

Air Pollution Control Strategies In Taiwan



Environmental Protection Administration, Executive Yuan, R.O.C. (Taiwan)

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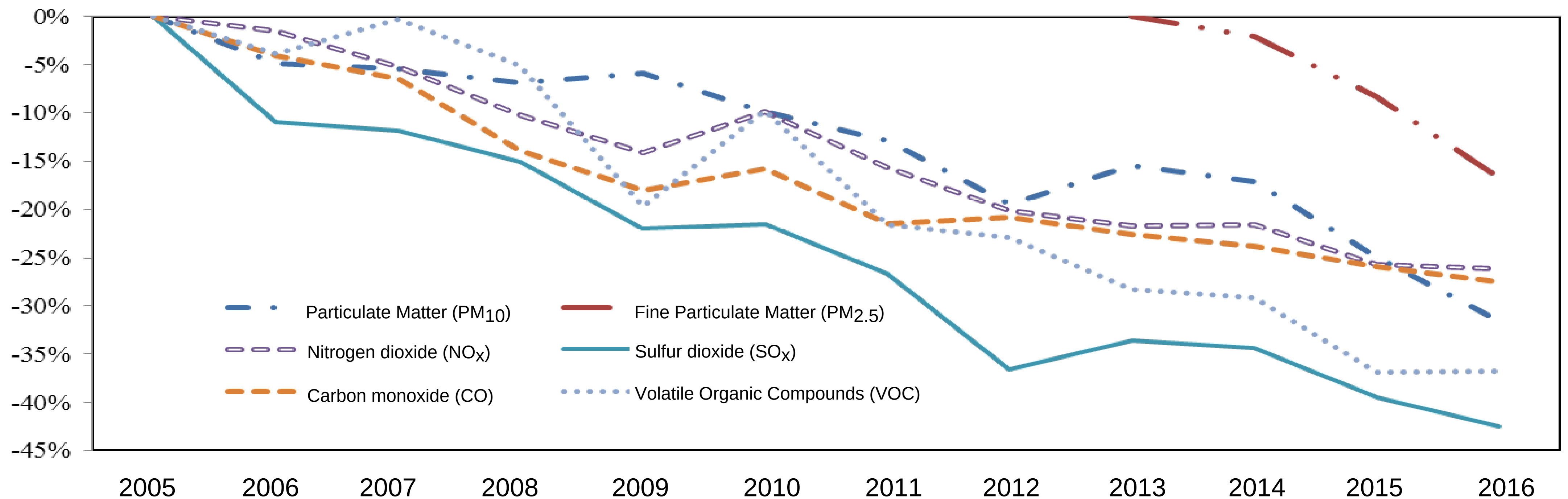
Taiwan’s Natural Environment and Environmental Load

Taiwan’s Environmental Load Compared to Other Countries				
Density (per km²)	Taiwan	US	Japan	Germany
		multiples		
Population	644	20.2	1.9	2.8
Vehicles	588	22.8	2.5	4.0
Pigs	160	24.3	6.2	2.1

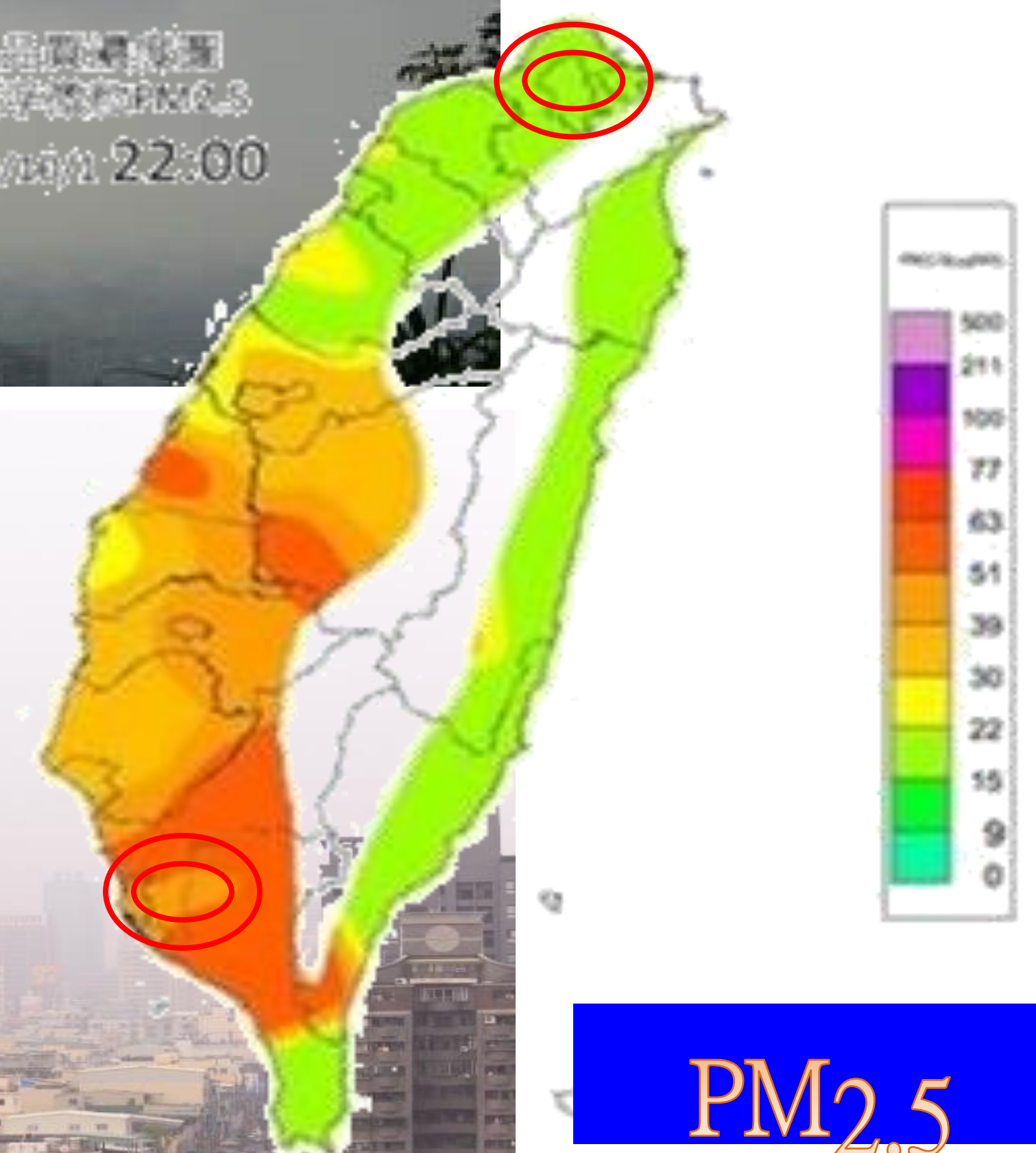
Sources : <http://www.moi.gov.tw>, <http://www.prb.org>, <http://faostat.fao.org> (population, land area); <http://www.motc.gov.tw> (vehicles); <http://faostat.fao.org> (pigs);
Data year for population: all countries, mid 2014; Data year for vehicles: Taiwan, 2014; Japan and Germany, 2013; US, 2011; Data year for pigs : Taiwan, second quarter of 2014; other data, 2013



