

How coal mining hurts the Indonesian economy

March 2014

Executive Summary

Over the past ten years, Indonesia has experienced an unprecedented coal mining boom, with coal production and exports growing 5-fold from 2000 to 2012. Despite uncontrolled growth, the coal sector makes up a mere 4% of Indonesia's GDP and prospects for future growth are even more limited. The coal boom has come at a cost to the national economy, to other economic sectors and livelihoods of Indonesians in the affected areas.

Extractive industries such as coal mining destabilise the Indonesian economy, causing large fluctuations in the balance of payments and the exchange rate. The impact of these fluctuations also hinders the long-term development of higher value-added industries by diverting and discouraging initial capital investments. At present, Indonesia is suffering because international coal markets are weak. Systemic reasons, including, most importantly, China's aggressive efforts to reduce coal consumption mean that prices are unlikely to recover anytime soon.

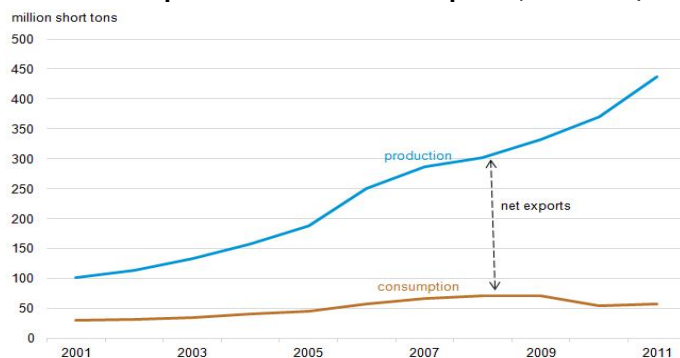
The coal industry is presenting itself as a major driver of the Indonesian economy. In reality, coal is a low value industry that causes excessive destruction of livelihoods, exacerbates poverty and contributes little to the overall GDP, and even less to future growth prospects. Nevertheless, the industry has managed to secure disproportionate public investment and preferential treatment. This public investment would be much better spent to boost the productivity and competitiveness of higher value-added industries in manufacturing and services.

Introduction

Indonesia controls only 3% of the world's coal reserves, but companies operating there have been moving to exploit these as quickly as they can. Over the past decade, production has ballooned, reaching over 450 million tonnes in 2012. The vast majority of coal produced from Indonesian mines is exported to China and other countries in Asia, while domestic coal consumption remains relatively flat (see Figure 1). In 2011, Indonesia overtook Australia as the world's largest exporter of coal.¹

Figure 1

Indonesia coal production v coal consumption (2001-2011)



Source: U.S. Energy Information Administration, International Energy Statistics.

While developers were quick to chase short-term gains from coal exports during the 'boom' years, governments and the coal industry have either failed to realise or wilfully ignored the negative impacts of relying on coal exports to drive the economy. In this paper, we consider a few of the problems that a coal-based economy creates:

1. Reliance on coal as a major export destabilises the Indonesian economy by creating large fluctuations in the balance of payments and exchange rate.
2. A continued focus on coal projects hinders the development of higher value-added industries, and Indonesia could miss out on better growth opportunities.
3. There is systemic weakness in the global coal market, and Indonesia would be foolish to invest in more coal export capacity.
4. The coal industry is a relatively minor contributor to Indonesia's national economy, but has a major negative impact on local economies, poverty and livelihoods.

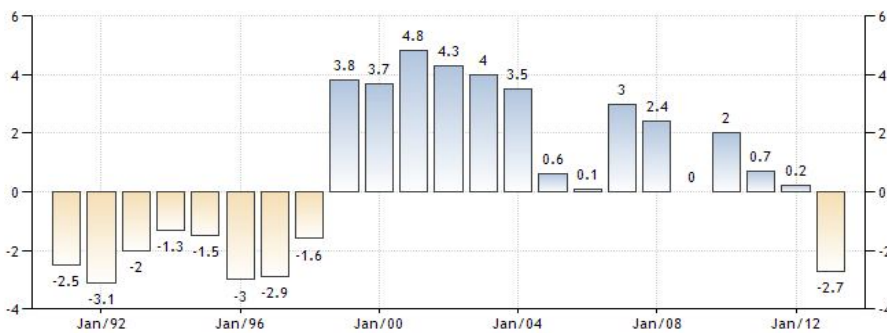
Reliance on coal as a major export destabilises the Indonesian economy by creating large fluctuations in the balance of payments and exchange rate

The boom-bust commodities cycle and Indonesia's current account deficit

In 2012, Indonesia's current account slipped into deficit for the first time since the Asian economic crisis in the late 1990s (see Figure 2).

