WORLD BANK GROUP | KOREA GREEN GROWTH TRUST FUND | Ministry of Economy and Finance

KGID 2025 Green Growth: The Path to Sustainable Jobs

Session 3-3 (Urban Transport & Energy)
"Advanced Green Mobility Systems: Partnerships for a More Sustainable Urban Mobility Paradigm"

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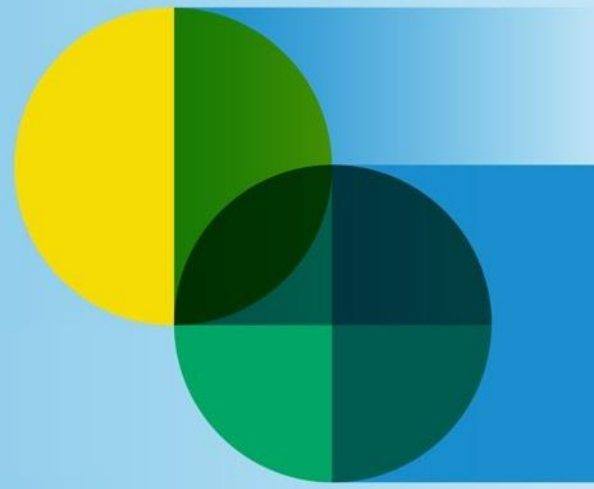
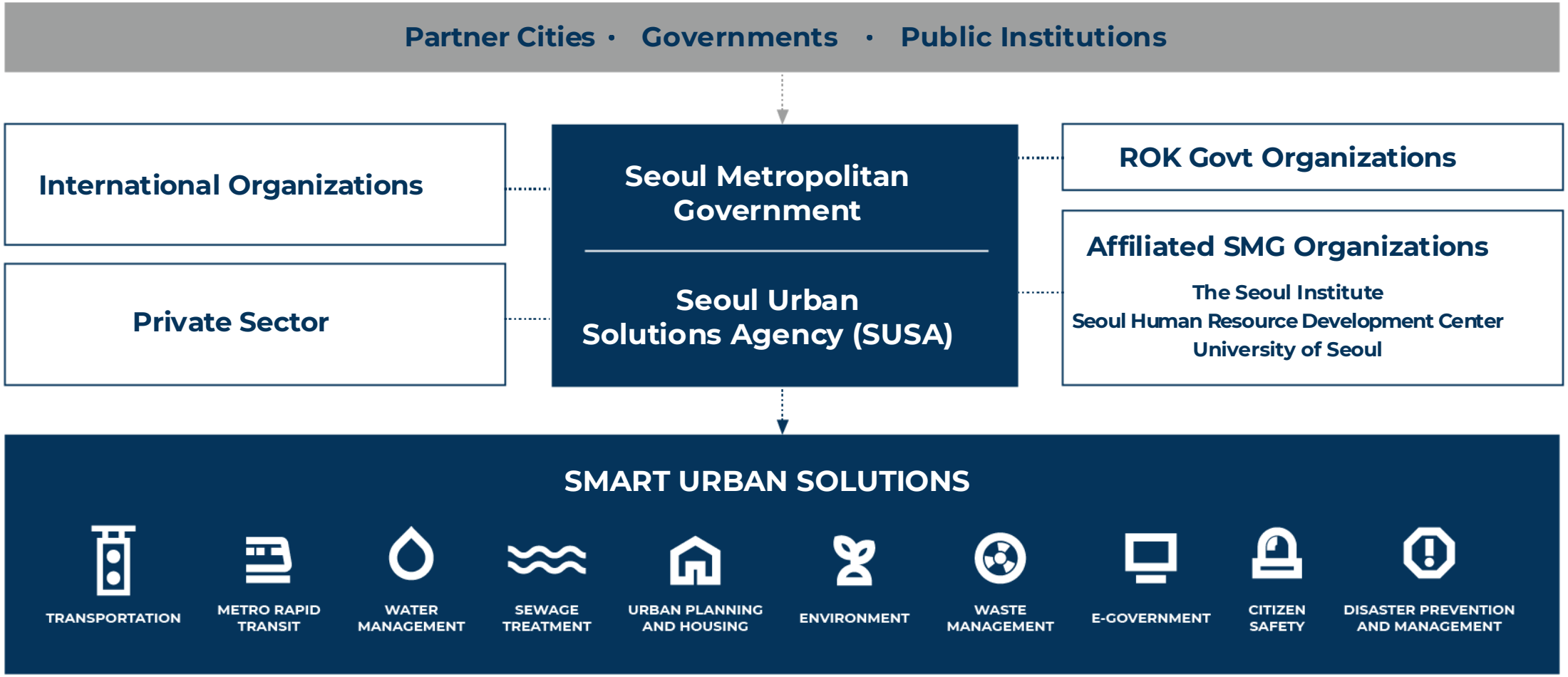


