

The background of the entire page is an aerial photograph of a city skyline, likely Jakarta, Indonesia. The sky is a clear, deep blue at the top, transitioning to a hazy, golden-brown glow over the city buildings. In the foreground, a red construction crane is visible, partially obscuring some of the lower buildings. The overall scene suggests a mix of urban development and environmental concerns.

Uncertain and Harmful: Japanese Coal Investments in Indonesia

December 2018

GREENPEACE

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A shepherdess watches over her flock of sheep that graze near a coal power plant in Jepara, Central Java.
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Children play by the beach near a coal power plant in Jepara, Central Java, oblivious to the possible threats to their health.

Introduction

While many countries and regions of the world aim to phase out coal - the single largest cause of climate change and air pollution as well as an increasing financial risk - a few countries remain that do not seem to have fully grasped this critical global trend yet. Japan and Indonesia are two such countries.

Japan is a major global trading nation with substantial overseas investments, and one of the three biggest trading partners for most Asian economies.¹ In 2018, it was the biggest infrastructure investor in Southeast Asia.² It is also among the main trading partners for Indonesia³ - in 2018, it was the second biggest source of foreign investment to Indonesia after Singapore.⁴

Japan's investments give it both the power and responsibility to influence developments in infrastructure and the energy sector beyond its borders. This magnifies its impact on the global climate. Unfortunately, ongoing Japanese investments in coal-fired power generation both internationally and domestically are not in line with global efforts to limit the worst impacts of climate change. Among G7 nations, Japan has been the biggest source of public finance to coal power globally,⁵ and its private banks are among the biggest lenders to coal projects.⁶

The Paris Agreement of 2015 commits all countries to limiting global warming to well below 2°C and pursuing efforts to limit warming to 1.5°C. According to the IPCC special report published in October 2018, all pathways aiming for under 1.5°C warming require a near-total phase-out of coal use for electricity generation by 2050, with reductions of approximately two-thirds by 2030.⁷ With such an imminent phase-out for coal, building new coal plants doesn't make sense, either for the climate or for investors. Japan's continued investment in coal power directly undermines the goals of Paris Agreement, which it publicly claims to support.

At the same time, more positive trends have started to appear. Globally, an increasing number of financial institutions have begun limiting their exposure to coal.⁸ In 2018, several major financial institutions in Japan have taken their first steps in the same direction by announcing new policies on investing in coal, taking a more cautious approach than before. Still, despite these new policies, all of the three biggest Japanese banks are involved in ongoing coal projects in both Japan and overseas - including in Indonesia.

Japan, mainland China and South Korea together play a critical role in the continued funding of coal development, particularly in Asia. This report focuses on Indonesia, and the risks and impacts of Japanese coal technology investments overseas. We look at Japan's economic relationship with Indonesia, the issue of energy access in the Indonesian archipelago, risks currently undermining the economics of coal projects in Indonesia, as well the social and environmental cost of coal investments. Based on the risks shown in the report - and on the other hand, the positive outlook for renewable energy - we suggest questions the investors should look into when considering their involvement in coal projects in Indonesia.

2

Indonesia and Japan: A close Asian partnership

Indonesia, an archipelago of about 18,000 islands, is the world's fourth most populated country. It has a population of over 266 million - 54% of it urban⁹ - and a rapidly growing middle class. According to PWC, Indonesia is projected to become the fifth largest economy in the world by 2030.¹⁰

Indonesia has huge coal reserves and is the world's second-largest net exporter of coal. Conversely, Japan is the world's second largest net importer of coal,¹¹ and Indonesia is the second biggest source of that coal after Australia.¹²

Japan is the world's third largest economy with its GDP of 4,872,137 million USD in 2017.¹³ It also has significant overseas investments. In 2017, Japan had the second highest overseas direct investment in the world, behind only the United States, and the UN Conference On Trade And Development reports these investments from Japan are growing.¹⁴ Japanese banks are also some of the biggest providers of overseas credit.¹⁵

Indonesia is a key recipient of Japanese investment. According to Indonesia's Investment Coordinating Board (BKPM) in 2017, Japan had more investments in Indonesia than in any other Southeast Asian country.¹⁶ It is also among the main trading partners for Indonesia¹⁷, and in 2018, it was the second biggest source of foreign investment to Indonesia.¹⁸