Figure 2

Indonesia current account (% of GDP)



SOURCE: WWW.TRADINGECONOMICS.COM | BANK INDONESIA

What this means is that at present, the net revenue on exports is not sufficient to cover Indonesia's payments for imports. One major factor underpinning this shift has been the end of the commodities boom which was driven by emerging economies in the 2000s. In the aftermath of the global financial crisis in 2008, economic growth in China and other major world economies slowed significantly, and commodity prices have softened to much lower levels, especially from 2011 onwards. For example, all major international coal price indices, including the FOB Kalimantan price, have been on the slide since 2011 (see Figures 3 and 4) and this has severely impacted the value of Indonesia's coal exports. Beyond coal, Indonesia is also a major exporter of tin, nickel and copper. Mineral fuels accounted for 14% of total exports in 2013.ⁱⁱ

Figure 3

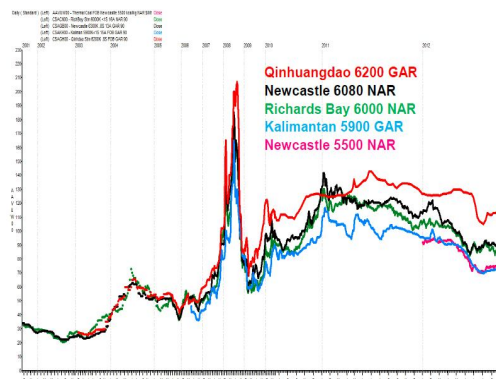
Major coal price indices (Jan 2012-Nov 2013)



Source: Platts

Figure 4

Major coal price indices - historical (2001-2013)



The softening of commodity prices has been recognised by the Bank Indonesia, Indonesia's central bank, as the main cause of the present current account deficit, stating, for example, in its Q2/2013 report that "improvement in non-oil-and-gas export performance was hampered by declining commodity prices in the international market due to China's economic slow-down".ⁱⁱⁱ

Standard Chartered have noted that deterioration in the current account is reflective not just of cyclical factors, but also structural issues such as:

1. "Heavy dependence on imported capital goods and production inputs, meaning that Indonesian firms are unable to meet domestic demand for such goods.
2. Indonesia's increasing reliance on commodity exports relative to manufactured exports, making it more susceptible to commodity-price shocks and the 'Dutch disease' trap.
3. The fuel-subsidy policy, which leaves Indonesia dependent on imported fuels."^{iv}

Similarly, Morgan Stanley expects that the present current account deficit to be "persistent", given that 62% of Indonesia's exports are commodity-related and 60% of imports are non-commodities.^v A high current account deficit means that Indonesia will be increasing its net liabilities to foreign countries. These liabilities could result in the need to sell assets or borrow more from foreign countries, both of which are detrimental to Indonesia's future economic development.

Exchange rate fluctuation

Persistent current account deficits also have knock-on impacts in the currency markets. The value of the Indonesian rupiah against the US dollar has swung wildly since the global financial crisis, rising steeply to a peak in 2011 but falling sharply since then as coal and other commodity markets became oversupplied and prices dived (see Figure 5).

Figure 5

Indonesian rupiah (IDR) v US Dollar (USD) – 10 year historical (2004-2014)



Source: Google Finance

Perry Warjiyo, Deputy Governor of Bank Indonesia, described the rise and fall of the rupiah in line with global commodity markets in the following terms:

Thus, with current account surpluses and sizable capital inflows during the period from the onset of the global crisis up to August 2011, the rupiah appreciated by as much as 14.9% in 2009, then by 4.6% in 2010 and 5.4% up to August 2011 – an appreciation helpful in mitigating imported inflation due to high global commodity prices during the period.

The situation was reversed as the global crisis worsened in September 2011 with the downgrading of the US ratings and the aggravation of the Greek crisis. The immediate impacts took the form of huge capital outflows from Indonesia. Heavy pressures led to exchange rate overshooting, threatening overall macroeconomic and financial system stability as well as the momentum of economic growth. Even though capital inflows resumed in 2012 as the global financial market improved, pressures on the exchange rate continued as the current account went into deficit territory with declining global commodity prices. Overall, the rupiah depreciated 6.9% from August to December 2011, and 6.6% in 2012.^{vi}

The rupiah was the worst performing Asian currency in 2013, dropping 21%. It currently sits at similar levels to that during the global financial crisis at approximately 11500 to 12000 IDR per USD. A weaker rupiah means that Indonesia pays more for its imports, and this is likely to hurt economic growth in the medium-term as businesses incur higher input costs. For example, in June 2013, the weak rupiah caused a massive fuel price hike, with petrol up 44% and

diesel rising 22%. These increases were also reflected in a steep rise in consumer price inflation of 8.3% in October 2013, up from 5.5% in May 2013.^{vii}

An unstable currency is especially bad because its impacts can be felt in many different parts of the economy. An uncertain exchange rate influences business decision-making and undermines investor confidence. For example, if an auto maker is deciding whether to manufacture a car in Indonesia or source cars from overseas, it will need to make some long-term projections about the future exchange rate. The less certain this projection can be, the less likely the investment is likely to proceed. This issue is especially important for Indonesia as it seeks to develop higher value-added goods and services to serve both domestic and export markets, many of which require significant upfront capital investment.

