



Greenpeace's City Rankings for PM2.5 in Thailand

The Greenpeace's city ranking statistics were downloaded from the Pollution Control Department's Monitoring Station, which provides hourly air quality readings on particulate matter, measuring 2.5 micrometers or less (PM2.5), from 10 locations in Thailand.

Greenpeace Southeast Asia publishes *City Rankings for PM2.5* — the first of its kind in Thailand— to provide the public with more comprehensive air quality data, including PM2.5 concentrations, and to monitor implementation of government's air quality initiatives. Clearly, there is an urgent need for policy makers to upgrade the country's air quality index (PM2.5 AQI).

Key Findings

- From January-July 2016 the 5 cities with the highest annual average concentrations of PM2.5 were Chiang Mai, Lampang (Mae Moh), Khon Kaen, Bangkok and Ratchaburi. Seven out of the eleven cities measured (63.6%) did not reach the 'National Ambient Air Quality Standard' annual limit of 25 $\mu\text{g}/\text{m}^3$ for PM2.5 and all 11 cities measured did not reach the World Health Organisation (WHO) guideline annual limit of 25 $\mu\text{g}/\text{m}^3$
- In 2015, the 5 cities with the highest annual average concentrations of PM2.5 were Saraburi, Bangkok, Chiang Mai, Lampang and Khon Kaen. Nine out of the twelve cities measured (75%) did not reach 'the National Ambient Air Quality Standard' annual limit of 25 $\mu\text{g}/\text{m}^3$ for PM2.5 and all 12 cities measured did not reach the WHO guideline annual limit of 25 $\mu\text{g}/\text{m}^3$
- In 2014, the 5 cities with the highest annual average concentrations of PM2.5 were Saraburi, Chonburi, Bangkok, Chiang Mai and Samut Sakhon. Seven out of the eleven cities measured (63.6%) failed to reach the 'National Ambient Air Quality Standard' annual limit of 25 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for PM2.5 and all 11 cities measured did not reach the WHO guideline annual limit of 25 $\mu\text{g}/\text{m}^3$

Introduction

Air pollution in Thailand is responsible for cutting short 50,000 lives every year.¹ This is a public health crisis where children, the elderly and the most vulnerable people in our society are most affected by dangerous and toxic air. According to the Pollution Control Department (PCD), ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in Thailand.

Based on data collected in 2015 from air monitoring stations in 29 provinces, average annual levels of particulate matter of less than 10 micrometers (PM10) exceeded the annual standard in 23 provinces. The five provinces with the highest air pollution levels were Saraburi, Lampang, Samutprakarn, Bangkok, and Khon Kaen.

Currently, only 12 ambient air quality-monitoring stations in 10 provinces across Thailand are able to monitor, record, and report PM2.5 levels. In 2015, average annual PM2.5 levels exceeded the annual standard in nine provinces.

¹ Institute for health metrics and evaluation, University of Washington (2013) supported by World Bank (a) http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/09/03/000456288_20130903103914/Rendered/PDF/808500PUB0L2590Box0379820B00PUBLI C0.pdf (b) <http://oic.go.th/FILEWEB/CABINFOCENTER3/DRAWER056/GENERAL/DATA0000/00000425.PDF>

Greenpeace believes everyone has the right to breathe clean air.

The Thai government must take decisive action to address this national health emergency and create and implement a bolder action plan that reduces pollution, cleans our air, and saves lives.

Major Sources of PM2.5 in Thailand

	PM2.5	SO2	NOx as NO2
Transportation	50,240	14,000	246,000
Electricity Generation	31,793	231,000	227,000
Manufacturing Industries	65,140	212,000	222,000
Household/Businesses	28,265	0	31,000
Open Burning	209,937	5,000	84,346

Estimated emissions (tons/year) from different sources contributing to air pollution
(Source: Pollution Control Department, and Ministry of Energy)

Thailand's Weak Emission Standards

Thailand's national air quality standards are weak compared to the World Health Organisation's (WHO) recommendations. The annual standard for the most dangerous pollutants, PM2.5, is 25 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) - 2.5 times as high as the WHO guideline. The daily standard of $50 \mu\text{g}/\text{m}^3$, is twice as high as the WHO. Similarly, for PM10, Thailand's annual standard is $50 \mu\text{g}/\text{m}^3$ compared to the WHO guideline of $20 \mu\text{g}/\text{m}^3$, and the daily standard is $120 \mu\text{g}/\text{m}^3$ compared to the WHO's $50 \mu\text{g}/\text{m}^3$. Official WHO measurements indicate that even the national standard is being violated in a number of cities.

