# Chapter 23
# Implication for China's Resource Demand on Sustainability in Australia

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**Abstract** The recent rapid growth of the Chinese economy combined with urbanization and changes in consumption patterns are increasing Chinese demands for iron, oil, gas and coal. These changes have greatly influenced China's public policies, especially energy and resource policy and foreign policy. For instance, China has moved to strengthen cooperative relations with foreign resource-intensive countries. Australia, and Western Australia (WA) in particular, is an ideal target for China in this regard. This chapter first studies the existing relationship between China's demand for resources and supply from Western Australia. It then analyses different effects produced as a result of this resource trade. China's demand for resources has been a key driver of economic growth in Western Australia in recent decades, and this is likely to continue for the foreseeable future. However, this resource-driven economic growth is inconsistent with a sustainable approach to development in WA. The chapter discusses some potential conflicts and predicts some trends in the Sino-Australian resource trade. In conclusion, it presents suggestions for policy-makers.

**Keywords** Resource supply and demand · China · Australia · Sustainability · Western Australia · Economic growth · Trade

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## Introduction

China has been experiencing uninterrupted economic growth for over the last three decades. China's GDP has increased by 22 times since 1978 and grew at an average growth rate of 9.9 % between 1979 and 2011 (National Bureau of Statistics of China 2012). In 1978, the total primary energy consumption in China was 0.57 billion tons of standard coal equivalent (SCE), and in 2007 it increased to 2.22 billion tons of SCE (Guerrero, n.d.). China is currently the global second largest oil consumer, and the largest energy consumer in the world. Correspondingly, resource and energy demand in China have increased tremendously. In 2011, China's oil consumption growth accounted for 50 % of the global oil consumption growth. Although annual growth rates in China have recently slowed down to around 7 %, the country's economy is likely to go strong for another two decades, with this continuous expansion escalating resource demands (US Energy Information Administration 2013).

China's growing demands for energy and other resources have greatly influenced China's public policies, especially energy and resource policy, and foreign policy (Kristen 2005). For instance, China has moved to strengthen cooperative relations with foreign resource-intensive countries. Australia, and Western Australia (WA) in particular, is an ideal target for China in this regard. China can secure a stable, quality supply of resources from WA, which in turn has experienced a commodity boom associated with significant economic benefit. However, the short-term and long-term effects of this supply–demand relationship are very complex and have significant implications for sustainable development in WA (Government of Western Australia 2003).

## China's Resource and Energy Demands

China has experienced rapid economic growth over the last decade (see Fig. 23.1). In 2001, China's gross domestic product (GDP) was 1096 billion RMB, while in 2011 GDP grew to four times that amount. The average economic growth rate was about 10 % per annum during the period of 2001 to 2011 (see Fig. 23.1). However, this high growth rate has been achieved, to a great extent, at the expense of natural resources and the ecological environment.

### *Structural Analysis of China's Resource and Energy Demand*

China's economic growth has been associated with dramatic increases in energy and resource use (Wu 2004). The country is the world's largest consumer of coal,

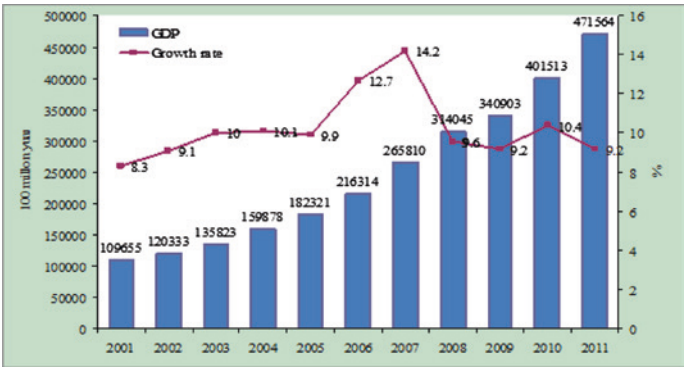


**Fig. 23.1** China's economic growth from 2001 to 2011. *Source of data* National Bureau of Statistics (2013)

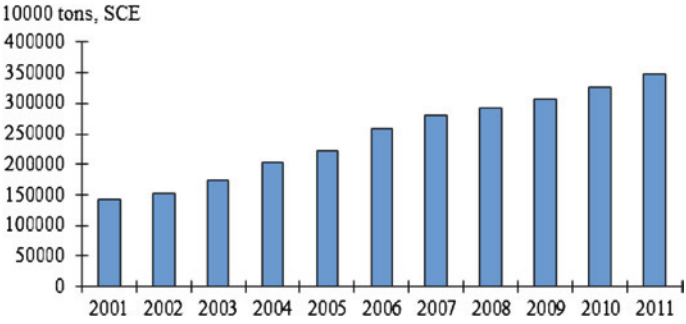


**Fig. 23.2** Total primary energy consumption during 10th and 11th Five-Year Plan. *Source of data* National Bureau of Statistics (2013)

