



## Clean and Attractive City, Seoul

# Seoul's Eco-Friendly Transportation Policies

- Public Transportation System Reform & Introduction of Eco-Friendly Buses -

# Contents



- 1 Transportation Conditions & Policies in Seoul
- 2 Public Transportation System Reform
3. Introduction of Eco-Friendly Buses
4. Visions for Electric Vehicle Delivery



# 1

## Transportation Conditions & Policies in Seoul

- ▶ Transportation Conditions
- ▶ Transportation Policies

# Transportation Conditions in Seoul

- Area of Seoul : 605.3km<sup>2</sup>, consisted of 25 Gus (district offices)
  - ◆ Han River flows through the center: Gangbuk(northern part) 297.8km<sup>2</sup>(49.2%), Gangnam (southern part) 307.5km<sup>2</sup>(50.8%)

## ■ Population in Seoul & metropolitan area (Unit : 10K)

Year	1970	1990	2000	2005	2010
Seoul	543	1,062	1,037	1,030	1,044
Metropolitan Area (including Seoul)	872	1,860	2,214	2,360	2,499

※ Population in Seoul fell after reaching the peak in 1990 while metropolitan area population doubled than that of in Seoul in 2000 and has been increasing since then.

## ■ Number of registered vehicles (Unit : 10K)

Year	1970	1990	2000	2005	2010
Seoul	6	119	244	280	298
Metropolitan Area (including Seoul)	18	179	558	711	798

## Change in Traffic Volume

(Unit: 10K trips)

Year	1996	2002	2005	2009
Total Traffic Volume	2,779	2,968	3,100	3,194
Traffic Volume (Suburban area ↔ Seoul)	618	876	917	928

※ Despite stagnation of population increase in Seoul, total traffic volume and the amount of traffic between Seoul and the outskirts of the city is increasing.

## Modal Share

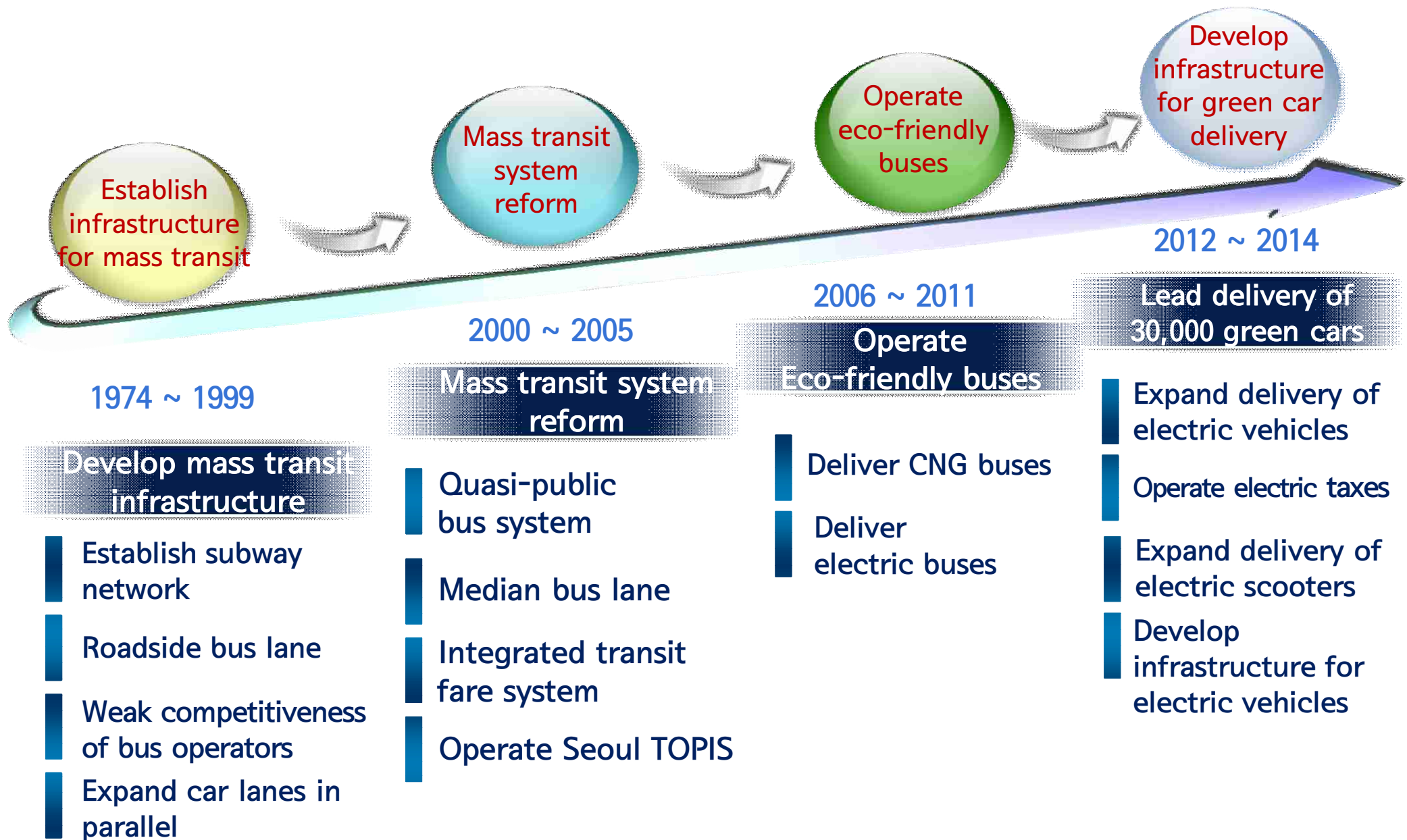
(Unit: %)

