



Daejeon's Road

to Becoming an Air Quality Model City

Northeast Asian Mayors' Forum 2018

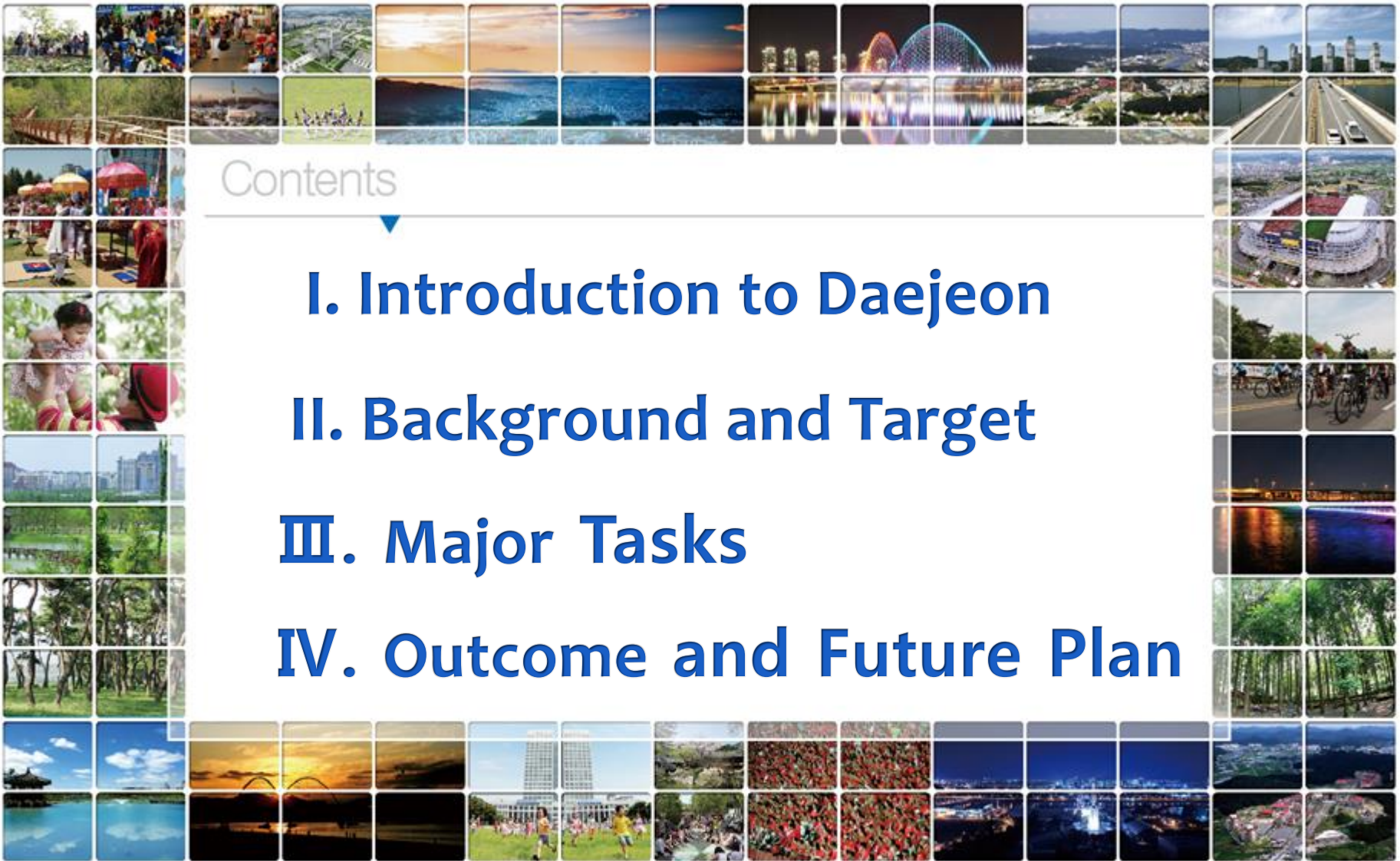
June 17~19, 2018



LEE EUNCHUL

Ambassador for International Relations

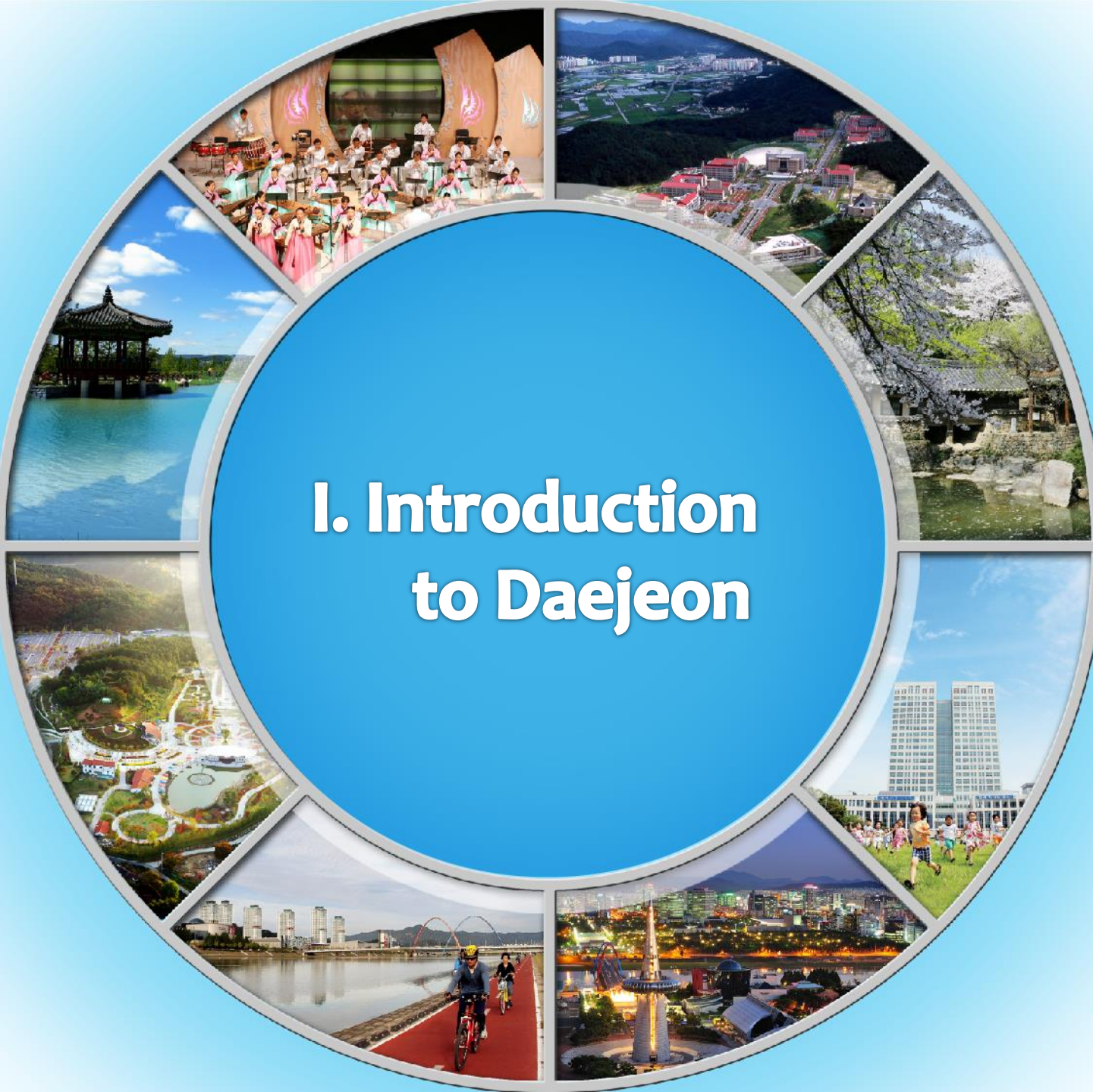
Daejeon, Republic of Korea



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I. Introduction to Daejeon



1. Overview of Daejeon

Population 1,519,658 (3%)

▶ **Area 540km²**

Administrative Districts 5 Municipal Districts, 79 Sub-districts

▶ 7,500 **Government Employees**

Budget \$ 5.2 Billion (Financial Independence 43%)

▶ **5 Municipal Districts: \$2.4Billion**

GRDP \$31.6 Billion (2.2%)



2. Characteristics of Daejeon

The Present Status of Daejeon

01 Hub City in Korea – Location, Traffic, Administration

- Daedeok Science Town in 1970s, World Expo – One of 5 main Cities
- Cluster of National Government Administrative Organizations – 60%

02 World Science Mecca

- Top R&D Science Town in Korea – Daedeok Innopolis
- Institute for Basic Science(IBS), Heavy Ion Accelerator – RAON
 - ※ Top – Reseachers, R&D Budget, Patents

03 International City

- 14 Sister cities, 18 Friendly Cities
- Exchanges with World Science Cities as a Chair City of WTA
- Korean Hub ► Hub of the World