Both Japan and Indonesia are already experiencing the effects of climate change. As most of Indonesia's population, industries, infrastructure, and fertile agricultural lands are located in low-lying coastal areas, sea-level rise poses a major problem to the country.¹⁹ In the future, Indonesia is expected to suffer major problems from rising temperatures. A study by University of Hawai'i shows that in 2100, if greenhouse gas emissions continue to rise at their current rates, Indonesia may experience over 300 days a year when temperatures rise over threshold that is deadly for humans.²⁰ Meanwhile in Japan, the extreme weather in the summer of 2018 caused over 220 fatalities in July due to heavy rains and consequent flooding,²¹ making the local authorities order an immediate evacuation for more than 8 million people.²² Afterwards, a heatwave



Daily life navigating air pollution in Jakarta.

pushed temperatures over 41 °C, causing 54,000 people to be transported by ambulance due to heart attack only in July.²³

Energy in Indonesia

The power sector in Indonesia has grown rapidly, driven in part by increased consumption and an ambitious government target to add 35 GW of new power generation. In particular, coal consumption has grown rapidly until now and reached its highest level ever in 2017.²⁴ While oil remains the number one source for primary energy consumption, coal dominates in power generation. In 2018, coal was the source for 62% of Indonesia's power.²⁵ Currently, coal is the main fuel for 61 power plants in Indonesia, and as of July 2018, a total of 50 new projects have been announced or are in pre-permit or permit status.²⁶

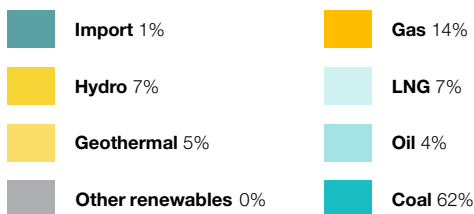
However, the commissioning and construction of new power plants is outstripping the growth in electricity consumption. Poor planning by Indonesia's state-owned utility PLN has led to huge overcapacity, particularly on the Java-Bali grid, and serious financial difficulties for PLN. PLN is currently lowering its growth assumptions to be more realistic.²⁷

Since 2007, the share of renewables in electricity production in Indonesia has remained stable, at around 12%. In 2017, the country set a target to increase the share of renewables in the overall energy mix to 23% in year 2025 in order to meet its commitment to the Paris Agreement.²⁸

Despite its aim to increase the use of renewables, as of 2018, the Indonesian government is aiming to boost both the domestic consumption of coal as well as its export overseas. The plan includes raising the country's annual coal production target from around 485 million tonnes a year to 585 million tonnes in 2019 and further increases in subsequent years.²⁹ However, the plan is not in line with the country's National Medium-Term Development Plan (RPJMN) that requires the decrease of coal production.

With the expected continued growth in the Indonesian power sector, it is critical that its development is managed in a sustainable manner. Future investments directed towards energy efficiency, demand flexibility and renewable energy are needed in order to avoid a huge new fleet of coal-fired power plants with the high CO₂ emissions and associated air pollution that would inevitably follow.

Fuel mix projection for Indonesian electricity production in 2018



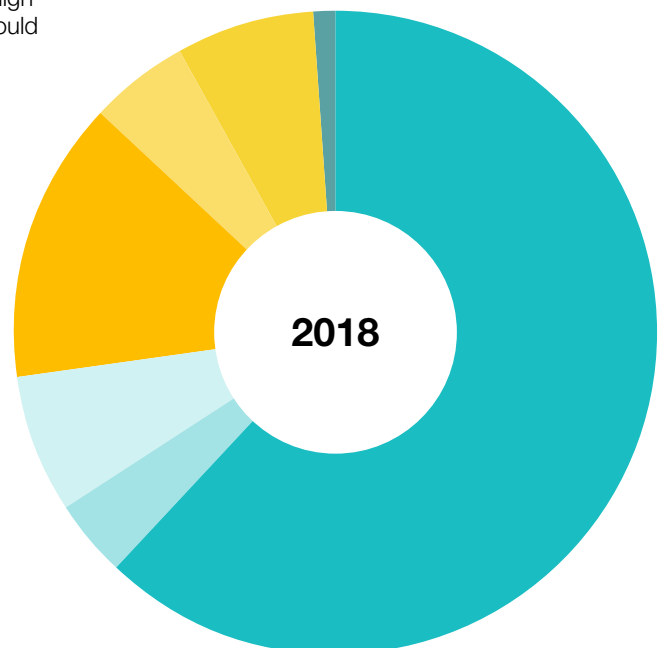
Source: PLN 2018.

Japanese coal fired power projects in Indonesia

Numerous energy projects funded by Japanese public and private financial institutions are contributing to Indonesia's power sector development. But many projects still rely on coal. Using information from the Global Coal Plant Tracker,³⁰ World Electric Power Plants Database³¹ and press releases from the companies and institutions involved, we have listed coal projects in Indonesia where Japanese investors are involved.