Year	1996	2002	2005	2009
Public Transportation	59.5	60.6	62.3	63.0
(Bus)	(30.1)	(26.0)	(27.5)	(27.8)
(Subway)	(29.4)	(34.6)	(34.8)	(35.2)
Passenger Car	24.6	26.9	26.3	25.9
Taxi	10.4	7.4	6.5	6.2
Other	5.5	5.1	4.9	4.9

※ Continuous increase in use of public transportation: 59.5% ('96) → 63% ('09)



# Transportation Policy Change in Seoul





# 2

## Public Transportation System Reform

- ▶ **Bus Operation System Reform: From Private to Quasi-Public Management**
- ▶ **Integrated Fare System for Public Transportation**
- ▶ **Median Bus Lane System**
- ▶ **Establishment of Scientific Transportation Management System**
- ▶ **Achievements in Public Transportation Reform**

# Bus Operation System Reform: From Private to Quasi-Public Management

SMG controls transportation revenues to lower fiscal deficit and promote bus route arrangements

- **Establish bus route system based on the citizens' needs**
  - Increase operation of inconvenient bus routes with low revenues
  - For bus operators, remove factors that cause deficits occurring from intensive competition
- **Operate collective system to control transportation revenues**
  - Joint management of bus operation revenues; calculate and allocate revenues to bus operators based on their operational performance
- **Secure stable profits for bus operators by providing subsidies**
  - Seoul subsidizes deficits for bus operators after calculating the profits
  - Eliminate factors that result loss for bus operators



Integrate all public transportation (bus, subway) fare systems –  
Free or discounted fare system for transferring between buses or  
between bus and subways

▣ Free transfers within 10km regardless of number of transfers

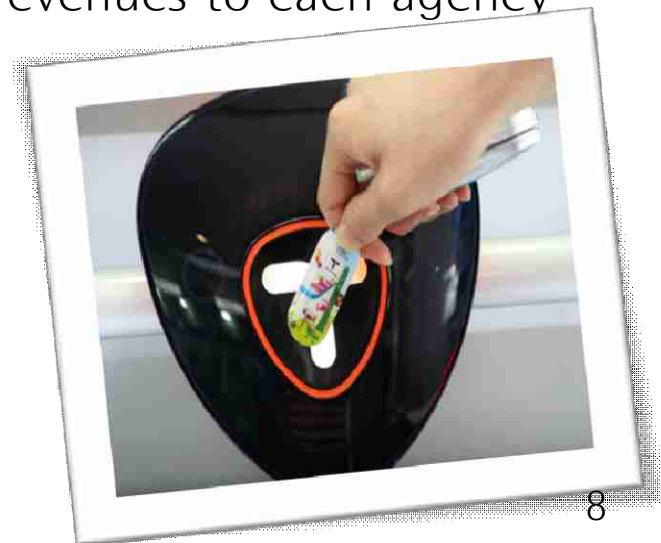
- Lessen the fare burden for citizens living in remote, outskirts area

