



**JAKARTA'S
SILENT KILLER**

HOW THE CITY'S
DANGEROUS LEVELS
OF AIR POLLUTION
ARE ABOUT TO GET
EVEN WORSE



TABLE OF CONTENTS

Summary (Key Findings)	3	TABLES AND FIGURES	
Part 1: The Poor Air Quality In Jakarta	4	Table 1. Coal-Fired Power Plants Located Within	
A New Threat For Jakartans	5	100 Km From Jakarta	5
Part 2: The Distribution Range Of Coal Pollution		Table 2. Projected Premature Deaths And Other	
And Its Impact On The Human Health	6	Health Impacts Caused By Emissions From	
How Each Pollutant Attacks Human Health?	6	The Observed CFPPs (Cases Per Year)	10
Fine Particles (PM2.5)	6	Figure 1. The Air Quality In Central And South Jakarta	
Nitrogen Dioxide (NO ₂)	7	Between January And September 2017	4
Sulphur Dioxide (SO ₂)	8	Figure 2. The Annually And Daily Distribution	
Mercury (Hg) And Other Heavy Metals	8	Range Of PM2.5	7
Future Health Risk Due To The Increasing		Figure 3. The Annual Distribution Range Of NO ₂	7
Air Pollution From CFPPs Surrounding		Figure 4. Daily Distribution Range Of SO ₂	8
Jakarta	10	Figure 5. Annual Distribution Range Of Mercury	10
Part 3: Indonesian Regulations On Emissions		Figure 6. Comparison Of Emission Standards For	
From Thermal Power Plants	16	Thermal Power Plants Between Countries	16
Steps Forward	17	Infographic Premature Deaths And Other Health Impacts	
Appendix 1 Comparison Of Emission Standards		Caused By Emissions From The Observed CFPPs	11
For Thermal Power Plants Between Countries	18	Infographic Coal-Fired Power Plants Located Within	
		100 KM from Jakarta	12
		Infographic How Coal-Fired Power Plants Can	
		Make You Sick	14

SUMMARY (KEY FINDINGS)

Jakarta already suffers from dangerous levels of air pollution, from traffic, residential emissions and coal-fired power. It's rare for the air quality to meet standards set by the World Health Organization (WHO); the pollution levels are frequently even worse than the much weaker standards set by the Indonesian government. And the situation is about to get much worse.

The Government is proposing another four coal-fired power plants in the region (seven units), to add to the existing eight plants (22 units). One existing plant would be expanded. If these disastrous plans go ahead, Greater Jakarta would be ringed by power stations, which will choke the city and its 30 million inhabitants. While China is closing coal-fired power plants in Beijing to curb dangerous levels of air pollution, Indonesia is doing the opposite. **Greater Jakarta could see more new coal-fired power stations built within 100 kilometres than any other capital city.** The pollution from these new power plants – NO₂, particulate matter and SO₂ - is equivalent to putting an extra 10 million cars¹ on Jakarta's streets. Yet there has been no assessment of the impact on the air quality and health of the millions of people living in Greater Jakarta.

The emissions from the new and existing coal-fired power plants would put at risk the health of everyone in Greater Jakarta, including 7.8 million children, by exposing them to PM2.5 levels way above WHO guidelines. The health impacts of this pollution across the region would include a projected 10,600 premature deaths and 2,800 low birth weight births per year; nearly half of these would be within Greater Jakarta. The regulation and enforcement of emissions standards for key pollutants, such as PM2.5, SO₂, NO₂ and dust, is extremely weak in Indonesia. The new coal-fired power plants will be allowed to emit 20 times as much SO₂ as new plants in China, and more than 7 times as much as new plants in India.

Coal power plants are a major source of mercury emissions. Mercury is especially toxic because

it damages the nervous system, particularly the developing nervous system of a fetus or young child. The new power plants would emit an estimated 400 kg of mercury per year, resulting in potentially unsafe levels of mercury deposition in heavily-populated areas. The total amount of mercury deposited on Java and South Sumatra would be an estimated 140 kg. Indonesian laws and regulations set no limits on mercury emissions from power plants, and the lack of SO₂ control equipment in the plants leads to very high local deposition of mercury.

Estimation Of Air Pollution Exposure From CFPP To The Jakartans Compared To The Who Guideline.

POLLUTANT	PERIOD	THRESHOLD	SOURCE	PEOPLE EXPOSED TO POLLUTION ABOVE CRITICAL THRESHOLD (MILLION)	
				FROM EXISTING PLANTS	FROM EXISTING AND NEW PLANTS
SO ₂	1 hour	211.5ug/m ³	U.S. EPA	2.2	6.3
SO ₂	24 hours	20ug/m ³	WHO	4.3	6.3
NO ₂	1 hour	200ug/m ³	WHO	3.1	3.9
PM2.5	24 hours	20ug/m ³	WHO	2.8	30.7
Mercury	yearly total deposition	125mg/ha/yr	potential risk level in scientific study	1.4	4.3

It is indicated that the coal pollution emitted from both existing and new CFPP, exceeds the WHO guidelines, which can dangerously affect the human health.

¹ Calculated based on emission factors in Peraturan Menteri Negara Lingkungan Hidup Nomor 12 Tahun 2010 Tentang Pelaksanaan Pengendalian Pencemaran Udara di Daerah, and assuming 30 km driven per car per day, estimated from http://www.jterc.or.jp/english/kokusai/conferences/pdf/140220_seminar_2-2.pdf