Since 1999, Japanese institutions have funded or are planning to fund 14,280 MW worth of coal projects in Indonesia.

Note: we have aimed to use the most recent publicly available data for each project, but changes may have occurred in some project details which are not reflected. Names of the lenders are used in the form they appeared during the time of publication of the project's press release. Where information is unavailable or inapplicable, the space is blank.



Japanese coal fired power projects in Indonesia

Project name, region	Status	Date of press release	Boiler type & capacity (MW)
Tanjung Jati B (units 1-2), Central Java	In operation (from 2006)	31 Jul 2003 ³²	SUB 1 320
Tanjung Jati B (units 3-4), Central Java	In operation (from 2011, 2012)	30 Dec 2008 ³⁴	SUB 1 320
Tanjung Jati-B (units 5-6), Central Java	Under construction	27 Feb 2017 ³⁵	USC 2 000
Paiton 2 (units 5-6), East Java	In operation (from 2000)	17 Aug 2011 ³⁷	SUB 1 220
Paiton 3, East Java	In operation (from 2012)	8 Mar 2010 ³⁸	SC 815
Paiton (units 7-8), East Java	In operation (from 1999 ⁴⁰)		SUB 1 230
Cirebon (unit 1), West Java	In operation (from 2012)	8 Mar 2010 ⁴³	SC 660

Owners	Lenders	JBIC loan	Cofinanced loan
Sumitomo Corporation	JBIC, Sumitomo Mitsui Banking Corporation, others ³³	86.7 billion JPY	144.4 billion JPY
Sumitomo Corporation	JBIC, The Bank of Tokyo-Mitsubishi UFJ, Ltd., Sumitomo Mitsui Banking Corporation, BNP Paribas Tokyo Branch		160 billion JPY
Sumitomo Corporation, The Kansai Electric Power Co. Inc., PT United Tractors Tbk ³⁶	Mizuho Bank, Ltd., The Bank of Tokyo-Mitsubishi UFJ, Ltd., Sumitomo Mitsui Banking Corporation, Mitsubishi UFJ Trust and Banking Corporation, Sumitomo Mitsui Trust Bank, Limited, The Norinchukin Bank, Oversea-Chinese Banking Corporation Limited, Tokyo Branch	1 678 million USD	3 355 million USD
Marubeni Corporation, YTL Power International, PT. Bumipertwi Tatapradipta, Siemens AG			
Mitsui & Co., Ltd., JERA Co., Inc., Nebras Power, PT Batu Hitam Perkasa ³⁹	JBIC, The Bank of Tokyo-Mitsubishi UFJ, Ltd., Mizuho Corporate Bank, Ltd. *, Sumitomo Mitsui Banking Corporation, The Sumitomo Trust and Banking Co., Ltd., BNP Paribas, Tokyo Branch, Crédit Agricole CIB - Tokyo Branch, ING Bank N.V., Tokyo Branch, Tokyo Branch of The Hongkong and Shanghai Banking Corporation Limited		1 215 million USD
Mitsui & Co., Ltd., JERA Co., Inc., Nebras Power, PT Batu Hitam Perkasa ⁴¹	JBIC		900 million USD ⁴²
Marubeni Corporation, Korea Midland Power Co., Ltd., SAMTAN Co., Ltd., PT Indika Energy Tbk	JBIC, The Bank of Tokyo-Mitsubishi UFJ, Ltd., Mizuho Corporate Bank, Ltd. *, Sumitomo Mitsui Banking Corporation, ING Bank N.V., Tokyo Branch, The Export-Import Bank of Korea		595 million USD

Project name, region	Status	Date of press release	Boiler type & capacity (MW)
Cirebon (unit 2), West Java	Under construction (est. operation 2022)	14 Nov 2017 ⁴⁴	USC 1 000
Cirebon (unit 3), West Java	In planning (halted)	17 May 2016 ⁴⁶	USC 1 000
Banten Lontar (unit 4), West Java	Under construction	16 Mar 2016 ⁴⁷	USC 315
Batang (units 1-2), Central Java	Under construction (est. operation 2020)	3 Jun 2016 ⁴⁸	USC 2 000
Indramayu (unit 4), West Java	In planning	28 Mar 2013 ⁵⁰	USC 1 000
Tabalong (units 1-2), South Kalimantan	Under construction	1 Feb 2017 ⁵¹	SUB 200
Kalselteng 2 (units 5-6), South Kalimantan	In planning (delayed)	21 Jun 2017 ⁵²	SUB 200

