

# Chapter 5

## Impact on Coal-producing Countries

December 2015

**This chapter should be cited as**

Kutani, I. and V. Anbumozhi (2015), 'Impact on Coal-producing Countries', in *The Macroeconomic Impact of Coal-Fired Power Plants*. ERIA Research Project Report 2014-43, Jakarta: ERIA, pp.49-55.

## CHAPTER 5

### Impact on Coal-producing Countries

This chapter analyses how coal-exporting countries are influenced when multilateral development banks (MDBs) and export credit agencies (ECAs) discontinue financing coal-fired power generation.

#### 5.1. Scenario Setting and Methodology

##### A. Paths of Influence and Case Setting

What influences result when MDBs and ECAs discontinue financing the development of coal-fired power generation in developing countries?

When assuming efficiency downgrade and gas conversion scenarios in Chapter 4, the current account balance of the coal-exporting country is adversely influenced by the latter scenario. If a coal-fired power generation project is replaced by a gas-fired one, future demand for coal in that country will decrease. Import volume drops in a country where coal supply depends on import, resulting in decreased coal export volume in a coal-exporting country.

In contrast, lower coal-fired power generation efficiency increases demand for coal. Accordingly, contrary to the above, a coal-importing country increases import volume and a coal-exporting country increases export volume. In short, lower coal-fired power generation efficiency for a coal-exporting country is effective in offsetting decreased coal export volume brought about by the gas conversion scenario.

**Table 5.1: Case Setting**

	<b>Efficiency Downgrade</b>	<b>Gas Conversion</b>
Efficiency downgrade case	-5% than BAU	-
Combination scenario 1	-5% than BAU	15% of CPPs will be converted
Combination scenario 2	-5% than BAU	30% of CPPs will be converted

BAU = business as usual, CPP = coal-fired power plant.

Source: Authors.

## B. Subject Countries

Of the two countries evaluated in Chapter 4, Indonesia has an abundant volume of domestic coal resources and exports coal. Thus, the influence of discontinued financing by MDBs and ECAs is seen taking place only in India as a change of coal import volume. This chapter analyses how the coal-producing countries are influenced by the change of coal import volume in India.

According to a study report by the Ministry of Economy, Trade and Industry,<sup>17</sup> steam coal for power generation will be exported to India by Australia, Indonesia, Mozambique, South Africa, the US, and other countries in 2040. Accordingly, these countries are candidates for analysis. If India cuts down on import of steam coal, it is only natural that the countries with higher coal export to India will be influenced more. The same report says Australia, Indonesia, and South Africa—three major coal-producing countries—are expected to maintain high coal export volume to India up to 2040. With a balance considered between coal resources possessed and future domestic demand, these three seem to remain as major export countries even in 2035. This chapter targets these three countries for analysis.

In case India actually cuts down its coal import volume, the reduction would differ from one supplier country to another. The following is assumed to simplify this study:

<sup>17</sup> Ministry of Economy, Trade and Industry (2013), *Study on Coal Supply-Demand Trend in Asia Pacific and Atlantic*, March.

- Coal import volume balance by India's supplier country in 2035 is identical with that in 2040 in the study report by the Ministry of Economy, Trade and Industry (Table 3.2).
- Variation of India's coal import volume is proportionally divided among the top three supplier countries according to their import volume ratios in 2035.

**Table 5.2: Outlook of Thermal Coal Export and Import in 2040**

		to												
		North America	Latin America	OECD Europe	Africa	Middle East	non-OECD Europe	Japan	China	India	South Korea Chinese Taipei	Other Asia	total	
from	USA	4.8	9.9	20.0				0.6	5.3	2.8			43.4	
	Canada			2.5				2.1	0.3		1.4		6.3	
	Colombia	5.2	58.1	29.3	5.0			0.6	1.5		1.0		100.8	
	Russia			52.0		10.8	8.8	12.5	22.2		17.7		123.9	
	South Africa			10.0	12.2	15.7		0.6	13.0	44.3	7.0	5.2	108.0	
	Mozambique				0.1	1.7				9.0			10.8	
	China							2.8			5.7		8.5	
	Indonesia			5.0		5.0		25.0	83.2	98.4	58.3	90.3	365.2	
	Australia		40.0			13.0		59.5	51.0	196.1	59.6	150.0	569.2	
	Other Asia						0.8	0.9	32.5	3.3	1.4		38.9	
	Others			19.0			22.2			1.0			42.2	
	total		10.1	108.0	137.8	17.3	46.2	31.8	104.6	209.0	354.9	152.1	245.5	1,417.3

OECD = Organisation for Economic Co-operation and Development.