Air Quality Improvement



The Major Air Pollution Issue in Taiwan

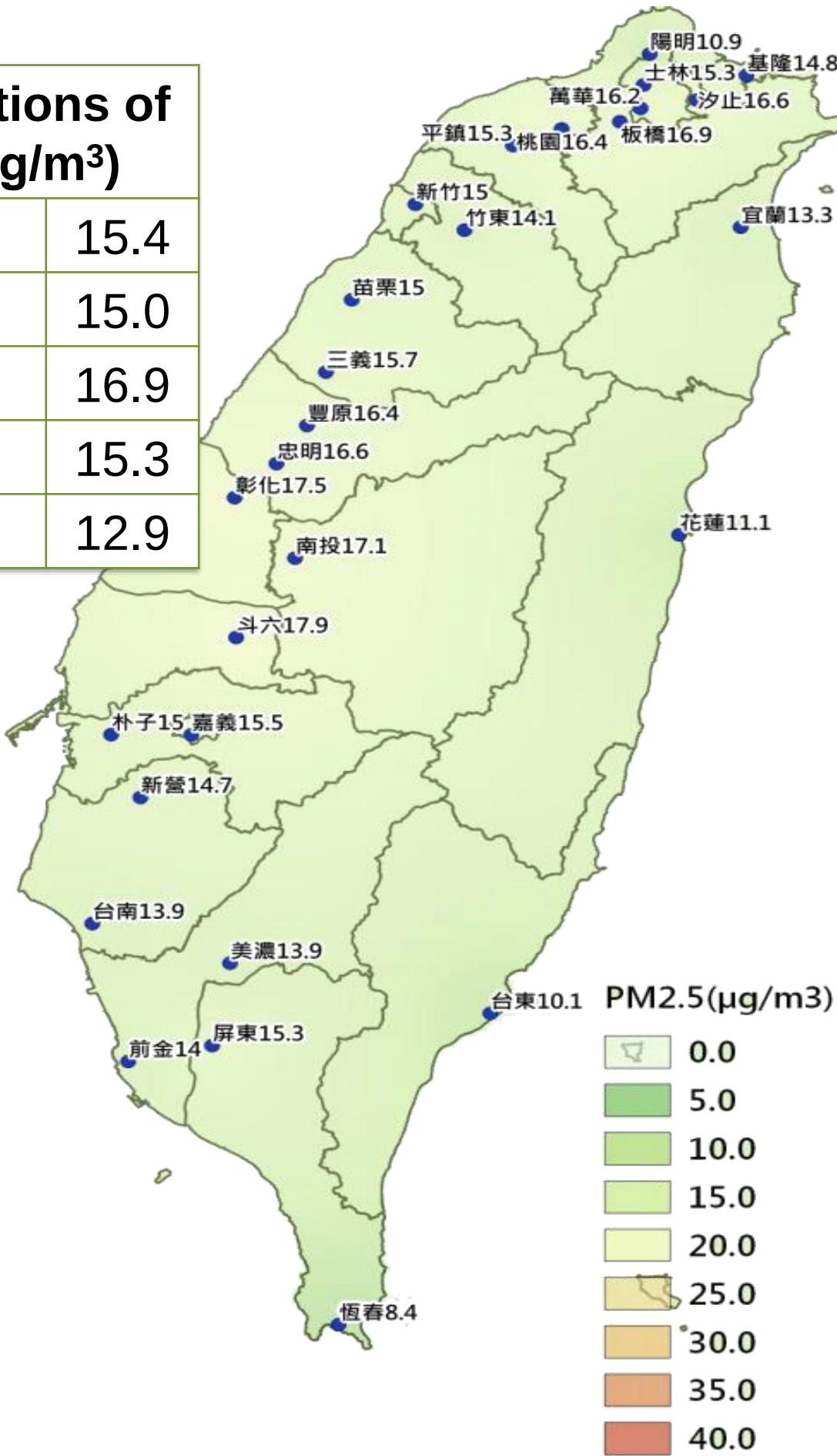


PM_{2.5}

