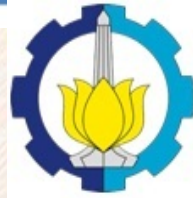


Third Annual Meeting
Energy, Environment and Ecosystems (3E) Nexus
Initiative for Sustainable Development in Asian Countries
14-15th January 2016, Danang, Vietnam



Air Quality Indicators towards more Environmental-Friendly Transportation Policy

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Outline

1. Introduction
2. Impact of Emissions
3. Air Quality as Indicators
4. Emission and Ambient Air Quality Control





INTRODUCTION

Pollutant Sources

Stationary, mobile sources and combination

1. Stationary → comes from still sources eg., stack or chimneys from industries
2. Mobile → movable sources
 - vehicles (road)
 - airplanes, ships, farm tractors and so on
3. Combination → integrated sources from both stationary and mobile e.g., industrial parks, disposal site, forest burn



Main Emission Source in Urban



- Vehicles → main contributors
- Contribution of vehicles reach up to 70% on any big cities in Indonesia, especially in Jakarta, Surabaya





IMPACT OF EMISSIONS

Measuring Danger

- How can we know that the quality of the air we inhale is on dangerous level..?
- How can we know that emissions are safe for us..?



Emission Test in Surabaya – 4th May 2015



<http://surabaya.bisnis.com/read/20150505/3/80282/hut-ke-722-surabaya-dishub-gelar-uji-emisi-berhadiah>
<https://hendragalus.wordpress.com/2011/07/14/ayu-uji-emisi-gas-buang-kendaraan-anda/>