Seoul Urban Solutions Agency

- A dedicated institution for international development cooperation of Seoul



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SEOUL ODA PROGRAM

Providing technical/policy support for sustainable urban development

Facilitating access to municipal infrastructure financing

Enhancing institutional capacity for partner cities

Sharing Seoul's development experiences, strengthening C2C cooperation

TYPES OF SUPPORT (250,000USD/Project)

- Planning Support (Master Planning, Concept Planning)
- Pre-Feasibility Studies
- Technology & Infrastructure Pilots
- Targeted Policy & Technical Advisory
- Capacity Building

SECTORS

- Urban Planning & Housing
- Urban Mobility
- Environment (Water & Waste Management)
- E-Government
- Urban Security
- Welfare
- Cultural Heritage & Tourism

* Eligible Applicants: Local governments of OECD DAC List of ODA Recipient Countries

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Transportation condition in Seoul

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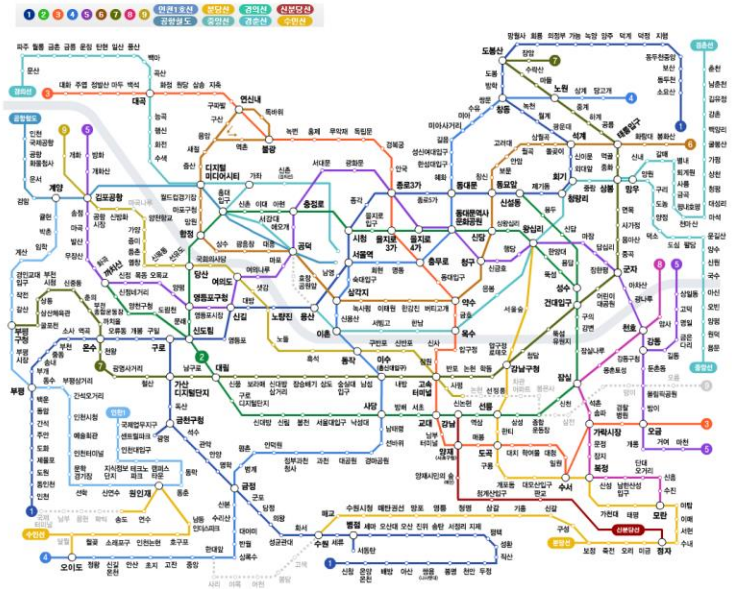
Seoul Condition & Transport Infra

The number of subway lines in the metropolitan area is a total of 24 routes, buses are operated on a semi-public system, and 7,383 are operating on about 384 routes on 2025.



3.12million vehicles
Roda length :
8,246km

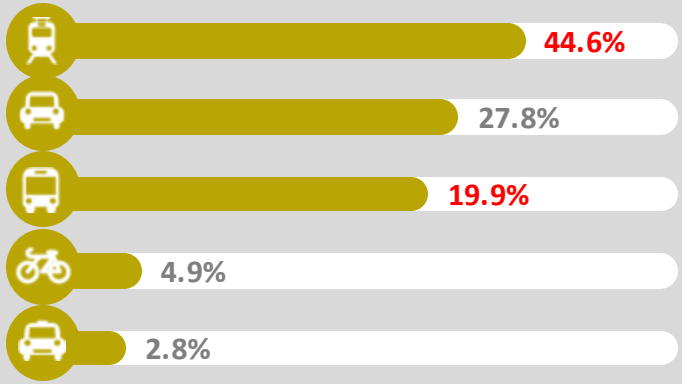
11 lines
359.56km
338 stations

393 routes,
7,014 operating vehicles, 6,640 stops(2022year)

254 Taxi Companies
(71,805 cars)

25,000 vehicles
(1,540 shed)