* In 2013, Mizuho Bank and Mizuho Corporate Bank merged and began operating as the new Mizuho Bank. See <https://www.mizuhobank.com/link/0003.html>

Owners	Lenders	JBIC loan	Cofinanced loan
Marubeni Corporation, SAMTAN Co., Ltd., PT Imeco Inter Sarana, Korea Midland Power Co., Ltd., JERA Co., Inc., PT Indika Energy Tbk ⁴⁵	JBIC, The Bank of Tokyo-Mitsubishi UFJ, Ltd., Mizuho Bank, Ltd., Sumitomo Mitsui Banking Corporation, ING Bank N.V., The Export-Import Bank of Korea	731 million USD	1740 million USD
Marubeni Corporation, Korea Midland Power Co., Ltd., SAMTAN Co., Ltd., PT Indika Energy Tbk			
Perusahaan Listrik Negara	JBIC, Sumitomo Mitsui Banking Corporation	9.8 billion JPY and 107 million USD	16.4 billion JPY and 179 million USD
PT Adaro Power, ITOCHU Corporation, J-POWER/Electric Power Development Co.,Ltd. ⁴⁹	JBIC, Sumitomo Mitsui Banking Corporation, The Bank of Tokyo Mitsubishi UFJ, Ltd. Mizuho Bank, Ltd., Sumitomo Mitsui Trust Bank, Limited, Mitsubishi UFJ Trust and Banking Corporation, Shinsei Bank, Limited, The Norinchukin Bank, DBS Bank Ltd, Oversea-Chinese Banking Corporation Limited	2 052 million USD	3 421 million USD
Perusahaan Listrik Negara	JICA	1 727 million JPY	
PT Adaro Power, PT EWP Indonesia	The Bank of Tokyo-Mitsubishi UFJ, Ltd., DBS Bank Ltd, The Hongkong and Shanghai Banking Corporation Limited, Korea Development Bank, Korea Development Bank Singapore Branch, Mizuho Bank, Ltd., Sumitomo Mitsui Banking Corporation, Singapore Branch		
Perusahaan Listrik Negara	JBIC, The Bank of Tokyo-Mitsubishi UFJ, Ltd.	10.1 billion JPY and 53 million USD	16.9 billion JPY and 89 million USD

Investing in overcapacity, potential stranded assets and air pollution

Investing in overcapacity

Japanese funders of coal projects use the argument that they are helping Indonesians gain access to electricity. However, the vast majority of Indonesians already have access to electricity. In 2017, the electrification rate for the country reached 95.35%.⁵³

Japanese coal power projects are not situated in areas where new energy is actually needed. On the contrary, **most of the Japanese funded coal plants are being built on the Java-Bali grid, where electricity access is already highest in Indonesia.** In 2017, Java had the highest overall electrification rates out of the main islands: provinces of Banten, DKI Jakarta (Jakarta Capital Region), Jabar and DIY (Yogyakarta Special Region) reaching 99.99%, Bali 97.12%, Jateng (Central Java) 96.30% and Jatim (East Java) 92.03%.⁵⁴

80% of Indonesia's power demand is situated at the Java-Bali grid.⁵⁵ However, **the rush to build power capacity on this grid has already led to a situation of overcapacity.**⁵⁶ In November 2017, the CEO of Indonesia's state-owned utility PLN, reported to media that 40% of electricity produced by the company was unused at that time.⁵⁷ According to Ministry of Energy and Mineral Sources data, PLN's business plan for 2018-2027 shows that current reserve margin (the gap between existing power capacity and peak demand) on Java-Bali grid is at 28.2-30.7%.⁵⁸ Due to the overcapacity situation, critical questions about the need for new coal plants have been raised.⁵⁹

The current overcapacity is the result of PLN's unrealistic assumptions of fast increases in electricity sales. The company's business plan in 2017 assumed annual increases of 8.3%. However, real demand growth has been much lower at 3.1% in 2017.⁶⁰ In 2018, the forecast was lowered to an annual growth of 6.86% - still significantly higher than actual growth seen in recent years.⁶¹

The problem of overcapacity has already become a political scandal in Indonesia, putting PLN under extreme political and financial pressure.