▣ Develop a system that automatically calculates revenues for transportation agencies (bus operators, subways)

- Automatic calculation to allocate transportation revenues to each agency
- Resolve inconveniences between transportation agencies in advance

▣ Develop T-money card system for automatic transfer

- Multi-functioning transportation card  
– i.e. shopping and tax payment



# Median Bus Lane System

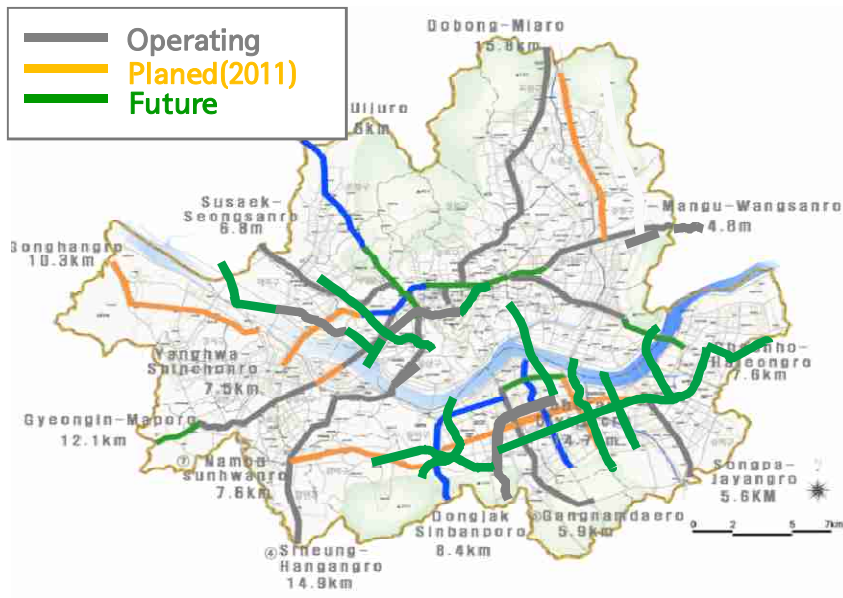
- Install bus lane and stations in the middle of the road
- Other lanes are used by private cars



## ▣ Problems caused by roadside bus lane

- Established in 1986 for effective management of existing roads
  - Stopping by the road is dangerous to bus passengers
  - Causes traffic congestion when buses try to cut into inner lanes





## Current status & future plans

- 2011: 12 routes, 105.5km
  - Plan to expand to 19 routes, 215 km from 2012

## Achievements

- Punctual bus operation
  - Buses arrive within 1~2 minutes of expected arrival time
- Faster bus speed
  - Bus speed rose by an average of 4km/h compared to roadside bus lane



## ▣ TOPIS (Transport OPeration and Information Service)

- Collect various transportation data from bus management system (BMS), use of transportation cards, and unmanned inspection system
- Analyze collected data; control and provide real-time information

### ● Collecting traffic information

- GPS, wireless communication network, bus card reader, traffic broadcasting system, National Police Agency, Korea Expressway Corporation, etc.

### ● Provide traffic information to citizens and users

- Traffic volume, congested areas, bus routes, bus service intervals, bus arrival time, etc.