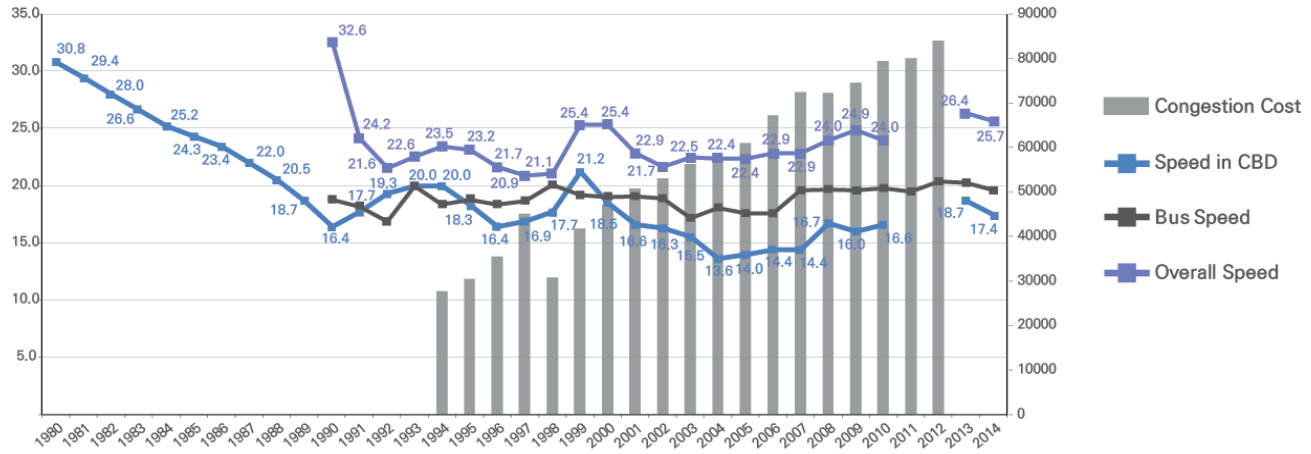
Modal share



Transit Share rate

64.5%

Shift in Travel Speed & Traffic Congestion Cost



Trips per day

31.9mil.(2025y)

Congestion Cost

10.7billion USD.
(2020y)

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Traffic flow control

(Traffic signal & enforcement)

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Traffic flow control(Organization, Management, Guiedeline, 1/6)

Operational and management organization of operating platforms

A single operating system by the Seoul Metropolitan Government and the Seoul Metropolitan Police Agency

Oranization

서울특별시 SMG + 서울지방경찰청 SEOUL METROPOLITAN POLICE AGENCY Seoul Metropolitan Police Agency

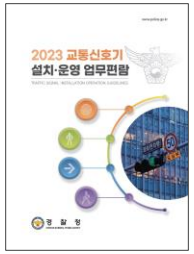
SW Packages	SCOOT	SCATS	COSMOS
When	Late 1970's	Early 1980's	Early 1990's
By Whom	Transport and Road Research Lab	Australia	Seoul Metropolitan Gov.
Where	England	Australia	Korea
Where to	Glasgow and North American Cities	Many Worldwide Cities	Seoul
Stand For	Split, Cycle and Offset Optimization Technique	Sydney Coordinated Adaptive Traffic System	Cycle, Offset, Split Model of Seoul

Guidelines for Optimization of Traffic Signal System Design

Establishment and distribution of manual for improvement of signal operating system in Seoul

SMG

Police



Traffic signal guideline + Signal control variable instruction

Utilizing the Optimization of Traffic Signal System in Seoul

Defining and Purpose of Signal Optimization	Details of signal optimization
Current Status Analysis Method	A plan to improve the signal system
Simulation Evaluation Method	Effectiveness Analysis Method

