

Seoul's Air Quality Control & Vehicle Restrictions

I • SEÒUL • U

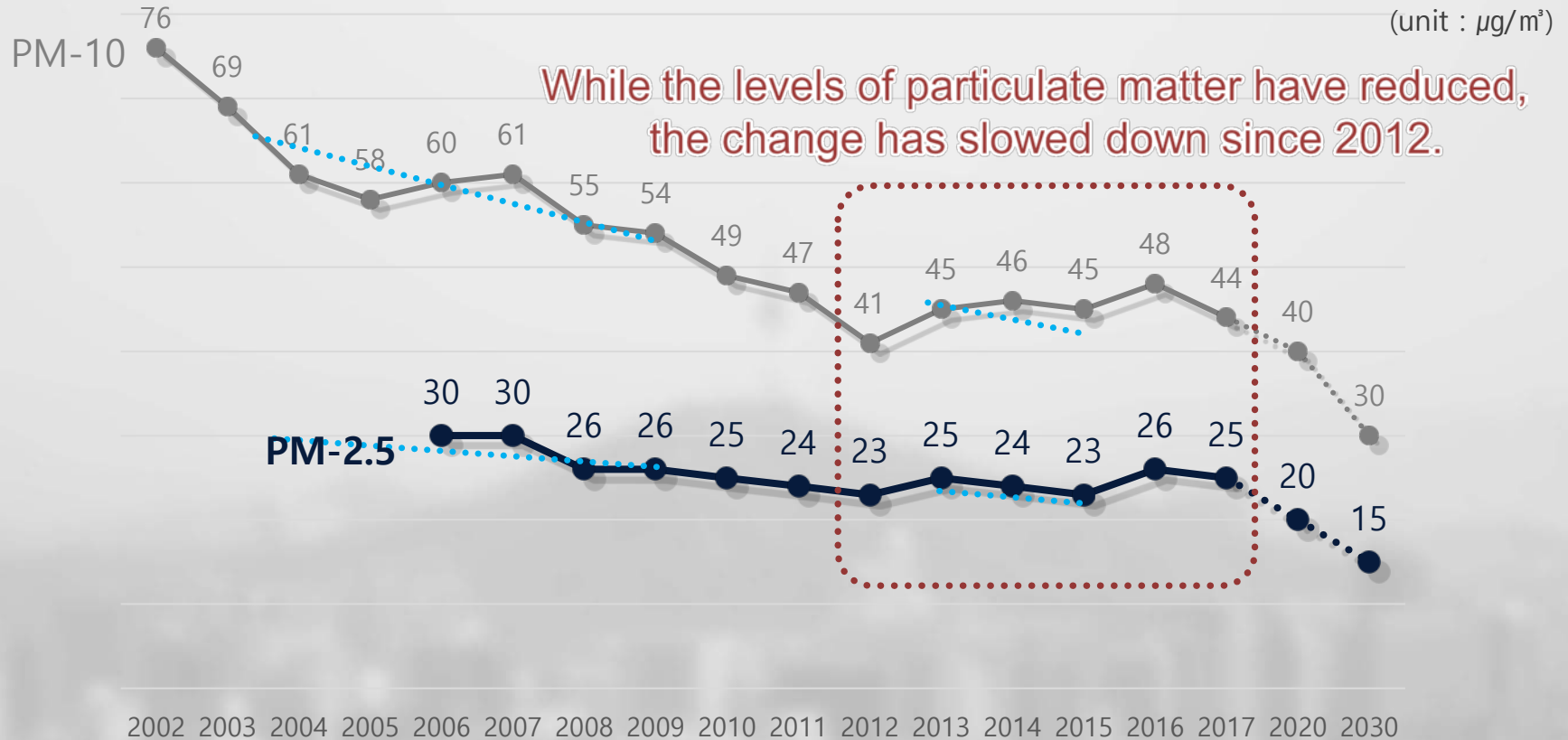


A city skyline at sunset with a dark blue rounded rectangle overlay containing text. The background shows a city with various skyscrapers and buildings, with a prominent blue glass skyscraper on the right. The sky is a mix of blue and orange, indicating sunset. The text is white and centered within the dark blue rectangle.