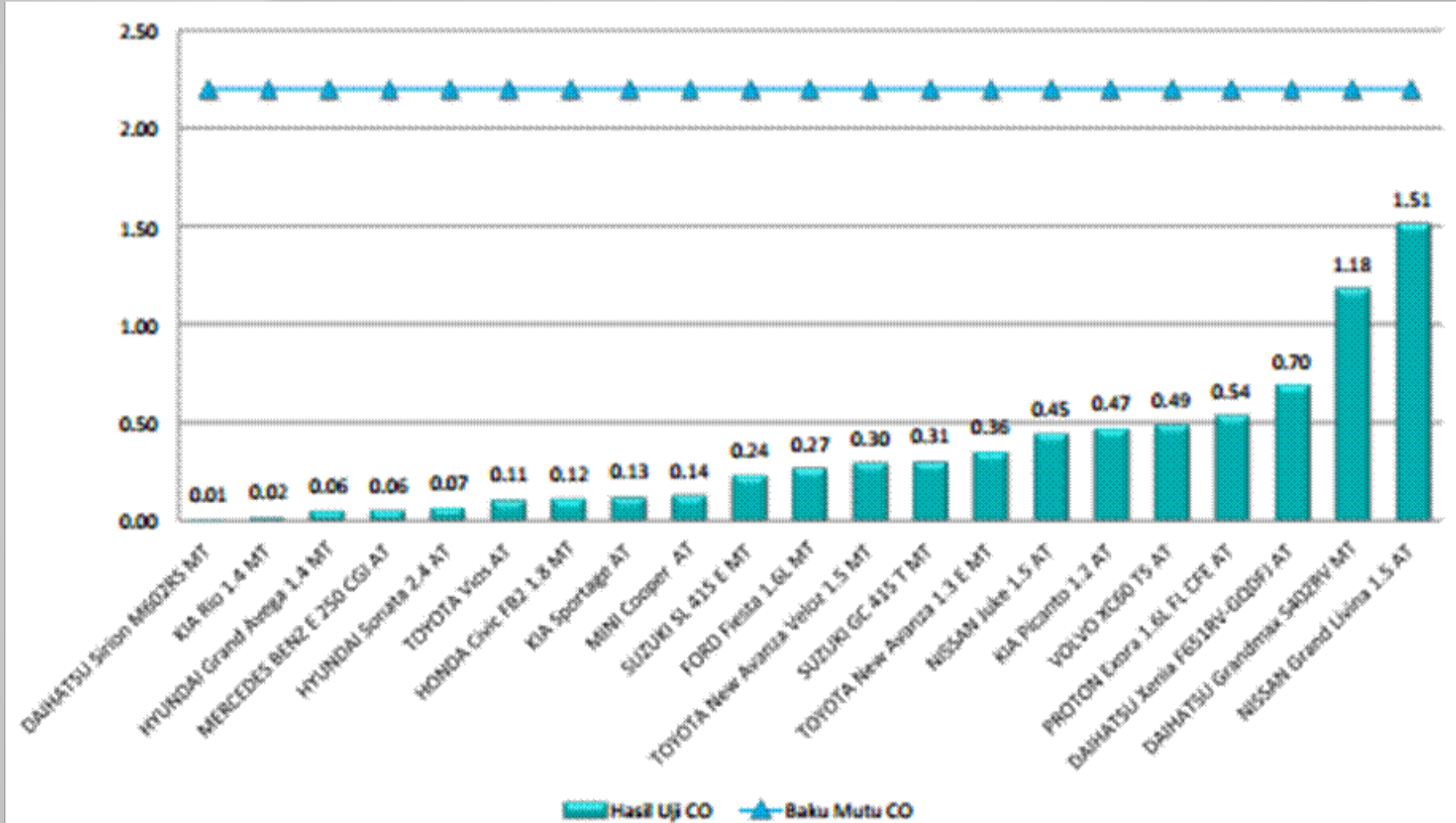


Evaluation and Monitoring Purposes

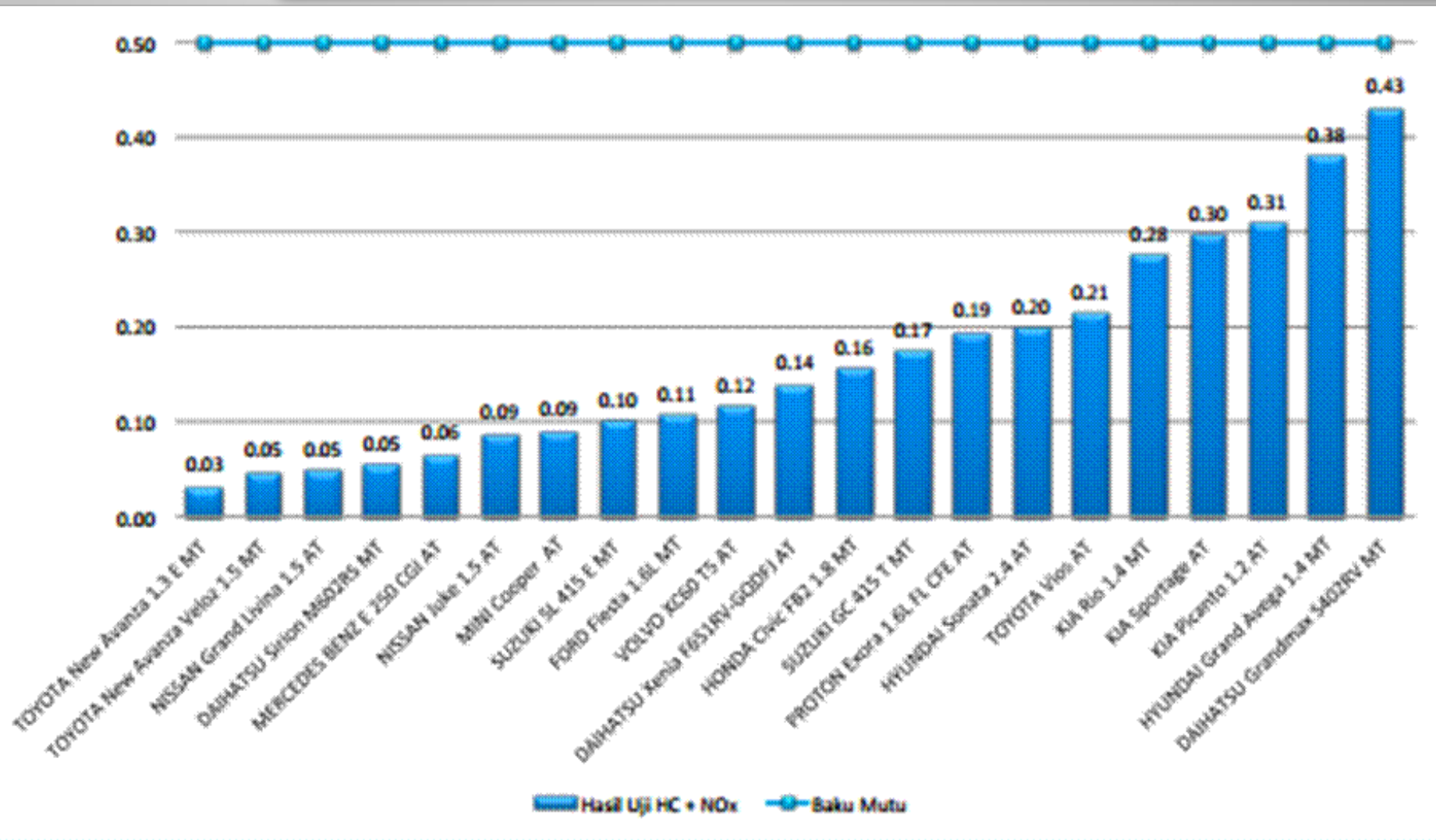
- Promoting environmental-friendly vehicles through market mechanisms
- Encourage industries to produce environmental-friendly vehicles
- Standard fuel economy → environmental-friendly fuel



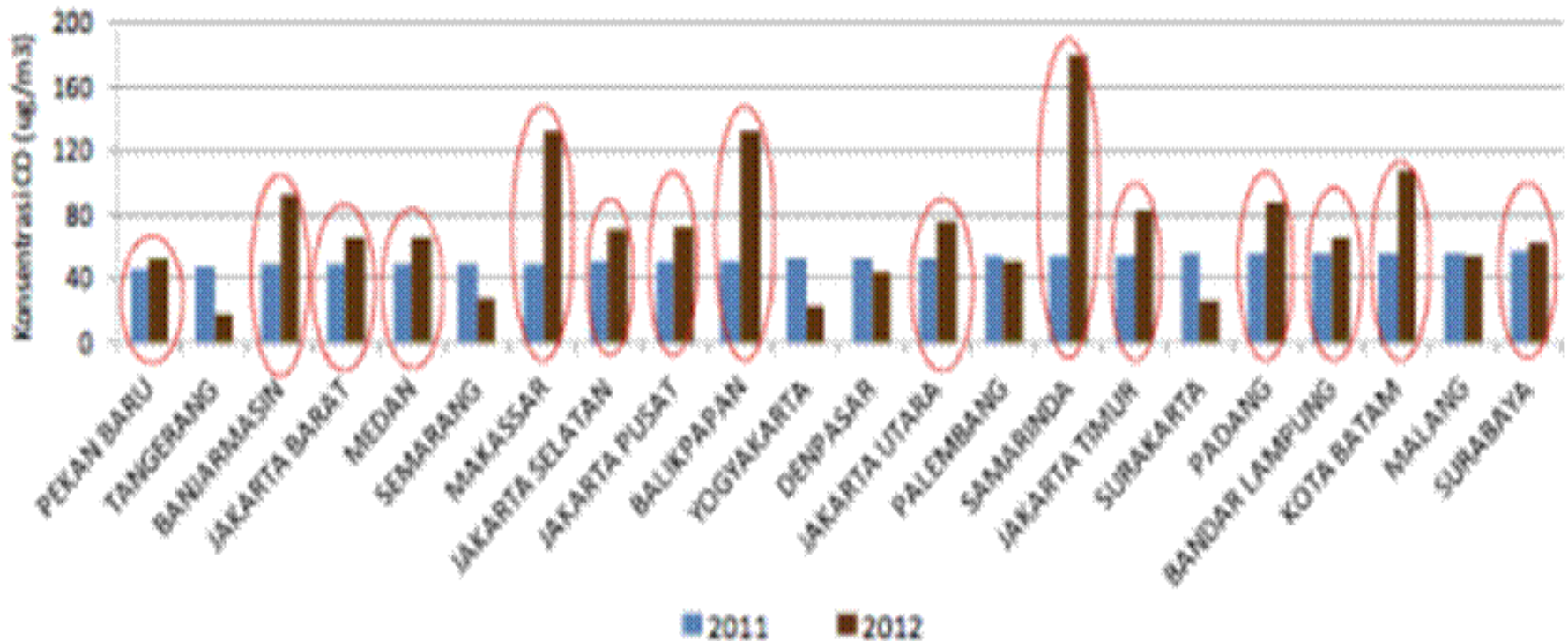
CO Emission Test (Gasoline cars)



HC and NOx Emission Test (Gasoline Cars)



CO Emission in 22 cities (2011 and 2012)



- Emission test of recent vehicles → below threshold level

How about the ambient..?





AIR QUALITY AS INDICATORS

Urban Air Quality Conditions (Ambient)