iron and steel, and copper, and the second largest consumer of oil and electricity (Wang 2009, p. 125). Its demand for energy and resources impacts significantly on the global market. Recently production and consumption in China have been increasing rapidly. Figure 23.2 shows the change of total primary energy consumption, measured by standard coal equivalent (SCE), in the 10th and 11th Five-year Plan (FYP). According to Fig. 23.2, total primary energy consumption has increased steadily over the last decade.

China consumes more energy and resources than it produces, as shown in Table 23.1, particularly in crude oil and iron ore.

A breakdown of China's energy consumption by source is shown in Fig. 23.3, coal is the dominant source of energy in China, 68.4 %, followed by oil, 18.6 %; hydroelectric power, 8 %; and natural gas, 5 %. Clearly, coal and oil remain the dominant sources of energy in China, while natural gas and hydroelectric power together account for only 13 % of energy consumption.

**Table 23.1** Production and consumption of energy and resources in 2010

| | Product | Growth rate (%) | Consumption | Growth rate (%) |
|---|---|---|---|---|
| Total primary energy (SCE, 100 million tons) | 31.8 | 7.0 | 34.8 | 7.0 |
| Coal (100 million tons) | 35.2 | 8.7 | 34.9 | 9.7 |
| Crude oil (100 million tons) | 2.04 | 0.3 | 4.4 | 2.7 |
| Natural gas (100 million $m^3$) | 1030.6 | 8.7 | 1174.2 | 12.0 |
| Hydroelectricity, wind electricity, and nuclear electricity (SCE, 10,000 tons) | 27,982.9 | 0.26 | 27,840.2 | −0.37 |
| Iron ore (100 million tons) | 1.3 | 27.2 | 9.2 | – |
| Copper (10,000 tons) | 206.1 | 14.88 | 330 | 11.9 |

*Source of data* National Bureau of Statistic of China (2013)

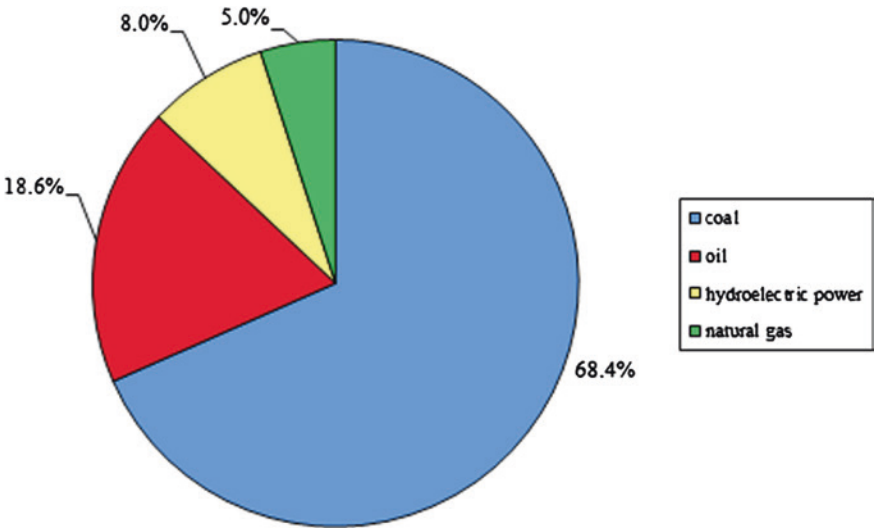


**Fig. 23.3** China's energy consumption in 2011. *Source of data* National Bureau of Statistic of China (2013)

## *Causes of the Rapid Increases in China's Resources and Energy Use*

For the last three decades, China' intensifying industrialization and fast increasing urbanization have driven China's energy demand which is expected to continue to rise in the coming decades (WorldWatch Institute 2010). A number of factors drive this increase in energy demand. These include: First, in developing countries, as elsewhere, economic growth is typically closely correlated with increased demand for energy. As China's enormous and robust economy has grown, energy use has

increased correspondingly. Secondly, energy consumption for non-production purposes has also increased dramatically. As living standards rise in China, people increase their spending on home appliances such as air conditioning, refrigeration, cooking, and space and water heating, as well as on automobiles and other energy-intensive products. Increasing urbanization has amplified this process. A third major factor contributing to high levels of energy consumption in China is inefficiency.