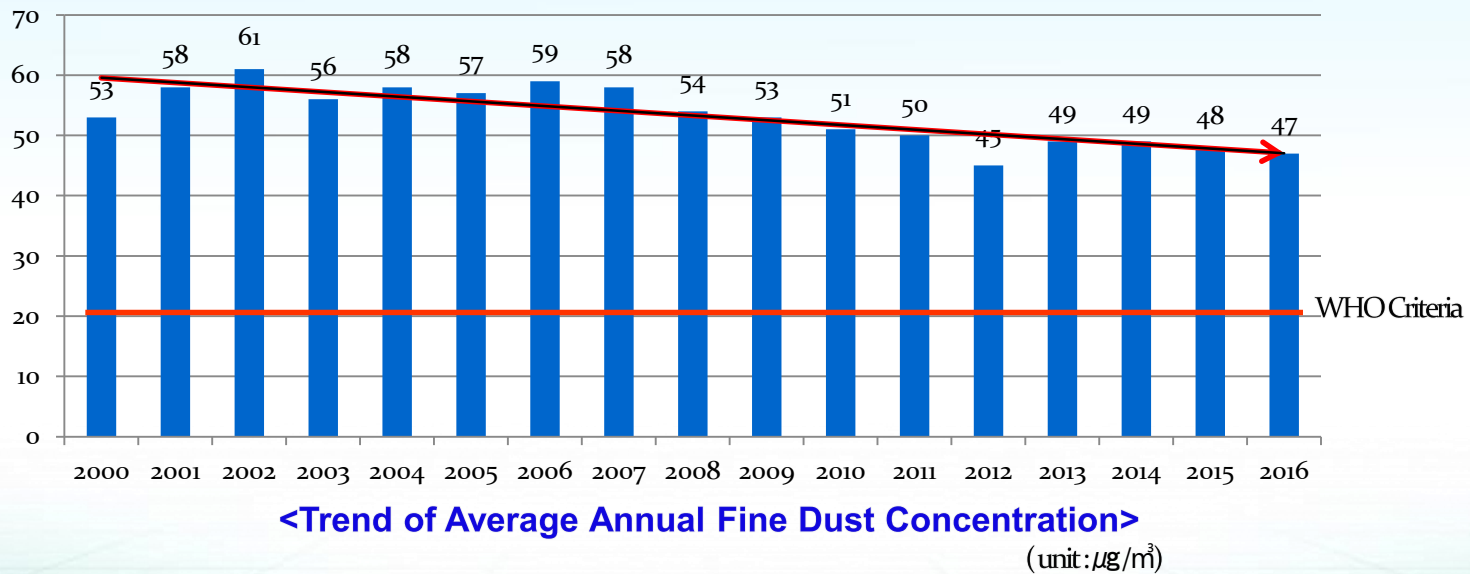


II. Background and Target



1. Background

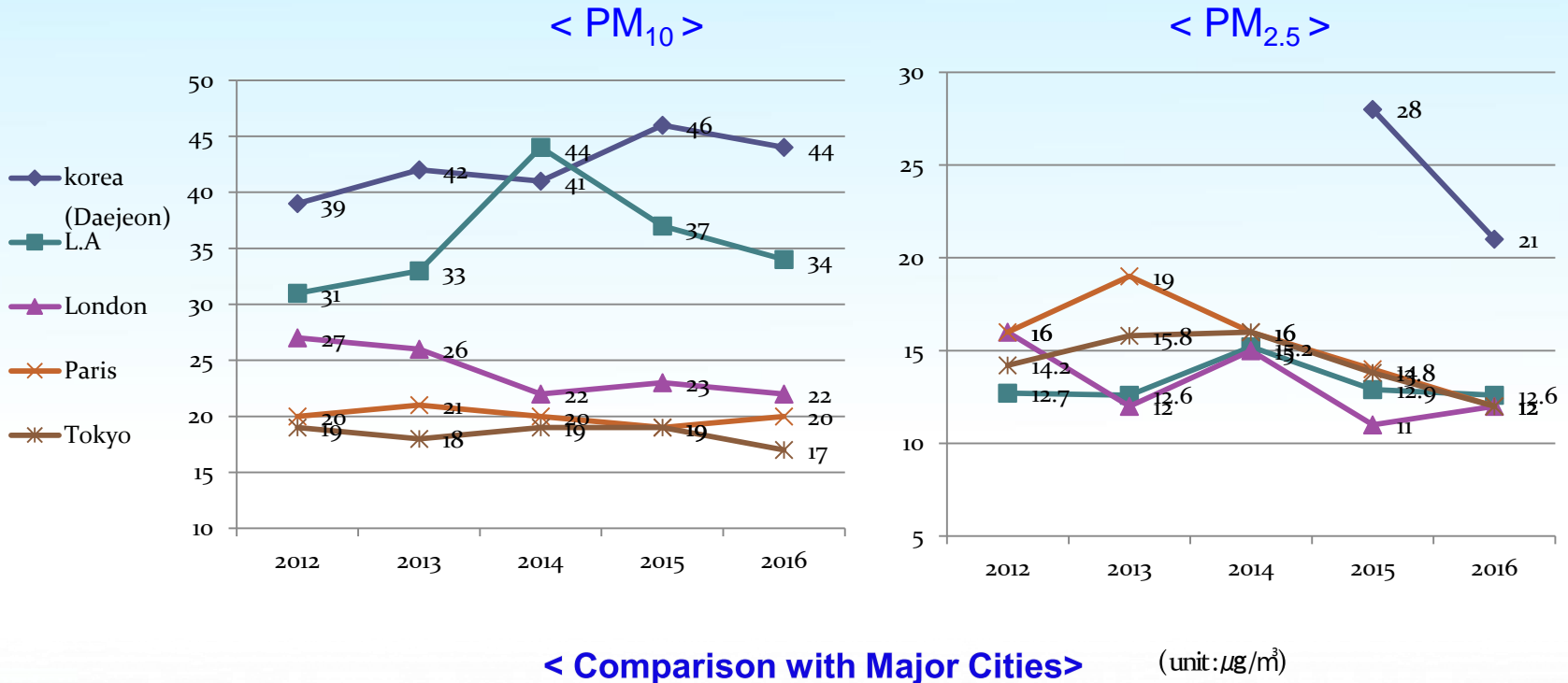
- Korea's PM₁₀ concentration was **improving until 2012**, but has **remained stagnant** since 2013.
- Based on WHO criteria, the fine dust concentration is **still high**.