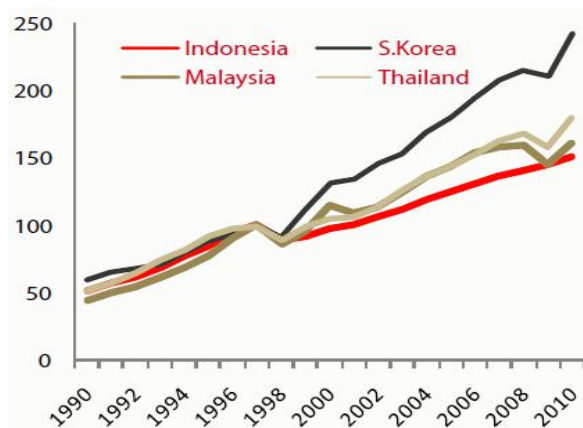
A continued focus on coal projects hinders the development of higher value-added industries, and Indonesia could miss out on better growth opportunities

The commercial uncertainty associated with an unstable exchange rate is not the only impact of a coal-based economy. During a commodities boom, mining revenues have the impact of increasing demand for, and therefore the costs of, skilled labour, raw materials and other services for other manufacturing and service industries. Mining booms also drive up the exchange rate, making other goods and services exports more expensive and less competitive.

In the early 1990s, Indonesia was once considered —along with Malaysia and Thailand— one of the three “Tiger Cub Economies”, the second wave of fast-growing, industrialising economies in Asia that were closely following the growth path of the first wave consisting of South Korea, Hong Kong, Singapore and Taiwan. Indonesian manufacturing’s share of GDP grew from 8% in 1967 to 26% in 1996.^{viii} However, since the financial crisis that battered Asian economies during 1997-98, Indonesia’s manufacturing sector has been a significant underperformer compared to its neighbours (see Figure 6). Almost all Indonesian manufacturing sub-sectors saw a rapid decline in output growth in the years following the Asian financial crisis (see Figure 7). One of the key factors underpinning this decline were rising commodity prices which led to a shift away from investment in manufacturing toward the resource –driven export economy which dominates today.^{ix}

Figure 6

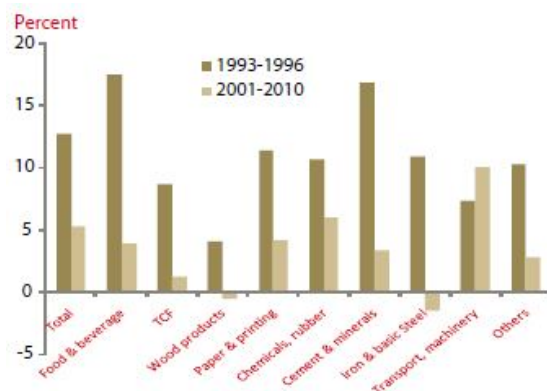
Manufacturing real GDP, 1997 = 100



Source: World Bank

Figure 7

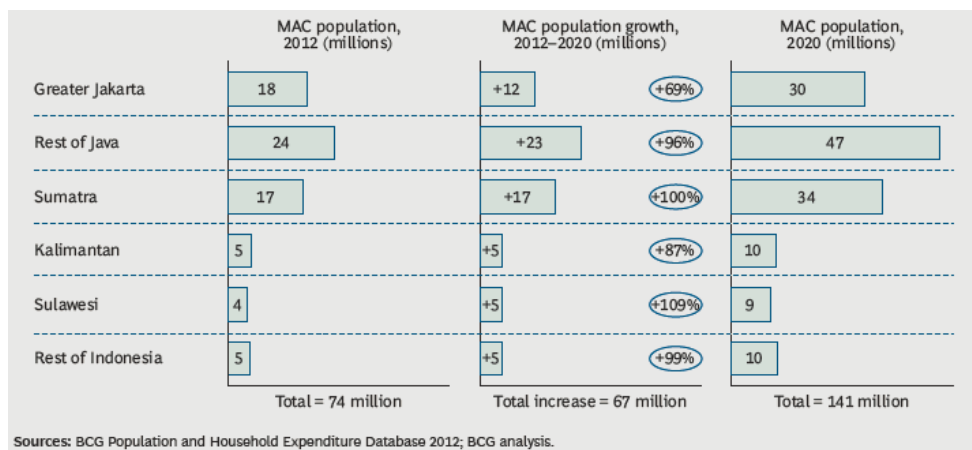
Average annual output growth of Indonesian manufacturing sub-sectors (real value added)



Looking toward Indonesia’s medium and long-term economic future, the country needs to move away from the boom-bust resources economy, or risk missing out on huge opportunities in its domestic market. According to a study by global management consulting firm, Boston Consulting Group, the number of middle-class and affluent (MAC) consumers in Indonesia is set to double from 74 million people in 2012 to 141 million people by 2020.^x Most MACs currently reside in Jakarta and the major cities in Java and Sumatra, with such trends set to continue.

