complex challenges for Australia's strategic approach. The emissions embodied in Australia's current annual coal exports are greater than total annual national greenhouse gas emissions within Australia's borders. Mitigation policies are the domain of the countries where fossil fuels are used, so any measures by Australia to unilaterally restrict supply would by themselves be unlikely to have much long term effect on global emissions.

Nevertheless, Australian policymaking needs to consider the full range of options that could support overriding strategic objectives. One such option that should be kept open for consideration is to adjust settings of fossil fuels taxation. For example, a tax on fossil fuel exports (possibly differentiated by carbon content) could large fiscal revenues even if set at levels far below the expected carbon prices in Australia's domestic carbon pricing scheme. Such revenues could then be used to support climate change action in developing countries (Jotzo et al 2011), in support of Australia's climate change mitigation objective and in fulfilment of Australia's international commitments.

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Contact: frank.jotzo@anu.edu.au

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