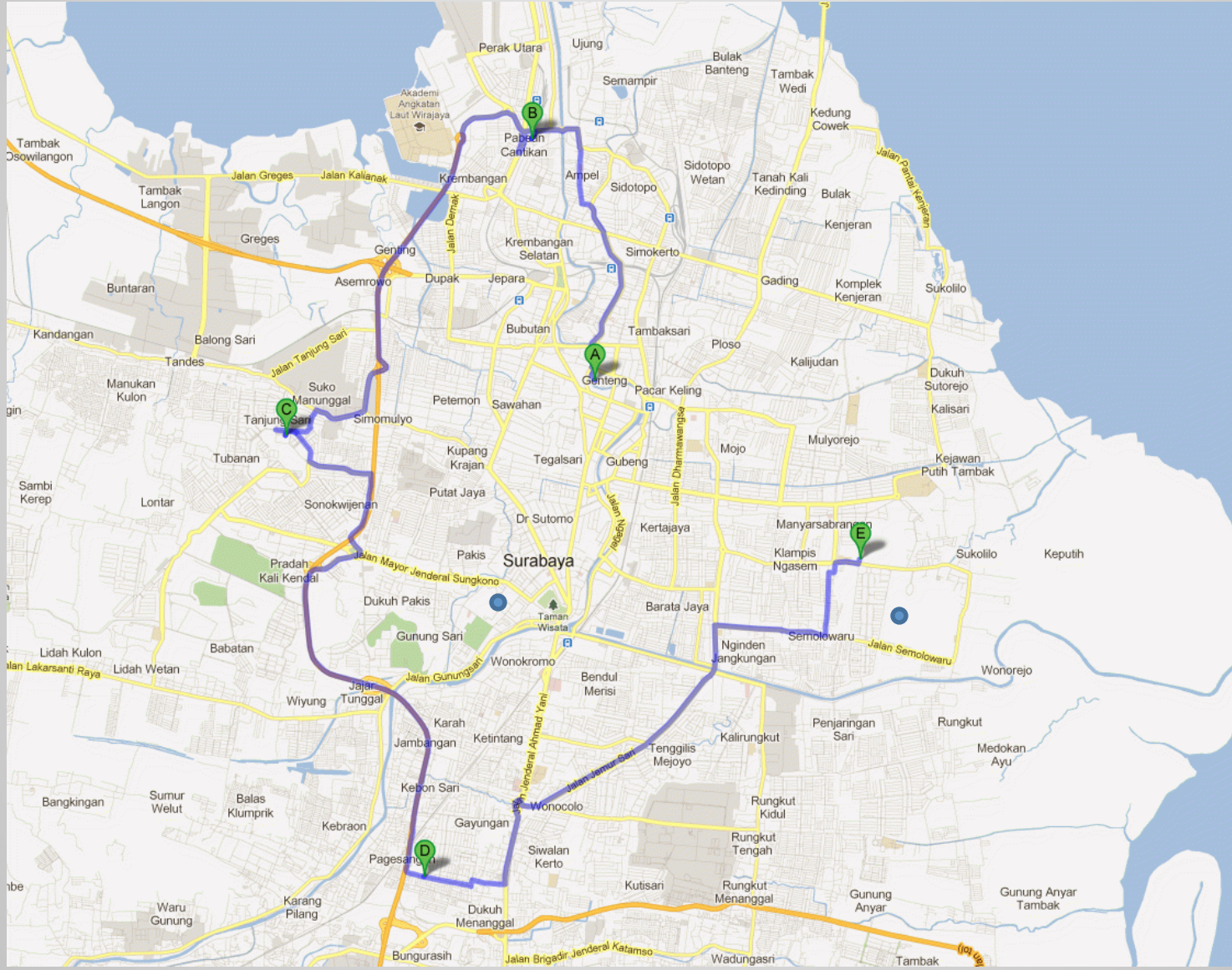


Effects of Emission to our Ambient

- Emission will negatively affect ambient level
- To monitor ambient level → monitoring station



Surabaya Monitoring Station



Current Status of Monitoring Stations

Station	Zone	Coordinates	Elevation (m)	Status
A. Ketabang Kali	<u>City center</u>	S 07'15'41.8" E 112'44'33,9"	23	Disorder
B. Perak	<u>Trading</u>	S 07'20'17.1" E 112'42'59,9"	13	Disorder
C. Sukomanunggal	<u>Suburban</u>	S 07'16'41.5' E 112'44'34.0"	57	Disorder
D. Gayungsari	<u>N e a r highway</u>	S 07'20'17.4" E 112'42'59,6"	63	Disorder
E. Sukolilo	<u>Suburban</u>	S 07"17'20.3" E 112'47'48,1"	-9m	Disorder
F. Near Stikom	<u>Suburban</u>			OK
G. Near Hotel Singgasana	<u>Suburban</u>			OK

Suburban (E)



City Center Zone (A)



Near Highway (D)



Trading Zone (B)



Display ISPU (Index Standar Air Pollutant)



<http://www.todayonline.com/photos/gallery-indonesia-outlines-measures-deal-haze-situation>



Nilai ISPU

ISPU kalkulasi dengan jumlah hari Number of days with PSI calculation of	Batas nilai ISPU Range of PSI values
0 Tidak ada no value available	
6 BAIK GOOD	0 - 50
25 SEDANG MODERATE	51 - 100
0 TIDAK SEHAT UNHEALTHY	101 - 199
0 SANGAT TIDAK SEHAT VERY UNHEALTHY	200 - 299
0 BERBAHAYA DANGEROUS	300 - 500

