

Technological Insinuation and Value Drivers for Australian Coal through Resource Engineering



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Abstract: This research represents the demand and supply of coal as a natural resource and its contribution to the GDP of the country. This is a descriptive research that focuses on technological insinuation and enablers that are important for Australian economy to impart enhanced value to GDP of the country and in turn helps in the economic development of the country. Australia's resources sector is quite important to the economy and it serves as a catalyst in facilitating global energy preservation and removing energy deficiency. This paper attempts to study the technological implications of the coal as a natural resource and its impact on the Australian economy in terms of its efficient utilization through resource engineering. It focuses on the drivers that are indispensable and can be banked upon to increase the value and in turn make the economy self reliant and increasing the optimal utilization of scarce resources.

Keywords: Australian Coal, Energy, Exports, Economy, GDP, HELE

I. AUSTRALIAN COAL

Natural bonanza of coal resources to Australia clearly differentiate it from others and provide a clear comparative edge in coal production which ultimately leads to value additivity for the country. Australia is one of the top five in terms of proven coal reserves in the world. Current forecasts as per Bureau of Resources and Energy Economics, Australia's proven and probable reserves can be attributed to 110 years for black coal and 510 years for brown coal (lignite) for extrapolating the respective resource life. Australia is a major supplier of quality coal to both developed and developing economies, taking the share of 54 per cent of earth trade in metallurgical coal and 24 per cent of earth trade in thermal coal (Chart 1).

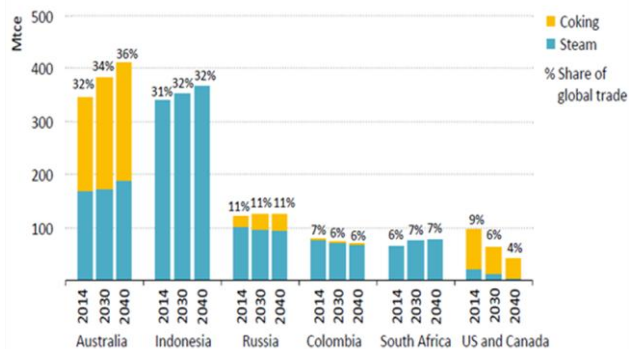


Chart 1: Australian share of coal exports by respective category, 1990 to 2035, International Energy Agency's core scenario (Mtce)

II. DEMAND AND SUPPLY

High productivity and closer vicinity to significant markets and strong demographical growth will continue to increase that leads to increase the coal export for the long term. South-east Asian coal demand is set to have a huge increment, reversing a global trend that leads to value creation for Australia's coal exporters. Australia is and will continue to be a major producer and exporter of coal in the world. Average growth for global demand and with emergence of increasing low-cost supply is leading to huge supply and leads to lower energy and commodity prices with demand being on the bearish side, specifically for iron ore but also for metallurgical as well as thermal coal. Iron ore prices have already decreased with a noticeable impression, while metallurgical coal prices held up in the June quarter with the impression of halted supply due to Cyclone Debbie are also coming back to the same level.

The demand for Australia's coal will be supported by the development in electricity generation. Asia is going to produce the strong demand for iron and steel along with electricity generation leads to the brighter future for the coal industry in Australia. Coal has an important role in a secure and sustainable energy future in Australia too and it is assumed to remain the largest source of electricity generation for the long term perspective. The essential quality of coal in Australia is of a huge advantage to all energy, iron ore and steel making where high energy combined with low ash by product category of coal match the requirements for the building of HELE power plants all over Asia whereas