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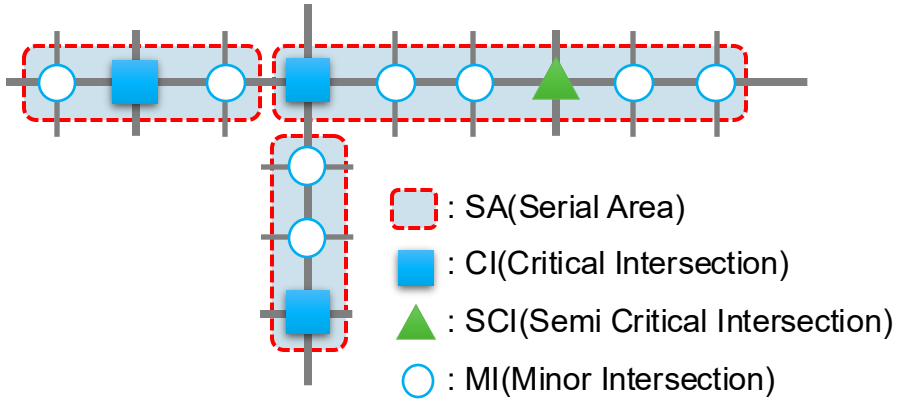
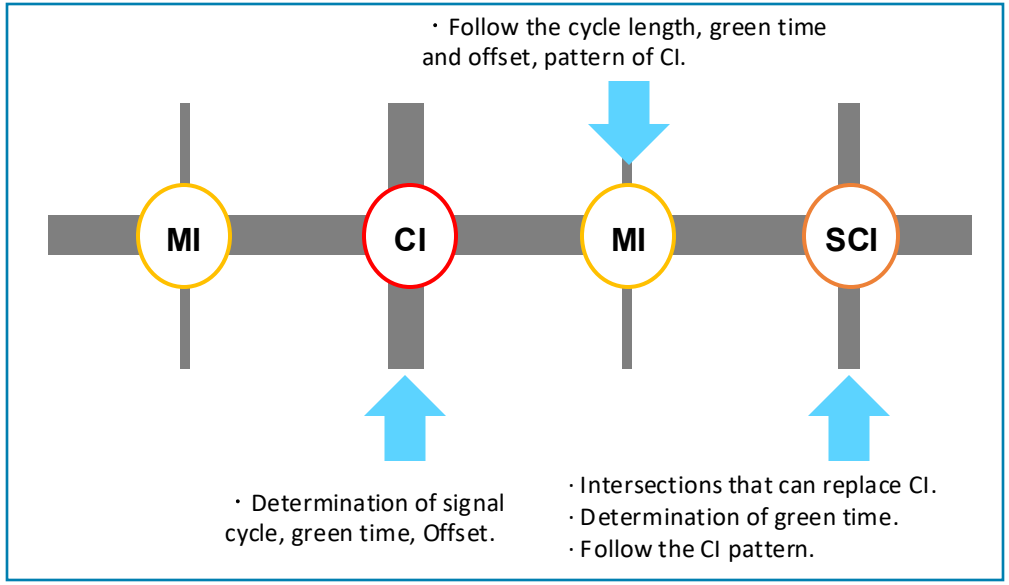
Traffic flow control(Operation & Management, 2/6)

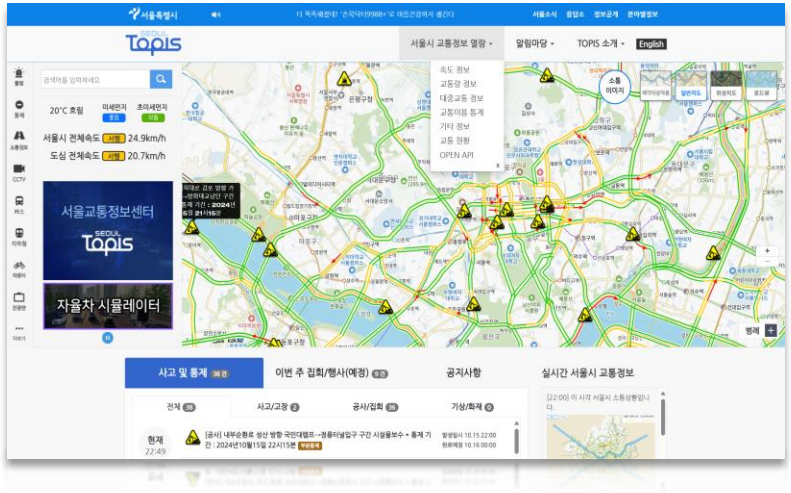
Traffic signal synchronization for continuous driving