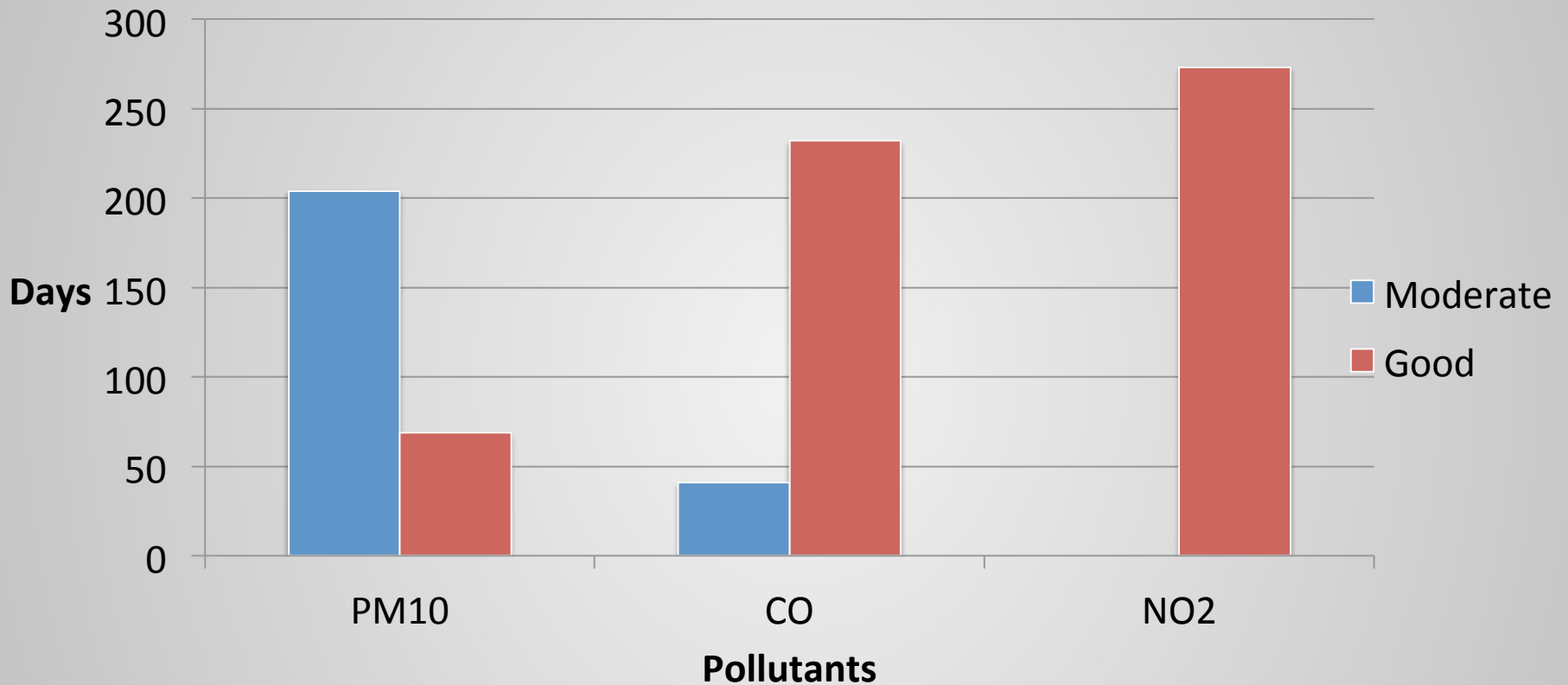


Impact to Health based on ISPU

Category	Index	Description
Good	0-50	At this level, air doesn't negatively affect human or animals as well as plants, buildings or aesthetics
Moderate	51-100	Air doesn't negatively affect human or animals and doesn't affect sensitive plants as well as aesthetics
Unhealthy	101-199	Level of air quality which can harm human and/or sensitive animal health or can damage plants and affect aesthetics
Very Unhealthy	200-299	Level of air quality, which is able to harm the health of a large segment of the exposed population
Dangerous	300 or more	Level or air quality which is dangerous to health and can seriously harm all populations exposed



ISPU Year 2014 (2 stations)



DO THOSE DATA MEAN THAT SURABAYA AIR QUALITY IS GOOD..?

Source: Air Quality Lab of Environmental Agency Surabaya



Review

- Index shown above were only from two stations which were newly installed since 2010
- On next slide, we will show you 2001-2002 NO₂ concentrations from five (5) monitoring stations
- Data 2003-2009 have many missing values