PART 1:
THE POOR AIR QUALITY IN JAKARTA

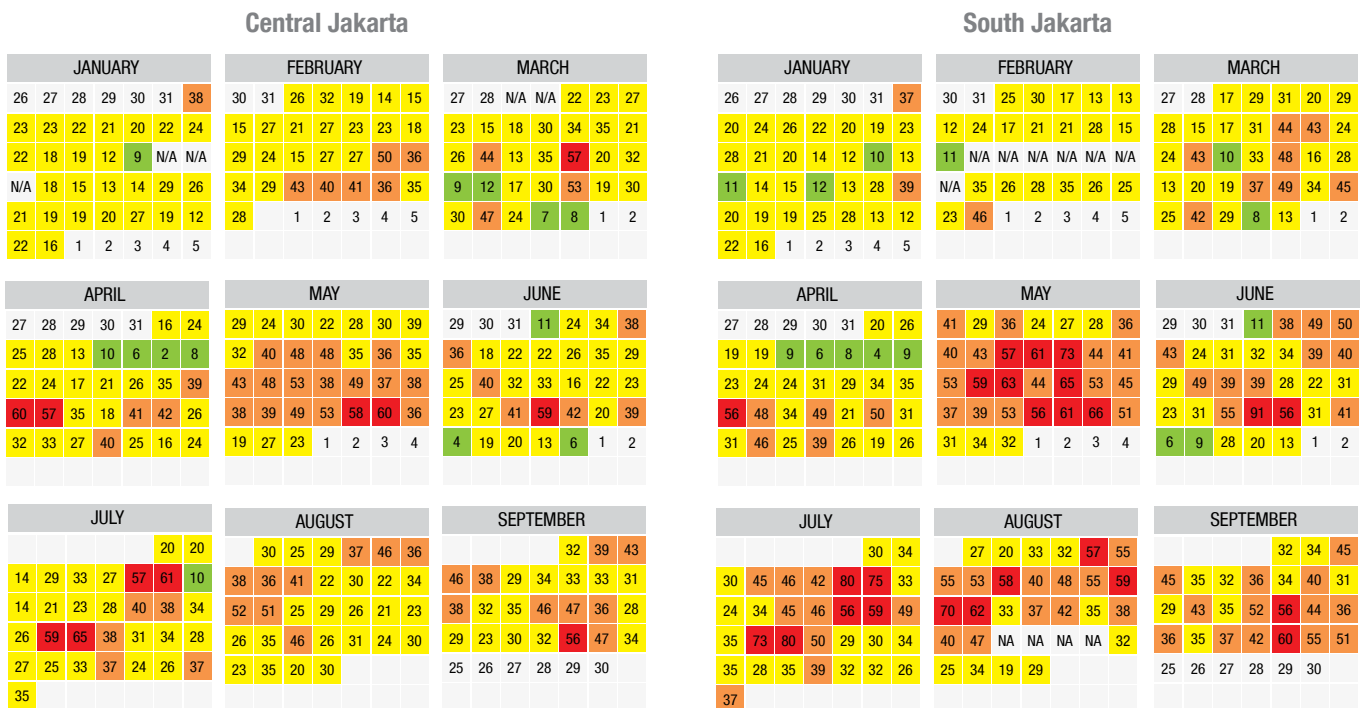
Jakarta already has notoriously bad air quality, caused mainly by transport and residential emissions. It's rare for the skies to be clear as the city struggles even with current levels of air pollution. The people of the city have always blamed traffic for the polluted air they breathe.

But it is not just traffic which is damaging the health of Jakartans and their children. There are coal-fired power plants (CFPPs) in Java, and two thermal power plants (TPPs) inside this city, at TPP Muara Karang and TPP Tanjung Priok. The pollution from these plants is making the air in Greater Jakarta even more hazardous

to people's health. A study conducted by Indonesia University found that approximately 60 percent of Jakarta's residents suffer from breathing problems associated with poor air quality ².

According to air quality monitoring conducted by the US Embassy (Figure 1), there have been only 14 days this year when the air in South Jakarta was classed as "good" and safe to breathe based on Air Quality Index US. While air pollution levels in Jakarta are not as bad as Beijing's, Jakarta's air is polluted more often than Beijing's air ³.

Figure 1. The Air Quality In Central and South Jakarta Between January And September 2017



AQI MATRIX

PM2.5 µg/m3	AQI US
0.0 - 12.0	GOOD
12.1 - 35.4	MODERATE
35.5 - 55.4	UNHEALTHY FOR SENSITIVE GROUPS
55.5 - 150.4	UNHEALTHY
150.5 - 250.4	VERY UNHEALTHY
250.5 - 500.4	HAZARDOUS

Source: US Embassy Data, 2017.

It is indicated that there have been only 14 days this year when the air in South Jakarta was classed as "good" and safe to breathe based on Air Quality Index US.

2 https://www.vice.com/en_id/article/qkzedm/how-bad-is-the-air-in-jakarta
 3 <https://www.pressreader.com/indonesia/the-jakarta-post/20170502/281702614613787>



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Air Pollution Sampling Student in Jakarta

The Active Personal Particulate Monitor, an equipment to monitor PM2.5 air pollution particles, installed at an elementary school classroom to monitor one student Miftah Rafly Hanafi daily routine at the school, in Jakarta. During the observation that is held by Greenpeace Indonesia which is recorded for six hours school activities the student inhales 40 Ug/m³ PM2.5 pollution particles, so for a month there will be predicted 25,920 Ug/m³ of PM2.5 in his body.

A New Threat for Jakartans

But there is now a new danger, which threatens to make the situation much worse. A wave of massive coal-fired power plants - a total of seven large units - is being planned within 100 km of Greater Jakarta. These CFPPs will have few of the basic emission controls routinely required in most other countries.

Greater Jakarta already sits in the shadow of eight CFPPs (22 units); four more (seven units) will become operational between 2019 and 2024, and one existing plants will be expanded in 2019 (Table 1). Each CFPP is expected to operate for at least 30 years, the minimum time period for a power supply contract. So the people of Greater Jakarta will be condemned to worsening air pollution for at least a generation. Children being born today will grow up breathing in the pollutants emitted by these CFPPs and their children will suffer too. Two of the thermal power plants (TPPs) are planned within Jakarta's city limits, at TPP Tanjung Priok and TPP Muara Karang, adding to the air pollution.

Table 1. Coal-Fired Power Plants located within 100 km from Jakarta

GOAL-FIRED POWER PLANTS	CAPACITY	LOCATION
Existing CFPPs		
CFPP Suralaya Unit 1-7	3400MW	Banten
CFPP Suralaya Unit 8	625MW	Banten
CFPP Labuan Unit 1-2	600MW	Banten
CFPP Lontar Unit 1-3	945MW	Banten
CFPP Babelan Unit 1-2	280MW	Cikarang, Bekasi
CFPP Pelabuhan Ratu 1-3	1050MW	West Java
CFPP Lestari Banten Energi - Privately Owned	670MW	Banten
CFPP Merak Power Station 1-2 - Privately Owned	120MW	Banten
CFPP Pindo Deli and Paper Mill II - Privately Owned	50MW	Bekasi
Planned CFPPs		
CFPP Jawa-7 (COD: 2019)	2000MW	Banten
CFPP Lontar Exp. (COD: 2019)	315MW	Banten
CFPP Jawa-9 or Banten Exp. (COD: 2022)	1000MW	Banten
CFPP Jawa-6 or Muara Gembong (COD: 2023-2024)	2000MW	Bekasi
CFPP Asahimas Chemical 1-2 (COD: 2018) -Privately Owned	300MW	Cilegon, Banten

Source: RUPTL 2017-2026; www.coalswarm.org

THE DISTRIBUTION RANGE OF COAL POLLUTION AND ITS IMPACT ON THE HUMAN HEALTH

The eight coal-fired power plants (CFPP) in the Greater Jakarta area already pour toxic pollutants into the air: Nitrogen Dioxide, Sulphur Dioxide, Mercury, Lead, Arsenic, Cadmium and PM2.5. All these pollutants are linked to increases in heart and lung disease, and breathing problems in children and other vulnerable population groups.