I

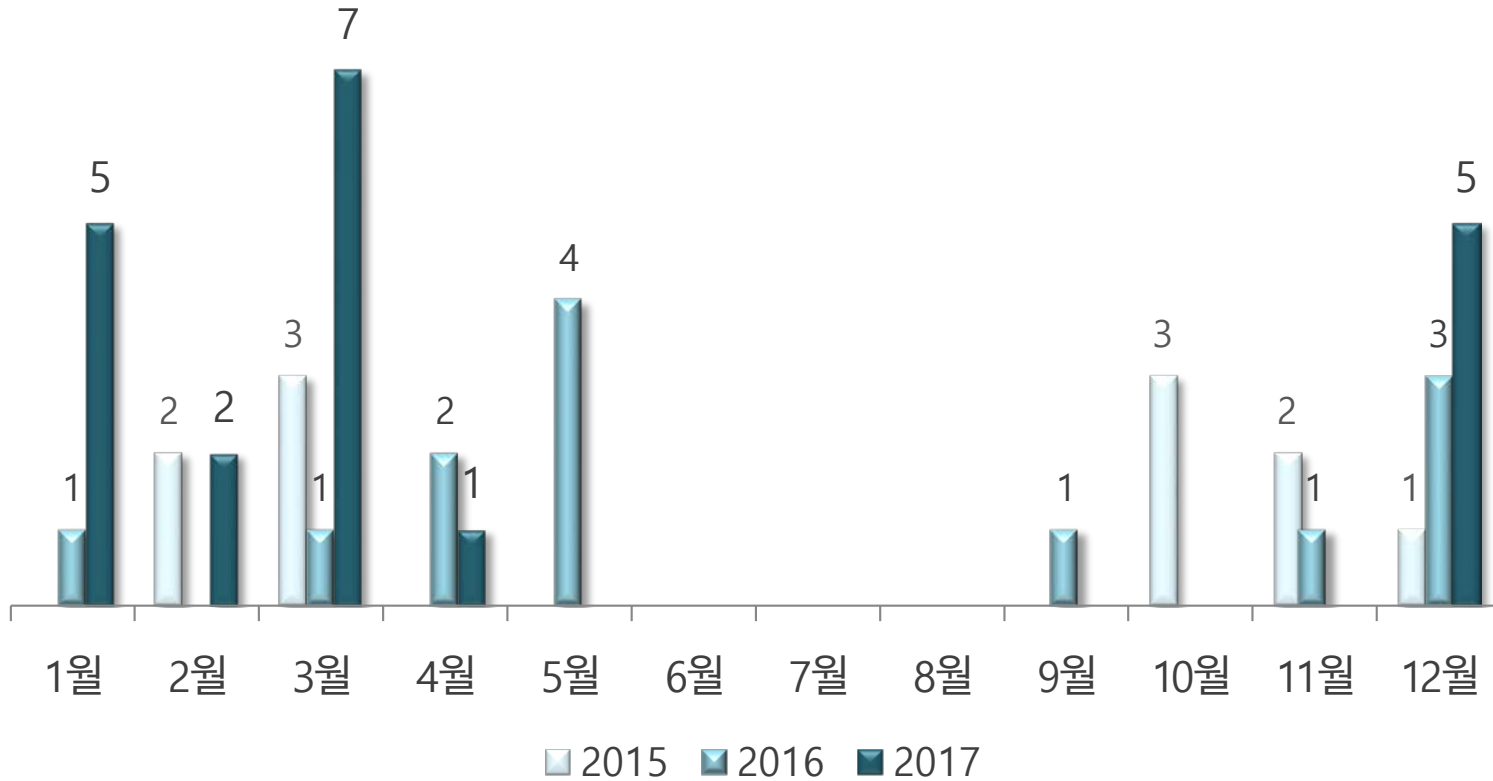
Air Quality
Trends &
Policies

01 CHANGES IN LEVELS OF PARTICULATE MATTER IN SEOUL



In 2017, levels of PM-10 and PM-2.5 increased by 7% and 9% from 2012, respectively.

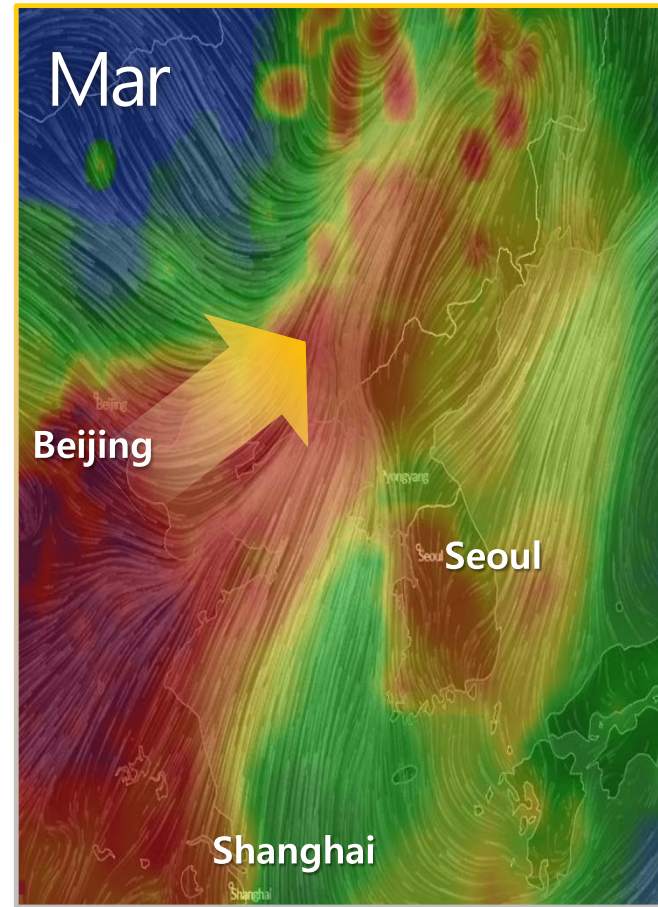
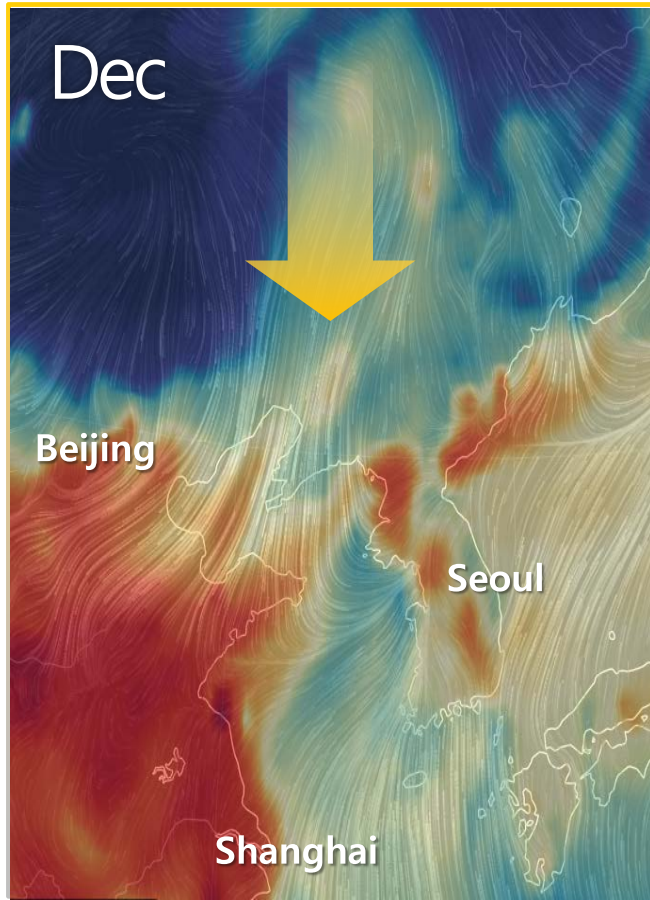
01 NO. OF BAD-PM2.5 DAYS OVER PAST THREE YEARS