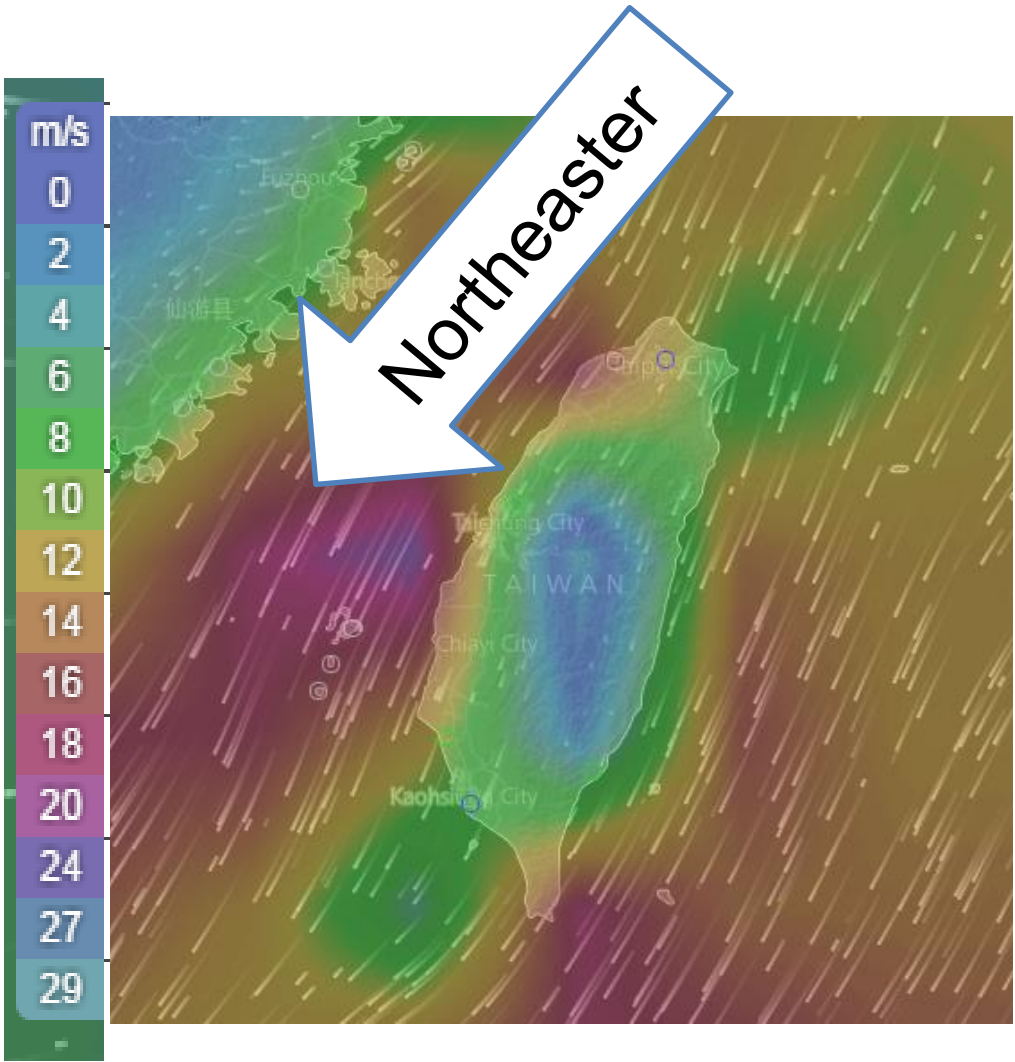
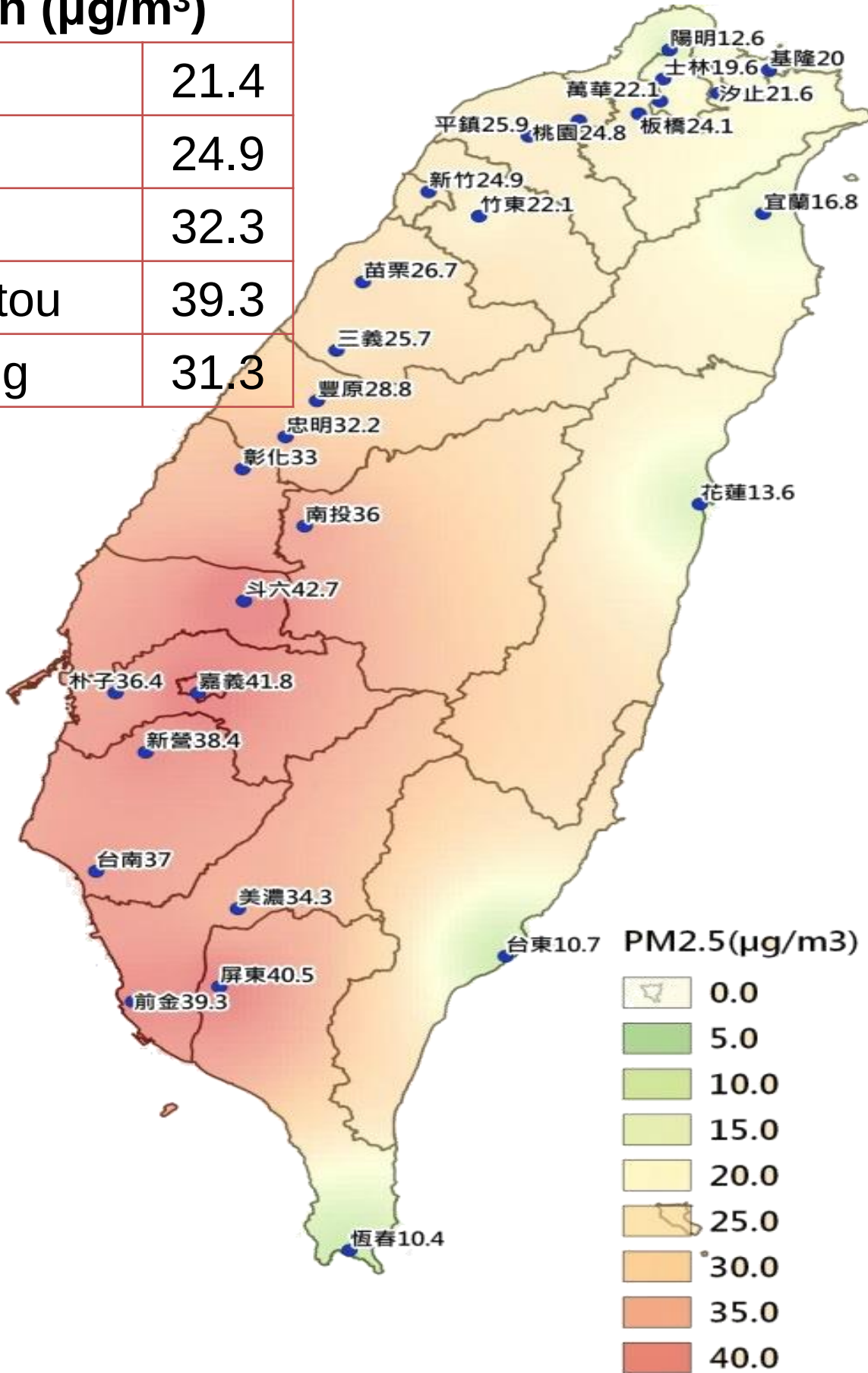
Reducing the Concentrations of PM_{2.5}