Greenpeace has used a sophisticated atmospheric modeling system developed under the U.S. Environmental Protection Agency to project the air quality impacts and health impacts of the power plants surrounding Greater Jakarta. The emissions from the power plants were calculated at full operation based on the Environmental Impact Assessment, using the assumption of 80% capacity utilization. Next, the emission data from those plants were used as the basis of modeling the CFPPs' air quality impacts using the CALMET-CALPUFF modeling system to picture the distribution range of CFPPs' emission.

The results indicated that **the emissions from the existing and new CFPPs are likely to have the biggest impact on pollution levels in cities and towns to the north and west of the power plant. The highest estimated daily SO₂, PM_{2.5} and NO₂ levels are in Cilegon, Tangerang, Bogor, and Jakarta for the existing plants. The planned CFPPs will increase pollutants levels not only in those areas, but also in Bekasi, Depok, Tambun, and Karawang. All these areas would be subject to a major new source of air pollution.**

HOW EACH POLLUTANT ATTACKS HUMAN HEALTH?

This section shows the projected distribution of each pollutant from both existing and new CFPPs.

Fine particles (PM_{2.5})

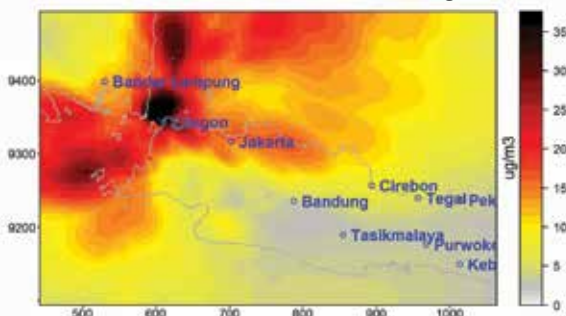
PM_{2.5} is microscopic particles produced from all types of combustion, including motor vehicles, power plants, and industrial activities. PM_{2.5} is potentially the most damaging of all the noxious chemicals found in air pollution as it is easily inhaled and can enter the bloodstream. Long term exposure of PM_{2.5} can cause acute respiratory infections - especially in children - and lung cancer. With higher PM concentrations in urban areas, asthma becomes more common, especially in children⁴. PM_{2.5} can lead to strokes, cardiovascular disease and other heart diseases. For pregnant women, it poses a serious risk to the unborn child. In addition, PM_{2.5} compounds of other air pollutants, specifically NO₂, SO₂, O₃, and also Mercury.

The modelling (*Figure 2*) shows that **the planned CFPPs would significantly increase the concentration of PM_{2.5} around the Jakarta area, most notably around Tangerang and north Jakarta. Emissions just from coal power plants currently expose an estimated 3 million people to PM_{2.5} levels above WHO guidelines of 20µg/m³ on days with**

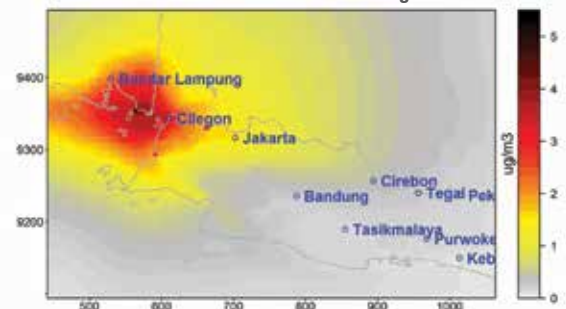
⁴ Jung, K.H., Torrone, D., Lovinsky-Desir, S., Perzanowski, M., Bautista, J., Jezioro, J.R., Hoepner, L., Ross, J., Perera, F.P., Chillrud, S.N. and Miller, R.L., 2017. Short-term exposure to PM 2.5 and vanadium and changes in asthma gene DNA methylation and lung function decrements among urban children. *Respiratory research*, 18(1), p.63.

Figure 2. The Annually And Daily Distribution Range Of PM2.5

Maximum 24-hour PM2.5 Concentration from Existing Plants

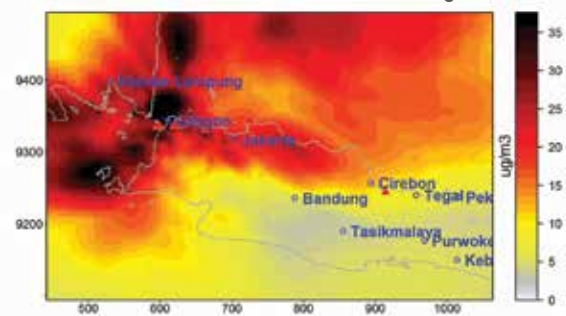


Annual Mean PM2.5 Concentration from Existing Plants

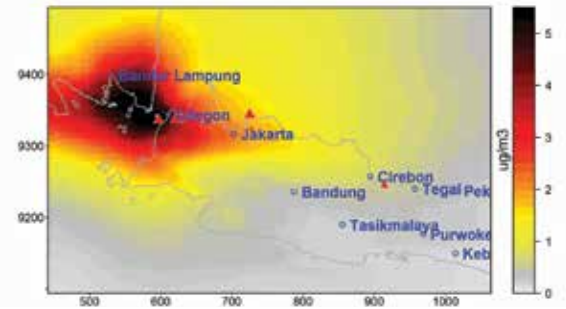


Source: Myllyvirta and Chuwah, 2017.

Maximum 24-hour PM2.5 Concentration from Existing and New Plants



Annual Mean PM2.5 Concentration from Existing and New Plants



Modeled daily and annual average PM2.5 concentrations caused by the CFPP within 100KM from Jakarta City, both existing CFPPs and planned CFPPs. Black and red areas are predicted to have the highest individual health risk.