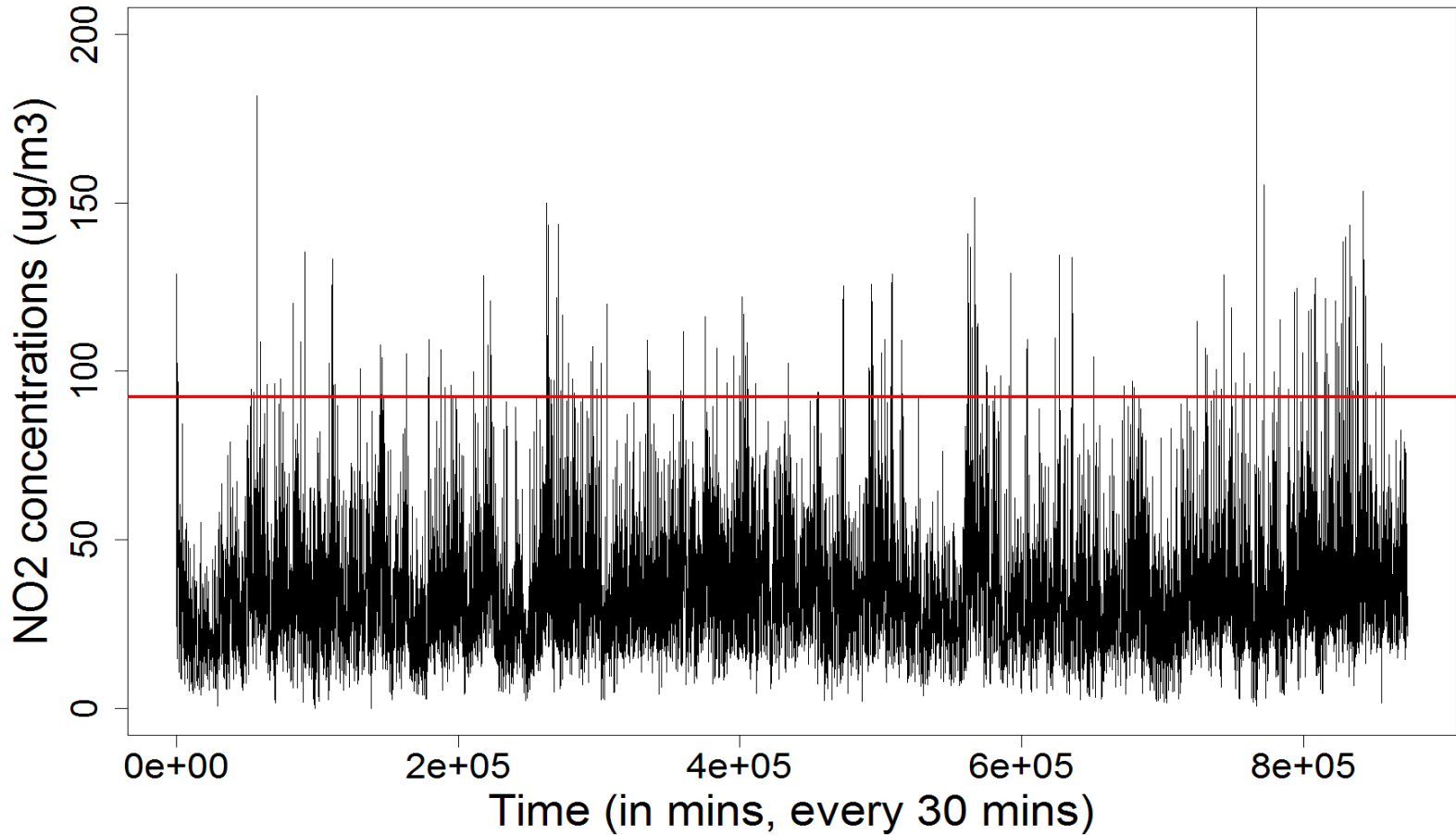


Ambient Threshold Level

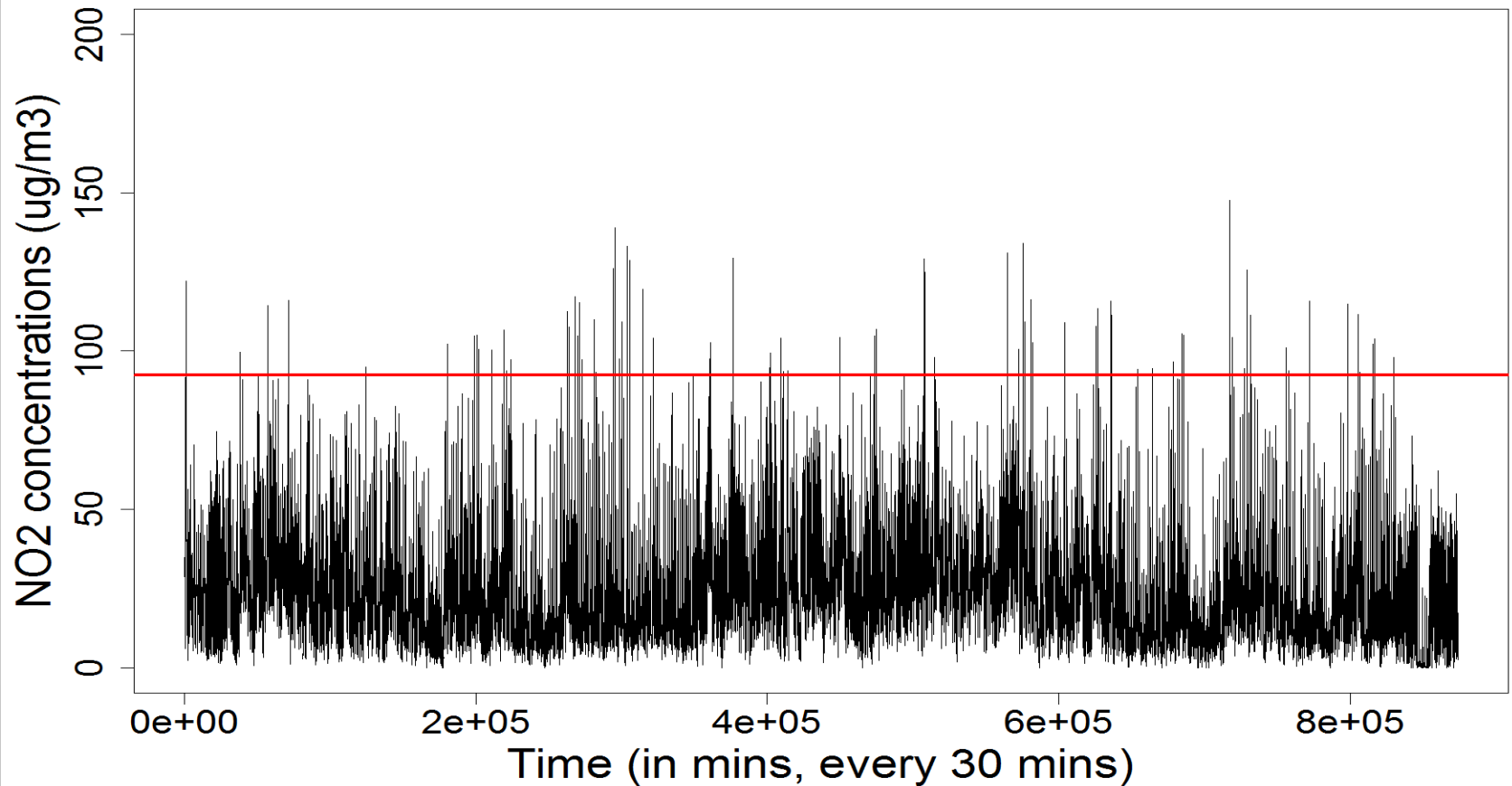
No	Parameter	Exposure Time	Threshold Ambient	Analysis Method	Equipments
1	Sulphur dioxide (SO ₂)	24 hours	0.1 ppm (262 ug/Nm ³)	Pararosanilin	Spectrophotometer SO ₂ analyzer
2	Carbon monoxide (CO)	8 hours	20.00 ppm (22,600 ug/Nm ³)	NDIR	CO analyzer
3	Nitrogen oxides (NO _x)	24 hours	0.05 ppm (92.5 ug/Nm ³)	Saltzman, NDIR	Spectrophotometer NO ₂ analyzer
4	Oxidant (O ₃)	1 hour	0.1 ppm (200 ug/Nm ³)	Neutral Buffer potassium Iodida	Spectrophotometer
5	Dust	24 hours	0.26 mg/Nm ³	Gravimetric	Hi-vol



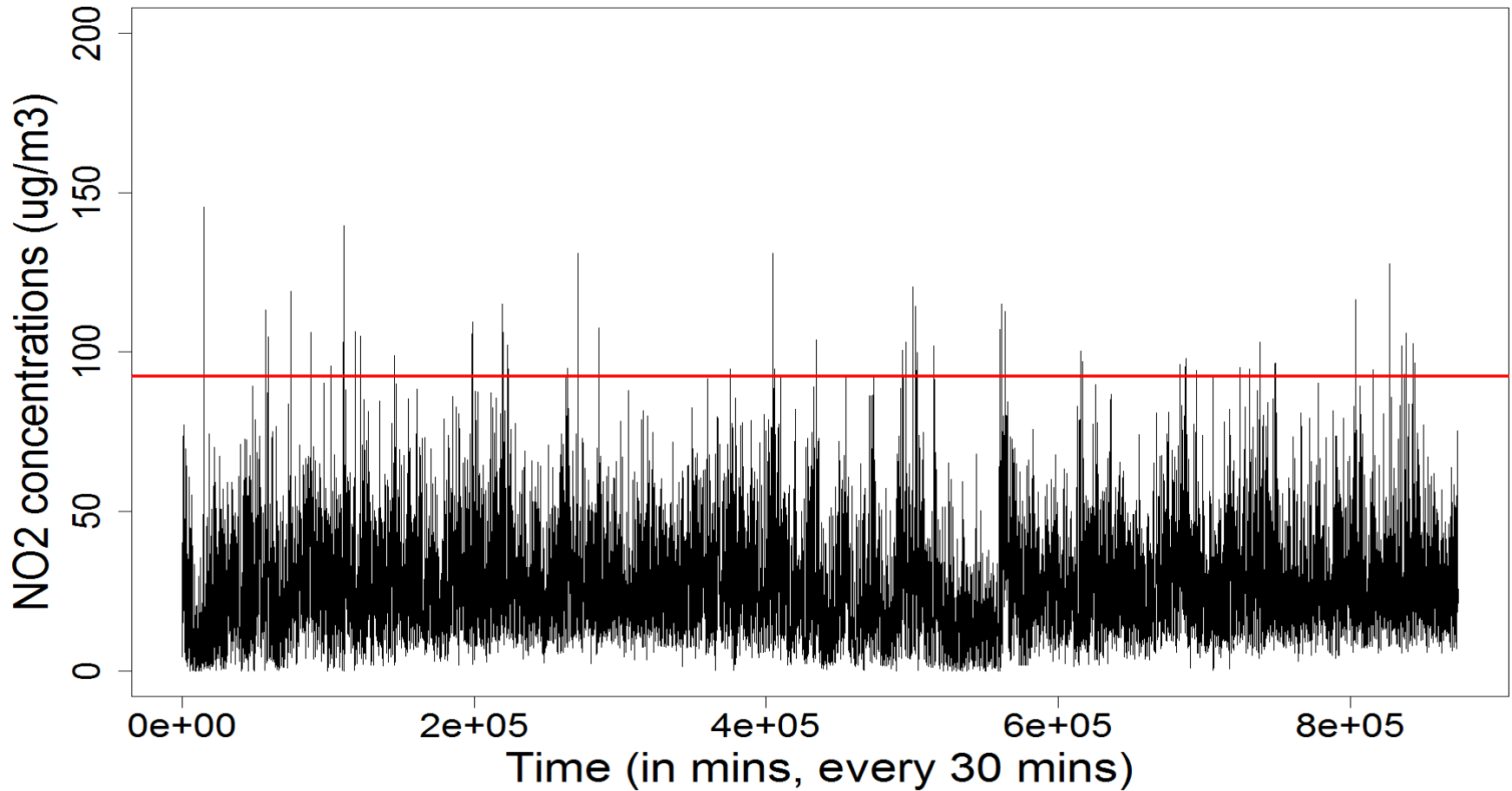
Concentration of NO₂ 2001-2002 (City Center)