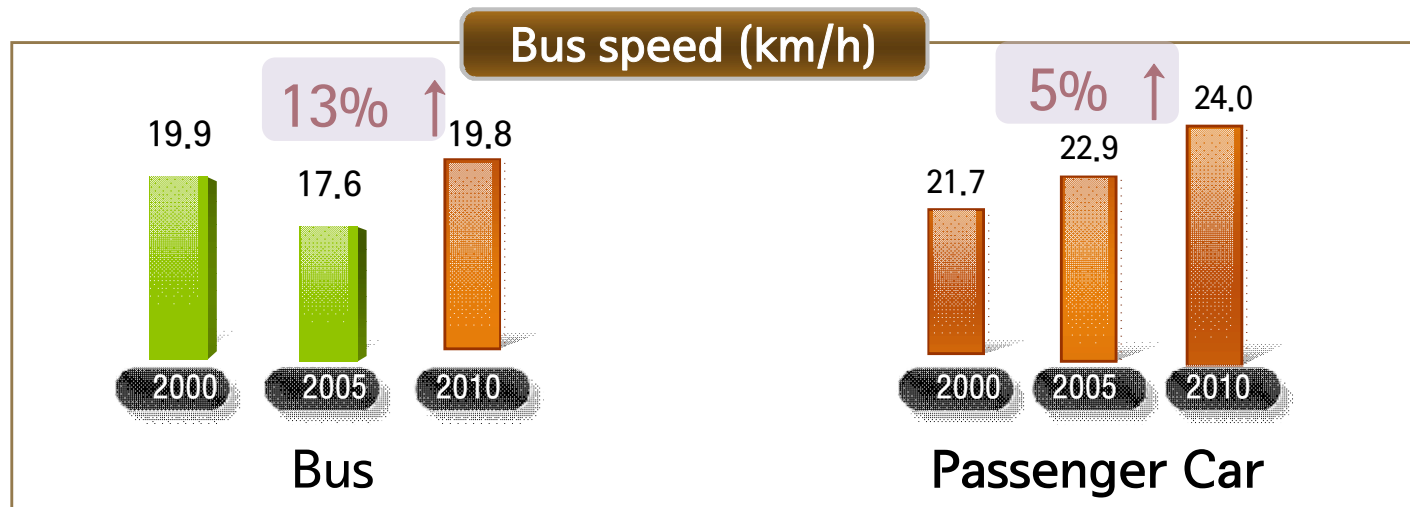
### ● Use at transportation policy

- Transportation system reform, operation data collection, analyze operation history, etc.



# Achievements in Public Transportation Reform

- Increase in public transportation users: Average of 840K users /day(9.2%)
- Faster bus & vehicle speed: Buses rose by 13%, and passenger cars by 5%



- Establish scientific foundation for public transportation management
  - Improve bus operation management based on the data including ridership by each vehicle and service intervals
  - Bus service interval management based on the number of users by routes, time-based number of passengers, and routes with many users
- Secure social equity of fare system - free transfer
  - Improve fare systems unfair to the areas without bus or subway routes
  - Reduce average price of using inner-bus city (average of 29 KRW per trip)





# 3

## Introduction of Eco-Friendly Buses

- ▶ CNG Bus
- ▶ Electric Bus

## Introduction background

- ◆ Diesel buses were recognized as the main contributors of air pollution; started to deliver CNG buses since 2000
  - 8,551 buses accounted for 20% of NOx & 24% of particulate matter emissions (in 2000)
- ◆ Introduced 400 buses (annual average) until 2005; increased the delivery to over 900 buses every year since 2006 to significantly reduce particulate matter



## How to deliver CNG bus

- ◆ Financial support for purchasing CNG buses:  
Subsidize price difference between diesel and CNG buses
- ◆ Consider CNG bus possession rate when assessing inner-city bus operators
- ◆ Provide loans for installation of CNG station
- ◆ Additional financial support for using remotely located charging station

## ▣ Challenges and resolutions

- Bus companies were not willing to replace the buses before regular replacement period
  - Encourage bus companies and provide subsidies for early replacement (2010)
- Residents opposed installation of CNG stations
  - Held presentations to persuade the residents; installed a CNG station in City Hall (2007)



## ▣ Delivery status & future plans

- Replaced 7,425 buses (99%) out of 7,522 inner-city buses
- Installed 46 CNG stations (Daily charging capacity: 10,440 cars)
  - ⇒ Annual reduction of particulate matter by 26 ton & NOx by 530 ton

