

A woman with dark hair pulled back, wearing a black t-shirt, holds a black sign in front of her chest. The sign features white text and a Greenpeace logo. The background is a solid green color. The woman's expression is serious and focused.

**THE HIGH COST OF COAL POWER:  
INTERNALIZING HEALTH IMPACTS AND COST  
FROM COAL-FIRED POWER PLANTS IN INDONESIA**

**GREENPEACE**

# The High Cost of Coal Power: Internalizing Health Impacts and Cost from Coal-Fired Power Plants in Indonesia

Coal power as the Government of Indonesia's main option to achieve its ambitious target to build an additional 35 Gigawatts (GW) of new power plants by 2019 creates hazardous health impacts and a huge amount of health cost which will burden the government and the affected people. Taking into account the health impacts and associated costs from coal-fired power plants, its generation cost is much more expensive than all types of renewable energy. Hence, coal-fired power is obviously a false option for the country's future energy strategy.

Energy production and use remains a major source of air pollution in Indonesia. Over 85 percent of particulate matter and most sulfur oxides and nitrogen oxides are released by the energy sector. Currently, millions of tonnes of pollutants from energy are released which contributes significantly to as many as the death of an estimated 190 people per day in the nation in 2013.<sup>1</sup>

Coal emissions are one of the most damaging pollutants released by the energy sector. However, to date, around 40 percent of power plants worldwide still use coal as its energy source. While coal power plants are getting less popular in a number of developed countries such as the United States and the Netherlands -thanks to increasing awareness of its hazardous impacts, broad public opposition toward the use of coal and the availability of affordable renewable energy - it still dominates energy production in Indonesia. Coal-fired power plants make up to approximately two thirds of coal sales in the country in 2010.

The false rationale for the existing use of coal for power generation is it is deemed cost efficient compared to other energy sources, including the cost of renewable energy. It has some worrying implications for the Government of Indonesia's energy strategy. For instance, to achieve the Government of Indonesia's ambitious target to build an additional 35 Gigawatts (GW) of new power plants by 2019, it appears that 22,000 megawatts of this capacity will come from coal power plants.

The premise that coal power is cheap is outdated and misleading. It does not take into account the real and worrying negative externalities, such the health impacts and associated costs from coal-fired power plants. In fact, power plants emit toxic pollutants including mercury and tiny toxic particles containing lead, arsenic and cadmium into the air that subsequently expose communities to the risk of chronic diseases in adults and acute respiratory infection in children. A recent Greenpeace report, based on modelling carried out at Harvard University, estimates coal power plants are responsible for premature deaths of 6,500 people every year in Indonesia. Taking into account the current planned coal power expansion in Indonesia, coal power would endanger the lives of 15,700 people every year in Indonesia.<sup>2</sup>

<sup>1</sup> Institute for Health Metrics and Evaluation. GBD 2013. University of Washington. <https://vizhub.healthdata.org/gbd-compare/#settings=94d9c7a7ff84d53359a62754fd1f16f7fdd63b02>.

<sup>2</sup> Greenpeace Indonesia, 2015. Human Cost of Coal Power: How Coal-Fired Power Plants Threatens the Health of Indonesians.





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. One of her children, Juniko Ade Putra died aged 2,5 years old in June 2011 from respiratory illness believed to be caused by coal dust.. **Photo: Greenpeace doc. 2012, by: Kemal Jufri.**

## Internalizing the health impacts and cost

Currently, there are coal power plant projects with a total additional capacity of 45,365 MW across the country. The stages of development vary, comprised of 17,825 MW 'announced' projects, 17,930 MW 'pre-permit development' projects, 4,400 MW 'permitted' projects and 5,210 MW 'under construction' projects. It is estimated that the total investment cost would amount to USD 58.5 billion or IDR 770 trillion.

Aside from the investment cost -and other components of cost which include the fuel cost and the operation and maintenance cost- it is important to internalize the health cost -and other types of externalities- to obtain the figure on the 'real' cost of coal power. Based on a Greenpeace's calculation using Harvard University research, health impacts from 45,365 MW coal power plants will cost USD 26.7 billion or equal to IDR 351 trillion for every year of operation.