The Indonesian government has criticised PLN's "improper and irrational" projection of available capacity and peak demand in key regions across the



40 year-old Ma'ani with her 6 month-old baby Anfi Setyawan Adi Putra in front of their house which is covered with thick cloth to protect it from coal dust from a nearby coal power plant in Cilacap Central Java.

country. According to Deputy Energy and Mineral Resources Minister Arcandra, the overcapacity issue means that due to the power purchase contracts (PPA) with take-or-pay clauses PLN has made with various independent power producers (IPPs, including the Japanese developers), PLN would be paying for unnecessary electricity.⁶² In 2017, a leaked letter from the Minister of Finance Sri Mulyani Indrawati noted PLN's failure to meet electricity sales targets and debt payments, saying the company's situation is a burden on Indonesia's state budget.⁶³ The minister also said it was "necessary to adjust the investment completion targets".⁶⁴ IEEFA has also criticized PLN's poor planning, its reliance on government subsidies, and its myopia over global trends such as the growing importance to investors of environmental performance.⁶⁵

Another challenge for power projects in Indonesia is the weakness of the country's currency, which in September 2018 led the government to suddenly announce that half of the planned power projects would be put on hold.⁶⁶ The Indonesian Rupiah has depreciated substantially against the US dollar in 2018.⁶⁷

PLN's problems should concern Japanese investors, as all of the Japanese funded coal projects rely on contracts and cooperation with the state owned company. Sudden and big changes in the country's electricity development plans also pose significant uncertainty for investors.

Changing regulations, deteriorating economics

Japanese developers of coal plants in Indonesia face uncertainties that could contribute to deteriorating economics and potentially to stranded assets, even in projects that currently look strong on paper. Beyond macroeconomic risks (such as currency, growth and political risks among others) and overcapacity issues, there are a few questions Japanese investors and lenders to Indonesian coal power plants should consider before committing large resources.

Are PLN's PPAs really "bullet-proof"? How stable are current regulations and capacity plans?

Regulations around PLN-IPP PPAs have been changed several times during recent years in Indonesia. This creates uncertainty about the regulatory environment - there is no guarantee that the ongoing financial issues of PLN will not lead to legal changes that are detrimental to IPP owners and lenders. This risk cannot be ruled out in the light of PLN's recent large losses and the government's determination to limit state subsidies to the utility.

For example, in one of the 2017 reviews, key clauses in the rules around PPAs were changed. Some of the changes were aimed at benefiting the IPPs, but disadvantages were identified as well. In their analysis of the changes, a major legal firm noted that "the language in Article 6(3) suggests that the take-or-pay commitment of PLN may be limited to the duration of the financing repayment term, as opposed to the duration of the PPA."⁶⁸ Uncertainty about the duration of such commitments should be a major concern, in combination with other pressures that may cause projects to be delayed (e.g. overcapacity) or prematurely discontinued (competition from other energy sources, climate regulations etc.).

The fast and numerous changes in the regulations have been viewed negatively by the markets. An Indonesian Power Survey of the domestic and international market participants, undertaken by Price Waterhouse Cooper, showed that **94% of respondents believe that regulatory uncertainty is a major barrier to investing in new large-scale power generation in Indonesia.** Even after some of the disadvantageous changes to PPA regulations in 2017 were later amended, uncertainty about the stability of the investment environment remains an issue.⁶⁹

Another major uncertainty comes from the annual reviews of PLN's business plans (RUPTL). **The last review in spring 2018 resulted in a significant reduction in targeted power generation capacity: the target for the next ten years was lowered from 78GW to 56GW.**⁷⁰ Changes of this magnitude raise serious questions about the reliability of the plans.

The reduced capacity target was followed by more changes in PPA regulations⁷¹: "the 2018 Electricity Plan (RUPTL) published earlier in the year expressly recognized PLN's reduced ambitions for new power projects, including due to the reduced projected growth for electricity demand. MEMR [Ministry of Energy and Mineral Sources] has now announced its policy plans to delay the COD [Commercial Operation Date] for PPAs already signed by PLN but which have not yet reached financial close. MEMR has stated that PPAs scheduled to reach COD in 2018-2019 will be delayed until 2020-2021 while **PPAs scheduled to reach COD in 2020 or beyond will be delayed based on the needs of PLN.**"

Additional bad news for overseas investors is the local content consideration that will limit imports: "MEMR has also announced its renewed **policy plans to increase the local content of Indonesian power projects.** It is understood that MEMR will implement the tightening of goods import plans for power projects in order to maximize the use of domestic products and reduce Indonesia's current account deficit."

How long can you profit from coal plants if Indonesia honors the Paris Agreement?