Source: Ministry of Economy, Trade and Industry, *Study on Coal Supply–Demand Trend in Asia-Pacific and Atlantic*, March 2013.

### C. Assumption of Fuel Cost

This analysis converts the change of coal export volume into monetary value, with assumption of fuel prices as requirement.

The estimated price in 2035 in the *IEA World Energy Outlook 2013* was used as the coal export price.

**Table 5.3: Assumption of Fuel Cost for Power Generation**

	Australia	Indonesia	South Africa
Coal price export	\$110/tonne*		

\* IEA, *World Energy Outlook 2013*, New Policy Scenario.

Source: Authors.

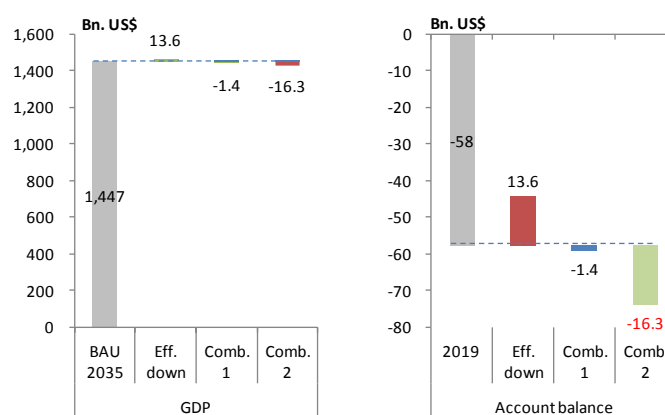
## 5.2. Calculation Results

### A. Australia

The calculation result indicates that delayed improvement of coal-fired power generation efficiency and a shift to gas-fired power generation have both good and bad effects on the Australian macroeconomy. The degrees of effects differ depending on the case. In the efficiency downgrade scenario, an increased coal export volume has positive effects on the Australian economy. Under the calculation conditions, Australia's GDP is boosted by 0.9 percent and its current account balance is improved by 23 percent.

In the combination 1 and combination 2 scenarios, decreased coal export volume by a shift to gas-fired power generation denies an effect of improvement by the efficiency downgrade scenario. Consequently, they lower the GDP by 0.1 percent and 1.1 percent, and the current account balance by 2.4 percent and 28 percent, respectively.

**Figure 5.1: Calculated Result (Australia)**



BAU = business as usual, bn = billion, Comb. = Combination, Eff. = Efficiency, GDP = gross domestic product.

Sources: Economic Research Institute for ASEAN and East Asia, *Analysis on Energy Saving Potential in East Asia*, June 2013; BAU scenario: International Monetary Fund, *World Economic Outlook*, April 2014.

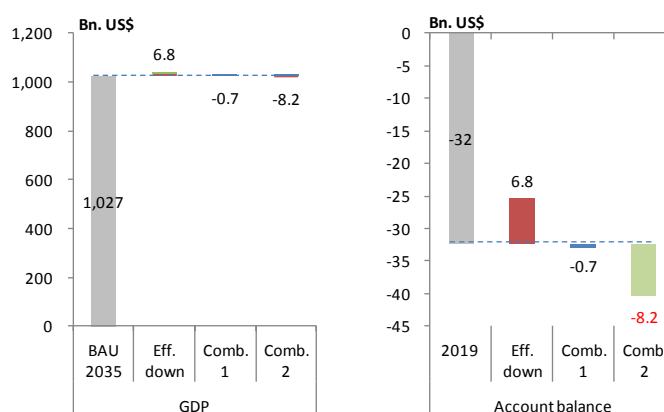
### B. Indonesia

The calculation result indicates that delayed improvement of coal-fired power generation efficiency and a shift to gas-fired power generation have both good and bad effects on the Indonesian macroeconomy. The degrees of effects differ depending on the case. In the efficiency downgrade scenario, an increased coal export volume has positive effects on the Indonesian economy. Under the calculation conditions, the GDP is boosted

by 0.7 percent and the current account balance is improved by 21 percent.

In the combination 1 and combination 2 scenarios, decreased coal export volume by a shift to gas-fired power generation denies an effect of improvement by the efficiency downgrade scenario. Consequently, they lower the GDP by 0.1 percent and 0.8 percent, and the current account balance by 2.1 percent and 25 percent, respectively.

**Figure 5.2: Calculated Result (Indonesia)**



BAU = business as usual, bn = billion, Comb. = Combination, Eff. = Efficiency GDP = gross domestic product.