Data management by TOPIS

Transport Operation & Information Service

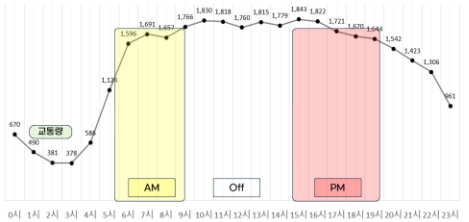


2,642 in Gangnam

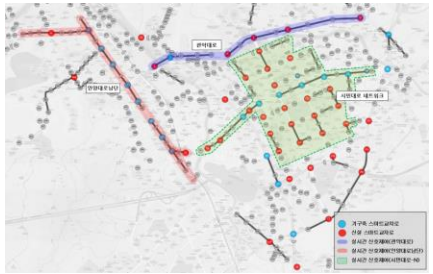
2,569 in Gangbuk

Design of traffic signal timing plan

TOD Design Considering Traffic Patterns



Serial Area Design



Setting SA

Setting CI

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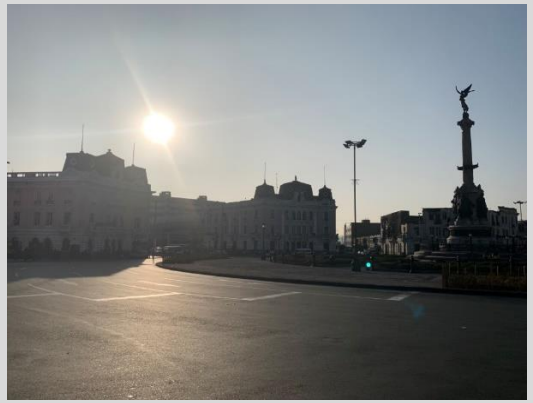
Traffic flow control(2024 Seoul ODA Challenge Project overview, 3/6)

- Project : Building Sustainable and Efficient Mobility: Advisory on Development of an Integrated Transportation Platform Management and Automated Enforcement in Metropolitan Lima for the Metropolitan Municipality of Lima, Peru
- Type : Policy/technical advisory & Capacity Building
- Period : 10 months
- Funding amount : 270,000 USD(360million WON, KRW)
- Goal : Aligned with Sustainable Development Goals, its aim is to contribute to sustainable urban development efforts.
- Contents
  - Identification and Analysis of Traffic Conditions in Lima
  - Advisory on the Establishment of Integrated Platform, Centralized Traffic Signal and Control Center
  - Advisory on establishment/operation of speed and signal violation control system and automatic control system
  - Test-Bed Construction and Effectiveness Analysis
  - Holding seminars (initiation/intermediate/final) and capacity building programs



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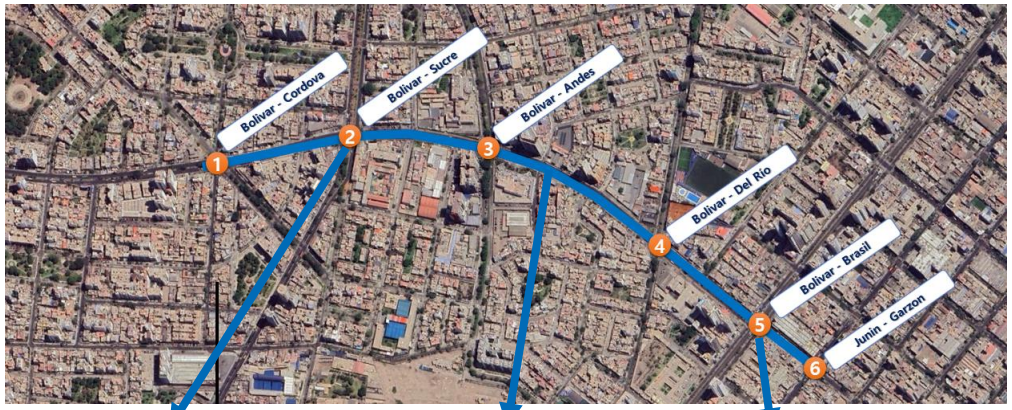
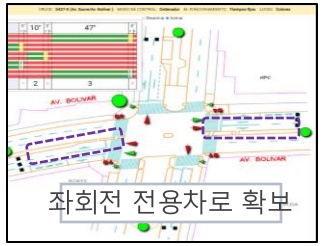
Traffic flow control(2024 Seoul ODA Challenge(Lima, Peru), 4/6)