11 days in 2015, 13 days in 2016, 20 days in 2017


01 CAUSES OF SERIOUS PARTICLE POLLUTION

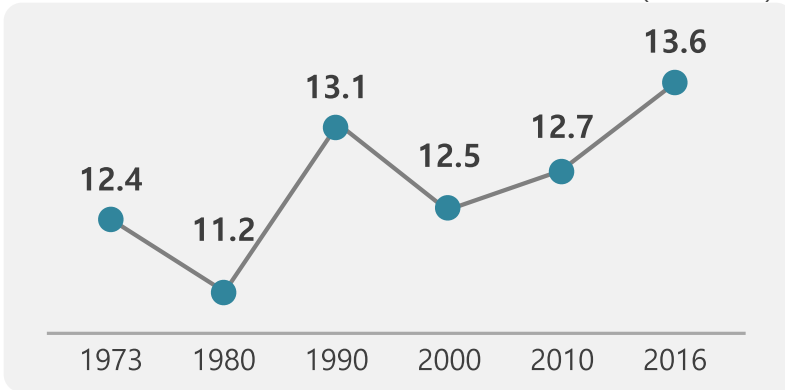
Geopolitical location: Dust blown into Korea from China and Mongolia



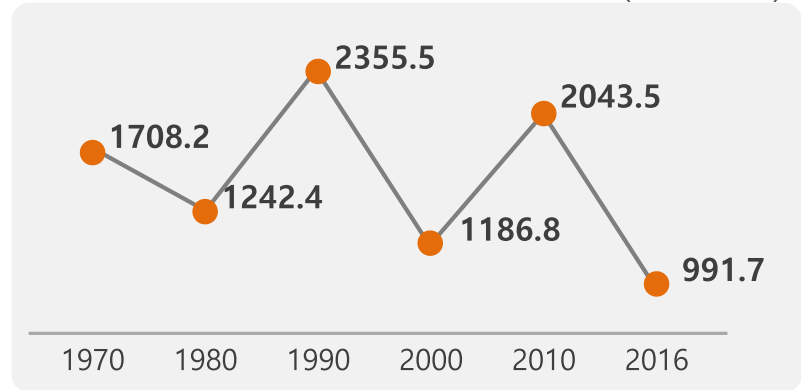
01 CAUSES OF SERIOUS PARTICLE POLLUTION

Impact of Climate Change

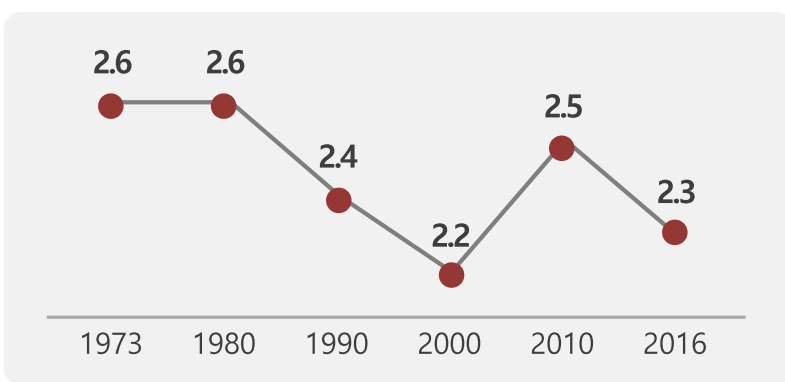
 Higher temperature (unit : °C)



 Lower precipitation (unit : mm)

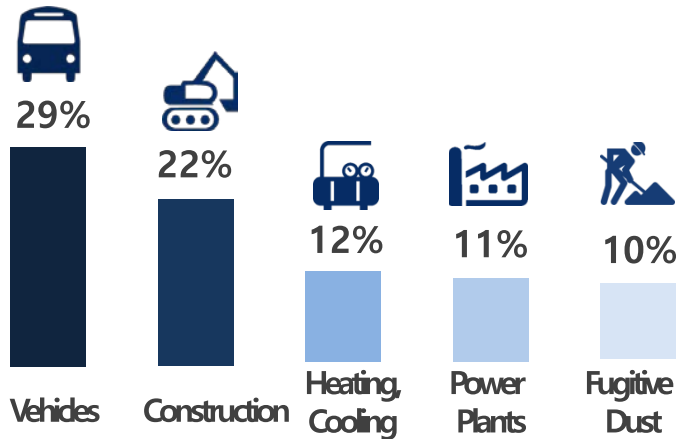


 Lower Wind Velocity (unit : m/s)



01 CAUSES OF SERIOUS PARTICLE POLLUTION

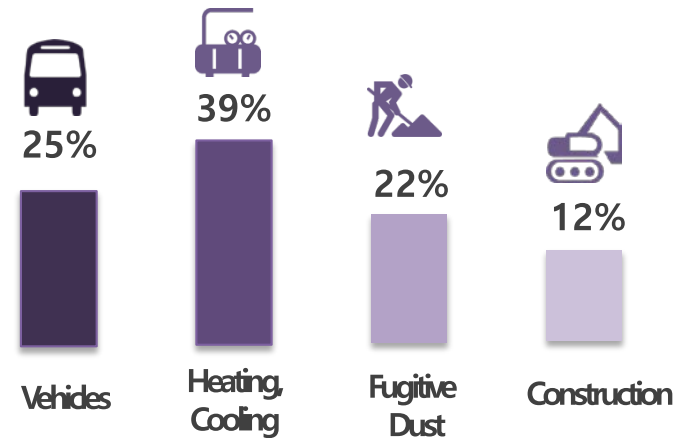
Sources of PM2.5 in Metropolitan Area



* Other sources: Commercial sites 9%, Biomass burning 5% etc.

