Foreign Affairs and Aid Sub-Committee
Minerals Council of Australia
Question Taken on Notice at the Public Hearing, 1 September 2014

What type of investment do they [the multi-lateral development banks] need to build a coal-fired power station, and how many people does that provide electricity for? [Question from Mr Craig Kelly, MP, Member for Hughes]

The Minerals Council of Australia is not in a position to respond with detailed quantitative information on this question as it requires expert electricity industry knowledge and modelling capability that, among other things, takes account of thermal efficiency variability of the same facility built at different locations around the world. There are organisations better placed to do this, such as the International Energy Agency (IEA), Bureau of Resources and Energy Economics (BREE) and the US based Electric Power Research Institute.

Having said that, it is possible to provide an indicative response based on publicly available information.

According to BREE, in Australia approximately $2.2 billion is required to construct a state-of-the-art, supercritical coal-fired power station of approximately 750 MW generation capacity (of which an estimated 714MW is actually "sent out" into the electricity grid).

This power station will provide enough electricity to power up to 1,000,000 homes in Australia.

Supercritical Black Coal fired Power Station

Parameter	**Measurement**	**Value**	**Source**
Capital Cost	($/kWnet)	3,124	(a)
New entrant size (NSW)	(MWnet)	714	(a)
Cost of power station	($ billion)	2.2	
Estimated number of homes powered by 750MW generation facility		<1,000,000 in Australia	(b)

Sources: (a) Bureau of Resources and Energy Economics (2012), *Australian Energy Technology Assessment,* page 27.
(b) CS Energy, *Kogan Creek Power Station fact sheet*, website consulted 17 October 2014.

The question taken on notice was raised in the context of a discussion about multi-lateral development banks and their role in funding power generation investment. So it might be helpful to add some commentary on such investment activity.

"In both China and India, some hundreds of gigawatts of new coal-fired power plants are under construction, adding to the massive investments already built in the last decade or so … Similar trends can be seen in a number of ASEAN countries. By 2020, around three quarters of global coal use will be in non-OECD countries". [1]

Coal fired power output in China and India alone increased by 2500 TWh over the past decade, equivalent to ten times total Australian power production. According to the IEA's *World Energy Outlook, 2013,* China is the main driver of increasing energy demand in the current decade but India takes over in the 2020s as the principal source of growth. India's new plants are still relatively inefficient and account for more than 60% of subcritical units under construction around the world.[2]

[1] Ian Cronshaw (2014), *The current and future importance of coal in the world energy economy*, Public Policy Paper 5/2014, Energy Policy Institute of Australia, page 4.
[2] International Energy Agency, *Energy Technology Perspectives 2014 – Harnessing Electricity's Potential*, chapter 9.

In June, the IEA released a *World Energy Investment Outlook special report* that highlighted the significant investment needed to secure the world's energy system. It contained an important cautionary note on coal financing:

> *"If development banks withhold financing for coal-fired power plants, countries that build new [coal-fired] capacity will be less inclined to select the most efficient designs because they are more expensive, consequently raising CO_2 emissions and reducing the scope for the installation of CCS. In addition, many of the countries that build coal-fired capacity in the 450 Scenario need to provide electricity supply to those who are still without it, a problem that may be resolved less quickly if investment in coal-fired power plants cannot be financed."* [3]

Thus, there are three problems with failing to invest in coal fired generation from the development bank perspective:

1. Less efficient and more greenhouse intensive plants are built (sub-critical and super-critical rather than high-efficiency, low-emission – or HELE – plant);
2. Because these are unlikely to be built CCS ready they are inconsistent with the IEA's HELE roadmap,[4] which is based on a two-step process of:
    a. Deploy HELE technology to improve the efficiency of coal-fired power production and reduce CO_2 emissions where economically and technically feasible;
    b. In parallel, develop CCS so it can subsequently be integrated into power plants using fossil-fuels (eg, gas, coal, lignite, diesel and oil) and other industrial plant (eg, steel mills, smelting and refining) when the implementation conditions are appropriate. This will further reduce CO_2 emissions.
3. Countries with energy access challenges may have more difficulty eradicating poverty because they lack the necessary electricity.

High-efficiency, low-emission or HELE technologies not only improve the thermodynamic efficiency of coal-fired power generation. They also involve meaningful reductions in CO_2 emissions. In fact, increasing the efficiency of coal-fired power plants by 1 per cent reduces CO_2 emissions by between 2 and 3 per cent. By reducing those emissions from a power station, HELE technologies reduce the cost of subsequent application of CCS and, therefore, provide greater scope for its deployment. That in turn decreases the cost of abating world greenhouse gas emissions.

HELE technology coal-fired power plant investments are being made internationally, notably in Japan, Germany and China. Showcase examples of HELE technology include the Isogo ultra-supercritical thermal power station and the Nakoso integrated gasification combined cycle (IGCC) power plant, both in Japan.

Japan invested over A$20 billion in coal generation power projects in other countries between 2007 and 2013. That makes it the World's largest public financier of such projects. The Japanese government recently announced it will be increasing this support for coal-fired power plants built in other countries where they use the latest HELE coal technologies. The MCA welcome this leadership role that Japan is playing in both the demonstration and the deployment of high efficiency, low emissions generation technologies.

[3] International Energy Agency (2014), *World Energy Investment Outlook – Special Report*, page 125-26.

[4] International Energy Agency (2012), *Technology Roadmap: high-efficiency, low-emission coal-fired power generation*.