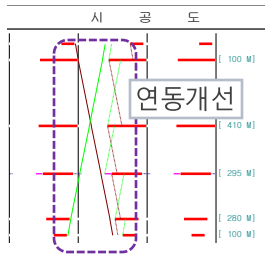
Test Bed



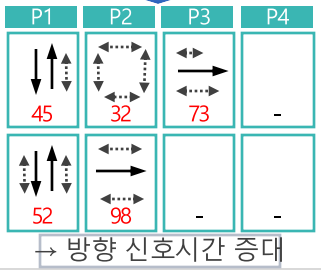
- Congestion caused by left turn vehicle queues



- Delay due to non-operation of continuous driving signals



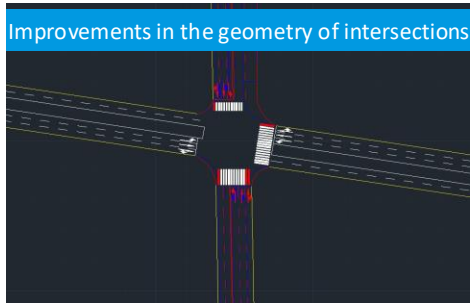
- Congestion occurs due to non-operational signal time for traffic conditions



Simulation analysis results for improvement plans

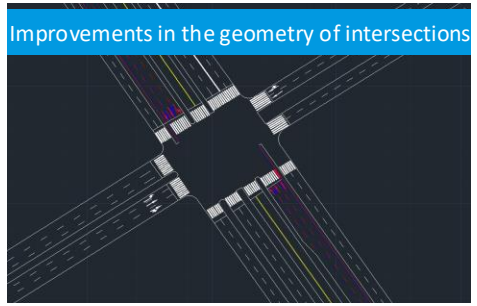
[B] Republica de Panama - #4 intersection

- There is no left-turn lane on the north-south road, so left-turn and straight traffic congestion occur.
- When a left turn lane is secured, the delay d = 77.34sec/veh → d = 74.2sec/veh is reduced to **Δd= - 3.14 sec/veh**



[C] Tomas Marsano - #3 intersection

- There is no left-turn lane on the north-south road, so left-turn and straight traffic congestion occur.
- When a left turn lane is secured, the delay d = 113.18sec/veh → d = 101.45sec/veh is reduced to **Δd= - 11.73 sec/veh**



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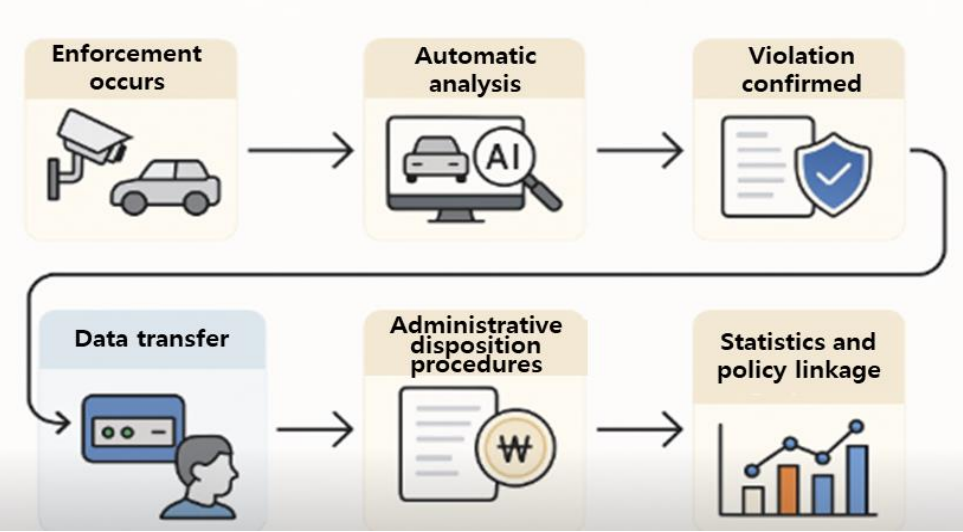
Traffic flow control(2024 Seoul ODA Challenge(Lima, Peru), 5/6)

In case of Seoul

All enforcement procedures are automatically performed by the automatic enforcement platform.