(Sources: National Institute of Environmental Research)

Sources of PM2.5 in Seoul



* Other sources: Biomass burning 2% etc.

(Sources: Seoul Research Institute)



01 HEALTH IMPACT OF PARTICULATE MATTER

World Health Organization classified PM -2.5 as Group 1 carcinogen

- ☑ WHO classified PM -2.5 as Group 1 carcinogen (2013)
- ☑ More premature deaths (OECD as of 2016):
17,000 in 2010 → 52,000 in 2060
- ☑ Higher social costs
 - In large cities, about KRW 450,000 of social costs are incurred for the increase in PM-2.5 by 1kg
 - Decrease in labor productivity and crop yields will result in losses of KRW 2mn a year per person as of 2060.
- ☑ Higher suicide rates: The group with highest exposure to PM-10 is 4.03 times more likely to commit suicide than the group with lowest exposure



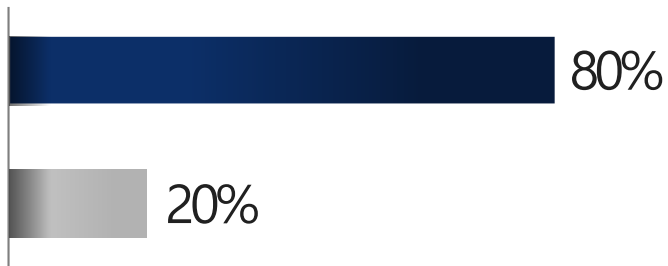
Strong and innovative measures are urgent

CITIZENS' POLICY PRIORITIES

■ For ■ Against

Odd-even driving restriction on days with high PM levels

(1,867 respondents, %)



Polluted vehicle restrictions in the city center

(1,867 respondents, %)



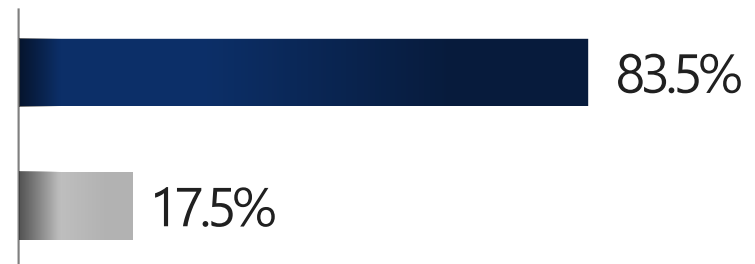
Temporary shutdown of coal power plants in Spring

(1,867 respondents, %)



Environmental values put before citizen convenience

(1,867 respondents, %)



01 KEY AIR QUALITY CONTROL POLICIES

1 Natural Disaster



- ✓ Designation of 'Particle Pollution' as **Natural Disaster**
- ✓ Public measures to protect the safety of citizens

2 New alert



- ✓ Introduction of an alert for PM2.5 **sensitive** groups
 - Hand out of **dust masks** : 1.5 mn persons/2.2bn KRW
 - Deployment of **air purifiers** : 6,806 places /2.9bn KRW

3 Emergency Measures



- ✓ Enforcement of Emergency PM2.5 Reduction Measures
- ✓ SMS alert services

4 Odd-even Driving ban



- ✓ Voluntary alternate day driving ban
- ✓ Shut down of public parking lots (6am~8pm)

5 ULEZ



- ✓ Dirty vehicle ban in Green Transportation Promotion Zone(ULEZ)

01 KEY AIR QUALITY CONTROL POLICIES

6 Green Construction



- ✓ Old construction equipment retrofits
- ✓ Mandatory use of eco equipment at all public and private construction sites from 2018

7 Eco Boilers



- ✓ Support for household eco boilers and industrial low-NOx burners
 - 6,000 units of boilers / 4,357 units of low-NOx burners by 2018

8 R & D



- ✓ R&D support and expansion of research to nurture air quality startups

9 Environmental Diplomacy



- ✓ Environmental cooperation with East Asian cities
 - East Asia Clean Air Cities
 - Seoul-Beijing MOU on environmental cooperation
 - information exchange/ Joint research on air pollution
 - 'Seoul-Beijing Air Quality Forum' / 'Seoul-Beijing staff training program'

10 Local Cooperation



- ✓ Cooperation with state government
 - Air quality policy committee of state and local governments

01 EMERGENCY PM-2.5 REDUCTION MEASURES



Conditions

Enforced five times this year (Jan. 15, 17 and 18 & March 26 and 27)

- ✓ The measure **was enforced in Seoul alone** (Jul 2017)
- ✓ It is enforced when the average (from midnight to 4pm) PM2.5 levels exceed $50\mu\text{g}/\text{m}^3$ and the next day's forecast is bad at $50\mu\text{g}/\text{m}^3$ or worse



Measures

- ✓ Public parking lot shutdown and Voluntary odd-even driving ban
- ✓ Operation reduction of construction sites and high air pollution emitting facilities
- ✓ Public vehicle fleet suspension
- ✓ SMS warning services
- ✓ Deployment of Fugitive dust suction vehicles
- ✓ Handout of air purifiers at child care facilities and masks to the vulnerable



Benefits

- ✓ An estimated 3.3% (1.1 ton) of PM2.5 reduction
- ✓ Subway use up by 5.8% and bus use up by 9.4% (Jan)

01

EMERGENCY REDUCTION MEASURE IMPROVEMENT

Citizen engagement

- ✓ Citizen-led public campaigns
- ✓ More incentives for active citizens



Focused Source control

- ✓ Car Labeling Scheme
- ✓ Dirty Vehicle Restriction
- ✓ Tight policing on compliance



Exposure reduction

- ✓ Indoor air quality control at sites frequented by many people
- ✓ Make Seoul's own standards to control indoor air quality