		PM2.5 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)
Thailand	Annual mean	25	50
	24-hour mean	50	120
WHO	Annual mean	10	20
	24-hour mean	25	50

Thailand's Air Quality Index (AQI)

The Air Quality Index (AQI) is an index for reporting daily air quality. It reports how clean or polluted our air is, and what associated health effects might be for people. The AQI focuses on health effects we may experience within a few hours or days after breathing polluted air. The Pollution Control Department (PCD) calculates the AQI for 5 major air pollutants regulated by the National Ambient Air Quality Standards (NAAQS): ground-level ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_x), nitrogen dioxide (NO_x) and PM10. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in Thailand according to the PCD.

Thailand's Air Quality Index (AQI)			
AQI values	Description	Color code	Level of Health Concern
0-50	Good	Blue	No health risk.
51-100	Moderate	Green	No health risk.
101-200	Unhealthy	Yellow	People with respiratory tract disorder should avoid outdoor exercise. Children and the elderly should not spend an extended period of time outdoors.
201-300	Very Unhealthy	Orange	People with respiratory tract disorder should avoid outdoor activity. Children and the elderly should restrict the time spent outdoors.
More than 300	Hazardous	Red	People should avoid outdoors exercise. People with respiratory tract disorder should stay indoors.

Although the AQI system represents a significant step forward in providing people in Thailand with timely, reliable information about air pollution levels--using data collected from 57 ambient air quality monitoring stations across 25 provinces--² the current AQI is still based on PM10 and vastly under-reports air pollution levels and underestimates health risks.

Thailand needs PM2.5 AQI

The question is then, do we know what's in the air we're breathing? If we aren't factoring in PM2.5 values, we might not have the whole story.

Legal protection for the right to clean air in Thailand is inadequate. The WHO and the U.S. Environmental Protection Agency encourage the use of PM2.5 AQI values, rather than PM10 AQI values, to more accurately judge potential health effects from pollution.

PM2.5 Air Quality Index			
AQI values	Description	Color code	Level of Health Concern
0-50	Good air quality	Green	No health effects forecasted All groups may participate in normal activities.
51-100	Moderate	Yellow	Unusually sensitive people may experience health effects and may consider limiting activities.
101-150	Unhealthy for sensitive groups	Orange	Children, active individuals, elderly adults and those with heart or lung conditions should limit activity and exertion.
151-200	Unhealthy	Red	Individuals in sensitive groups should avoid activity or exertion ; all others should limit

² Note: Thailand's primary ambient air quality standards were promulgated in 1981. The first air quality monitoring system installed in 1983 consisted of 8 stations located in Bangkok (non-online system). The first on-line and real-time continuous air quality monitoring system installed in 1987 consisted of 5 stations located in Samutprakarn province with JICA assistance. The 3rd monitoring system (on-line/real-time system) put in place in 1991 consisted of 4 station located on the kerb sides of streets in Bangkok. In 1992 the Pollution Control Department with technical assistance from the Swedish Government, started preparing the design of a nationwide ambient air quality monitoring network and meteorological monitoring network. The networks were gradually installed in several phases through the upgrade of the existing air quality monitoring stations and the installation off new ones. (Source: the Ambient Air Quality Monitoring Network in Thailand, Ambient Air Quality Division, Air Quality and Noise Management Bureau, Pollution Control, Department)

			activity or exertion.
201-300	Very Unhealthy	Purple	All individuals should avoid activity or exertion
301-500	Hazardous	Burgundy	Health effects are forecasted regardless of exertion level; emergency actions are required.

Greenpeace Southeast Asia Demands

For Pollution Control Department(PCD) to:

- Urgently install and monitor PM2.5 in all monitoring stations in Thailand
- Immediately upgrade Thailand's air quality index (AQI) incorporated PM2.5 (PM2.5 AQI)
- Strengthen the monitoring of, and regulations to control, air pollutants from existing coal plants.