A recent analysis from the Carbon Tracker Initiative shows large stranded asset risks in the Indonesian coal power generation sector from the requirement to meet the goals of the Paris Agreement. The analysis expects Japanese group Sumitomo Corporation to be the second most exposed company, behind PLN: "In a scenario where Indonesia phases-out coal power in accordance with the Paris Agreement, coal power owners risk losing \$34.7 billion. This asset stranding is due to the premature retirement of coal capacity. Our cost-optimised retirement schedules show an average plant lifetime of 16 years, which is 24 years less than the typical lifetime of a coal plant. PLN Persero, Sumitomo Corporation and Sinar Mas Group are at most risk due to increasing unviability of coal."⁷²

What happens if other investors leave? Will the last investor standing take all the hits?

In 2018, major Japanese banks, the top three Japanese insurance companies, and Marubeni, a major industrial conglomerate, announced plans to reduce their coal-exposure and involvement in coal projects.⁷³ Meanwhile, some Korean companies have actually announced withdrawal from specific coal investments in Indonesia. In September 2018, Korea Midland Power, a subsidiary of the South Korean utility KEPCO, revealed that it was pulling out of a proposed 1000 MW coal plant Cirebon 3 in Indonesia, and would convert it to a renewable energy project. Another KEPCO subsidiary, Korea Western Power, is also considering converting a 1200 MW coal plant to a renewables project in Vietnam.⁷⁴ This trend may directly affect ongoing Japanese projects in Indonesia, increasing the risk for the remaining investors and lenders.

The myth of reduced emissions

Supporters of Japanese coal technology exports to countries like Indonesia often argue that so-called “clean coal” technology will reduce CO₂ emissions, thereby contributing to efforts to mitigate climate change.

In reality, the emission reduction from subcritical plants to ultra-supercritical ones is marginal. Coal-fired power plants with higher thermal efficiency typically reduce CO₂ emissions from around 880g/kWh for a new subcritical power plant to around 740-800g/kWh for an ultra-supercritical plant⁷⁵ - **a reduction of only 15%**. In short, issues of CO₂ emissions won't be sufficiently solved by building new coal plants with somewhat more advanced technologies.

Technology	CO ₂ emissions intensity (gCO ₂ /kWh)
Subcritical (SUB)	≥ 880
Supercritical (SC)	800 - 880
Ultra-supercritical (USC)	740 - 800
A-USC/IGCC	670-740

CO₂ emissions intensity values for coal technologies. Ecofys, 2016.

In 2014, the emission intensity of Indonesia's power sector was around 736gCO₂/kWh⁷⁶. According to currently available information, coal projects with Japanese involvement in Indonesia include 12 subcritical, 2 supercritical and 8 ultra-supercritical units. Assuming the plants' CO₂ emissions reflect the typical emission range for their respective types, it appears that the Japanese coal projects would not decrease

power sector's emission intensity in Indonesia. In reality, actual emissions could be even higher, as the quality of coal used in Indonesia is typically lower.⁷⁷

It is also important to note that Japanese coal projects in Indonesia are not replacing old, less efficient power plants, but providing additional capacity. Even with lower emissions compared to less developed coal technology, every new coal power plant – including the ones built by Japan in Indonesia – increases the amount of carbon in the atmosphere and contributes to climate change.

At the same time, the IPCC's Special Report on 1.5°C shows that global CO₂ emissions must halve by 2030 before falling to net zero by mid century at the latest. For the coal sector, in practice this means reducing coal use for electricity production by two-thirds by 2030, and a near-total phase-out by 2050.⁷⁸ The warnings from climate scientists, set out in the IPCC report, make it very hard to argue for new coal power capacity.

Exporting air pollution

Coal-fired power plants are dangerous for public health. They cause air pollution, which has been identified by the World Health Organisation as the biggest environmental risk to public health. Ambient air pollution causes more than four million premature deaths a year. Of all the pollutants produced by burning coal, fine particulate matter has the biggest impact.⁷⁹

Even power plants with the best technologies cannot eliminate the pollution from coal power plants completely⁸⁰ - and currently, best technology is not even being required by Indonesian law. Hence, plants built by Japanese companies in Indonesia do not install emission controls that are up to modern standards, nor to the current Japanese domestic level. New power plants subjected to EIA process in Japan generally emit an average of 15-25ppm for SO₂ and NO_x, and 5-10mg/Nm³ for dust.⁸¹ **In comparison, the emissions data in the EIA (Environmental Impact Assessment) of the Batang coal power project for example shows that the plant is expected to emit approximately five times as much pollution**, as the developer has indicated the emission amounts will be approximately 105ppm, 127ppm and 50mg/Nm³ respectively.⁸²