Citizen-led PM reduction policies

II

Dirty Vehicle Restriction

02 METROPOLITAN AGED DIESEL CAR RESTRICTION

Current Status

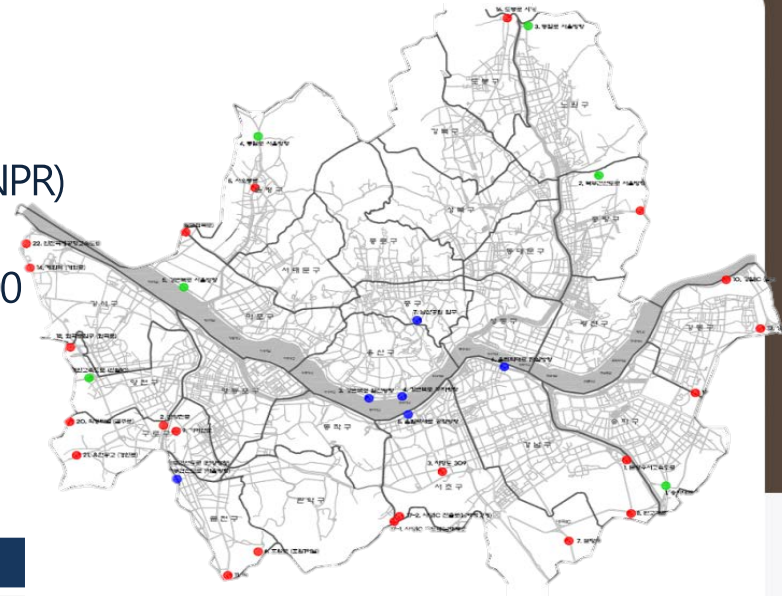
- ✓ Scope : across Seoul
- ✓ Target : Diesel cars weighing over 2.5tons and registered before Dec 31 2005
+ 33,000 commercial cars entering the Seoul metropolitan area over 60 days a year
- ✓ Cooperation agreement signed to expand the restriction to include other areas (August 2016)
 - I step (2017) : Seoul
 - Police by Seoul
 - Fines for non-compliant cars (including car registers in Incheon and Kyunggi Province)
 - II step (2018) : Seoul, Incheon, and 17 cities in Kyunggi Province
 - Police by Seoul, Incheon, and Kyunggi Province
 - Fines for non-compliant cars(including cars registers in other cities and provinces)
 - III step(2020) : Seoul, Incheon and 28 cities in Kyunggi Province



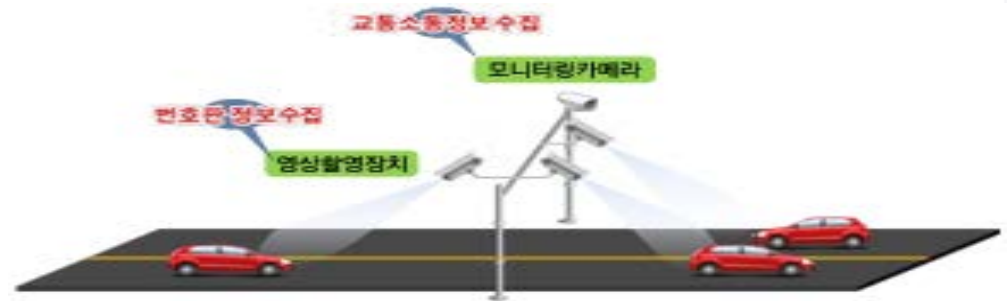
02 METROPOLITAN AGED DIESEL CAR RESTRICTION

Policing Status

- ✓ Methodology : Automatic Number Plate Recognition(ANPR)
- ✓ A warning is given to first violators, and fines of 200,000 KRW are imposed on repeated violators
- ✓ Policing trends



구분	Total	2012-15	2016	2017	2018
Cameras	37/80	7/24	6/22	24/34	14/14
Vehicles	8,216	4,150	2,273	1,793	-



02 SEOUL DIRTY VEHICLE RESTRICTION



| Target-setting criteria (planned)