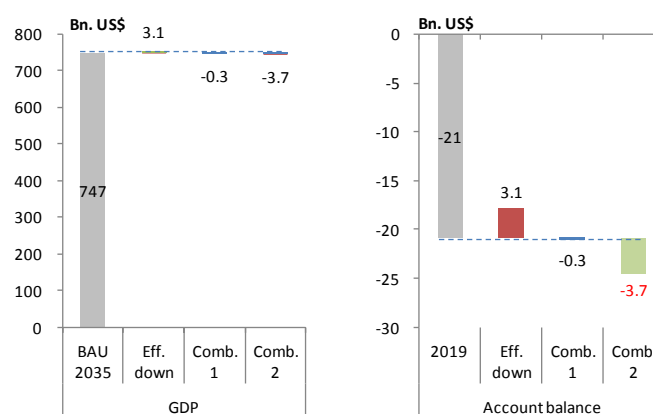
Sources: Economic Research Institute for ASEAN and East Asia, *Analysis on Energy Saving Potential in East Asia*, June 2013; BAU scenario: International Monetary Fund, *World Economic Outlook*, April 2014.

### C. South Africa

The calculation result indicates that delayed improvement of coal-fired power generation efficiency and a shift to gas-fired power generation have both good and bad effects on the South African macroeconomy. The degrees of effects differ depending on the case. In the efficiency downgrade scenario, an increased coal export volume has positive effects on the South African economy. Under the calculation conditions, the GDP is boosted by 0.4 percent and the current account balance is improved by 15 percent.

In the combination 1 and combination 2 scenarios, decreased coal export volume by a shift to gas-fired power generation denies an effect of improvement by the efficiency downgrade scenario. Consequently, they lower the GDP by 0.04 percent and 0.5 percent, and the current account balance by 1.5 percent and 18 percent, respectively.

**Figure 5.3: Calculated Result (South Africa)**



BAU = business as usual, bn = billion, Comb. = Combination, Eff. = Efficiency, GDP = gross domestic product.

Source: Economic Research Institute for ASEAN and East Asia, *Analysis on Energy Saving Potential in East Asia*, June 2013; BAU scenario: International Monetary Fund, *World Economic Outlook*, April 2014.

### 5-3. Conclusion

Discontinued financing for coal-fired power generation by MDBs or ECAs may have both good and bad effects on the macroeconomies of the coal-exporting countries. In case discontinued financing delays improvement of power-generation efficiency in coal-importing countries, coal demand, i.e. an increase in coal import, has positive effects on the GDP and the current account balance of coal-exporting countries such as Australia. However, at the same time, it should be noted that this scenario will lead to increase of global air pollution and CO<sub>2</sub> emission.

On the other hand, coal demand is lowered by a shift from coal-fired to gas-fired power generation, seen as simultaneously advancing in the coal-importing countries. Coal import volume may greatly drop depending on a balance between delayed efficiency improvement and a shift to gas-fired power generation. In this case, the GDP and current account balance of the coal-exporting countries are lowered.

A degree of impact depends on amount of coal export to India. As such, Australia would be the most affected country, followed by Indonesia and South Africa. In the case of Australia, impact for current account balance is estimated to range more than +/- 20 percent.

**Table 5.4: Consolidated Result of Analysis for Major Coal-exporting Countries**

	Impact for	Unit	Benchmark	Scenario		
				Efficiency down	Comb. 1	Comb. 2
Australia	GDP	US\$ billion	1,447 [BAU 2035]	+13.6 (+0.9%)	-1.4 (-0.1%)	-16.3 (-1.1%)
	Account balance	US\$ billion	-58 [2019]	+13.6 (+23.4%)	-1.4 (-2.4%)	-16.3 (-28.1%)
Indonesia	GDP	US\$ billion	1,027 [BAU 2035]	+6.8 (+0.7%)	-0.7 (-0.1%)	-8.2 (-0.8%)
	Account balance	US\$ billion	-32 [2019]	+6.8 (+21.3%)	-0.7 (-2.2%)	-8.2 (-25.6%)
South Africa	GDP	US\$ billion	747 [BAU 2035]	+3.1 (+0.4%)	-0.3 (-0.0%)	-3.7 (-0.5%)
	Account balance	US\$ billion	-21 [2019]	+3.1 (+14.8%)	-0.3 (-1.4%)	-3.7 (-17.6%)

Comb. = Combination, GDP = gross domestic product.

Source: Authors.