Where will be affected?
When is the high season?
Where is the source from?

Average PM _{2.5} Concentrations of Southwest Monsoon (µg/m³)	
Northern	15.4
Hsinchu and Miaoli	15.0
Central	16.9
Yunlin, Chiayi and Nantou	15.3
Kaohsiung and Pingtung	12.9



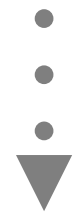
Average PM _{2.5} Concentrations of Northeast Monsoon (µg/m³)	
Northern	21.4
Hsinchu and Miaoli	24.9
Central	32.3
Yunlin, Chiayi and Nantou	39.3
Kaohsiung and Pingtung	31.3



About PM_{2.5}...

Where ?

Middle and south part
of Taiwan



Especially in Yunlin, Chiayi,
Tainan and Kinmen, the
annual means are all higher
than 25µg/m³.

When ?

October-March



During northeast monsoon
period, it is difficult to
diffuse under leeside
condition.

Source from ?

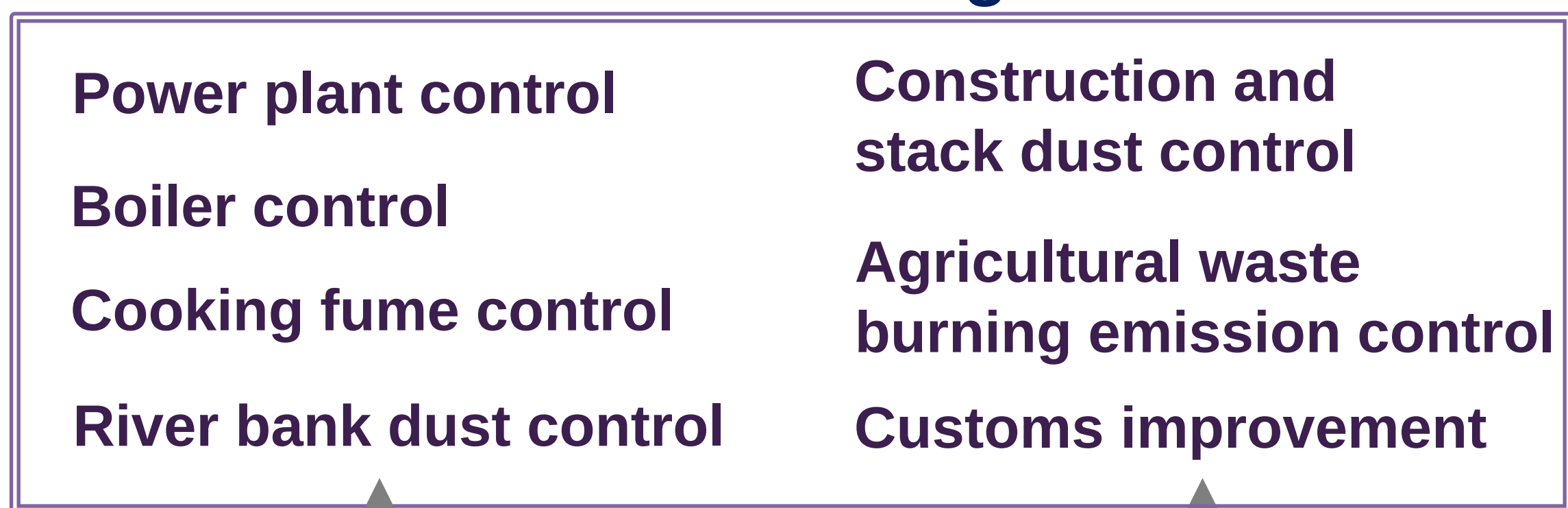
Domestic source
+
Offshore transport



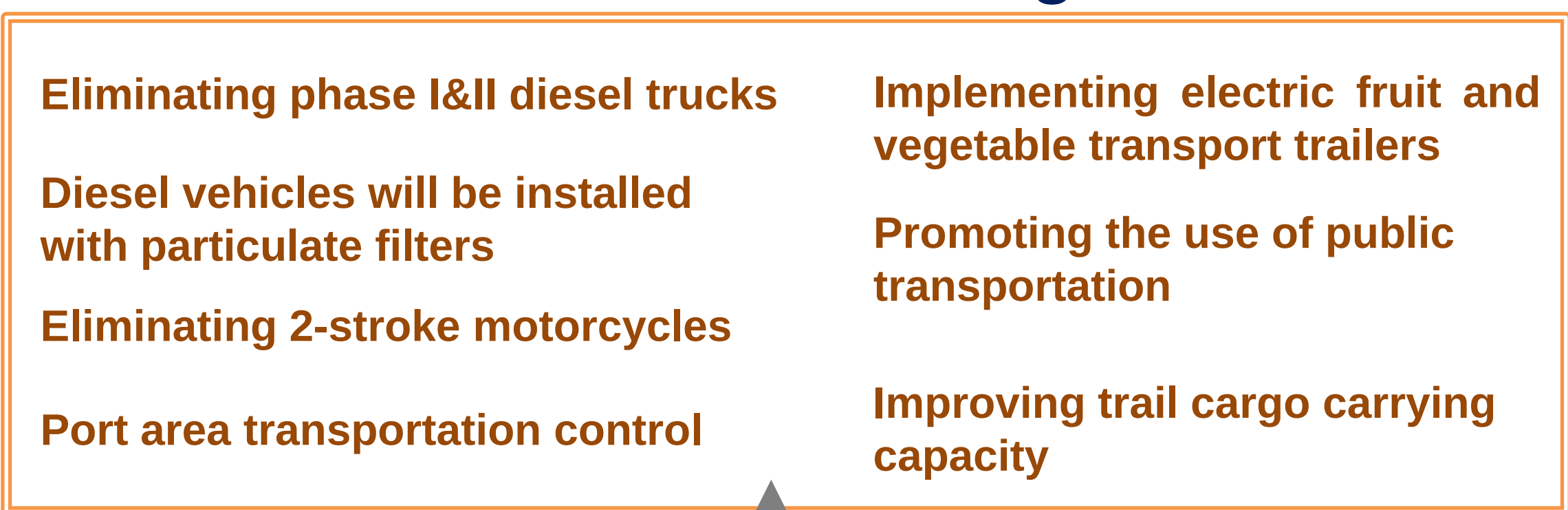
Offshore transport : 34% - 40%
Domestic source : 60 % - 66%

Control Strategies: Reducing from Domestic Sources

Stationary Pollution Sources Control Strategies



Mobile Pollution Sources Control Strategies



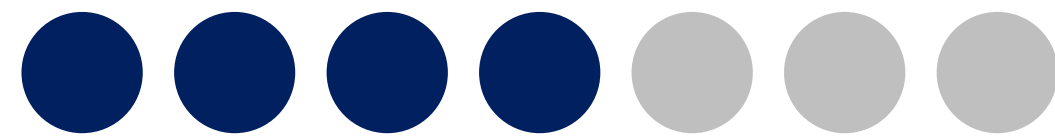
Type and Rate of Domestic Sources

Stationary Pollution Sources

- 1 **Power plant control**
- 2 **Boiler control**
- 3 **Agricultural waste burning emission control**
- 4 **Construction and stack dust control**
- 5 **Cooking fume control**
- 6 **Customs improvement**
- 7 **River bank dust control**