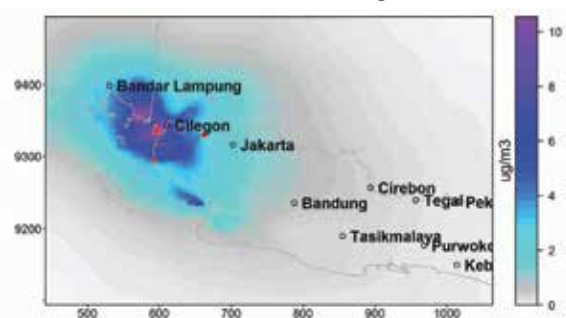
unfavorable weather conditions. When the planned CFPPs operating, they would increase the daily maximum concentration around the already heavily affected areas, and create a new hotspot east of Jakarta, affecting Bekasi and east Jakarta in particular. **The numbers at risk will increase 10-fold. 30 million people would be exposed to PM2.5 levels above WHO guidelines.**

Nitrogen Dioxide (NO₂)

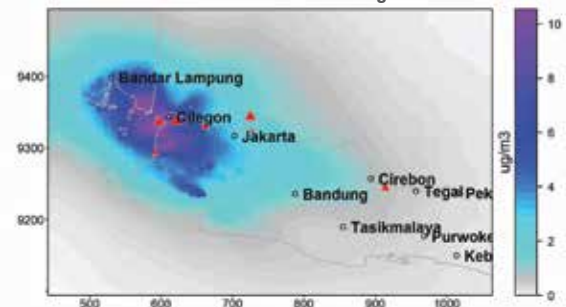
NO₂ is formed by the oxidizing process of NO in the atmosphere, which is harmful to human health - attacking the respiratory system and causing inflammation of the airways at high levels. Long term exposure aggravates asthma, causes chronic obstructive lung disease, cardiac arrhythmias and ischemic strokes. Furthermore, NO₂ reacts with Volatile Organic Compounds (VOCs) in the presence of sunlight to form Ozone (O₃), associated with adverse health effects⁵. NO₂ gases

Figure 3. The Annual Distribution Range of NO₂

Annual Mean NO₂ Concentration from Existing Plants



Annual Mean NO₂ Concentration from Existing and New Plants



Source: Myllyvirta and Chuwah, 2017.

Modeled annual average NO₂ concentrations caused by the CFPP within 100KM from Jakarta City, both existing CFPPs and planned CFPPs. Purple and dark blue areas are predicted to have the highest individual health risk.

5 <http://www.icopal-noxite.co.uk/nox-problem/nox-pollution.aspx>

react to form smog and acid rain as well as being central to the formation of fine particles (PM) and ground level ozone, both of which are associated with adverse health effects. High levels of NO₂ can have a negative effect on vegetation, including leaf damage and reduced growth ⁶.

The modelling shown in Figure 3 indicates a significant additional distribution of NO₂ from the existing and planned CFPPs in the North and West regions of Jakarta. **Emissions from the existing and planned CFPPs would expose an estimated 4 million people to levels of NO₂ which exceed WHO guidelines of 200µg/m³ for 1-hour mean.**

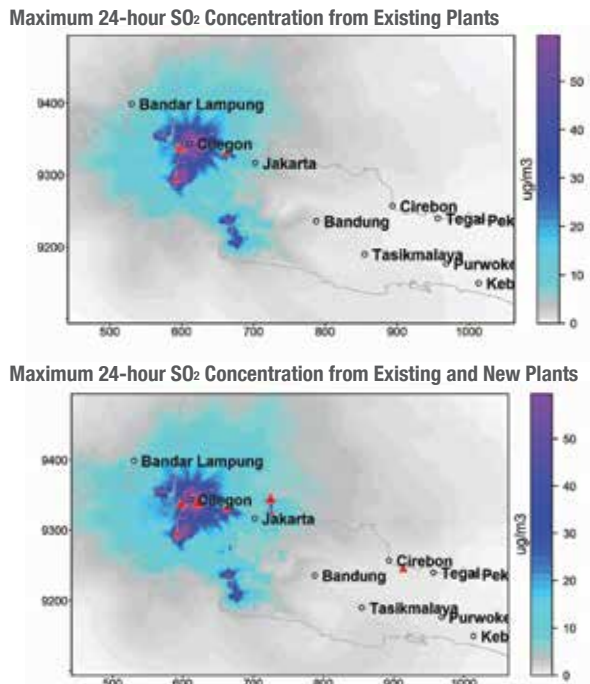
Sulphur Dioxide (SO₂)

Exposure to sulphur and exposure to acids derived from SO₂ is dangerous for people's health because these compounds can enter the circulatory system through the airways. SO₂ can decrease respiratory and lung function, aggravate asthma and chronic bronchitis for at-risk groups, and cause eye irritation, heart disease, and ischemic stroke. Most importantly, SO₂ forms PM_{2.5} particles in the atmosphere, contributing to deadly PM_{2.5} pollution. SO₂ is also a leading cause of acid rain. The compounds remain in the atmosphere for 3-5 days, so can affect wide areas ⁷.

The modelling indicates that the emissions from the existing and planned coal-fired power plants would increase SO₂ levels above the WHO guideline of 20µg/m³ in an area with an estimated 6.3 million people. The worst affected areas would be the North West and South West of Jakarta with some places receiving more than 40 kg of SO₂-equivalent per hectare per year. Those new CFPPs are likely to increase the total acid deposition in

these hotspots. This acid pollution could affect agricultural yields or increase input costs for farmers who will have to neutralize the soil. Acid rain also damages buildings.

Figure 4. Daily Distribution Range of SO₂



Source: Myllyvirta and Chuwah, 2017.

Modeled daily (24 hr) average SO₂ concentrations caused by the CFPP within 100KM from Jakarta City, both existing CFPPs and planned CFPPs. Purple and dark blue areas are predicted to have the highest individual health risk.

Mercury (Hg) and Other Heavy Metals

Mercury is a highly potent neurotoxin that damages the central nervous system in both people and wildlife ⁸. Exposure to mercury is particularly dangerous for pregnant and breastfeeding women, as well as children, since mercury is most harmful in the early stages of development. Additionally, mercury can cause damage to the brain, nervous system, kidney and liver.

⁶ <https://www.greenfacts.org/en/ozone-o3/1-2/2-health-effects.htm>

⁷ http://www.mma.gob.cl/retc_ingles/1316/w3-article-51518.html

⁸ National Wildlife Federation. 2011. Mercury Pollution from Coal-fired Power Plants. National Advocacy Center: Washington.



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Jakartans wear masks to protect them from air pollution while charging their phone at public space in Jakarta.

The 22 existing coal-fired units within 100km of Jakarta emit an estimated 400 kg of mercury every year, an amount that would double if the new units go ahead. Based on the atmospheric modelling result, the **total mercury deposition on land from the existing CFPPs exceeds 30 mg per hectare per year in southeast Jakarta. The planned CFPPs will increase projected mercury deposition by as much as 50 mg per hectare per year around the city. Mercury deposition rates as low as 125 mg per hectare per year can lead to the accumulation of unsafe levels of mercury in fish** ⁹. Mercury can also accumulate in rice as a result of fallout on rice fields ¹⁰, leading to potentially unsafe levels of mercury exposure.