Replace remaining 96 buses into CNG buses ⇒

Achieve 100% replacement of buses with CNG ones within this year

By 2012, replace all town-shuttle buses and garbage cars suitable for replacement with CNG buses by 2012

## ■ Background

- CNG buses reduce exhaust gas significantly but GHG reduction is not enough
  - Delivered electric buses - need to reduce GHG emissions by more than 50%
- Lead technical development to not lag behind the trend of global automobile industry which is rapidly moving towards green cars
  - Korea is especially suitable to deliver electric cars as electric car part industries such as second batteries, motors and inverters, are well developed in the country.



## ■ Development & Test Operation

- Encourage electric bus development through “Advance Purchase Commitment” (‘09.8)
  - Inform how many buses Seoul will purchase to encourage manufacturers to develop technologies as their concerns are low demand of buses
  - Support price difference between CNG buses and electric buses
- Conduct test operation in Namsan for efficient promotion of the buses to tourists (‘10.12)
  - Namsan has steep slopes and curvy routes – suitable for testing bus performance

## Commercial Operation of Electric Bus

- 2010. 12 Introduced 5 buses on Namsan route
- 2011. 2 Added 4 buses on Namsan route – total 9 buses are in operation
  - 500K passengers used electric buses as of Oct. '11.10
  - : Buses travelled total 400,000 km in cumulative distance
- Plan to operate total 20 buses by adding buses on Gangnam routes by end of 2011



### First commercial operation of electric bus drew a lot of interest from global media and overseas cities

#### ● Interests from global media

- Reuters('11.1) : First commercial electric bus route
- CNNGO('11.8) : Namsan electric bus cruises into international limelight

#### ● Countries visiting Namsan: 13 visits from overseas – i.e. foreign governments, cities, companies, etc.

- Visitors from transportation agencies at various countries (i.e. Denmark, Chile, Japan, Turkey, Ecuador, Russia)
- Several cities asked for further information about electric bus operation, and some cities are checking the opportunities to import the buses







# 4

## Visions for EV Delivery

## ▣ Visions for delivery

2014 『Global TOP3 EV Leading City』 ⇒ 2020 『Global Leading City』  
(30K EVs, 10K electric scooters) (120K EVs, 20K electric scooters)

## ▣ Introduction strategies



- ◆ “Prioritize public transportation” such as buses and taxis which are close to citizens’ life and operate long distances
  - Electric buses are eco-friendly and economic, and have significantly impact development of related industries
  - Electric taxis travel long distances everyday; save fuel cost significantly; and create an early electric vehicle market
- ◆ “Prioritize bulk purchasing private businesses” such as incorporations and rental car services
- ◆ Expand opportunities to experience electric cars by promoting electric car public rental (sharing) projects
- ◆ Support private supply by securing charging infrastructure, tax exemption and discounts on parking fees

## ▣ Delivery Plan



	2011	2012	2014	(No. of scooters) 2020
Electric bus	20	30	400	4,000 (50%)
Electric taxi	10	60	1,000	35,000 (50%)
Electric vehicle	86	1,710	28,600	81,000 (3%)
Electric scooter	177	1,600	10,000	20,000 (100%)
Rapid charger	7	20	126	600
Charger(total)	300	800	8,000	110,000

## ■ Establishment of charging infrastructure

- ◆ Install 8,000 chargers by 2014 for reliable operation of electric vehicles
  - Rapid charger: Disperse installation at 126 points around Seoul to provide charging service anywhere in the city within 5 minutes
  - Level 2 charger: Install chargers at drivers' garages for night charging
- ◆ Install charging facilities at public parking lots and large new buildings
  - Install level 2 chargers, especially in parking lots with the capacity of over 100 cars
  - Mandatory installation of chargers at new buildings larger than a certain size when conducting environmental impact assessment