Figure 8

Indonesian middle-class and affluent consumers (MAC) population – current and projected



The study notes that as urban consumers move into the MAC class, there is a large jump in demand for consumer durables, with most middle class owning a washing machine as well as a significant portion owning smart-phones and personal computers. Slightly further up the chain, the study found demand for products to make their lives more comfortable including air conditioners, cars and microwaves.

This is a rare chance for Indonesia to build national champions capable of grabbing a larger share of the expanding markets for goods and services, while simultaneously creating local jobs, developing a more skilled labour force, as well as allowing the country to move higher up the global value chain. The World Bank notes, for example, that the manufacturing sector is better for job creation (both in terms of quality and quantity), facilitates positive structural transformation and promotes higher labour productivity.^{xi} To realise these positive outcomes, the Indonesian government must increase public investment and enact supportive government policies to help develop higher value-added goods and services, while moving away from low value-added mining exports.

There is systemic weakness in the global coal market, and Indonesia would be foolish to invest in more coal export capacity

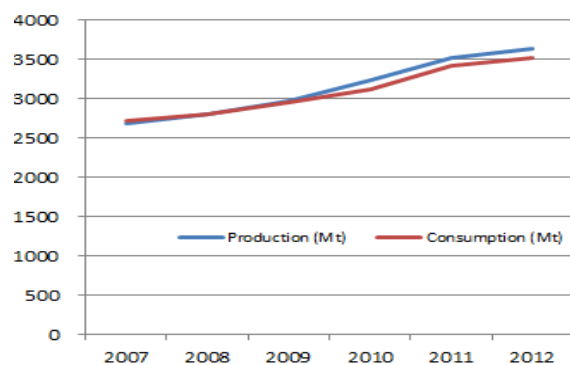
Chinese coal import demand is likely to weaken, with several factors pushing demand down

China produces most of the coal it consumes

China consumed 3.5 billion tonnes of coal in 2012, accounting for approximately half of the world’s total consumption. However, while China is the world’s largest coal consumer, it is also the world’s largest coal miner. With production increasing rapidly in the past decade, China’s produced 3.6 billion tonnes in 2012 (see Figure 9).

Figure 9

Chinese coal production v consumption (2007-2012)



Source: NBS, China Statistical Yearbook 2013

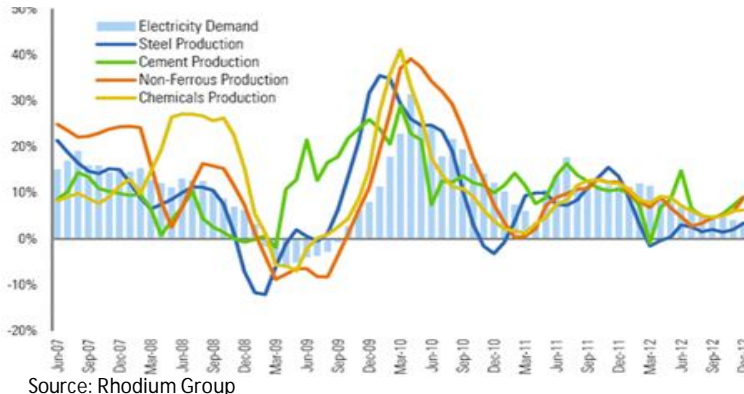
China became the world’s largest importer of coal in 2011, and in 2012, China imported 288 million tonnes of coal. Despite this rapid growth, China’s imports only 8% of the country’s total coal consumption in 2012. In other words, China is 92% self-sufficient in terms of its coal use.

China's economic growth is slowing as it transitions away from an investment-driven economy

The Chinese economic miracle has been fuelled by the production of basic materials such as steel, cement, glass and chemicals for large-scale infrastructure investments. Basic materials production drives demand for thermal coal for electricity (see Figure 10) and also coking coal for steel production.

Figure 10

Basic Materials Production v Electricity Demand, YoY 3mma



Source: Rhodium Group

Recognising that the country's rapid economic growth has come at immense social and environmental cost, Chinese policymakers have started to engineer a transition the country away from these traditional investment-based drivers of its economy to an economy drive more by domestic consumption.

One of the first moves has been to cut down the enormous overcapacity in basic materials production. Among others, Hebei, China's largest steel-producing province, pledged to cut 60 million tonnes of steel capacity and 61 million tonnes of cement capacity by 2017, while Shandong province promised to cut 10 million tonnes of steel capacity by 2015 and 40 million tonnes of coke production capacity by 2017.