Stationary Pollution Sources Control Strategies



1 Power plant control

Improving efficiency

Controlling power plants (TEPA 、 Local Government)

Reducing the pollution of power plants (Ministry of Economic Affairs)

2 Boiler control

Using clean fuel

1,000 commercial boilers (TEPA 、 Local Government)

5,000 industrial boilers (Ministry of Economic Affairs 、 Local Government)

3 Agricultural waste burning emission control

Reducing 90% of burning straws

Inspection and education (TEPA 、 Local Government)

Resourceization and recycling techniques (Council of Agriculture)

4 Construction and stack dust control

Up to 90% of eligible pollution control equipment

Regulation (TEPA 、 Local Government)

Supervision and inspection (Public Construction Commission)

Stationary Pollution Sources Control Strategies



5 **Cooking fume control**

Setting pollution control equipment for 7,000 restaurants

Setting control standard (TEPA 、 Local Government)

Regional inspection (Ministry of the Interior 、 Ministry of Health)

Develop the techniques and equipment

(Ministry of Economic Affairs)

6 **Customs change**

Centralized burning joss paper amount 22,000 tonnes

Promoting burning centralization and reduce firework use

(TEPA 、 Local Government)

Inspecting import joss paper (Ministry of Finance 、 Ministry of Economic Affairs)

Design alternatives (Ministry of the Interior 、 Local Government)

7 **River bank dust control**

Cleaning river bank during the dry season amount 180,000 km

Dust control methods (Water Resources Agency 、 River Management Bureau)

Planting and protection of forest (Forestry Bureau 、 Forest District Office)

Communication platform between central and local government (TEPA 、 Local Government)

Mobile Pollution Sources

- 1 **Eliminating phase I&II diesel trucks**
- 2 **Diesel vehicles will be installed with particulate filters**
- 3 **Eliminating 2-stroke motorcycles**
- 4 **Port area transportation control**
- 5 **Promoting the use of public transportation**
- 6 **Improving trail cargo carrying capacity**
- 7 **Implementing electric fruit and vegetable transport trailers**



Mobile Pollution Sources Control Strategies



1 Eliminating phase I&II diesel trucks

Eliminating 80,000 phase I&II diesel trucks (until 2019)

Improving spot check, hiring green cars, subsidy, amending the law about air clean zone

(TEPA 、 Ministry of Transportation and Communications 、 Ministry of Finance 、 Public Construction Commission 、 Local Government)

2 Diesel vehicles will be installed with particulate filters

30,800 diesel vehicles will be installed (until 2019)

Subsidizing 15 counties participate in the demonstration run to install garbage truck with particulate filters.

Regulations of the subsidy of big diesel vehicles install with particulate filters. (TEPA 、 Local Government)

3 Eliminating 2-stroke motorcycles

Eliminating 1 million 2-stroke motorcycles (until 2019)

Promoting the regulations of subsidy and scrape.

Improving inspection and encouraging report. (TEPA 、 Local Government)

Mobile
Pollution Sources
Control Strategies

4

Port area
transportation control



5

Promoting the use of
public transportation

Promoting reduce the pollution

- Setting shore power (Ministry of Transportation and Communications 、 Ministry of Finance)
- Controlling diesel vehicles to enter port (Ministry of Transportation and Communications)
- Reducing the pollution of ship transport (Ministry of Transportation and Communications 、 Ministry of Finance 、 TEPA)

Carrying capacity of road public transportation reach 1.24 billion passengers (until 2020)

- Subsidy of bus operation.
- Promoting E-bus, bus information system and Demand Responsive Transit Services (DRTS).
- Cooperating with campus .
- (Directorate General of Highways 、 Local Government)

Mobile Pollution Sources Control Strategies



6 Improving trail cargo carrying capacity

The container rate of total should up to 15% (until 2019)
Promoting containerization, Encouraging private freight car .
Improving efficiency of transportation
Instructing that should "Keep Goods Off The Ground"
(Taiwan Railways Administration)