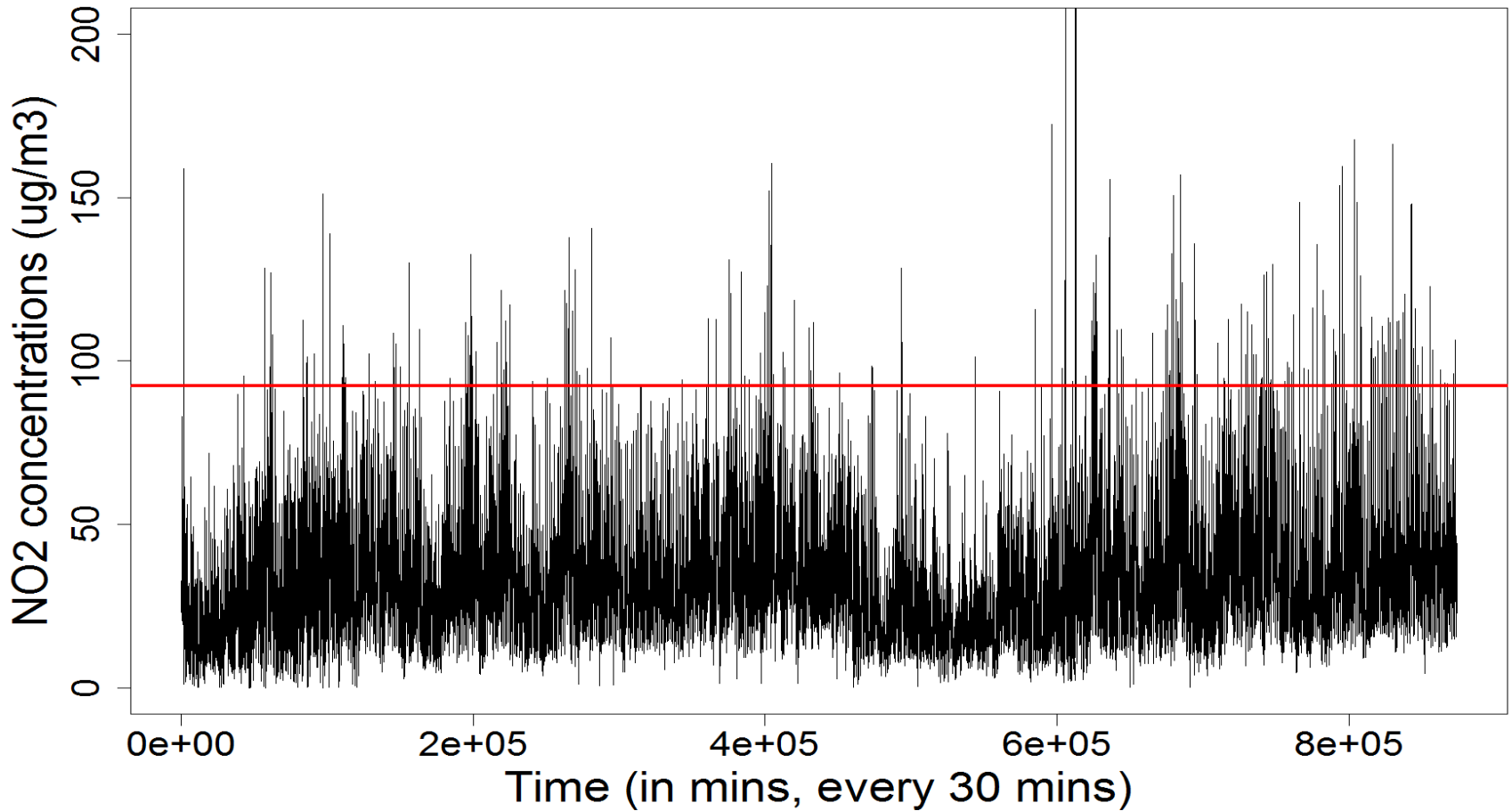
NO₂ Concentration 2001-2002 (Trading Zone)



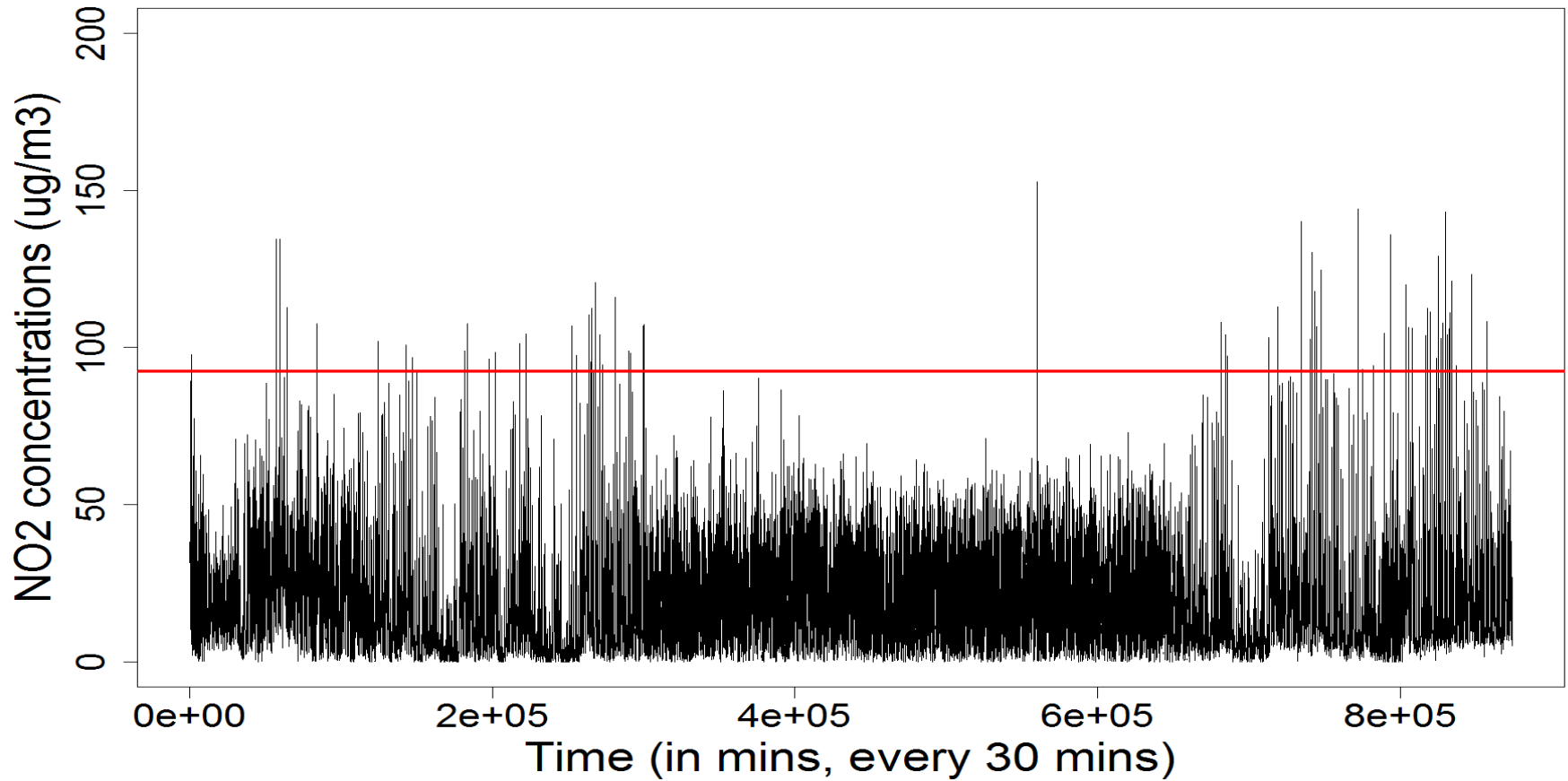
NO₂ Concentration 2001-2002 (Suburban)