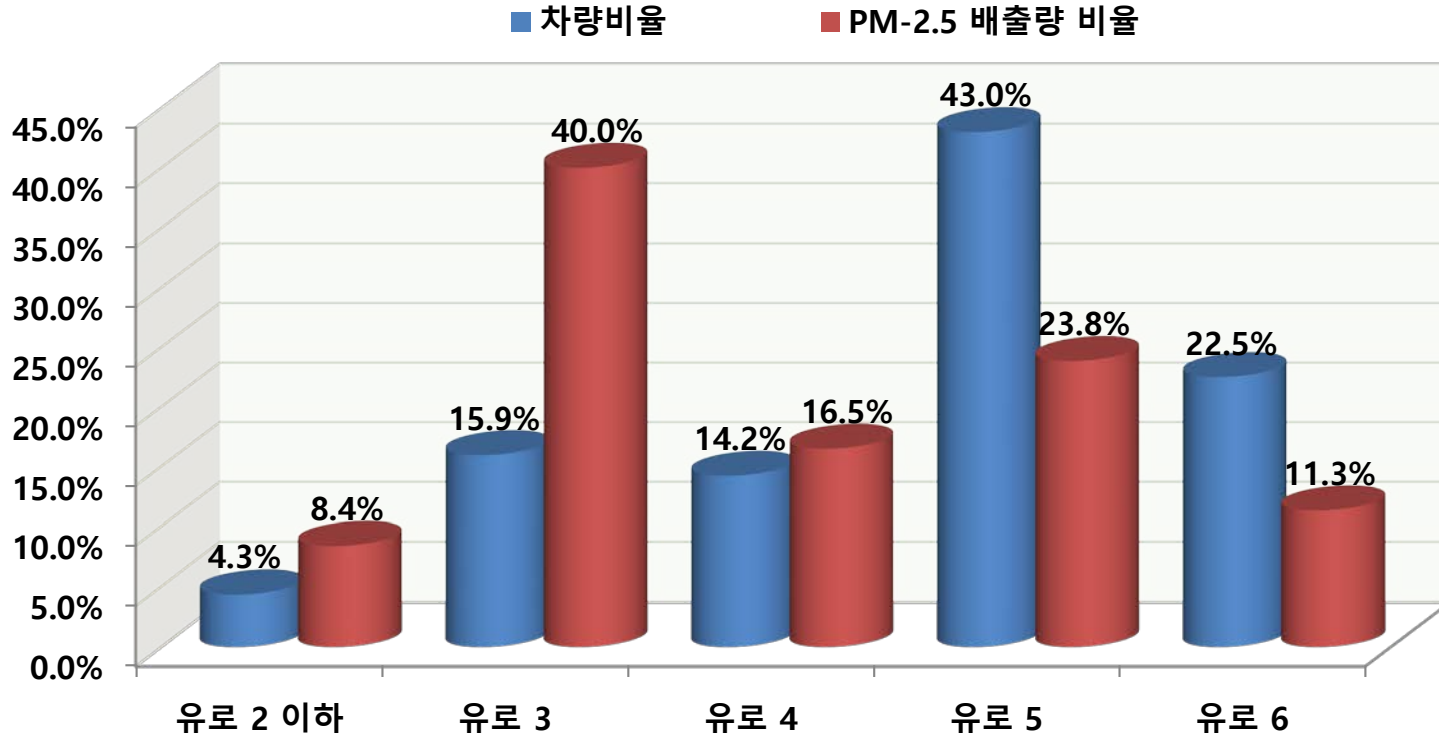
✓ Vehicles with high emissions

	EURO-3	EURO-4	EURO-5	-
NOx	5.0 g/kWH 2.5 times EURO-5	3.5 g/km 1.75 times EURO-5	2.0g/kWH	Heavy duty trucks
Particle Material	0.10 g/km 20 times EURO-5	0.04g/km 8 times EURO-5	0.005 g/km	Light duty trucks

02 SEOUL DIRTY VEHICLE RESTRICTION

Target-setting criteria (planned)

Comparison between registered vehicles and their PM2.5 emissions in Seoul



02 SEOUL DIRTY VEHICLE RESTRICTION

Selection of Target Vehicles(proposed)

		Option ①	Option②	Option ③
Targets		Diesel cars over 2.5tons, registered before Dec. 2005 (cars with reduction devices excluded) 5th class	Diesel cars registered before Dec. 2005(Pre-Euro3) (cars with reduction devices excluded) 5th class	Diesel cars registered before Sep. 2009 (Pre-Euro4) (cars with reduction devices included) 4th, 5th class
No. Registered Cars	Seoul	80,000(2.6%)	200,000(6.3%)	410,000(13.0%)
	Metropolitan	320,000(3.2%)	700,000(7.0%)	1.44mn(14.4%)
	Nationwide	1.2 mn (5.3%)	2.2mn(9.8%)	3.78mn(16.8%)

02 SEOUL DIRTY VEHICLE RESTRICTION

Overview

- ✓ Scope : The entire administrative area governed by Seoul Special City
- ✓ Enforcement : When Emergency PM2.5 Reduction Measures are enforced
after June 1 2018 (6am~9pm)
- ✓ Targets : All diesel vehicles registered before December 2005
(※ Retrofitted cars are excluded)
- ✓ Grace Period : by February 28 2019 (Communication of its enforcement is needed)
 - ① Diesel cars registered outside the administrative area
 - ② Diesel vehicles weighing below 2.5 tons
 - ③ Cars for people with disabilities