※Source : National Institute of Environmental Research(2017), Annual Report on Air Quality

1. Background

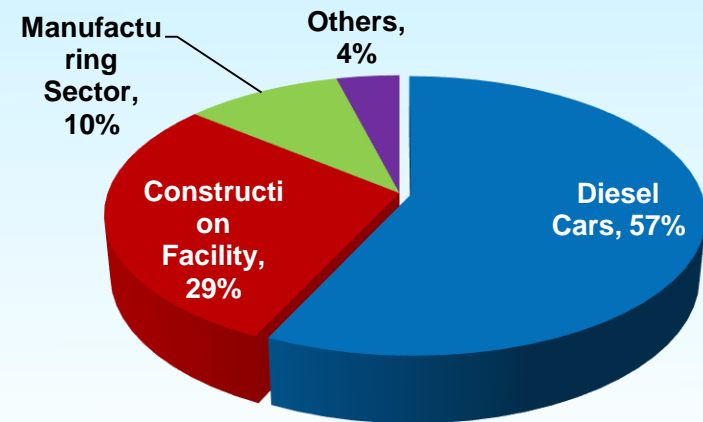
● Concentration levels in **Daejeon** are higher than those in major cities around the world.



※Source : National Institute of Environmental Research(2017), Annual Report on Air Quality

1. Background

- Analysis of the cause of ultra-fine dust in Daejeon pinpoints **diesel cars, construction equipment, etc. as the majority (86%) of culprits.**



< Analysis of the cause of air pollution in Daejeon >

- This result has led to a **comprehensive plan to reduce ultra-fine dust focusing on transportation vehicle management**

※Source : National Institute of Environmental Research (As of Mar.2017)

2. Target and Tasks

Vision

To Establish the Best Air Quality Model City

Target

To reduce ultra-fine dust concentration($PM_{2.5}$) to $18\mu g/m^3$ by 2020

Tasks

1. Management System

- ① Cooperative System
- ② Comprehensive Management System

2. Control System with advanced technology

- ① Intelligent Forecast System
- ② Measuring device and network expanded

3. Reduction Efforts

- ① Automobiles
- ② Industries
- ③ Citizens' cooperation

4. Related Projects

- ① LID projects(rain gardens)
- ② Clean energy (mini-PV panels per household)

III. Major Tasks



1. Strengthen Governance

1

Cooperative System

- T/F Team for the purpose of fine dust reduction: 9 members
 - ※ Officials from City government and Education office (areas of environment, traffic, energy, welfare, schools, etc.)
- Regional Cooperative committee: 16 members
 - ※ Daejeon, Sejong, and South and North Chungcheong (Civic groups, professors, researchers, city and provincial governments)
- Governance body : 13 members
 - ※ Civic groups, research institutes, universities, industries, and administrative agencies



1. Strengthen Governance

2

Comprehensive Management System

- Air Quality Analysis Center : From Mar. 2018
 - Real-time Air Pollution Monitoring, Analysis and Alerts
 - 3 Dedicated Staff in the Institute of Health and Environment
 - Intensive Care for those vulnerable to fine dust
 - Preschoolers, students, senior citizens and the disabled
 - Fine Dust Response System and staff training
 - Customized Policy to reduce fine dust
 - Came up with analysis on the cause of fine dust and countermeasures (Dec. 2017)
- ※ By Daejeon University