### *Future Development Trends*

It is difficult, and somewhat risky, to accurately predict what China's future resource demands are likely to be. According to National Bureau of Statistics of China, China's annual energy consumption in 2010 totalled 3.25 billion tons of standard coal, up 5.9 % from 2009, with its natural gas consumption jumping 18.2 % year on year in 2010, while coal, crude oil and electricity consumption also increased 5.3, 12.9 and 13.1 %, respectively, year on year (China Daily 2011). Generally, China's resource and energy demands will continue to grow significantly for the foreseeable future, despite recent downturns in economic growth. With China's strong and continued economic growth, the country became a net oil importer and its demand for oil has increased, from 4.6 mb/d in 2000 to over 8 mb/d.

In 2011, China imported more than 5 mb/d of crude oil, accounting for 54 % of its total demand (IEA 2012). In addition, it was reported that within 4 years, China will consume more oil than the USA. It is also projected that China's primary oil demand will increase to 12.2 mb/d and that the country will spend $500 billion a year on crude oil imports by 2020 (IEA 2012; Forbes 2013). In any case, China is likely to continue to be a big consumer in the world resource market.

In addition, energy consumption structure will be improved gradually, for instance, the consumption of renewable energy and natural gas has been increasing rapidly. But because of price and supply, the basic composition of energy consumption will not be greatly affected. Coal is expected to continue to play a dominant role in China's energy mix for the foreseeable future, although there is a serious coal pollution in China.

## Australia's and Western Australia's Resource and Energy Supply to China

As a member of many organizations such as APEC, the G20, WTO, and OECD, Australia has multiple trade flows with numerous countries, such as China, the USA, and Japan (see Table 23.2). However, Australia's recent economic progress has been heavily reliant on trade with China. In 2009, China became Australia's largest export market, surpassing Japan (see Table 23.2). Resources continue to underpin

Australia's exports to China. Australia is China's 11th largest merchandise trade partner, 11th largest import source, and 13th largest export destination. Australia exported 266.2 million tonnes of iron ore to China in 2009, an increase of 45.2 % over the same period. China is also Australia's largest source of imports. In 2011, China became Australia's largest import market, surpassing the European Union. China exports many different major products to Australia such as clothing, communication and sporting equipment, electronic devices, goods for children, and furniture.

As the world's largest exporter, China's share of worldwide value-add manufacturing has doubled since 2002 (Australian Government 2012). Western Australia, in particular, has a strong trade relationship with China. WA is booming on a trade and investment relationship based on the export of minerals, energy, agricultural goods and education services and Chinese investment in the WA resources sector. In 2011, more than 70 % of Australia's total merchandise exports to China are from WA which also accounts for 80 % of China's investment into Australia over the last 5 years (Australia China Business Council 2013).

## *Australia's Resource and Energy Supply to China*

More importantly, the two economies are complementary and have great potential for trade. China was Australia's largest export market, accounting for 26.1 % ($82.5 billion) of total exports in 2011–2012 (see Table 23.2). Iron ore and concentrates, coal, education-related travel services, and crude petroleum are Australia's largest exports (see Table 23.3). As showed in Table 23.3, most of the natural resource and services exports to China increased rapidly in year 2009–2011. These trades are underpinned by sizable long-term contracts, for example for iron ore and the sale of liquefied natural gas into the Guangdong market, and will remain the basis of Australia's export trade for many years to come.

**Table 23.2** Australian merchandise trade shares, by selected countries and country groups

| Period | South East Asian regions | China | Europea n Union | Hong Kong | Japan | New Zealand | Republic of Korea | United States of America |
|---|---|---|---|---|---|---|---|---|
| Annual exports (%) | | | | | | | | |
| 2008–2009 | 9.2 | 17.0 | 10.4 | 1.4 | 22.9 | 3.7 | 8.3 | 5.0 |
| 2009–2010 | 9.9 | 23.2 | 7.9 | 1.4 | 18.5 | 4.0 | 8.2 | 4.8 |
| 2010–2011 | 10.1 | 26.4 | 7.3 | 1.3 | 19.1 | 3.1 | 9.2 | 3.7 |
| Annual imports (%) | | | | | | | | |
| 2008–2009 | 19.9 | 16.9 | 20.7 | 0.6 | 8.1 | 3.2 | 3.0 | 11.5 |
| 2009–2010 | 20.2 | 17.9 | 18.9 | 0.6 | 8.7 | 3.4 | 3.5 | 10.7 |
| 2010–2011 | 18.4 | 19.2 | 18.0 | 0.5 | 7.8 | 3.4 | 3.3 | 10.8 |