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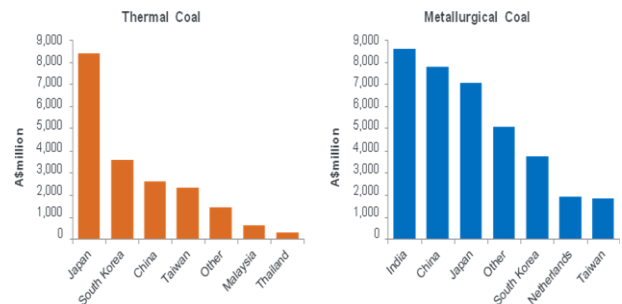
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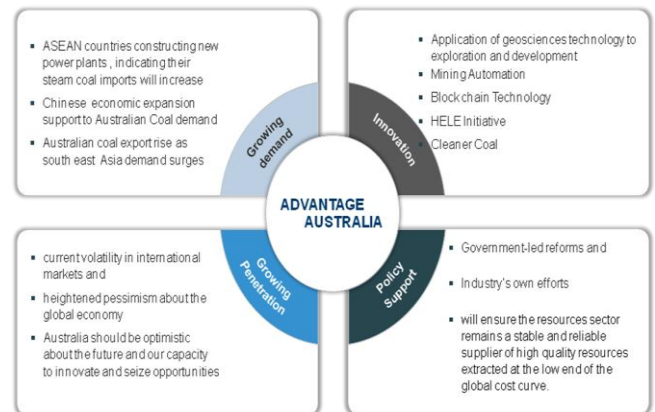
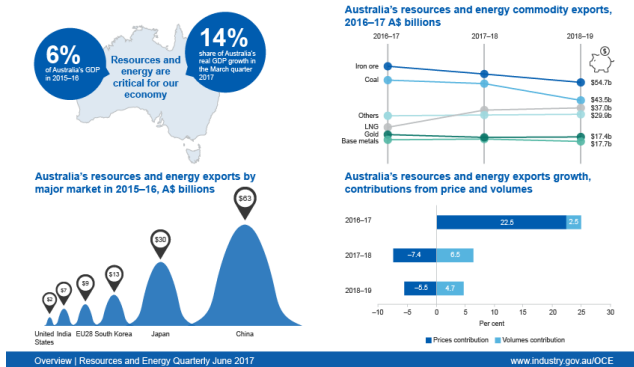
Australia's utmost quality metallurgical coal is among the best on the planet for today's steel making and contributes to the authenticity of the quality of the plant. Coal was one of Australia's largest sources of export revenue in 2017. Coal exports exceeded exports of both rural goods and manufactured items. Coal exports were a record high \$57 billion in 2017. Despite a drop in metallurgical coal export volumes in 2017 due to the impact of Tropical Cyclone Debbie, coal export values reached a new record high. Australia exported 172 million tonnes of metallurgical coal worth \$36 billion in 2017. Australia exported 200 million tonnes of thermal coal worth \$21 billion in 2017.

III. AUSTRALIA'S KEY COAL EXPORT MARKETS



Source: Department of Industry, Innovation and Science; Resources and Energy Quarterly – December 2017

IV. ADVANTAGE AUSTRALIA



Australia's supply capacity, geographical location and coal quality ensure we are well positioned to meet future demand in the region. Australia is well positioned to supply the growing coal demand in the non-OECD countries of Asia. Over 300 GW of new coal fired capacity is currently under construction and here are plans to develop another 950 GW. Some of this will replace retiring older plants, but there will still be a net increase in capacity and coal demand. In comparison, only 47 GW of wind and 17 GW of solar capacity are currently under construction around the world. World Coal Association chief executive Benjamin Spoton said that demand for Australian thermal coal was also forecast to remain steady in China and Japan, and new markets were emerging in Bangladesh and Pakistan. Demand from china and India is going to boost the revenue for Australia from coal exports. With increasing trend of fossil fuel power generation and crude steel production, demand for coal will definitely be increasing in the future. It would also not possible for India to cover domestic demand growth with domestically produced high ash coal which will definitely leads to high imports and higher revenue for exporting countries. The increasing energy demand in India will make a certain market for Australian Coal even when the Indian government is continuously presiding it's countrymen to reduce the dependence on coal. World Coal Association chief executive Benjamin Spotionsaid demand for Australian thermal coal was also forecast to remain steady in China and Japan, and new markets were emerging in Bangladesh and Pakistan.