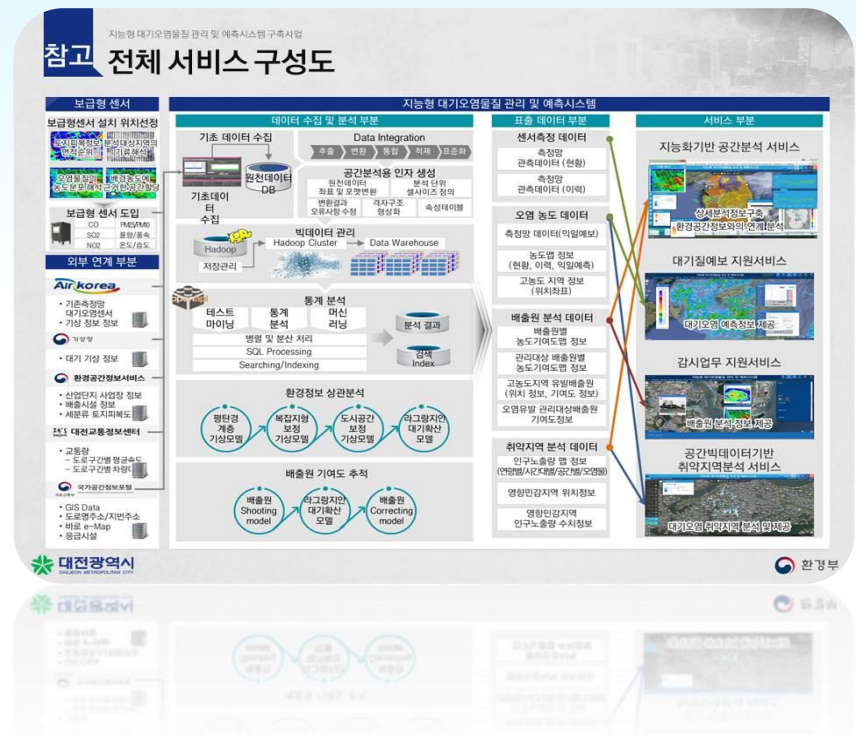


2. Control System with Advanced Technology

1

Intelligent Air Pollution Management and Forecasting System

- Comprehensive Air Quality Analysis and Management implementing IoT and AI technology
 - AI Fusion System (USD 1.1 Million)/May~Dec 2017
- Pilot installation of low-cost IoT sensor networks



2. Control System with Advanced Technology

2

Expansion of Measuring Facilities and Networks

- 10 measuring facilities for ultra-fine dust(PM_{2.5}) installed
- ※ 2 more will be installed by 2020



< Location of Measuring Networks (10)>



3. Reduction Efforts

1

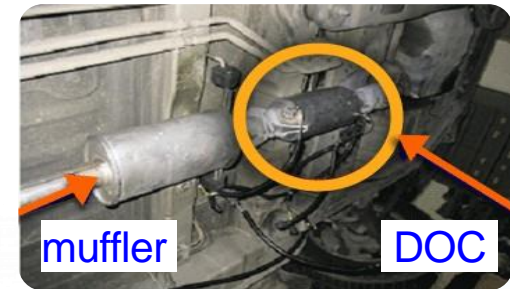
Automotive Sector

- Supply eco-friendly vehicles e.g. EV, Hydrogen/LPG cars
 - Provide subsidies for the purchase of eco-friendly vehicles
 - Expand charging stations for EVs and HVs

- Removal of outdated diesel cars and installing of emissions reduction devices
 - Subsidize scrapping old cars and installing emissions reduction devices



< Diesel Particulate Filters >



< Diesel Oxidation Catalysts >

3. Reduction Efforts

2

Industrial Sector

- Expand clean energy (bunker C oil → LNG)
 - Daejeon Combined Heat and Power Plant: Convert up to 80% by 2021
- Build eco-friendly power plants
 - Support the establishment of a hydrogen fuel cell power plant
 - Support the installation of a photovoltaic (PV) power plant
- Businesses generating fugitive dust* make their own efforts to reduce dust on surrounding roads
 - * Upon issuance of fine dust alert



< Rooftop solar panels at express bus terminal

3. Reduction Efforts

3

Citizens' Voluntary Participation

Facilitate Bicycle Usage

- Expand the number of public bicycles to 4,000 by 2020
- 294 Bicycle roads with combined length of 755.06km (As of 2017)

Provide incentives for joining weekly Car Free Day

- 10% car tax cut, discount for public parking and public facilities

Hold events to encourage the use of public transportation

- BUS-STAR Competition
- Reward the 110 people who use buses the most

Citizen movements such as planting flowers and air cleaning trees on unused land



It's paejeon 버스~타(Bus~Star) 이벤트!

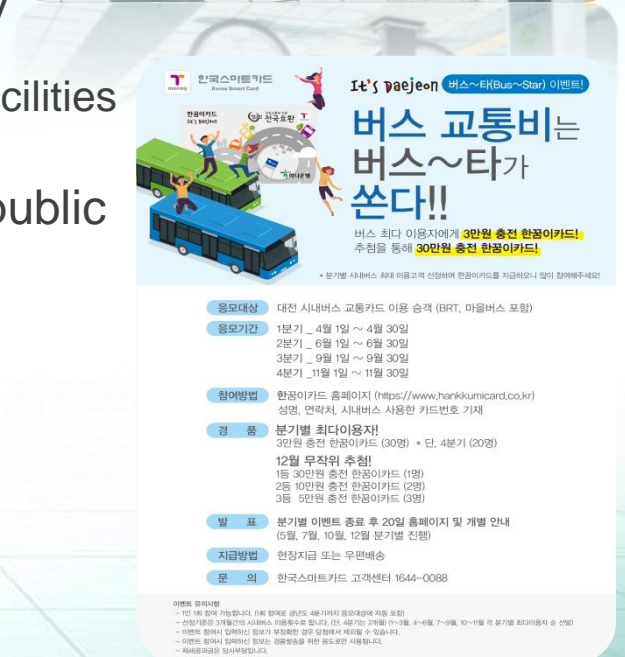
버스 교통비는 버스~타가 쏜다!!