## ■ Effects of delivery of 40,000 electric vehicles

- ◆ Pollutant reduction: 113,106 ton of CO<sub>2</sub>, 2,106 ton of air pollutants annually
- ◆ Costs of environmental pollution : Save 18.2billion KRW  
(USD 16million, based on CO, VOC, NO<sub>x</sub>, CO<sub>2</sub>) per year
- ◆ Fuel cost savings: 77.1~89.2 billion KRW(USD 67~78million) annually

# Future Seoul in 2020



## Deliveries done by electric scooters

“All delivery scooters will be replaced with electric scooters”



## Quiet streets, pleasant taxis

“Convert 50% of taxis into electric vehicles”



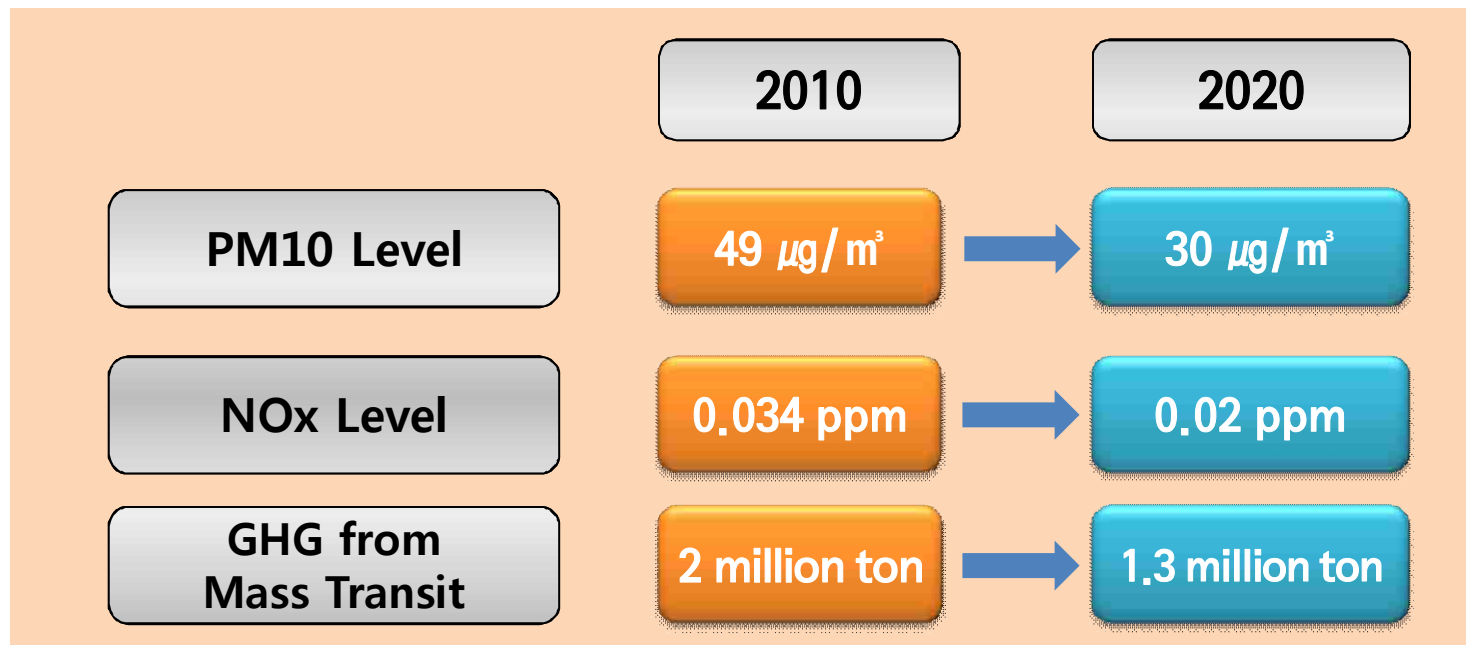
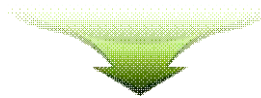
## Pleasant urban atmosphere

“Replace 50% of buses with electric buses”



## Rapid charging anywhere in the city within 5 minutes

“Install 110,000 chargers around Seoul”







*Hi Seoul*  
SOUL OF ASIA

**Thank you**