① Automatic detection of violations

② Collection of videos and photos of violations

③ Data transmission and storage

④ Automatic reading and AI analysis

⑤ Manual inspection (review by reader)

⑥ Linkage with administrative disposition

⑦ Data storage and archiving

⑧ Statistics and policy linkage

Improving method of Lima, Peru

Infrastructure needs to be built first

01 Integrated platform for automated enforcement systems

02 Maintenance and improvement of the vehicle registration database license plate recognition system

03 Vehide owner notice mailing system

Guidelines for Improving "Transportation and Communications Law in Peru"

- Procedures for imposing and collecting fines, etc.
- Entrustment of fine collection work
- Operation plan for the collection information system
- Scope of violations and amounts
- Notification of fine payment, etc.
- Agency for collecting fines
- Payment of fines, etc.
- Presence of a record book of fine collections

Establishment of an on-site automatic control system

- Install speed cameras and traffic light violation enforcement cameras.
- Establish a detection system for enforcement. Establish an online communication system for the automated enforcement system center.

Establishment of an automatic control system center system

- Establishment of an integrated automated enforcement system platform
- Establishment of a vehicle registration office database number recognition system (vehicle owner verification)
- Establishment of a tax payment notice issuance system and payment system

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Traffic flow control(2024 Seoul ODA Challenge(Lima, Peru), 6/6)

Improvement of traffic signal operation

Effect of improving the axis of traffic signals

Travel time and speed

- Before & after comparison analysis through driving surveys using test vehicles.
- Travel speed increased by v=1.2 km/h after improvement to improve communication

section	Before	After	Δx
Ave. travel time(sec)	464.8	408.8	-56.0
Ave. travel speed (km/h)	10.8	12.0	**1.2**
# of stop (# of times)	3.8	3.2	0.7
Delay time (sec)	274.8	225.2	-49.7

VISSIM

- The average control delay time on the horizontal road decreased by t=-8.47 sec/veh after improvement.

Section		Before	After	Δx
Ave. control delay(sec/veh)	All	110.29	101.82	-8.47
	Intersection #5	43.02	34.18	-8.84
LOS (Level of Service)	All	F	F	-
	Intersection #5	D	C	D → C

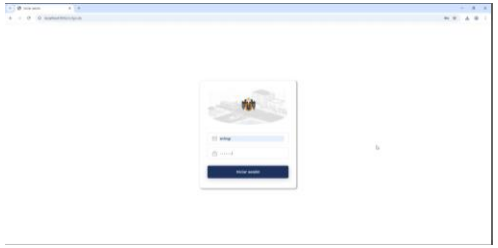
Automatic enforcement system

Effectiveness of Automatic Enforcement System

- Before & after comparison analysis with camera-collected data
- A Comparative Analysis of Travel Speed Changes, Speed/ Signal Violation Vehicle Changes
- Average travel speed decreased by **v=-5.25 km/h** due to reduction of speeding vehicles
- Speed/signal violation rate decreased by **-5.58% and -0.53%** respectively

Video

Vehicle data



Section	Before	After	Δx
Ave. travel volume (veh/day)	2,651	2,956	304
Ave. travel speed (km/h)	43.89	38.65	-5.25
Rate of speed violations (%)	18.09	12.51	-5.58
Rate of signal violations (%)	2.38	1.85	-0.53