버스 최다 이용자에게 3만원 충전 한공이카드!
추첨을 통해 30만원 충전 한공이카드!

* 분기별 시내버스 최대 이용고객 선정에 한공이카드를 지급했으나 이미 참여해주세요

응모대상	대전 시내버스 교통카드 이용 승객 (BRT, 마을버스 포함)
응모기간	1분기 _ 4월 1일 ~ 4월 30일 2분기 _ 6월 1일 ~ 6월 30일 3분기 _ 9월 1일 ~ 9월 30일 4분기 _ 11월 1일 ~ 11월 30일
참여방법	한공이카드 홈페이지 (https://www.hankumicard.co.kr) 성명, 연락처, 시내버스 사용 카드번호 기재
경품	분기별 최다이용자! 3만원 충전 한공이카드 (30명) + 단, 4분기 (20명) 12월 무작위 추첨! 1등 30만원 충전 한공이카드 (1명) 2등 10만원 충전 한공이카드 (2명) 3등 5만원 충전 한공이카드 (3명)
발표	분기별 이벤트 종료 후 20일 홈페이지 및 개별 안내 (5월, 7월, 10월, 12월 분기별 진행)
지급방법	현장지급 또는 우편배송
문의	한국스마트카드 고객센터 1644-0088

이벤트 유의사항
- 1인 1회 참여 가능합니다. (1회 참여 후 반드시 4분기까지 동문대상에 자동 포함)
- 신청기간은 3개월마다 시행되는 기준으로 적용될 수 있습니다. (단, 4분기에는 9개월 1~9월, 10~11월, 12~1월 각 분기별 최다이용자 선정)
- 이벤트 신청이 승인된 후 신청기간이 무효화될 경우 신청기간이 연장될 수 있습니다.
- 이벤트 신청이 승인된 후 신청기간이 무효화될 경우 신청기간이 연장될 수 있습니다.
- 4분기까지 신청기간이 종료되는 경우 신청기간이 연장될 수 있습니다.
- 4분기까지 신청기간이 종료되는 경우 신청기간이 연장될 수 있습니다.



4. Related Projects

1

Blocking Fine Dust Through LID Approaches

- Creating reduction facilities
- Installing pervious paver blocks and parking lots (permeable blocks, trenches)
- Constructing roadside rain gardens to reduce stormwater runoff



4. Related Projects

2

Supply Clean Energy Generation

- Supply mini PV panels (1500 households in 2017)
- Support solar energy at 66 bus stations (2016~2017)
- Solar panel rentals for apartments (2017)
 - Subsidize houses with renewable energy:
100 households
 - Subsidize balcony PV systems: 287 households