## Estimated Investment Cost and Health Cost of Coal Power

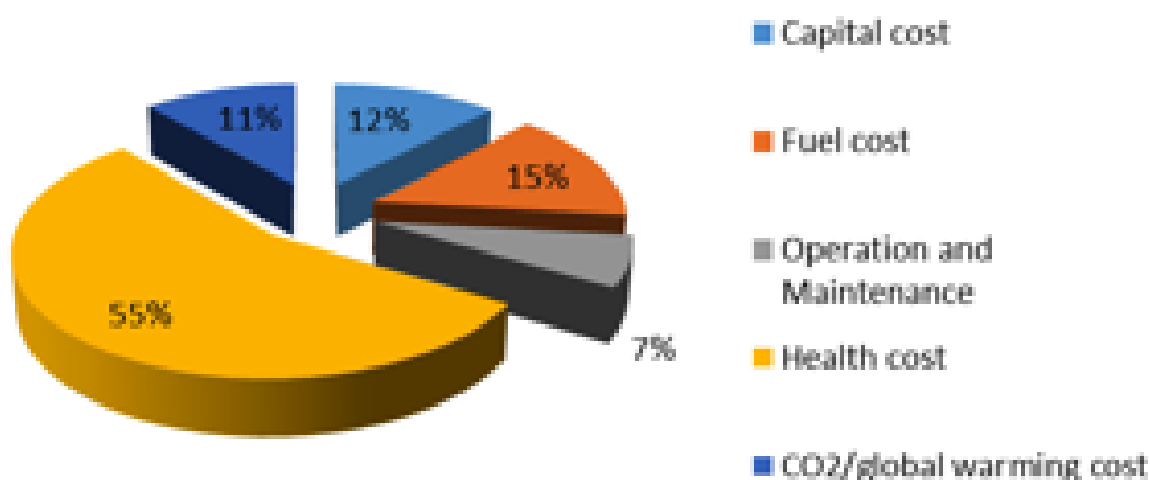
Tahapan Pembangunan	Biaya Investasi (Triliun Rupiah)	Biaya Kesehatan (Triliun Rupiah per Tahun)
Announced	302	138
Pre-permit development	304	139
Permitted	75	34
Construction	88	40
<b>TOTAL</b>	<b>770</b>	<b>351</b>

While the investment cost only occurs once during the development of power plants, health cost will continue to recur during the lifetime of power plants. As a result, the health cost has a larger implication compared to the investment cost into the total cost of coal power plants.

An IDR 351 trillion yearly health cost is much higher than the allocation of the 2016 State Budget for health sector which totalled approximately IDR 110 trillion, equal to 5 percent of the total budget. The health cost must be borne both by individuals and the government. Furthermore, it will decrease the quality of life and people's productivity on an ongoing basis.

A calculation carried out by Greenpeace shows that the health cost accounted for USD 84.19 per MWh coal power generation. It is equivalent to 55 percent of the total coal power generation cost which accounted for USD 152.65 per MWh. Taking out the health cost -and also the CO<sub>2</sub>/global warming cost- from the coal power cost structure is, therefore, misleading since the total share of capital cost, fuel cost and operation and maintenance cost is only 38 percent of the actual cost of coal power plants.

### Share of Generation Costs of Coal Power in Indonesia



Air pollution emitted from coal power plants increases the risk of serious illnesses like lung cancer, stroke, heart disease, chronic respiratory ailments and acute respiratory infection. Infants, pregnant women, and the elderly are most vulnerable to the acute effects of air pollution. In Indonesia in 2008 coal burning accounted for an estimated 50% of energy-related SO<sub>2</sub> emissions, 30% of PM<sub>10</sub> emissions and 28% of NO<sub>x</sub> emissions.<sup>3</sup> It is estimated that the planned 45,365 MW coal power projects will cause the premature deaths of 20,687 people per year in the nation. The number is roughly three times the current 6,500 premature deaths caused by strokes, ischemic heart disease, chronic obstructive pulmonary disease, lung cancer and other cardiovascular and respiratory diseases deaths of young children.