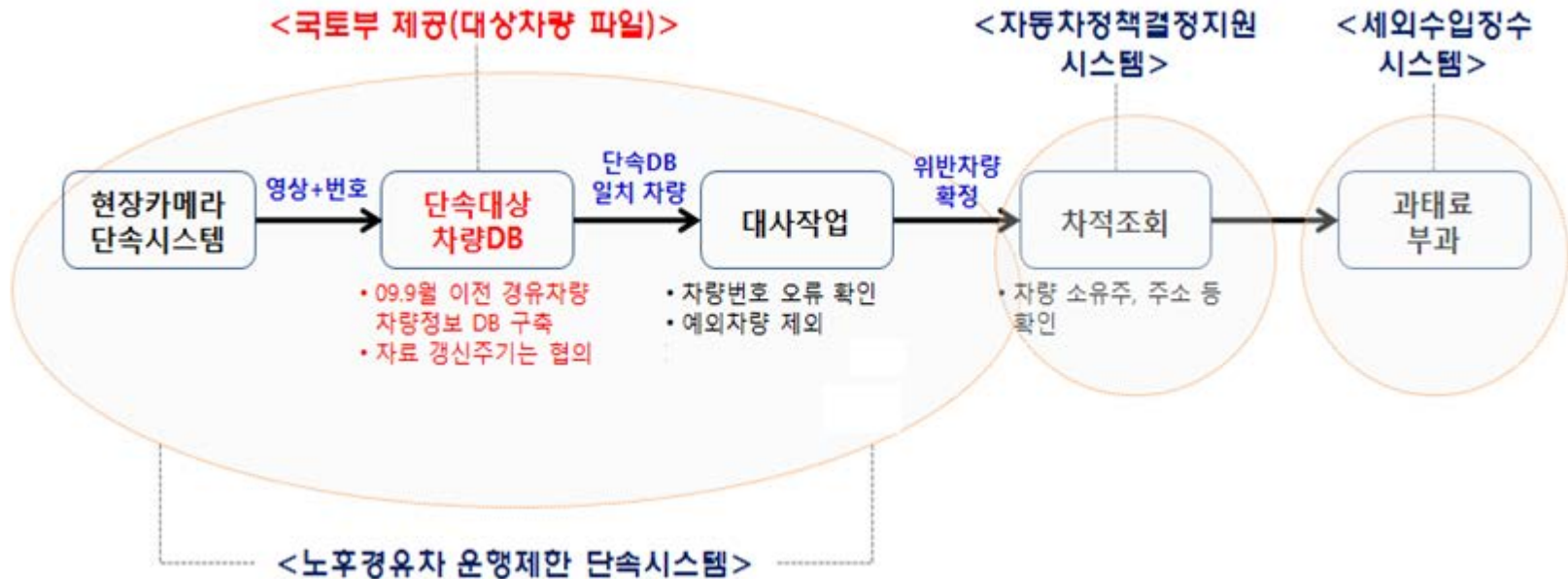
02 SEOUL DIRTY VEHICLE RESTRICTION

Overview

- ✓ Priority targets : 320,000 diesel vehicles weighing over 2.5 tons registered in the metropolitan area
 - Targets after grace period : 2.2 million diesel cars registered anywhere in South Korea
- ✓ Fines for non-compliant cars : 100.000 KRW
 - ❖ **Emissions reduction of public fleet**
 - All public fleet will be banned when the emergency reduction measures are enforce
 - But, fire trucks, cargo trucks etc. are exempted.

02 SEOUL DIRTY VEHICLE RESTRICTION

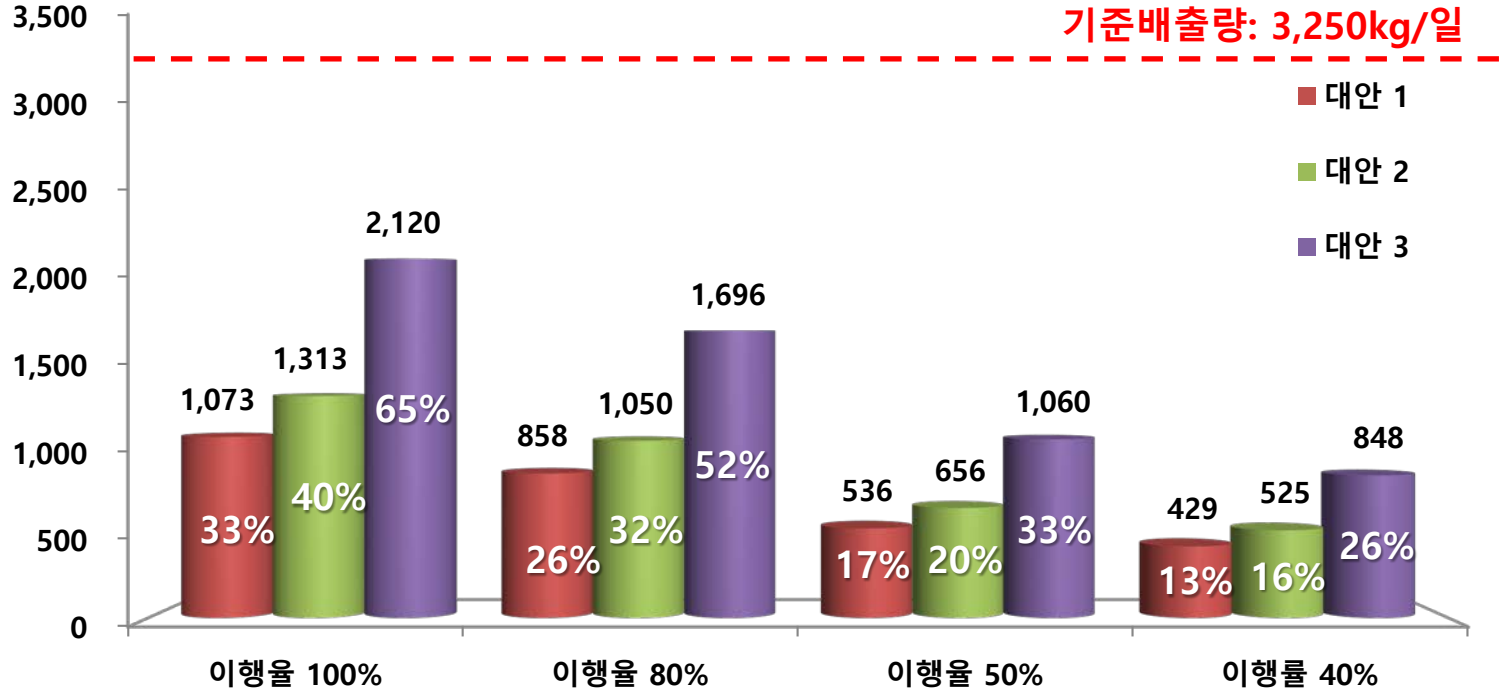
How to police non-compliant vehicles



02 SEOUL DIRTY VEHICLE RESTRICTION

Expected PM reduction effects

PM-2.5 reductions
(kg/일)



III

Car Labeling Scheme

03 DOMESTIC TRENDS

Existing National Car Labeling Schemes

✓ Low emission car label

- Ratings : 1~3 ratings
- Benefits: discounts at public parking lots, exemption of congestion charge



✓ Car energy efficiency label

- Information in the labels :
city fuel economy, highway fuel economy, combined fuel economy, combined CO₂ emissions(g/km), mileage per charge(km)
- Benefits: discounts at public parking lots, exemption of congestion charges

등급 구분					
	복합 에너지소비효율	16.0 이상	15.9~13.8	13.7~11.6	11.5~9.4

03 DOMESTIC TRENDS

National Care Labeling Scheme(before April 24 2018)

✓ 5 Ratings

- The scheme comes in five ratings depending on how much air pollutants (HC, CO, NO_x, PM) and CO₂ cars release compare to the emissions standard

Category	Grade1	Grade2	Grade3	Grade4	Grade5
Air pollutant emissions + Carbon emissions	9~10	7~8	5~6	3~4	2

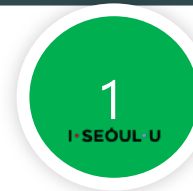
Different emissions between carbon and air pollutants
are not well reflected in the ratings