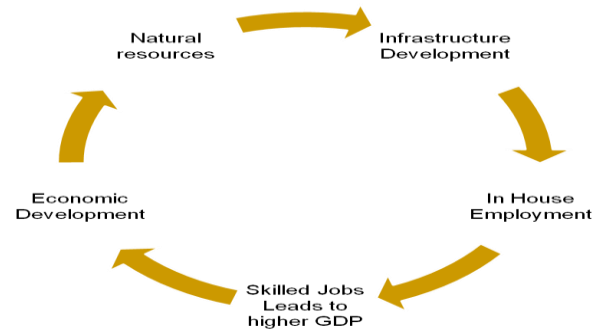
V. IMPACT ON AUSTRALIAN ECONOMY

Increased production leads to value additively and enhanced mining of quality coal will pave the way for enhanced exports and ultimately contributes to the higher economic development of Australia. Australia's rich inclination towards natural resources, in addition to strong and stable institutions and the facilitation of private enterprise, has been important to the economic development process. Work force inclusion in the mining will definitely leads to increased employment and contributes to GDP and ultimately leads to the upliftment of country stature on the planet. The resources and mining sectors represent a huge part of Australia's Gross Domestic Product and it will continue to rise as per the forecasts and impact the development of the country in a positive manner. Mining sector plays an important role in providing the skilled employment and that leads to more consumption and increased savings. Increased saving will again come back to the country and ultimately leads to economic development. The Australian coal exports are of significant importance for development of infrastructure and economy in developing economies and contributes to the reduction in poverty for the said economies in the world. Australia has always thrived to increase the share of resources sector in the GDP and focus on the nation's competitiveness. It has always looked for the opportunities to innovate and expand in the said sector to give a boost to the economic development.

The innovation in terms of mining automation will add the productivity and enhanced productivity leads to increased efficiency, helping put Australia on the world map as a largest coal exporter. As the increased capital inflows in mining sector with respect to the investment phase have provided unmatched economic benefits to Australia, they are providing additional competence to the country as compared to production phase. So, investment phase benefits will be there with the country for the longer duration as compared to production phase benefits. As per Reserve Bank Governor Glenn Stevens, Australians will be benefitted for the investment phase resources and enjoy increased level of coal and mining results in form of output for a longer period of time. Australia is having the large natural reserves for which there is a huge demand for the developed and developing economies. The rate of growth of that demand will be lower in future than it has been in recent years and going to decline in coming years as per recent forecasts. With the opening of foreign ownership in the resources sector to the advanced level, cash flows occurring to the Australians in terms of enhanced earning will definitely lead to the high standard of living for the countrymen.

The coal and mining industry in Australia is contributing to the welfare and raising the standard of living for the countrymen by providing employment and thereby leads to the wealth maximization for the respective countrymen. The increasing demand from China for infrastructure development will act as a catalyst to the demand for iron ore and coal, paving the way for the Australian economy to expand its wings on a broader level. Coal exports are actually contributing to the Australia's consistent growth on yearly basis and it is the only natural resource which is earning the maximum revenue from exports. The coal and mining industry also contributes a huge chunk of the export earnings for social infrastructure projects on annual basis to provide the funding and benefits for social upliftment of the community. This contribution is over and above the benefits of job security, business exposure opportunities, funding to develop public infrastructure, and support for education, health and research and development training to the countrymen. Australia is totally clear about the expansion in terms of organic and inorganic to increase the export earnings from the coal and mining sector and certainly pave the way for the country to progress leaps and bounds in terms of economic development. Sound Economy leads to sound currency appreciation and that ultimately leads to higher export earnings. High earnings will be deployed for social and economic well being for the Australian people and that can facilitate the process of further improvement in the GDP in geometric progression. It will also introduce Australia as a world largest exporter of coal to the entire planet and strengthen its place in the World as a negotiator and largest exporter of quality coal. The coal and mining sector will definitely replace the manufacturing sector as a contributor to the Australian GDP and that will automatically lead to competitive advantage in the global space. The significant impact of the enhanced mining that had happened historically will definitely lead to the increased production and quality production along with increased demand will contribute to economic development and in tune the resources exports will

add up to the enhanced share of real GDP growth for the country



VI. FUTURE SCOPE

HELE (high efficiency low emission coal) will lead to greater and cleaner coal and thereby improving efficiency and that can automatically raise the amount of energy that can be procured from a single coal unit. Supply will increase with HELE and will lead to additivity to the GDP of the country and ultimately leads to Economic development.

Carbon Controlled Preservation (CCP) is a way whereby carbon dioxide released in environment from the use of carbon-based energy resources or from industrial actions is:

- Recorded and controlled,
- Squeezed or compressed, and
- Permanently accumulated in suitable geological at least 800m below the surface

CCS can reduce CO2 emissions from coal use by 90 percent. CCS is not science fiction it has been undertaken around the world for over 20 years. Until the year 2000. HELE capital cost requirements are relatively low and other 'firm' generation options cannot match HELE

Prospects for hele power station development (options for australia)

- Report undertaken by Solstice with GHD cost estimate input
- Compares Long Run Marginal Cost for power stations delivering reliable, secure, affordable and sustainable base load electricity
- Provides an 'apples-for-apples' comparison for providing 'firm' generation