The Ministry of Environment and Forestry in Indonesia is currently in the process of revising current regulations for coal plant emission standards.⁸³ The revision is expected to be issued in the near future. This will affect both existing coal fired power plants as well as those in planning. Stricter air pollution emission regulations could force coal plant owners to install new

scrubbers and other expensive post-combustion control technologies not covered in the initial design of their power plants. These kind of additional costs have already made coal power plants increasingly unprofitable in other parts of the world.⁸⁴

Health impacts from air pollution

According to a report by WHO published in 2018, the island of Java is already suffering from air pollution levels that exceed its guidelines. While the WHO Guideline for annual mean concentrations of PM_{2.5} is to stay below 10µg/m³, the levels on most of Java range from 15-35µg/m³, rising to above 65µg/m³ near Jakarta.⁸⁵ For comparison, the Indonesian regulation (PP41/1999⁸⁶) requires a level of 15µg/m³ of PM_{2.5} for annual mean concentrations, and 65µg/m³ for the 24 hour mean concentrations.

Atmospheric modelling conducted by a research team at Harvard University Atmospheric Chemistry Modelling Group found that in 2011, air pollutants from coal power plants caused an estimated 7,480 premature death each year in Indonesia. It is estimated that **current coal expansion plans will increase that number to 24,400 per year by 2030**. The main causes of these premature deaths are strokes, ischemic heart disease, chronic obstructive pulmonary disease, lung cancer and other cardiovascular and respiratory diseases. Many of the deaths are due to increased exposure to toxic particulate matter (PM_{2.5}) due to emissions from power plants; others from exposure to ozone.⁸⁷ Young children, the elderly and people with existing medical conditions, as well as pregnant women are especially vulnerable.⁸⁸

Japanese investments in coal power projects are increasing the problem of air pollution on Java where most of the projects are concentrated.

One existing case concerns the Tanjung Jati B power plant, developed by Sumitomo Corporation and funded by JBIC, MUFG Bank, Sumitomo Mitsui Banking Corporation and BNP Paribas. The power plant consists of four units totaling 2,640 MW plant in Jepara, Central Java, brought into operation in 2006-2012.

Unlike the majority of operating coal-fired power plants in Indonesia, desulphurization equipment has been installed in units 3 and 4. Modelling for Greenpeace Indonesia shows the dispersion of air pollutants from the plant on the island of Java. The worst impact on air quality occurs in Jepara, Pecangaan, Kembang and Karangsari. Semarang in the south and Rembang and Lasem in the east are also affected. Most of the premature deaths occur in Semarang where the population density is greatest.



A coal power station in Jepara emits smoke and fumes into the surrounding landscape.

Overall, it is estimated that the emissions caused by the Tanjung Jati B power plants (units 1-4) lead to 1,020 premature deaths a year.⁸⁹ Currently, the power plant is being expanded to include units 5 and 6 for 2,000 MW of additional capacity, again financed by Japanese investors.

Protests against the local impacts caused by the Japanese power plant

According to local people in Jepara, the Tanjung Jati B power plant has had an impact on both the health and livelihoods of the local community. Members of the community have reported issues such as declining fish catch, as well as serious health issues like breathing difficulties, pneumonia, and skin complaints due to the air pollution from the plant. While people in the community hoped to be offered regular health checks to monitor the situation, this has not been offered by the power company.

The locals have organised protests against the power plant expansion. Many hope to receive treatment for their health issues. They want emissions from current units to be reduced, and assurances that the new units will not make the situation even worse. When asked by Greenpeace Japan what kind of energy they would like the Japanese developers to invest in, renewable energy projects were preferred.

Shifting the investments - Indonesia's renewable potential

While the main island of Java currently faces oversupply, worsening air pollution and the need to rapidly reduce CO₂ emissions means Indonesia will continue to need investment to modernise its energy sector. In particular, it needs investment in demand management, energy efficiency and renewable energy in order to facilitate the phase-out of its coal fleet.

The Indonesian government has set a target of generating 23% of its energy use from renewables by 2025.⁹⁰ This means a significant increase in renewable electricity production, with the current share at 12%. Given this target, there are plenty of opportunities for sustainable investment in Indonesia.

According to IRENA, Indonesia has abundant resources for solar, wind, ocean and bioenergy development, as well as some of the world's best geothermal and hydropower potential. In addition to electricity generation, these sources can provide energy for heating, cooling and transport.⁹¹ However, caution is needed in geothermal, hydropower and biofuels projects in order to avoid negative impacts to local communities and environments, and investors should adhere to robust sustainability criteria.