Figure 11: Steel mill being closed in Tangshan, Hebei province



Source: Xinhua

The imminent shutdown of this industrial overcapacity will decrease demand for both thermal and coking coal.

Chinese policy caps on coal production and consumption will decouple economic growth from coal

Over the past two years, air pollution has become a major social and political issue in China. Smog levels in China's major cities hit record levels in January 2013, with PM 2.5 (small particulate pollution measuring 2.5 micrometres in diameter) levels in Beijing reaching as high as 886 micrograms per cubic metre. This is more than 30 times the World Health Organisation safe level of 25 micrograms per cubic metre.

Severe air pollution episodes have now become commonplace and China's growing middle-class have become increasingly vocal about the need to clean up Chinese development. Policymakers have responded strongly, with all of China's 31 provincial governments entering into an agreement with the national Ministry of Environment to reduce air pollution. 26 provinces have already issued air pollution action plans, while 12 major provinces have clear coal reduction targets by 2017.

Together, these 12 provinces constitute 45% of China's total coal consumption, but more importantly for Indonesia, constitute 62.5% of China's total coal imports (see Table 1).

Table 1: 12 provinces which have defined targets for coal consumption reductions as a proportion of China's total coal consumption and imports

Province	2012 Coal consumption (Mt)	2012 Imports (Mt)
Beijing	22.7	4.9
Tianjin	53.0	4.2
Hebei	313.6	20.0
Liaoning	182.2	8.2
Jilin	110.9	0.1
Shanghai	57.0	6.4
Jiangsu	277.6	19.4
Zhejiang	143.7	18.6
Shandong	402.3	25.5
Guangdong	176.3	38.6
Chongqing	67.5	0.1
Shaanxi	157.7	0.0
12 provinces total	1964.6	146.0
12 provinces total as a percentage of China national total	45.0%	62.5%

The fact that these 12 provinces —mostly coastal provinces accounting for a majority of China's total coal imports— have now committed to absolute reductions in coal consumption raises serious questions about China's future demand for Indonesian coal.

China is developing renewable energy at a rapid pace

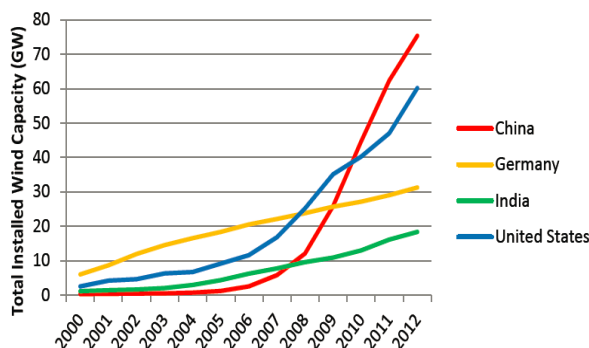
Another factor weighing on Chinese future coal demand is the large-scale investment in renewable energy generation. This is part of China's plan to diversify its energy mix, which currently relies on coal to generate 70% of its energy. China invested \$61b in renewable energy development in 2013, about one-quarter of total global renewable energy investment, according to Bloomberg New Energy Finance.

China's windy northern plains have provided fertile ground for wind farm developments, and the country is now the world leader in terms of installed capacity. Grid connection and curtailment have long been issues in getting the electricity from those areas to demand centres along the east coast, but the staggered completion from 2013 onwards ultra-high voltage transmission lines should begin to ease these issues.

Since 2009, China has also started to invest in domestic solar generation. In July 2013, the State Council, or China's cabinet, announced a new target to increase solar generating capacity to 35GW by 2015.^{xii} This enormous domestic rollout has been, in part, driven by a desire to help ease pressure on its domestic solar panel manufacturers, which have been hit hard by tariffs and anti-dumping duties from Europe and the United States.

Figure 12

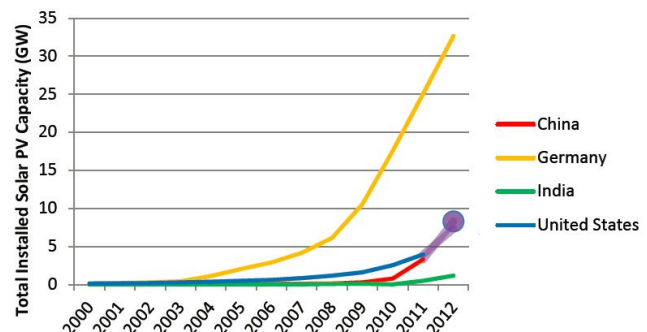
China Total Installed Wind Capacity (2000-2012)



Source: ChinaFAQs, BP Statistical Review

Figure 13

China Total Installed Solar PV Capacity (2000-2012)



The solar roll-out is backed by a generous feed-in tariff of between 0.90 and 1.00 Chinese yuan per kWh, as well as other subsidies and incentives. 20GW of the 35GW target is planned to be distributed rooftop solar. These small projects of less than 6MW also provide an additional feed-in tariff of 0.42 Chinese yuan per kWh.