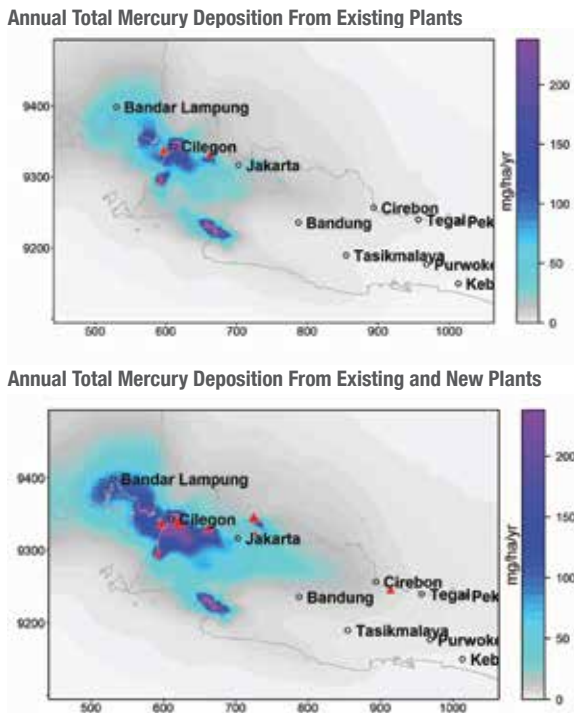
The predicted deposition from both existing and new CFPPs in the most affected regions

exceeds the potentially unsafe rate, even before taking into consideration other sources of pollution. Currently, an estimated 1.4 million people live in areas where mercury deposition from the studied coal plants exceeds 125 mg per hectare per year. If the new CFPPs are built and start operating, the numbers at risk will treble to 4.3 million people.

It should be noted that the mercury emission and deposition estimates are highly uncertain as mercury emissions from *coal are not regulated at all* in Indonesia. As a result, specific data on mercury content in coal or mercury emissions for the studied power plants was not available, so actual emissions and deposition could be considerably higher or lower.

⁹ Swain EB et al, 1992. Increasing Rates of Atmospheric Mercury Deposition in Midcontinental North America. *Science* 257:784-787.
¹⁰ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2944113/>

Figure 5. Annual Distribution Range of Mercury



Source: Myllyvirta and Chuwah, 2017.

Modeled annual average Mercury concentrations caused by the CFPP within 100KM from Jakarta City, both existing CFPPs and planned CFPPs. Purple and dark blue areas are predicted to have the highest individual health risk.

Future Health Risk Due to the Increasing Air Pollution from CFPPs Surrounding Jakarta

Based on previous calculations by Greenpeace’s research team, **emissions from the existing CFPPs are estimated to result in 5,260 premature deaths and 1,690 low birth weight per year because of exposure to PM2.5 and NO2. Taking future changes in population into account, the planned CFPPs would nearly double the number of premature deaths, and result in a dramatic increase in low birth weights.** The health impacts were projected to 2030 assuming no change in emissions but projected increase in population and change in rates of death from different causes, which reflect factors such as improved health care and aging population. The construction of the planned CFPPs would result in a projected 5420 additional deaths and 1130 low birth weight births per year.

Table 2. Projected Premature Deaths And Other Health Impacts Caused By Emissions From The Observed CFPPs (cases per year)

	HEALTH EFFECTS	EXISTING CFPPs	CONFIDENCE INTERVAL 95%	PLANNED CFPPs	CONFIDENCE INTERVAL 95%	TOTAL IMPACTS
PM2.5, PREMATURE DEATHS	Lower Respiratory Infections (Infants)	90	(20-220)	50	(10-110)	140
	Lung Cancer	130	(60-210)	210	(90-340)	340
	Other Cardiovascular Diseases	390	(240-540)	400	(250-560)	790
	Ischemic Heart Disease	1,110	(720-1510)	1,110	(710-1500)	2,220
	Stroke	1,270	(780-1760)	1,350	(830-1870)	2,620
	Other Respiratory Disease	140	(90-200)	160	(100-230)	300
	Chronic Obstructive Pulmonary Disease	190	(110-260)	210	(130-290)	400
	PM2.5 Total	3,330	(2020-4690)	3,490	(2120-4890)	6,820
NO₂, PREMATURE DEATHS	All Causes	1,940	(1120-4140)	1,930	(1110-4130)	3,870
PREMATURE DEATHS	Total	5,260	(2770-7450)	5,420	(2870-7640)	10,680
PM2.5	Low Birth Weight Births	1,690	(520-2940)	1,130	(350-1960)	2300
	Childhood Asthma Prevalence	8,070		6,030		14,100

Source: Myllyvirta and Chuwah, 2017.

CFPPs surrounded Jakarta City are the silent killer that causes premature death of about 5,260 people of Indonesia per year. The number is expected to increase to 10,680 people per year with planned CFPPs operated in the future.

KEPULAUAN SERIBU



PREMATURE DEATHS AND OTHER HEALTH IMPACTS CAUSED BY EMISSIONS FROM THE OBSERVED CFPPS



PROJECTED PREMATURE DEATHS AND OTHER HEALTH IMPACTS CAUSED BY EMISSIONS FROM THE EXISTING CFPPS

Lower Respiratory Infections (Infants)									
0	4	2	3	4	3	1	2	4	4
Lung Cancer									
0	6	2	5	6	4	1	4	5	5
Other Respiratory Diseases									
0	6	2	5	6	5	1	4	5	5
Chronic Obstructive Pulmonary Disease									
0	8	3	7	8	6	1	5	7	7
Childhood Asthma Prevalence									
2	358	134	295	357	270	59	217	307	313



Other Cardiovascular Diseases									
0	17	6	14	17	13	3	10	15	15
Ischemic Heart Disease									
0	49	18	40	49	37	9	30	42	43
Stroke									
0	56	21	46	56	42	9	34	48	49
Low Birth Weight Births									
0	74	28	61	74	56	12	45	64	65

PROJECTED PREMATURE DEATHS AND OTHER HEALTH IMPACTS CAUSED BY EMISSIONS FROM THE PLANNED CFPPS

Lower Respiratory Infections (Infants)									
0	2	1	2	2	1	0	1	2	2
Lung Cancer									
0	8	3	7	9	5	2	6	8	8
Other Respiratory Diseases									
0	6	2	6	7	4	1	5	6	6
Chronic Obstructive Pulmonary Disease									
0	8	3	7	9	5	2	6	8	8
Childhood Asthma Prevalence									
1	224	84	209	254	155	50	180	232	218