Australian government view on HELE

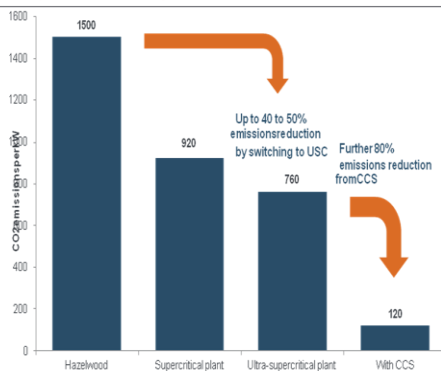
- As per Minister Matt Canavan Federal Resources Minister Townsville Bulletin, 07.01.2017, Japan will definitely set up a mining plant in Australia in place of setting it in Japan to refine the coal and achieve economies of scale in operations and ultimately leads to win-win situation for Japan as well as Australia.
- As per The Hon Malcolm Turnbull MP Prime Minister of Australia, National Press Club address, 01.02.2017,

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Australia is having the over the edge technology to produce cleaner coal that contributes to the economy and pave the way for the Australia to become world's largest coal exporter.

- As per Minister Josh Frydenberg, Energy Minister in The Australian, 24.01.2017, high quality coal or cleaner coal is an innovative part of the technology which can be got by having an application Australia by setting up a plant in the country.

Australia can reduce generation sector emissions and improve energy security with new coal generation



VII. COAL21 FUND

Exhibiting low emissions coal technologies in partnership with government and other investors Over \$300m committed to 14 projects. Achievements so far include:

- Recorder Carbon die oxide at Queensland's Callide coal-fired power plant
- Sequestered 65 000 tonnes of CO2 in Otway Basin in Victoria
- Intensified the search for preservation/godown sites in Australia
- Contributed to the global R&D effort
- COAL21 Fund extended to 2027

VIII. CHALLENGES FOR AUSTRALIA COAL EXPORTS

Technology integration through automation in extraction of coal though mining is the new challenge that has emerged from the recent developments. So, it needs to evaluate the new opportunities in the coal and mining sector through which Australia would be able to keep the competitive advantage and expand in different markets. With the help of automation and block chain technology in mining, Australia can keep up the position of world largest coal exporter and can give a needed impetus to its economy.

IX. COMMODITY MARKETS AND COAL EXPORTS

The significant contribution of coal and iron ore in Australia's trade surplus, it becomes an utmost necessity to analyze the global markets for the respective commodities. The analysis should be there in terms of integration of commodity markets in Australia with the other developed and developing economies. The share of enhanced earnings through coal exports can definitely lead to strengthen and integrate

Australia commodity markets. The said test of strength can be studied from demand and supply perspective of the metal. Increased demand will lead to increase prices of the metal and increased prices will lead to increased participation and that will lead to increase the depth of financial market in terms of enhanced volumes and ultimately give boost to the integration of the financial as well as commodity markets. With increase in the price of the metal along with the strong currency appreciation, the share of coal export earnings in the Australian GDP will rise considerably. The vicious cycle will pave the way for trade surplus for Australian economy and it will be able to retain the competitive advantage in terms of coal and mining exports and have a significant positive impact on the economic development

X. CONCLUSION

- Australia continues to need secure and reliable electricity from a fleet of power plants able to generate continuously and when required at an affordable cost.
- Australia is and will continue to be a major producer and exporter of coal.
- Demand for Australia's coal will be supported by the development of new electricity generation and steel-making capacity, particularly in Asia.
- Australia's supply capacity, geographical location and coal quality ensure we are well-positioned to meet future demand in the region
- Coal has an important role in a secure and sustainable energy future in Australia too.
- However in Australia there is considerable scope to do better by creating conditions to enable the use of advanced, cleaner, more efficient (HELE) technologies.

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AUTHORS PROFILE



Neeru Sidana Having more than 10 years comprehensive teaching experience in academic sector, she is dynamic and laborious personality, a shining star in her career so far and has left good benchmarks to be achieved. She has undertaken various administration positions and has worked with leading educational group associated with "Kurukshetra University- Haryana" namely "Shree Siddhivinayak Educational Trust's group of Institutions". Having passion for teaching & training she has participated in more than 50 seminars, workshops, Conferences, FDPs & MDPs and also has presented numerous research papers. Presently she has been working as Associate Professor with "Lovely Professional University" Jalandhar-Punjab. She is widely traveled person, her extrovert personality and temperament gives her winning edge.



Rohit Sood Having 8 years + comprehensive experience in corporate and academic sector, he is industrious personality. He has participated in more than 100 Seminars, Workshops, National & International Conferences,



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