*Source of data* ABS (2013)

**Table 23.3** Australia's top 10 goods and services exports to China (A $ million)

| | | | | | | % growth | |
|---|---|---|---|---|---|---|---|
| | Rank commodity | Sector | 2009 | 2010 | 2011 | 2010–2011 | 5 year trend growth |
| 1 | Iron ore and concentrates | Minerals | 21/790 | 34,685 | 43,960 | 26.7 | 44.9 |
| 2 | Coal | Fuels | 5651 | 5191 | 4543 | −12.5 | 78.9 |
| 3 | Education-related travel services | Services | 4040 | 4343 | 4091 | −5.8 | 13.1 |
| 4 | Crude petroleum | Fuels | 796 | 1668 | 2902 | 74.0 | 64.5 |
| 5 | Wool and other animal hair (incl tops) | Agriculture | 1382 | 1621 | 2022 | 24.7 | 4.9 |
| 6 | Copper ores and concentrates | Minerals | 1050 | 1314 | 1500 | 14.2 | 7.0 |
| 7 | Cotton | Agriculture | 180 | 426 | 1470 | 244.8 | 31.2 |
| 8 | Gold | Other goods | 1 | 220 | 1284 | 484.2 | 449.6 |
| 9 | Copper | Manufactures (STM) | 890 | 1066 | 1211 | 13.6 | 46.6 |
| 10 | Nickel ores and concentrates | Minerals | 610 | 1121 | 1094 | −2.3 | −0.4 |
| Total | – | – | 36,390 | 51,655 | 64,077 | 862 | – |

*Source of data* Australian Government (2013)

As a resource-rich state, WA is supplying China with a large amount of natural resources, and its top 10 exports to China in 2011 include iron ore, crude petroleum, nickel ores and so on.

## Effect of China Rise on Australian Sustainable Development

Generally, the effects of China's resource demands on sustainable development in Australia include positive and negative dimensions. However, it is difficult to distinguish between these two effects in real situations. What is positive or negative often depends on what measures are adopted to deal with these challenges. The impacts of China's resource demands are complicated and manifold, such as economic, ecological, political, social, and cultural.

## *Economic Effects*

China's huge and continuing demands have produced and will produce some positive results. First it propels the Australian economy. Second it is an important opportunity to restructure the Australian economy and industry, but this opportunity must be exploited in a timely fashion. In economic development, natural resources should be treated as a potential source of income, some of which is saved and converted into capital to support increases in future output levels. For example, resource rents may be used for transport development, modernization of telecommunication systems, health and educational programs, science, and technology activities.

On the other hand, this boom results from the advantage of Australia's abundant natural resources, and will continuously strengthen resource industries in the Australian economy. But this assumption is risky. Overdeveloped resource industries may restrain development of other industries, especially manufacturing and technology-intensive industries. At the same time, it is difficult to keep the advantages brought by natural resources for a long time, and high dependence on it will result in losing sustainable dynamics of economic growth.

According to research conducted by economists Sachs and Warner (1995), countries which base their economies on natural resources, such as Russia, Nigeria and Venezuela, tend to be examples of development failures over the longer term. In contrast, countries which have had only limited access to natural resources, such as Japan, Korea, Singapore, and Switzerland, have experienced extremely high economic growth rates. Some economists have further studied these issues and produced some interesting conclusions.

At the discovery of a natural resource, the sudden income increase may lead to sloth and less need for sound economic management and for institutional quality. The boom may also create a false sense of security and weaken the perceived need for investment and growth-promoting strategies. Naturally resource abundant economies benefit less from the technology spillovers that are typical in manufacturing industries because the exports of these industries are harmed by an appreciation of the local currency, e.g., through the inflationary pressure resulting from increased domestic demand. Finally, as the natural resource sector expands relative to other sectors, the returns to human capital decrease and investments in education decline (Sachs and Warner 1995, 2001; Papyrakis and Gerlagh 2004).