03 CAR LABELING/SCORING SCHEME

National Car Labeling Scheme (Current)

✓ Notification of the scheme(April 25 2018) : 5 ratings(1 ~ 5)

- Class 1: Electric, hydrogen fuel cell cars
- Class 1-3: hybrid cars
- Class 1-5 : Petrol and LPG cars
- Class 3-5 : Diesel cars



(Class1)
Low emissions
vehicles



(Class 4)
Euro4



(Class 5)
Euro3

Rating	Petrol-LPG car	Diesel cars
1	Electric, Hydrogen fuel cell vehicles	
	Cars subject to 2009~2016 emissions standard (NOx+HC : below 0.019g/km)	-
2	Cars subject to 2006~2016 emissions standard (NOx+HC : below 0.10g/km)	-
3	Cars subject to 2000~2003 emissions standard (NOx+HC : below 0.720g/km)	Cars subject to post- 2009 standard (NOx+HC : below 0.353g/km)
4	Cars subject to 1988~1999 emissions standard (NOx+HC : below 1.930g/km)	Cars subject to 2006 standard NOx+HC : below 0.463g/km)
5	Cars subject to 1987 emissions standard (NOx+HC : below 5.30g/km)	Cars subject to pre-2002 standard (NOx+HC : below 0.560g/km)

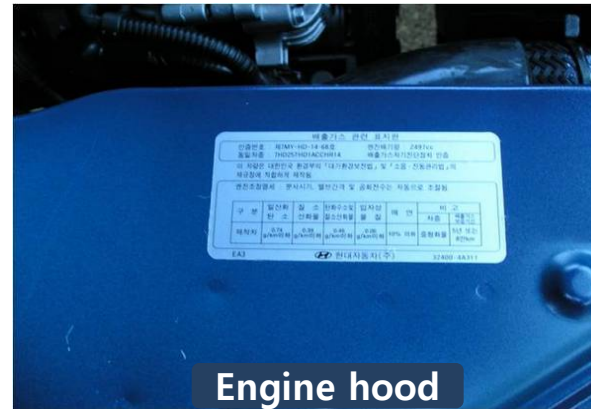
03 CAR LABELING/SCORING SCHEME

Where are the labels?

✓ Where are the labels?



hood



Engine hood

✓ Labels show vehicle emissions

배출가스 관련 표지판

- 제작사/모델명: Volkswagen AG / Passat 1.8 TSI
- 인증번호: GMY-AD-13-2
- 동일차종 명칭 및 기호: FAD1.8PG5FA313
- 원동기 주요 조정 내용
 - 점화 시가: 전자제어 점화
 - 점화 플러그 간격: 0.8 ~ 0.1 mm
 - 밸브 간격: 자동 조정식
 - 공회전 수: 760 ± 100 rpm
 - 배기량: 1,796 cc
- OBD 인증 여부: 배출가스자기진단장치 인증
- 배출가스 허용 기준 및 보증기간

구분	일산화탄소 (g/km)	질소산화물 (g/km)	배기량 탄화수소 (g/km)	입자상 물질 (g/km)	배연 (%)	비고
제작차	0.65	0.0125	0.00625	0.004	-	소형승용 10년 또는 192,000km

질소산화물+탄화수소 = 0.0125+0.00625=0.01875g

Petrol(Grade1)

배출가스 관련 표지판

인증번호 : 제3MY-HD-15호 엔진배기량 : 2497cc
 동일차종 : 3HD25SDICCHR

이 차량은 대한민국 환경부의 대기환경보전법 및 소음진동규제법의 제규정에 적합하게 제작됨.

엔진조정명세 : 분사 **질소산화물+탄화수소=0.78+0.08=0.86g/km**

구분	질소 배기관				매연	비고	
	일산화탄소	질소산화물	탄화수소	입자상 물질		차종	배출가스 보증기간
제작차	0.95 g/km이하	0.78 g/km이하	0.08 g/km이하	0.1 g/km이하	—	화물2	5년 또는 8만Km
운행차	—	—	—	—	30%(2도이하)	—	—

현대 자동차 (주) 32400-4A300

Diesel(Grade4)

03 CAR LABELING/SCORING SCHEME



(Class1) Low-pollution vehicles



(Class 4) Euro4



(Class 5) Euro3

- ✓ Regulating cars with low rates with the introduction of Car Labelling Scheme
- ✓ Provision of incentives such as a discount on public parking fees and exemption from congestion charges

03 CAR LABELING/SCORING SCHEME

Design 1



Design 2



Design 3



Design 4



03 CAR LABELING/SCORING SCHEME



- ✓ “Know your car’s class” mobile application
- ✓ “I put my label on the front window” campaign using an online platform
- ✓ Notifying the car ratings via car tax bills



03 Polluted vehicle restriction in green transport promotion zone(ULEZ)

Restricting cars with low eco rates from entering the Green Transport Promotion Zone

- ✓ Area: (Phase 1) Green Transport Promotion Zone (inside the city center, 16.7km²) → (Phase 2) Expansion to the entire Seoul
- ✓ Target: Cars with low eco ranks such as Class 4-5 (Diesel cars manufactured before Sep 2009)


Project
operation
(2 0 1 8)

- Legislation of Ordinance on Support, etc. of Car Labelling Scheme in line with the MoE announcement
- Basic planning (Mar 2018 -) and establishment (Oct 2018 -) of the traffic-control system
- Prior guidance: CCTV to monitor non-compliant cars, vehicles and staff deployed to police compliance et etc.

Enforcement
(2 0 1 9)

- Before building the system: A prior notice made by an enforcement officer on driving restriction by using PDA (Grades 4-5)
- After building the system: Automated enforcement with the technology capable of reading car plates





Cleaner Sky,
Healthier City,
For future generations



Together with citizens,
Seoul will tackle air pollution

Thank You