IV. Outcome and Future Plan

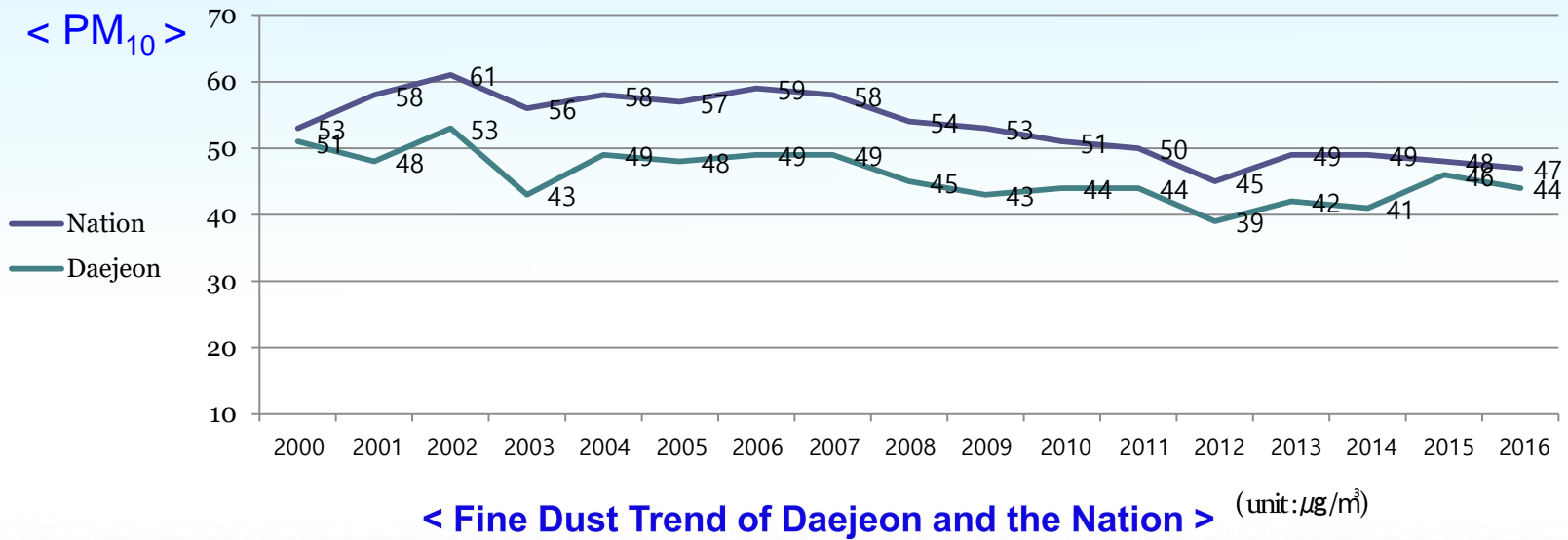


1. Major Outcome

1

Steady Reduction of Fine Dust

- Daejeon's fine dust concentration is lower than the national average (Second lowest to Ulsan among metropolitan cities)



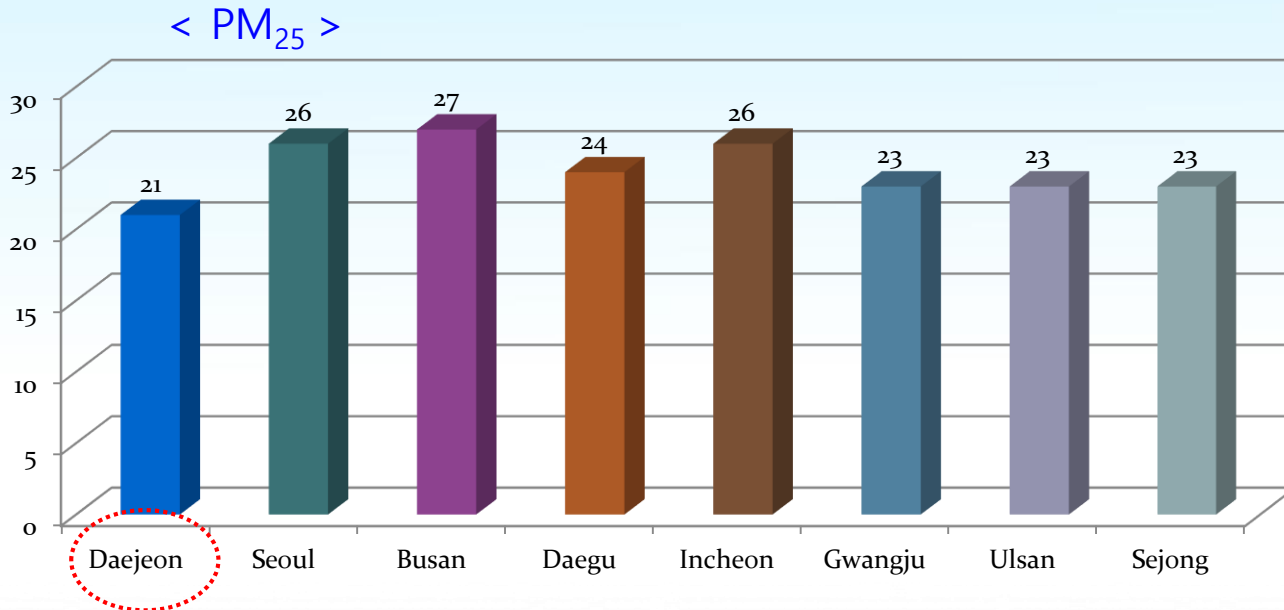
※Source : National Institute of Environmental Research(2017), Annual Report on Air Quality

1. Major Outcome



Steady Reduction of Fine Dust

- The lowest ultra-fine dust levels in the nation



< Ultra-fine dust comparison among major cities (2016) > (unit: $\mu\text{g}/\text{m}^3$)