For Ministry of Natural Resources and the Environment to:

- Ensure that Thailand honours its commitment to the 'Haze-free ASEAN by 2020' agreement by controlling and preventing the burning of agricultural materials/waste in plantations, forests and preserved areas, and concentrations of PM2.5 and other air pollutants that are threats to public health, such as Polycyclic aromatic hydrocarbons (PAHs), need to be monitored, reported, with all detailed information made publicly available.

For the Pollution Control Department and Ministry of Public Health to:

- Ensure that Thailand's standard of SO_x, NO_x and dust emission be reviewed and upgraded so they comply with the highest global policy standards.

For the Pollution Control Department and Industrial Works Department to:

- Measure PM2.5 and mercury at the source.

For the Ministry of Energy, Ministry of Transports, Ministry of Natural Resources and the Environment and The Thai Automotive Industry Association(TAIA) to:

- Promote clean fuel and renewable fuel in transport sector.
- Provide a better and easily accessible mass transit system.
- Improve energy efficiency in the transport sector, encourage the use of shared car schemes and switch to cleaner and greener vehicles on a national scale.
- Promote a cleaner and larger transport network, encourage even more cyclists onto our roads.

2014: Annual average PM2.5 concentrations in 10 Cities

	Monitoring Station	Province	Annual average PM2.5 level (micrograms per cubic meter)	Average maximum monthly PM2.5 level (micrograms per cubic meter)
1	Napalan Provincial Police	Saraburi	41	118
2	Leam Chabang Municipal Stadium	Chonburi	41	115
3	Din Deang Housing Community	Bangkok	35	87
4	Yupparaj Wittayalai School	Chiang Mai	34	188
5	Samutsakhon Wittayalai School	Samut Sakhon	30	173
6	Water Resource Management Office 4	Khon Kean	29	114
7	Provincial Waterworks Authority, Mae Moh	Lampang	28	123
8	Regional Environmental Office 8	Ratchaburi	23	79
9	Agriculture Office	Rayong	22	74
10	Hat Yai Municipality	Songkhla	19	48
11	Bodindecha (Sing Singhaseni) School	Bangkok	18	65

2015: Annual average PM2.5 concentrations in 10 Cities

Ranking	Monitoring Station	Province	Annual average PM2.5 level (micrograms per cubic meter)	Average maximum monthly PM2.5 level (micrograms per cubic meter)
1	Napalan Provincial Police	Saraburi	45	112
2	Din Deang Housing Community	Bangkok	36	101
3	Yupparaj Wittayalai School	Chiang Mai	34	266
4	Provincial Waterworks Authority, Mae Moh	Lampang	30	187
5	Water Resource Management Office 4	Khon Kean	30	117
6	Regional Environmental Office 8	Ratchaburi	29	105
7	Bodindecha (Sing Singhaseni) School	Bangkok	27	81
8	Samutsakhon Wittayalai School	Samut Sakhon	26	145
9	Agriculture Office	Rayong	26	87
10	The Public Relations Department	Bangkok	19	60
11	Hat Yai Municipality	Songkhla	18	35
12	Leam Chabang Municipal Stadium	Chonburi	15	76

January-May 2016: Average PM2.5 concentrations in 10 Cities

Ranking	Monitoring Station	Province	Annual average PM2.5 level (micrograms per cubic meter)	Average maximum monthly PM2.5 level (micrograms per cubic meter)
1	Yupparaj Wittayalai School	Chiang Mai	55	144
2	Water Resource Management Office 4	Khon Kean	52	112
3	Provincial Waterworks Authority, Mae Moh	Lampang	51	156
4	Din Deang Housing Community	Bangkok	44	103
5	Regional Environmental Office 8	Ratchaburi	41	136
6	Bodindecha (Sing Singhaseni) School	Bangkok	34	95
7	Samutsakhon Wittayalai School	Samut Sakhon	33	113
8	Agriculture Office	Rayong	29	88
9	The Public Relations Department	Bangkok	28	64
10	Leam Chabang Municipal Stadium	Chonburi	26	67
11	Hat Yai Municipality	Songkhla	23	41
12	Napalan Provincial Police	Saraburi	N/A	N/A