## *Ecological Effects*

Rapid growth of resource industries has resulted in some ecological and environmental issues in China. Non-renewable resources are decreasing; some landscapes have been destroyed; water and soil are polluted; some residential areas are damaged. As China's demand for resources will continue for a long time, it is enhancing the expansion of WA's resource industries and its relevant departments, such as minerals and

oil production, transport construction, population, and labor growth, which will bring pressure to ecological system in Australia and Western Australia, creating additional problems. In addition, economic prosperity does not play an absolutely negative role in environmental protection. In fact, the recent resource boom has strengthened WA's financial ability, making challenging tasks such as ecological restoration and environmental infrastructure development much more economically feasible.

### *Political Effects*

As a new economic power, China will have a definite influence on the Australian political system. Some politicians and parties, who keep close relation with resource industries, will play a more important role in political and administrative activities on both a national and state levels. At the same time, political powerful interest groups, which are associated with natural resource abundance, are emerging and attempting to influence politicians and to adopt policies that may not favor environmental protection. Some policies will be challenged. If parties do not adjust their policies, it will produce some adverse consequences. Furthermore, natural resources provide rents so that they promote rent-seeking competition rather than productive activities. In addition, rents induce economic agents to bribe the administration in order to gain access to them (Krueger 1974; Sachs and Warner 1995).

### *Social and Cultural Effects*

With the growth of two-way trade and personnel exchange, diverse factors of Chinese culture influence the social and cultural life of WA. Although Chinese have been living in WA, Chinese elements brought by them are thin and a little ostensible. In other words, there has been little or no mainstream Chinese cultural influence on WA. However, Chinese culture will play a more important role in the cultural diversity of WA in the future, as more Chinese people are immigrating into the state. Essentially, Chinese culture is rooted in Confucianism and Australian mainstream culture is rooted in European culture whose core values are originated from a Christian culture. So a clash of civilizations, to some extent, may take place in WA.

## Suggestions to Policy-Makers as Well as for Educating the Broader Community

In order to achieve the sustainability goals of social advancement, economic prosperity and environmental protection, governments, industries, and social communities respectively need to take on important responsibilities. The first involves

making sure that each understands their social, economic and environmental responsibilities and that each group, appreciates the importance of sustainability by developing an awareness of how to implement it within their sector scope of influence.

## *Promoting Communication and Diffusion of Ideas and Knowledge of Sustainability*

Theoretically, sustainability knowledge and education should be provided to everybody within in a certain area. However, from the view of efficiency and practice, it should focus on some special individuals and organizations, which could be called *key actors*. These will be critical stakeholders that provide an important impact on sustainability strategy. Such stakeholders might include some special persons, administrative institutes, economic agents, NGOs and local communities. More importantly, these key stakeholders should be integrated into a key stakeholders network, which will become the main target for sustainability education and thus a hub of knowledge diffusion and strategy implementation. Another issue that needs special attention is that lots of Chinese enterprises lack strong awareness of environmental protection and sustainability. So Australian economic agents and governments should popularize ideas and knowledge of sustainable development and social responsibility. This not only improves economic cooperation but also helps Chinese business accept an more sustainable development model.

## *Promoting Industrial Reconstruction and Adjusting Economic Strategy*

To help ensure continued development of the Australian economy, the most import factor to consider is that Australia should base its economy and industries on technological progress and innovation, not on natural resources. Resource booms only provides a strategic opportunity by which certain parts of the national and state economy (e.g., WA Resources Industry) might adjust their industrial structure and surpass previous performance by a great leap. The development of Australia's future business trade with China is unlikely to be only limited in the resources sector. Australia has strong capacities of the provision of technology and expertise that would help Asia, including China, in safeguarding food and energy supplies (Australian Government 2012). Enhancing technology-intensive manufacturing industry is also a critical strategy, as it will bring more talents, more capital and more knowledge. Otherwise, overreliance on a resource boom may prove to be more of a curse than a boon.

In summary, Australia continues to put more effort into enhancing sustainability and communities are also embracing a low-carbon and environmentally friendly society. The strong trade relationship between Australia and China will also bring more positive Chinese cultural elements such as harmony between humans and nature, Confucius and other oriental wisdom. This has been strongly encouraged in Australia's strategies developed in the White Paper of Australia in the Asian Century (Australian Government 2012). Therefore, Australia would become a green and innovative country with quality environment, economic prosperity, cultural diversity, and social inclusion.

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