Global oversupply leading to low prices, cancellation of expansion plans and mine closures

While China is reining in coal consumption and narrowing the space for imports, coal miners in Australia, Indonesia, U.S. and elsewhere are planning large investments leading to a massively oversupplied market. The IEA 2013 Medium Term Coal Market Report provides a useful description of the situation:

Oversupply and lower-than-expected demand have driven steam coal prices down to a three-year low. The shale gas revolution, combined with the mildest winter in decades and United States Environmental Protection Agency regulations, shrank US markets for domestic coal, moving exports to Europe. At the same time, major exporting countries (particularly Australia and Indonesia, but also Colombia, Russia and to a lesser extent, South Africa) saw significant expansions of mining capacity. Despite Chinese and Indian growth and the temporary European coal fever, the market could not absorb so much coal. In 2013, rains, strikes and other disruptions affected major exporters – particularly Colombia. However, these events caused little (if any) price reaction. Overall, there is simply too much coal on the market. Although subject to different supply and demand dynamics, met coal prices have followed the trend, declining to levels below the marginal supply cost. This also indicates a market oversupply.^{xiii}

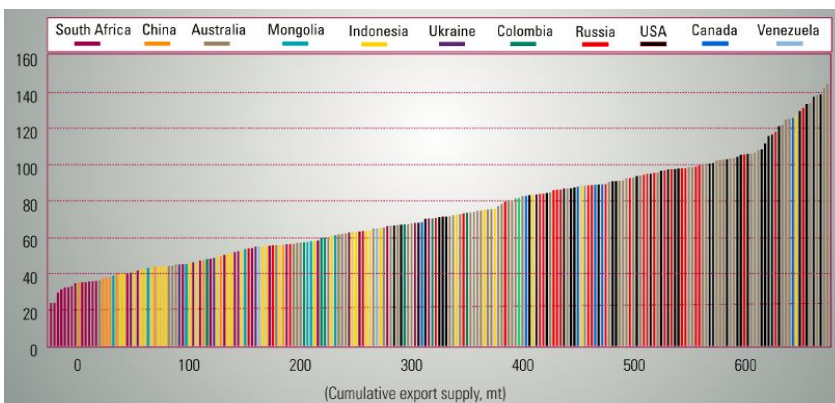
The IEA further noted that the impact on exporters in particular:

Coal prices below marginal supply cost indicate that some exporters are losing money. Export-oriented companies are generally focused on reducing costs, cutting jobs, optimising operations and maximising profits.^{xiv}

While it is true that some Indonesian producers are towards to lower end of the global cost curve, this is not true of all companies and production sites (see Figure 14).

Figure 14

Global Thermal Coal Cost Curve (\$/tonne)



Source: Platts, AME Group

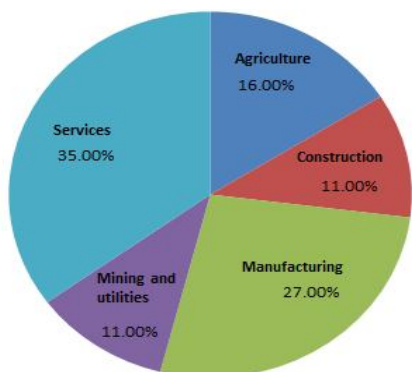
The coal industry is a relatively minor contributor to Indonesia’s national economy, but has a major negative impact on local economies, poverty and livelihoods

Coal’s contribution to Indonesia’s economic development is small

While mining is a significant portion of Indonesia’s exports, the industry actually contributes a very small portion of the overall economic output. The Reserve Bank of Australia estimated that mining and utilities generated 11% of Indonesia’s GDP in 2009, almost 40% of which was oil and gas.

Figure 15

Contribution to Indonesian GDP by sector (2009)



Source: RBA

Despite the dramatic growth over the past decade, coal exports make up only 3% of the national economy and domestic coal use makes up only 1%, as estimated in Table 2 below. Mining’s contribution to GDP was smaller than all of services (35%), manufacturing (27%) and agriculture (16%).^{xv}

Table 2: Estimated contribution of the coal sector to Indonesia’s GDP in 2011^{xvi}

	Volume	Value	GDP share (%)
Coal exports	300 Mt	\$88 / t	3.0
Coal-fired power	81 TWh	\$55 / MWh	0.5
Steelmaking	1.8 Mt	Steel: \$700 / t Iron ore: \$125 / t	0.2
Other domestic coal use	34 Mt	\$52 / t	0.2
Total percentage contribution to GDP			4.0

The coal industry also employs very few people, A major study in South Kalimantan —one of Indonesia’s key coal mining hubs— showed that the entire mining sector employed only two percent of the working population in the region.^{xvii} The study also found that economic gains from coal mining accrued mainly to high-income households rather than low-income households.^{xviii}

Coal’s destructive impact on local communities

Coal developments do not help the rural poor, as they have very strong negative impacts on agriculture, fisheries and other sectors that a much larger number of people depend on for their livelihoods. Coal mining swallows up vast tracts of forested areas and agricultural land. On the island of Borneo, Indonesia’s coal mining epicentre, it is not uncommon to see tropical rainforests and farmers’ rice fields literally within a stone’s throw of giant open-pit mines.^{xix}

Figure 16: Rice fields and pastures being swallowed up by coal mines in Kertabuana. Rice farmers are forced to use water discharged from mines for irrigation as natural water sources have been destroyed.