Other Cardiovascular Diseases									
0	15	5	14	17	10	3	12	15	14
Ischemic Heart Disease									
0	41	15	38	46	28	9	33	42	40
Stroke									
0	50	18	47	57	34	11	40	52	49
Low Birth Weight Births									
0	42	15	39	47	29	9	34	43	41

PROJECTED PREMATURE DEATHS AND OTHER HEALTH IMPACTS CAUSED BY EMISSIONS FROM THE EXISTING AND PLANNED CFPPS WHEN THEY OPERATE AT THE SAME TIME

Lower Respiratory Infections (Infants)									
0	6	2	5	6	4	1	4	5	5
Lung Cancer									
0	14	5	12	15	10	3	10	13	13
Other Respiratory Diseases									
0	12	5	11	13	9	2	9	12	11
Chronic Obstructive Pulmonary Disease									
0	16	6	14	17	12	3	11	15	15
Childhood Asthma Prevalence									
3	582	215	504	611	424	109	398	539	530
Other Cardiovascular Diseases									
0	32	12	28	34	23	6	22	30	30
Ischemic Heart Disease									
0	90	33	79	96	65	17	63	84	83
Stroke									
1	106	39	93	112	77	20	74	100	97
Low Birth Weight Births									
1	116	43	100	122	85	22	79	107	106



- LEGEND**
- Admin. Kepulauan Seribu
 - West Jakarta
 - Central Jakarta
 - South Jakarta
 - East Jakarta
 - North Jakarta
 - Bogor
 - Depok
 - Bekasi
 - Tangerang
 - Provincial Boundary
 - Border Area/District



COAL-FIRED POWER PLANTS LOCATED WITHIN 100 KM FROM JAKARTA



PLTU LONTAR UNIT 1-3
945MW



PLTU LONTAR EXP.
(COD: 2019) 315MW



PLTU JAWA-6/MUARA GEMBONG
(COD: 2023-2024)
2000MW



PLTU BABELAN UNIT 1-2
280MW



PLTU JAWA-9 ATAU BANTEN EXP.
(COD: 2022) 1000MW



PLTU PINDO DELI DAN PAPER MILL II
Privately Owned
50MW



PLTU PELABUHAN RATU 1-3
1050MW



The pollution from the new CFPPs
= Putting an extra 10 million cars
on Jakarta's streets.

-  EXISTING CFPPs
-  PLANNED CFPPs
-  1 Mio



TANGERANG

JAKARTA

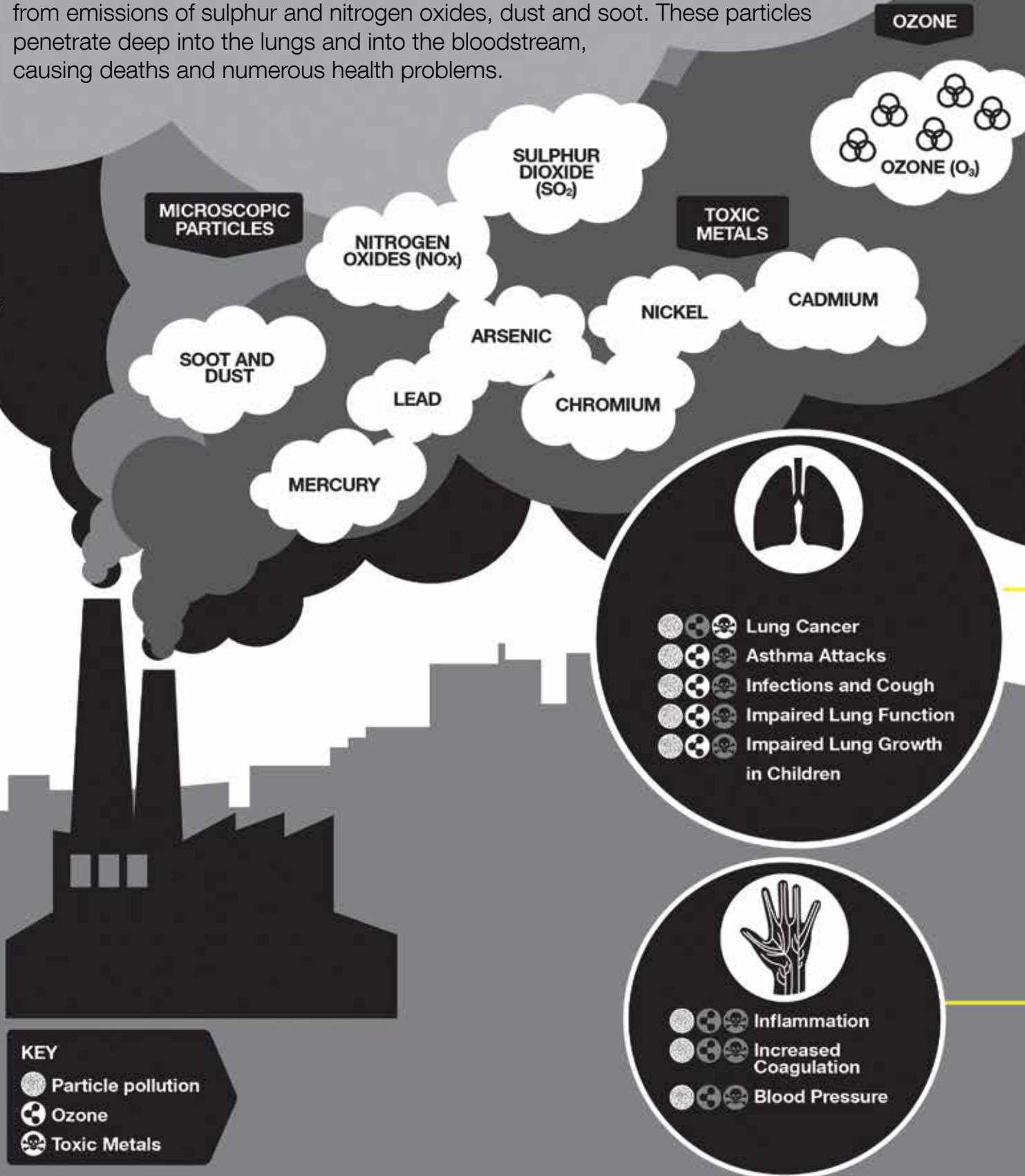
BEKASI

CIKAMPEK

BOGOR

HOW COAL-FIRED POWER PLANTS CAN MAKE YOU SICK

Coal-fired power plants expose people to toxic particles, ozone and heavy metals. The most serious health impacts are due to microscopic particles (pm2.5) formed from emissions of sulphur and nitrogen oxides, dust and soot. These particles penetrate deep into the lungs and into the bloodstream, causing deaths and numerous health problems.