7 Implementing electric fruit and vegetable transport trailers

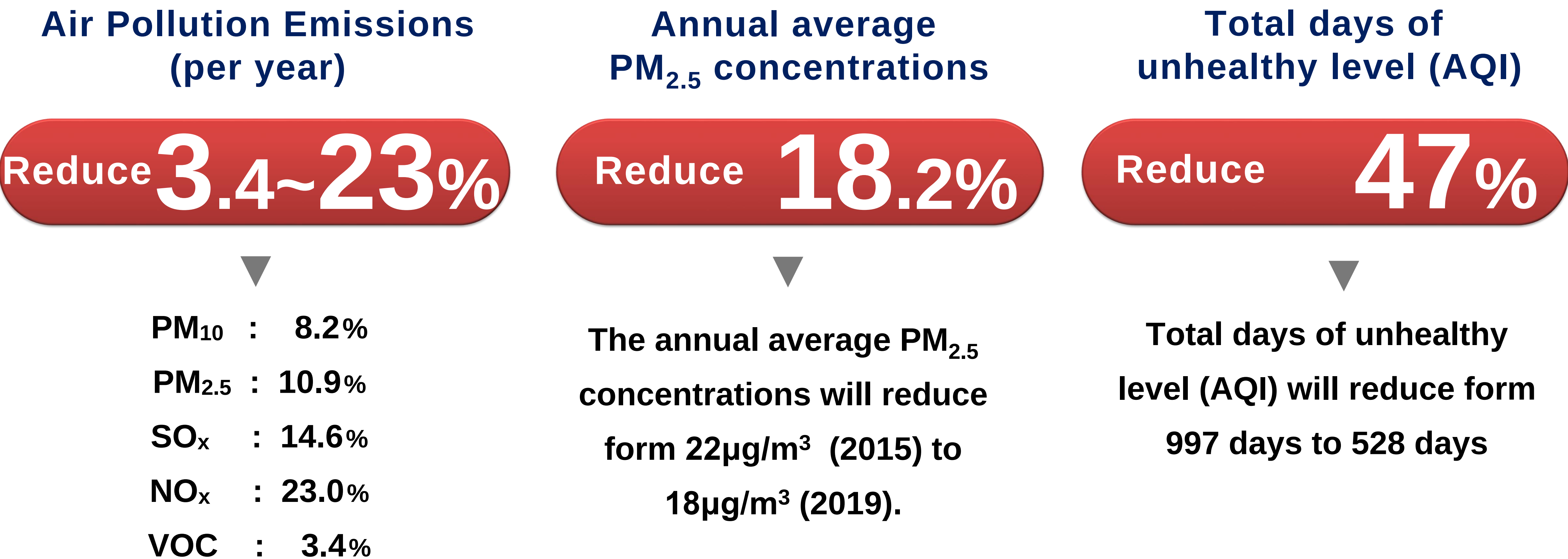
Promoting 2,100 electric trailers (until 2019)
(500 trailers in Siluo Wholesale Produce Market, 1,600 trailers
in other markets)
Regulation of the subsidy
Inspection specification of lithium battery safety
Developing small electric trailers
Regulating the management rules of diesel pallet truck
(TEPA 、 Council of Agriculture 、 Ministry of Transportation and
Communications 、 Local Government)

The Investment Budget of Reducing Air Pollution

* B=Billion

	Control Strategies	Government Investments		Private investments	Taipower (2017-2019)
		Fund budget	Official budget		
Stationary pollution sources	Power plant control	-	-	4.62 B	10.12 B
	Boiler control	0.49 B	2 B	9 B	PS. Taipower will invest 221.6 B after 2020.
	Agricultural waste burning emission control	0.23 B	-	0.11 B	
	Construction and stack dust control	0.71 B	-	13.93 B	-
	Cooking fume control	0.24 B	-	0.7 B	-
	Customs improvement	0.21 B	-	-	-
	River bank dust control	0.31 B	0.27 B	-	-
Mobile pollution sources	Eliminating phase I&II diesel trucks	13.75 B	-	107.8B-172.5B	-
	Diesel vehicles will be installed with particulate filters	2.6 B	-	6.84 B	-
	Eliminating 2-stroke motorcycles	1.15 B	-	24.4B-39B	-
	Port area transportation control	-	0.11 B	0.08 B	-
	Promoting the use of public transportation	-	14.09 B	0.53 B	-
	Improving trail cargo carrying capacity	-	0.01 B	0.03 B	-
	Implementing electric fruit and vegetable transport trailers	0.35 B	-	0.36 B	-
Total		20.04 B	16.48 B	168.4~247.7B	10.12 B

Expected Results of Air Quality Improvement



Public Participation

1 **Multi-Pronged Approach**

Promote multi-pronged approach, such as large sources pollution, medium & small boilers, construction, phase I&II diesel trucks, 2-stroke motorcycles, agricultural waste burning and customs improvement.

2 **Cooperation**

Reduce air pollution should be step by step.
TEPA will work together with public institutions and local government, promoting public participation as well.

3 **Keep improving**

Keep promoting and improving the next stage's strategies when achieving the goal in 2019.