There is also an important role for electrification efforts in Indonesia for remote settlements. The Asian Development Bank's analysis calls for increased use of renewable mini-grids and individual household systems for areas where grid extension is prohibitively expensive. As an example, on the island of Sumba in Nusa Tenggara Timur, it would be less costly to use renewable off-grid technologies rather than grid extension.⁹²

Competition from solar

The cost of renewables continues to plummet, and according to new analysis by Carbon Tracker Initiative, **building new solar PV capacity is expected to become cheaper than operating existing coal plants in Indonesia by 2028** - or sooner if regulations to limit air pollution require the current coal fleet to retrofit pollution controls.⁹³



Greenpeace donates a solar power system to a coastal village in Aceh, Indonesia.

While the current government plan foresees 9 GW of installed solar in 2030, IRENA has identified potential for as much as 47 GW. Realising this potential requires investments in both rooftop and utility-scale PV installations. Java-Bali offers the most potential because of good infrastructure, but solar is also ideal for delivering electricity to households in remote areas which are not connected to the grid.⁹⁴ PLN has already created a programme for rural solar expansion for the years 2017-2026. One of the goals of the programme is to accelerate private investment for solar in Indonesia.⁹⁵

Towards high renewable energy shares

Scenarios for 100% renewable generation for Indonesia are becoming more critical in order to deliver the necessary emission reductions identified in the IPCC 1.5 report. One study from 2017 shows how the Java-Bali grid could be powered entirely by renewables in 2050, using geothermal, waste biomass (e.g. residues from palm oil production), hydropower and solar. The study finds a major role for solar, and also recommends promoting geothermal in order to balance with other variable energy sources.⁹⁶ More scenarios showing possible pathways to a renewable energy system for Indonesia are needed. Developers and investors also need to be aware of such scenarios and adjust their energy export strategies accordingly.



Students visit the Climate Rescue Station at Lumbini Park in Borobudur, Central Java.

Conclusions and questions for investors

Japan argues that it is exporting advanced coal technology to Indonesia to contribute to its development while minimising environmental impact. However numerous problems related to coal expansion can be seen.

By betting on coal, Japanese banks and other lenders are not only contributing to global climate change and causing harm to Indonesians, who suffer from the pollution caused by coal plants, they are also risking their investments.

The issues highlighted in this and many other reports raise serious questions about the economics of the Japanese funded coal power projects. The individual risk factors presented in this report - macroeconomic risks, overcapacity, PLN's financial difficulties, political pressure leading to delays, regulatory changes around PPAs, climate regulations, cost competition from solar power, additional costs from air pollution regulations, investors' changing coal policies and withdrawals from projects - are all significant in themselves. A combination of these risks could radically change the prospects for any coal project. The combination of reduced targets for new capacity, delays in projects already in planning and the cost competition from renewables is negatively impacting the length of time investors can expect to have for getting returns on their investment and paying back loans.

At the same time the benefits of, and the need for, investments in renewable energy and energy efficiency are clear. All over the country, the wide-scale phase-in of renewables is needed in order to cut CO₂ gases, mitigate the problems of air pollution and provide energy when phasing out of the currently oversized coal power production fleet begins. In areas of Indonesia where access to electricity is currently the lowest, renewables are the most viable option.

If Japan and Indonesia wish to stay relevant in the global energy market, both countries need to modernise their approach to energy and align their visions for the energy sector with the Paris Agreement and the IPCC Special Report on 1.5°C. Ending the expansion of coal power is the crucial first step.

Key Japanese banks and financial institutions have already started reconsidering their investments in coal and published policies on the issue. From now on, those policies should be strengthened and extended to overseas projects - as many of their global peers are already doing.⁹⁷ **Ultimately, both public and private Japanese financial institutions must end coal investments both domestically and internationally.**

For the investors and the lenders of coal projects in Indonesia - including the numerous Japanese public and private financial institutions mentioned in this report - we suggest the following questions:

- Have the implications of overcapacity in the Indonesian power generation market been properly considered?
- Are PLN's electricity demand growth projections and capacity addition strategies reliable?
- Are PLN PPAs really "bullet-proof"? Are relevant regulations stable enough?
- How will involvement in these coal projects affect the owners and lenders' global brand reputation?
- How will delays issued by the Indonesian government affect the prospects of these power projects?
- How compatible are coal projects and their long pay-back times with the requirements of the Paris Agreement and the price trends for renewable energy?
- What will happen to the projects' economics if it is cheaper to build new solar than operate old coal plants within a decade from now?
- What happens if other investors leave or propose to redesign the project?
- Will investors face additional demands from new air pollution regulations?

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