NO₂ Concentration 2001-2002 (Near Highway)

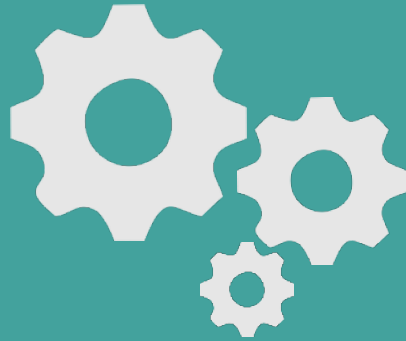


NO₂ 2001-2002 (Suburban)



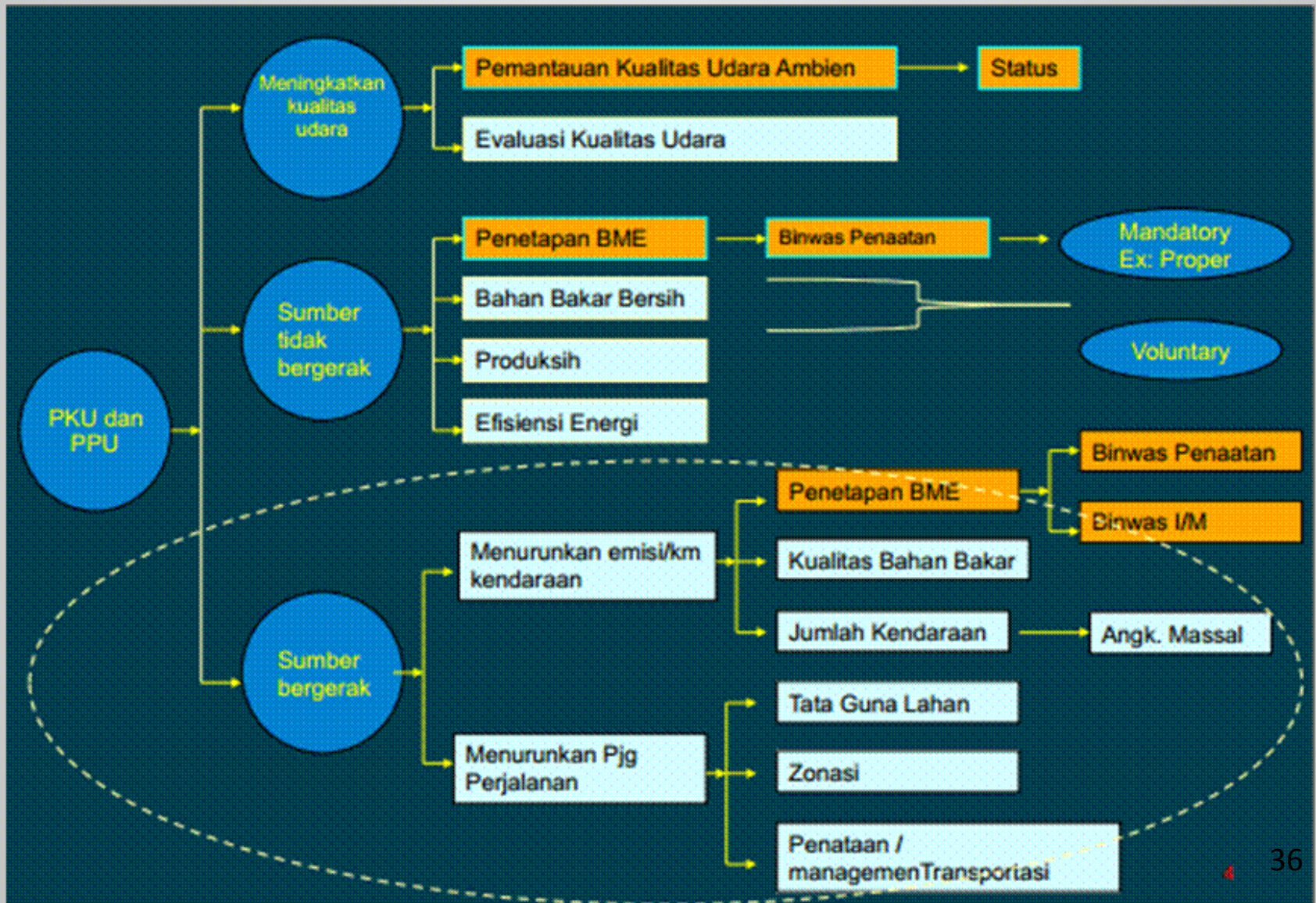
Other Pollutants in Summary

- There were many events when concentration of PM_{10} violated threshold level
- CO concentration has less breach events → better than NO_2 and PM_{10}
- *Note:* those data were from 2001-2002, **how about now..?**
- Unfortunately we don't have proof since many monitoring stations are damaged and only two are operating currently
- It is **VERY SAFE** to assume that in reality Surabaya air quality is **much worse than** 2001-2002