ThankS for your attention



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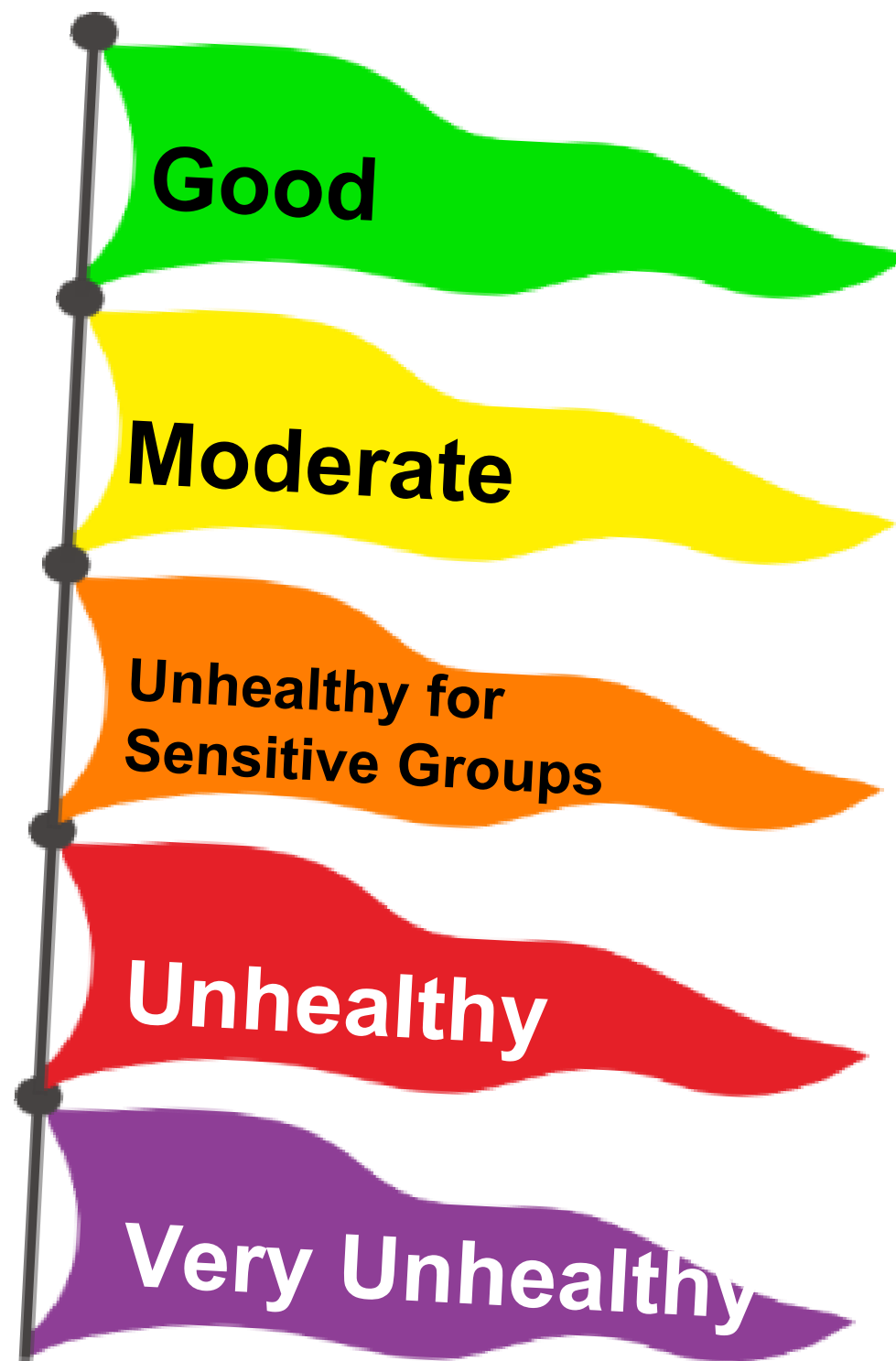
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6101

Air Quality Index and Breakpoints

Air Quality Index (AQI)							
Index Value	O ₃ (ppm) 8-hour	O ₃ (ppm) 1-hour ⁽¹⁾	PM _{2.5} (µg/m ³) 24-hour	PM ₁₀ (µg/m ³) 24-hour	CO (ppm) 8-hour	SO ₂ (ppb) 1-hour	NO ₂ (ppb) 1-hour
0-50 (Good)	0.000 - 0.054	-	0.0 - 15.4	0 - 54	0 - 4.4	0 - 35	0 - 53
51-100 (Moderate)	0.055 - 0.070	-	15.5 - 35.4	55-125	4.5 - 9.4	36 - 75	54 - 100
101-150 (Unhealthy for Sensitive Groups)	0.071 - 0.085	0.125 - 0.164	35.5 - 54.4	126 - 254	9.5 - 12.4	76 - 185	101 - 360
151-200 (Unhealthy)	0.086 - 0.105	0.165 - 0.204	54.5 - 150.4	255 - 354	12.5 - 15.4	186 - 304 ⁽³⁾	361 - 649
201-300 (Very Unhealthy)	0.106 - 0.200	0.205 - 0.404	150.5 - 250.4	355 - 424	15.5 - 30.4	305 - 604 ⁽³⁾	650 - 1249
301-400 (Hazardous)	⁽²⁾	0.405 - 0.504	250.5 -350.4	425 - 504	30.5 - 40.4	605 - 804 ⁽³⁾	1250 - 1649
401-500 (Hazardous)	⁽²⁾	0.505 - 0.604	350.5 - 500.4	505 - 604	40.5 - 50.4	805 -1004 ⁽³⁾	1650 - 2049

School Flag Program



(1)Areas are generally required to report the AQI based on 8-hour ozone values. However, there are a small number of areas where an AQI based on 1-hour ozone values would be more precautionary. In these cases, in addition to calculating the 8-hour ozone index value, the 1-hour ozone value may be calculated, and the maximum of the two values reported.

(2)8-hour O₃ values do not define higher AQI values (≥ 301). AQI values of 301 or higher are calculated with 1-hour O₃ concentrations.

(3)1-hour SO₂ values do not define higher AQI values (≥ 200). AQI values of 200 or greater are calculated with 24-hour SO₂ concentrations.



媽祖遶境活動空污監測