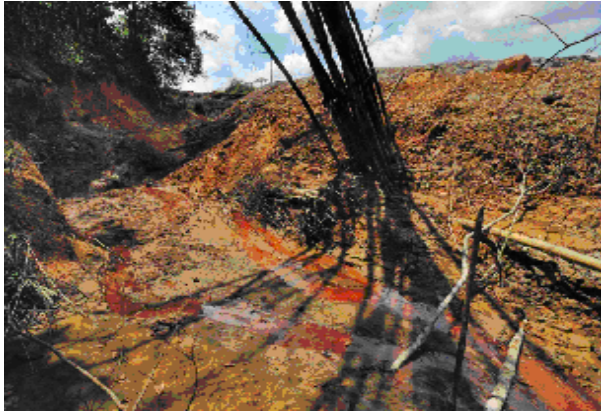
Source: Greenpeace / Lauri Myllyvirta

Coal mining in East Kalimantan has entailed massive destruction of farmland, wetlands, streams and forested lands. When the vegetation cover is destroyed, the soil no longer absorbs and retains water. Instant runoff increases

flooding dramatically. Much of the government revenue from mining is lost as spending is needed to address the floods and rebuild infrastructure, alongside other economic and social losses.

Even the farmland that is spared by the mine itself is affected as streams used as irrigation water sources are destroyed. Greenpeace has documented several villages in East Kalimantan where potentially contaminated water from coal mines is used for irrigation, with farmers reporting decreased yields and increased need for lime applications.

Figure 17: Severe acid mine drainage in Samarinda



Source: Greenpeace / Lauri Myllyvirta

Coal mining is a serious source of water pollution. Water discharged from the mines is contaminated with a suite of heavy metals, salts and solids, and often has either high alkalinity or acidity. All of these pollutants can harm fisheries, agriculture and people using the water. Regardless of regulatory requirements, Greenpeace has documented that many Indonesian coal mines do not adequately monitor and treat their discharges, making the impacts worse. Coal loading and transport operations spread toxic coal dust into their surroundings. Coal loading in East Kalimantan is often carried out in the middle of villages, where children and adults are exposed to health-threatening levels of coal dust pollution. More than a million people along the Mahakam river are potentially exposed to coal dust blown off the numerous large, uncovered coal barges sailing down the river every day.

Figure 18: Coal loading in the middle of a large village in Kecamatan Loa Janan



Source: Greenpeace / Lauri Myllyvirta

Figure 19: Coal barge passing through Samarinda



Although coal companies claim that they bring wealth to the region, the truth is that coal developments bring a trail of environmental destruction while local communities see little of the economic benefits. An analysis by Australia's national science agency of mining's impacts in East Kalimantan models how mining creates an adverse impact on poverty. According to the analysis, the initially positive impacts of jobs created in logging and land-clearing for new mining concessions diminishes over time. Large machinery and skilled operators are brought in from other regions for land-clearing activities, however, once clearing is complete, these migrants and their families often stay placing strain on the area's scarce resources. At the same time, soil erosion from the cleared land creates flow-on impacts on fish populations and increases the frequency of floods.^{xx} Such a pattern is common in heavily mined regions, where locals must live with the environmental and health-related burdens of coal development, but see little economic benefits or improvement in their standard of living. It is a bitter irony that even in Samarinda, the capital of East Kalimantan and one of the coal capitals of the world, that 39% of households still have no electricity access.^{xxi}

How the coal industry inflates its economic significance

The Indonesian Coal Association (APBI) paints an extremely rosy picture of the impacts of coal mining on the society: “large reserves of natural resources are synonymous with prosperity”; thanks to coal, “reduction of poverty can be achieved”; “people will gain easy access to adequate education and health care”; and “the country’s competitiveness and independence will be further strengthened”.^{xxii} APBI claims coal exports are “the driver of the Indonesian economy”,^{xxiii} and calls for increased government support to the industry, claiming that that spending more government resources on coal would aid economic development.^{xxiv}

None of these claims are accompanied by numbers on how much the coal industry actually contributes to the economy, and most are in contrast with evidence and experiences from Indonesia and elsewhere – coal mining regions tend to have high-poverty rates, low education levels and poor health situation in the U.S., U.K. and other countries with long experience of coal mining.^{xxv} The negative impacts on communities in Indonesia are all too apparent. However, before this briefing there has been little critical examination of the claims made by Indonesia’s coal industry.