PM2.5

Fine particle matter comparison.
µm = micrometer



HUMAN HAIR
about ± 70 µm wide




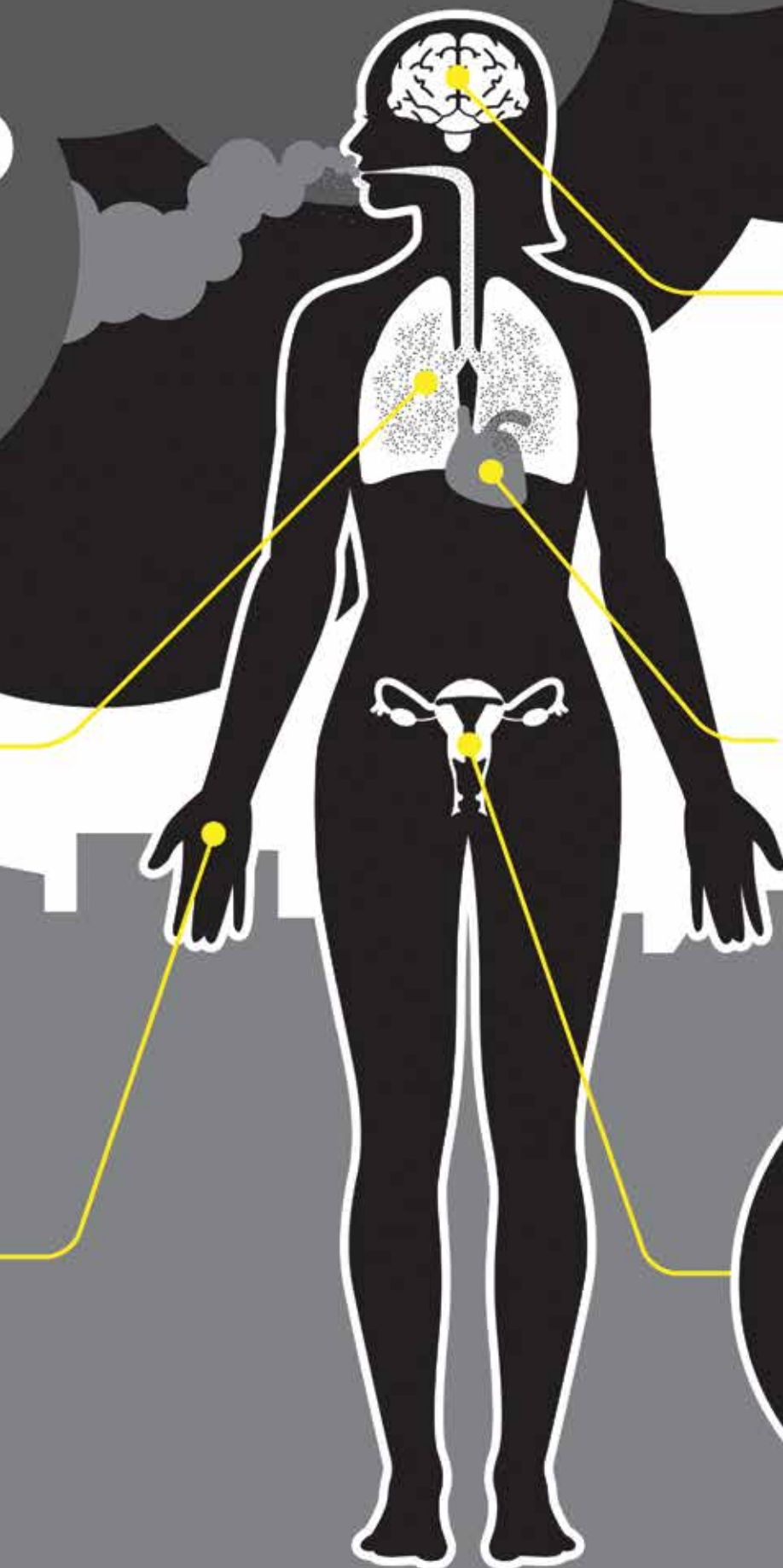
GRAIN OF SAND
about 50 µm wide



PM10
less than 10 µm wide



PM2.5
less than 2.5 µm wide



- Stroke
- Decreased IQ
- Diseases of Central Nervous System



- Heart Attack
- Heart Rate Variability
- Heart Disease



- Lower Birth Weight
- Impaired Foetal Growth
- Premature Birth
- Impaired Mental and Physical Development
- Decreased Sperm Quality

INDONESIAN REGULATIONS ON EMISSIONS FROM THERMAL POWER PLANTS

The regulation of emissions from CFPPs is set out in Regulation No. 21/2008 (Reg. 21/2008). The Reg. 21/2008 is a revised version of the 1995 regulation on emission standards for thermal power plants. But it is still weak.

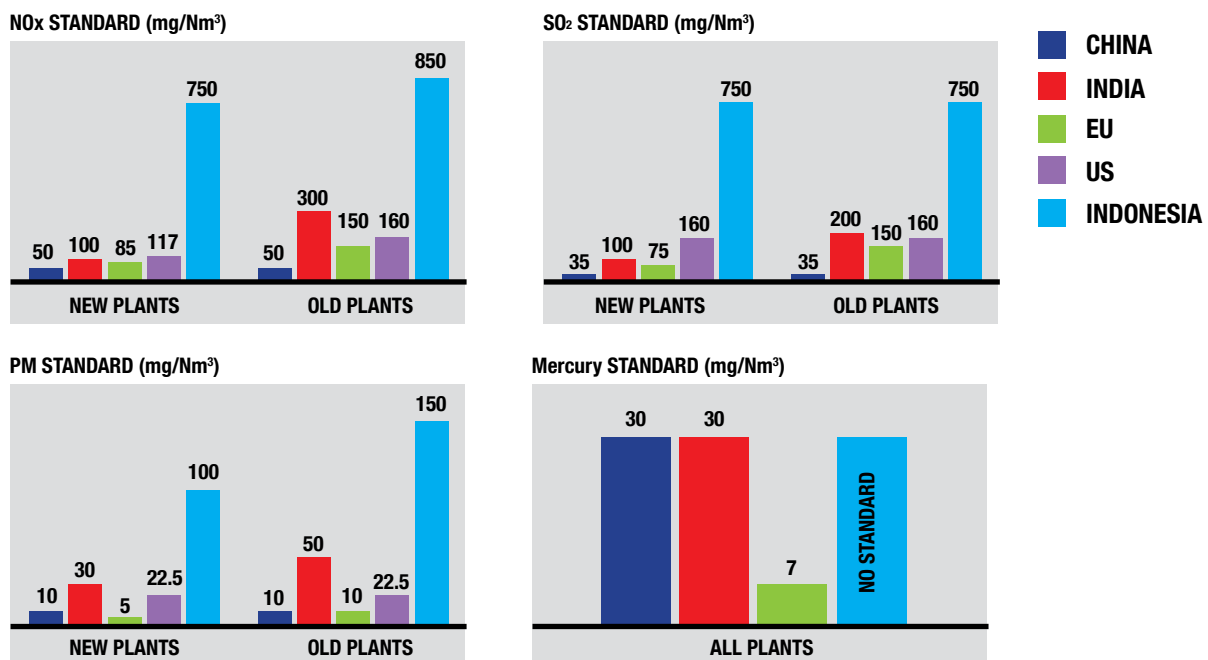
Firstly, this regulation only covers NO_x (referring to NO₂ and NO), SO₂, and PM, and the “PM” refers to total particulate matter; it does not include PM2.5 which is the most hazardous emissions pollutant. Secondly, the new Reg. 21/2008 still retains the loose 1995 standards for existing plants and for plants which were under construction before December 2008. Power plants planned at that time are subject to the 1995 standards while in transition, and have been required to comply with the new standard in Reg. 21/2008 since January 2015. But this is poorly monitored. Thirdly, the