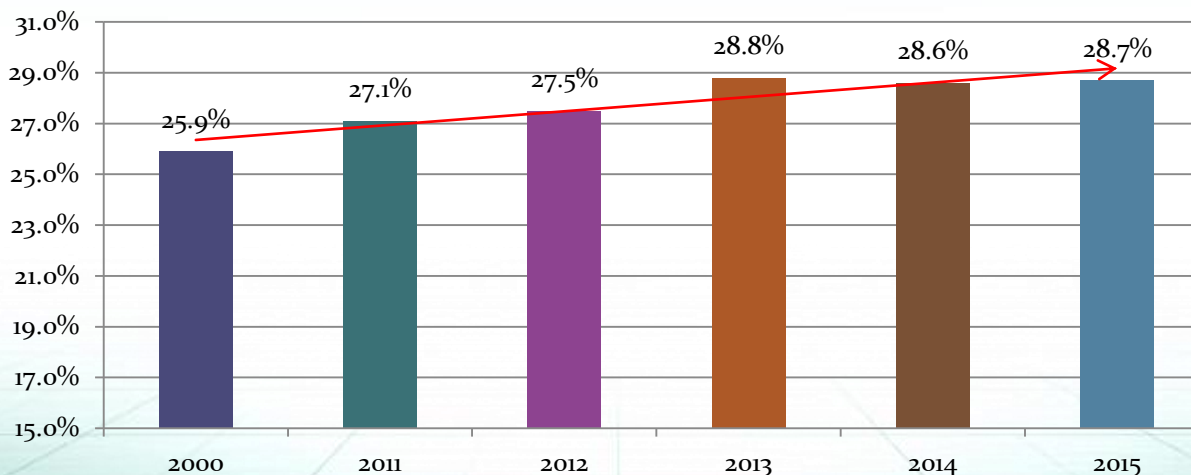
※Source : National Institute of Environmental Research(2017), Annual Report on Air Quality

1. Major Outcome

2

Business participation and public transportation

- 10 businesses with the largest dust emissions voluntarily joined reduction efforts (June 2017)
 - Voluntarily improved their dust reduction facilities
- The rate of public transportation usage is on the rise
 - Continue efforts to increase public transportation usage



< Rate of public transportation usage >

※Source: Korea Traffic Research Institute

1. Major Outcome

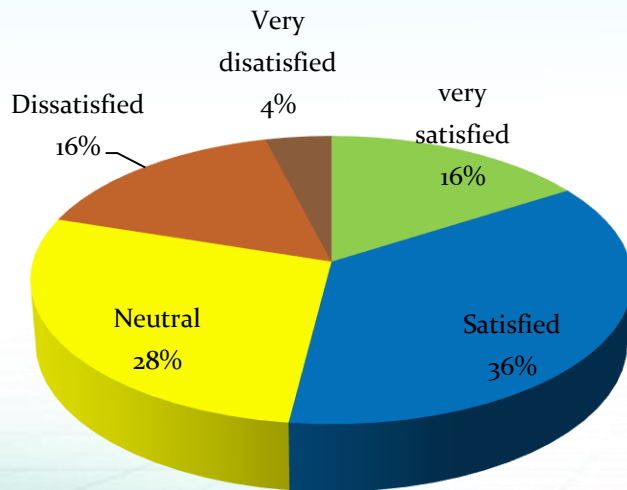
3

Highly Satisfied with Renewable Energy Supply Projects

Balcony (mini) PV

- **52% Satisfaction**

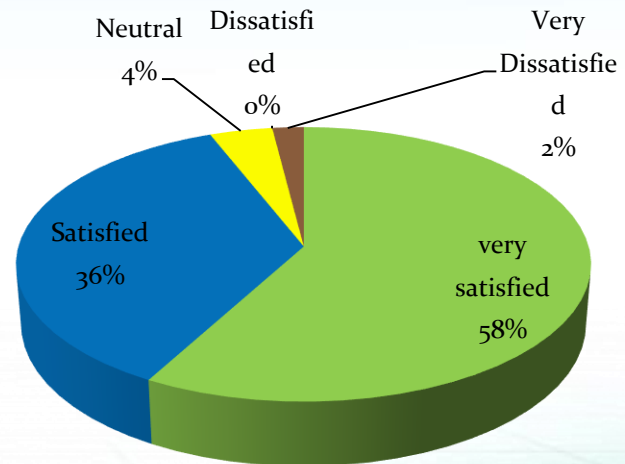
/ USD19,000 yearly reduction for 300 households



Renewable Energy

- **92% Satisfaction**

/ USD 56,000 yearly reduction for 100 households



1. Major Outcome

4

On Line Electric Vehicles (OLEVs)

- Developed and in operation by KAIST in Daejeon
 - Technology that sends electromagnetic fields to vehicles from cables buried in the roads
 - EVs that can be charged on the move, removing the need for charging stations



2. Future Plan

1

Establish Green Ways Connecting Parks and Vacant Land

- Link sections separated by roads between 602 parks and 3 streams
- Maintain damaged or vacant areas by planting air cleaning trees, flowers, etc.
- Improve planting methods, and attract pilot projects to creating forests aiming to reduce fine dust and local gardens from the national government, etc.



2. Future Plan

2

Continue Efforts to Reduce Fine Dust

- Low-pollution projects for construction machinery : 100 (by 2020)
- Increase EVs : 600(2018) ※ 2017: 200
- Electric two-wheelers : 1,000 (by 2020)
- Scrapping old diesels : 10,000 (by 2020)
- Pollution-free hydrogen vehicles : 100 (by 2020)
- Replace buses with electronic/LNG vehicles : 1,000 (by 2020)
- Support low NOx burner installation for SMEs : 700 (by 2020)



Thank You