As a result of this exaggerated perception of the contribution that coal makes to Indonesia’s economy, the country’s “Economic Masterplan” (MP3EI) includes major infrastructure investments to facilitate coal exports, and to expand coal-fired power generation. Furthermore, coal exports have been exempted from the raw minerals export ban and proposals to tax coal exports have not been successful.

Conclusions

The Indonesian economy is now the 16th largest in the world, with a strong manufacturing base, vibrant service sector and a big, rapidly growing consumer market. The country does not need coal exports, an industry with low value but large negative impacts on the society, for future prosperity. Uncontrolled coal exports merely introduce unwanted macroeconomic instability, while failing to provide benefits for local communities. Public incentives and investments directed into the coal industry would generate much more jobs, prosperity and growth if spent on services, hi-tech, and manufacturing industries – including renewable energy. Major world powers such as China and the United States have awoken to the dangers of coal-based development. This has led to plummeting demand outlooks in those countries, and triggered massive oversupply in the market.

To ensure inclusive economic growth, Indonesia needs to be smart and boost the competitiveness and productivity of its non-commodity sectors — what Morgan Stanley has termed “Structural Reform 2.0”. The future can be coal free without being impoverished.

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Appendix

Calculating the contribution of the coal industry to Indonesia's economy

According to different sources, Indonesia's coal output was 380-450 million tonnes in 2012,^{xxvi} exports were 300-350 Mt and domestic consumption 80-100 Mt.^{xxvii} Export revenue was reported as USD26.4 billion, a 4% drop from the previous year.^{xxviii} The contribution to GDP from coal exports is revenue minus imported inputs such as machinery and materials needed in mining; these imported inputs are ignored for this estimate, biasing it upwards.

PLN's revenue from power generation was USD11 billion, and total generation was 200.3 TWh, putting average revenue at 55 USD/MWh.^{xxix} Total power generation from coal in Indonesia was 81 TWh in 2011.^{xxx} Valuing coal-fired power at PLN's average revenue per MWh puts the value of coal-fired power generation at 4.7 billion USD. Again, the value of imported inputs such as power plant components is ignored for simplicity.

Indonesia's steel output was 3.7 million tonnes in 2012, and the international market price for steel products was around USD700/tonne and for iron ore around USD125/tonne. This puts the value of steelmaking at 1.9 billion USD (assuming 1.5 tonnes of ore needed for a tonne of steel). The entire value of steelmaking is attributed to the GDP contribution of the coal sector, again biasing the estimate upwards.

Domestic coal consumption other than power plants and iron & steel plants was 34 Mt in 2011. Valuing the domestic coal market at 52 USD/tonne,^{xxxi} the value of the remaining coal market is USD1.8 billion. Summing up these different values results in an estimated total GDP contribution from the coal sector of USD35 billion or 4% of Indonesia's GDP.^{xxxii}

With output valued at constant prices, Indonesia's coal sector contributed a 0.5% increase in GDP from 2010 to 2011, which is 8% of the total GDP growth. From 2011 to 2012, the sector actually contributed a decrease, due to the drop in international coal prices.

ⁱ US EIA, adjudged by weight, <<http://www.eia.gov/countries/cab.cfm?fips=ID>>.

ⁱⁱ Statistics Indonesia, Trading Economics.

ⁱⁱⁱ Bank Indonesia: Defisit Neraca Pembayaran Indonesia Berkurang. Siaran Pers No. 15/22/DKom (16 August 2013). <http://www.bi.go.id/id/ruang-media/siaran-pers/Pages/sp_152213_Dkom.aspx>.

^{iv} Standard Chartered 'IDR to fall further, but no currency crisis' (27 August 2013), available at:

<https://research.standardchartered.com/configuration/ROW%20Documents/IDR_to_fall_further,_but_no_currency_crisis_27_08_13_00_25.pdf>.

^v Morgan Stanley Research 'Big Debates: 2014 – Global' (6 January 2014), p.5.

^{vi} P Warjiyo, 'Indonesia: stabilizing the exchange rate along its fundamental' BIS Papers No. 73 (Oct 2013), p.179.

^{vii} BNP Paribas, '2014: Watch this space' (January 2014).

^{viii} Reserve Bank of Australia, 'The Growth and Development of the Indonesian Economy' (2011), available at <<http://www.rba.gov.au/publications/bulletin/2011/dec/4.html>>.

^{ix} World Bank, 'Picking up the Pace: Reviving Growth in Indonesia's Manufacturing Sector' (2012), available at <<http://www.worldbank.org/content/dam/Worldbank/document/Indonesia-ExecSum-Manufacturing-ENG.pdf>>.

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