Indonesian emission standards for CFPPs are much weaker than other countries, both developed and emerging economies (Figure 6).

As shown in Figure 6, **while Indonesia allows CFPPs to emit levels of NO_x and SO₂ up to 750 mg/Nm³, China has limited these emissions to 50 and 35mg/Nm³ in new plants and is retrofitting old plants to the same standard. India limits NO_x and SO₂ emissions from new CFPPs to 100 mg/Nm³.**

The emission limits for PM in Indonesia are also high at 100 mg/Nm³, compared to 10mg/Nm³ in China, 5mg/Nm³ in the EU and 30 mg/Nm³ in India. Moreover, Indonesia still has no standards for

Figure 6. Comparison of Emission Standards for Thermal Power Plants Between Countries



controlling mercury emissions from CFPPs. Other major countries regulate mercury emissions.

Equally important, **Indonesia has not developed an adequate air pollution monitoring system** for measuring the emissions of CFPPs in Indonesia, with results available to the public. This has led to widespread ignorance about air quality. Even where a continuous emission monitoring system (CEMS) has been mandated in the Reg. 21/2008 for old and new power plants, it is not adequately implemented in Indonesia. There is no reliable information on how many of the CEMS are connected to the Ministry of Environment and Forestry network, so it is unclear whether the Government is able to access self-monitoring data from the power plants ¹¹. Without reliable data, it is not possible to properly enforce regulations and ensure that CFPPs comply with emissions standards.

Steps Forward

The air pollution in Greater Jakarta, from transport, industrial activities, and coal-burning, is getting worse. It will deteriorate even more if the planned new CFPPs start operating in the next few years. Toxic pollutants are silently killing Jakartans and creating huge economic losses because of the impact on human health, and the reduced productivity of Jakartans made ill by breathing polluted air.

Greenpeace calls on the Government of Indonesia to take the following steps:

- Tighten emission standards for thermal power plants in Indonesia and monitor their implementation, especially for the newly-constructed plants and plants built since

1997. The current permitted SO₂ and NO_x levels are seven times higher than other major countries, while the PM standard is three times higher than others. There is still no standard for mercury.

- **Abandon the plan for new CFPPs. If all the planned CFPPs surrounding Greater Jakarta start operating, there will be an estimated 10,680 premature deaths and 2,820 low birth weights each year due to the resulting pollution.**
- Put human health at the heart of Indonesia's energy plan. Energy targets in Indonesia can be met with renewables, which can increase power supply and improve air quality to the benefit of all Indonesians.
- Strengthen the enforcement of regulations in the coal power sector, especially on air pollution from CFPPs. The law must address the dangerous impacts of CFPPs, and regulate NO_x, SO₂, PM2.5, and mercury. The Ministry of Environment and Forestry must assess the environmental impact of CFPPs, and penalise those which violate emissions standards.
- Establish an adequate real-time air quality monitoring system so that people are informed about pollution levels and can take steps to limit the damage to their health. The people of Jakarta deserve to be informed.

11 Indonesian Centre for Environmental Law (ICEL). 2017. Emission norms for coal-based power. ICEL: Jakarta.

APPENDIX 1

COMPARISON OF EMISSION STANDARDS FOR THERMAL POWER PLANTS BETWEEN COUNTRIES

POLLUTANT	CATEGORY	CHINA	INDIA	EU	US	INDONESIA
NO _x	New plants	50	100	85 (built after 2017)	117	750
	Old plants	50 for almost all plants by 2020; 100 (for units built during April 2004- December 2011) 200 (for units built till April 2004)	300 (for units built between 2004 – 2016) 600 (for unit built till 2003)	150	117 (for units built after February 2005) 160 (for units built 1997-2005) 640 (for units built 1978-1996)	850 (for units built till 2008)
SO ₂	New plants	35	100	75 (built after 2017)	160 (for units built after 2005)	
	Old plants	35 for almost all plants by 2020; before that 200 for 28 provinces 400 (for four provinces with high sulphur coal)	600 (for units built till 2016 and <500MW) 200 (for units installed till 2016 and >500MW)	150	160 (for units built 1997-2005) 640 (for units built 1978-1996)	750
PM (µg/Nm ³)	New plants	10	30	5	22.5	100
	Old Plants	10 for almost all plants by 2020; before that 30	50 (for units built between 2004-2016) 100 (for units built till 2003)	10		150 (for units built till 2008)
Mercury	All plants	30	30	Old plants: 7 (applies from early 2020s) New plants: 4	-	-

Sources: ICEL, 2017; European Union Industrial Emissions Directive ¹², European Commission (2017) ¹³, China Ministry of Environmental Protection (2015) ¹⁴.

¹² <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075>

¹³ Commission Implementing Decision (EU) 2017/1442 of 31 July 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for large combustion plants.
<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017D1442>

¹⁴ Full implementation of the main objectives of ultra-low emissions and energy-saving transformation of coal-fired power plants. Environmental regulation 2015 No 164. [document in Chinese]
http://www.mep.gov.cn/gkml/hbb/bwj/201512/t20151215_319170.htm

Jakartans breathe directly from the plant in the future

If the Jakarta's air quality is likely to get worse soon, then the Jakartans should find the other sources of clean air. Maybe they can carry the bag of plants and breathe directly using oxygen produced by plants.



Cover Photo:

The Jakarta's sky engulfed in a grayish-white haze due to air pollution.

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