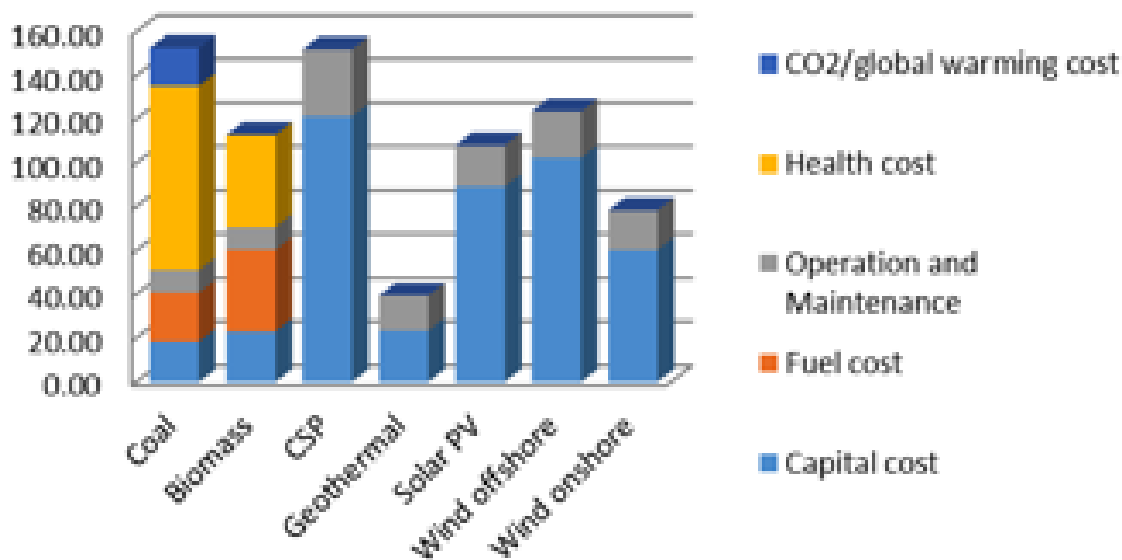
It is also important to note that the figures on coal power cost remain underestimated. It has yet to include all of the costs from environmental impacts, such as water pollution, and economic impacts from severe climate change exacerbated by a large amount of GHG emissions from coal burning.

### Coal-fired power plants are high cost

When the health cost are internalized into the cost structure of coal power plants, coal power is no longer a cheap energy source. Its generation cost without internalizing the health cost and CO<sub>2</sub>/global warming cost accounted for USD 51.22/MWh. The figure is much smaller than the investment cost of various kinds of renewable energy, except geothermal. Onshore and offshore wind energy, as comparisons, cost USD 78.25/MWh and USD 123.55/MWh respectively.

However, the generation cost increases significantly to USD 152.65 per MWh power generation when the health cost and CO<sub>2</sub>/global warming cost are internalized into the cost structure. The figure already exceeds the generation costs of all types of renewable energy. For instance, biomass and solar PV-generated power costs 112.76 USD/MWh and USD 108.07/MWh respectively.

**Cost of Power Generation (USD/MWh)**



<sup>3</sup> J. Kurokawa, T. Ohara, T. Morikawa, S. Hanayama, G. Janssens-Maenhout, T. Fukui, K. Kawashima, and H. Akimoto. 2013. Emissions of air pollutants and greenhouse gases over Asian regions during 2000-2008: Regional Emission inventory in ASia (REAS) version 2. Atmos. Chem. Phys. 13: 11019-11058.

## Recommendations

**Coal-fired power is a false option for Indonesia's future energy strategy. In light of this, the Government of Indonesia must implement the following:**

- 1. Stop new coal power plant projects:** It must be translated into concrete policies, among others by ensuring that the policies are included in the (revised) medium-term development plan, an important reference for lower-level development plans at the national and sub-national level.
- 2. Phase out and improve the monitoring of existing coal power plants:** In doing so, the Ministry of Mineral Resources and Energy should develop a roadmap with clear interim targets to promote a rapid shift from coal power to renewable energy. It is also necessary to carry out transparent monitoring for emissions from existing coal power plants that can easily be accessed by the public, including local communities, and strengthen law enforcement and impose tough sanctions to non-compliances by coal power plants
- 3. Set a more ambitious target to increase the share of renewable energy to replace coal power:** To be effectively implemented, the government should: (1) provide appropriate incentives for the development of renewable energy; (2) support the development of renewable energy-related technology, for instance those which aim to improve the capacity factor and lower the cost of renewable energy; (3) focus on Indonesia's abundant renewable energy, such geothermal which its potential accounted for as 40% of the world's geothermal reserves and its capacity exceeds 29,000 MW<sup>4</sup>, hydropower and wind power.

<sup>4</sup> Rosen, L. 2013. Climate Change, the World Bank, Indonesia and Coal. The Futurist-World Future Society. 15th October 2013. <https://www.wfs.org/blogs/len-rosen/climate-change-world-bank-indonesia-and-coal>