EMISSION AND AMBIENT AIR QUALITY CONTROL

Control Activities



Control Activities

1. National

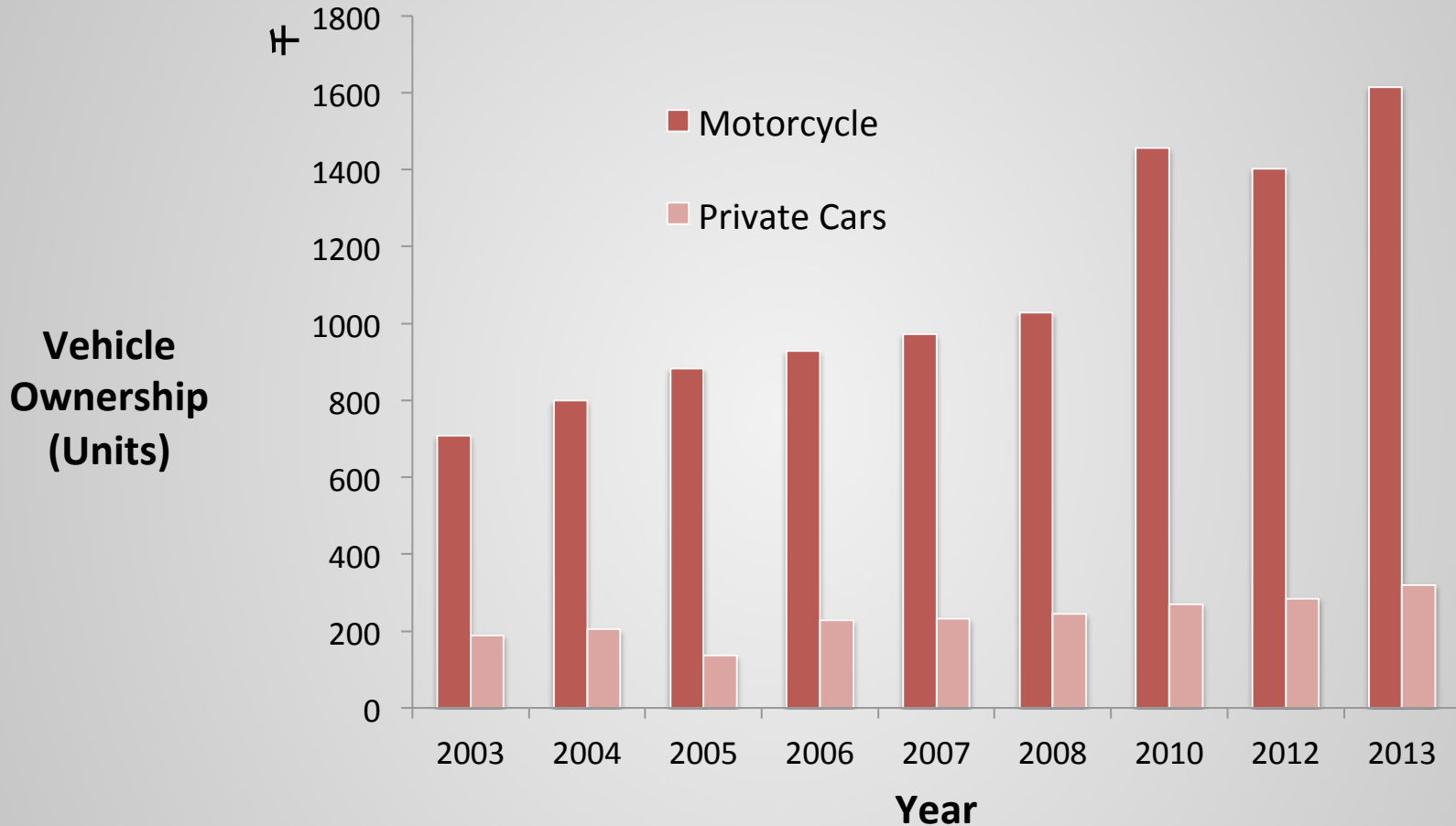
- Emission threshold level
- Clean fuel
- Cleaner production

2. Local

- Vehicle ownership control (tax)
- Public transportation policy and development
- Green space
- Traffic management



Vehicle Ownership in Surabaya



Vehicle Ownership the last 2 years

- Monthly growths of motorcycles → 13,441 units/month
- Monthly growths of motorcycles → 4,042 units/month

Source: Police Headquarter of Surabaya City (2014)

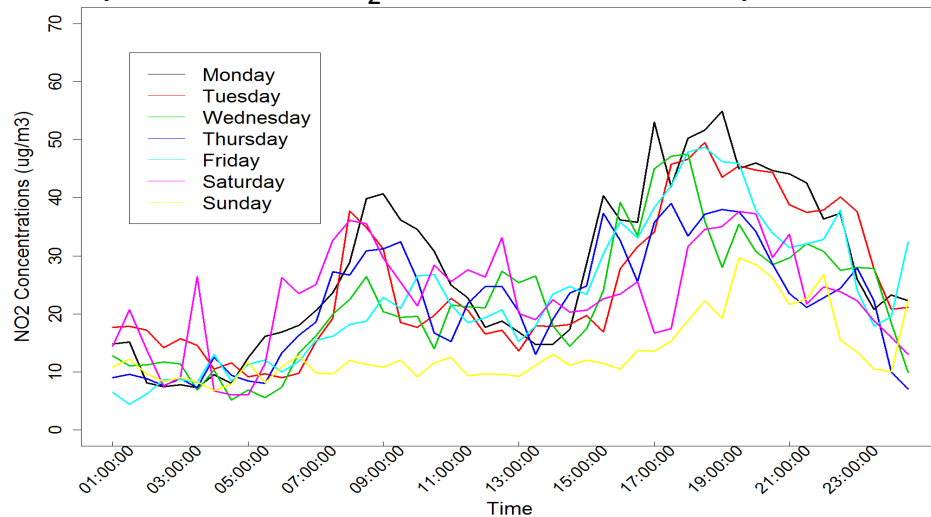
Inlet from outside Surabaya reaches up to 25,000 vehicles/day



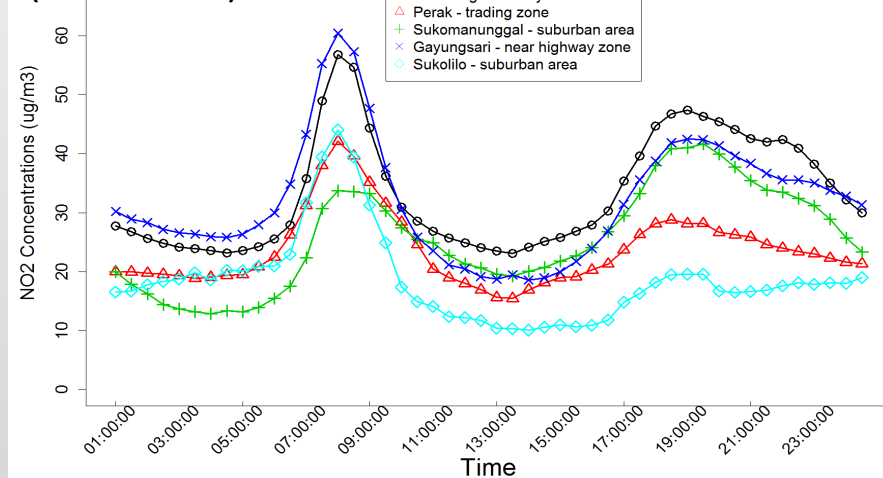
Policies in Surabaya

- Restriction to heavy vehicles on protocol road between 6am to 10am (implemented 4 years)
- Progressive tax for 2nd or more vehicle

Daily Pattern of NO₂ Concentration in City Center



Average Concentration of NO₂ Concentration (2001-2002)



Questions

Q: have those effective in improving air quality level?

Since there are only two monitoring stations right now we have no adequate data to conclude

However, based on 2001-2002 data, we make rough assumption that those policies are not adequate → based on the fact that the growth of vehicle ownership has been **tremendous**



Upcoming Policies in Transportation

Currently ongoing:

- Constructing road network and monorail north-south and east-west
- Establish 9 sub terminal to support public transportation network to suburban and buffer cities
- **Promoting massive shift from private to public transport**



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2. Peraturan Menteri Lingkungan Hidup No. 5 tahun 2006 tentang Ambang Batas Emisi Gas Buang Kendaraan Bermotor Lama
3. Status Lingkungan Hidup Daerah (SLHD) Surabaya 2011
4. Rencana Strategis Dinas Perhubungan Kota Surabaya Tahun 2011 - 2015