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Public transit system

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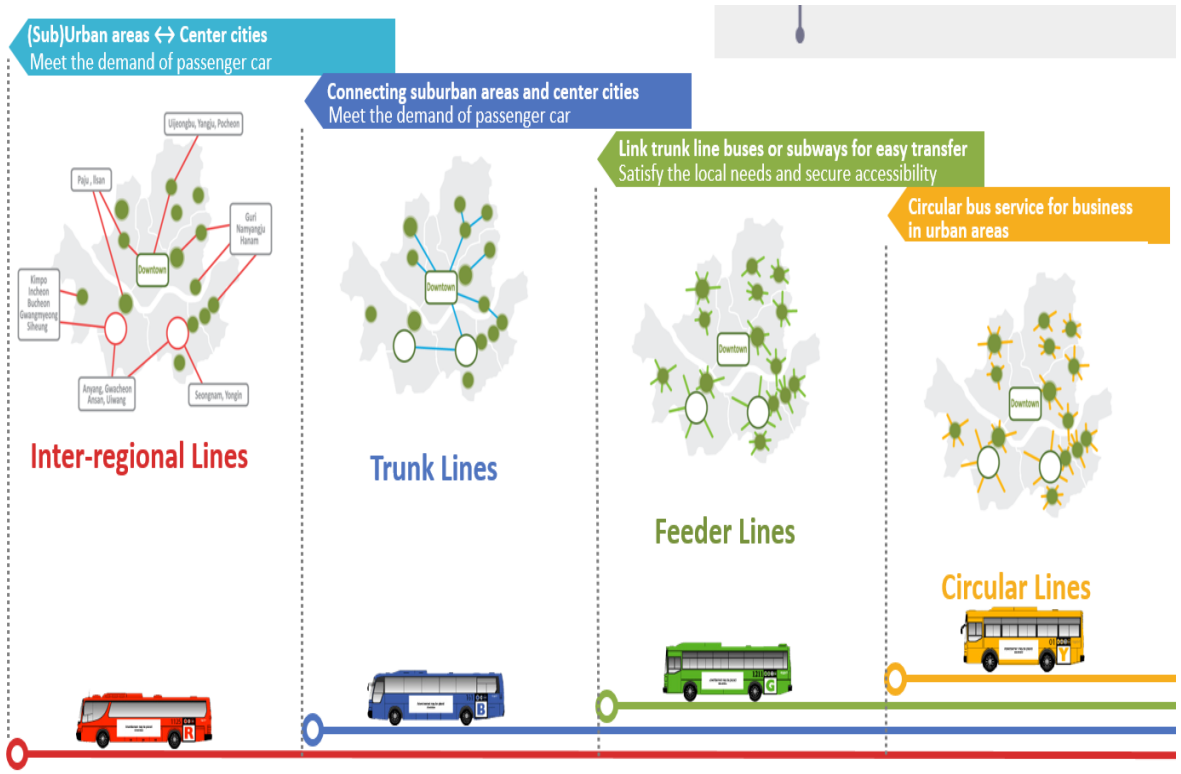
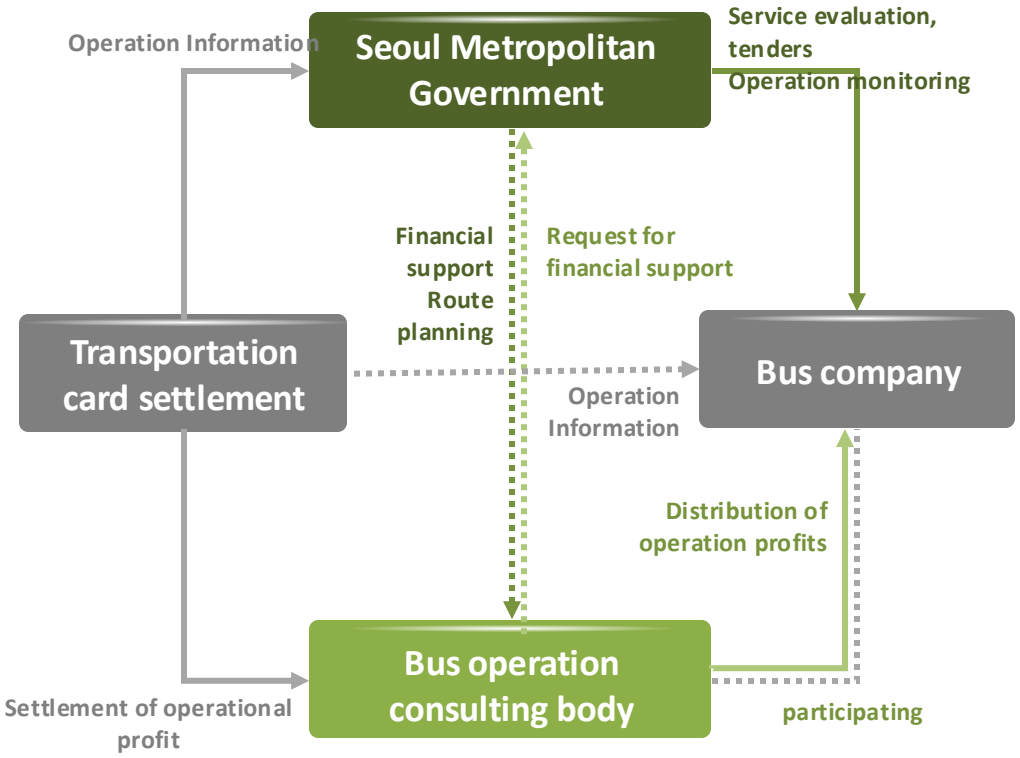
Public Transit System in Seoul(1/7)

The number of subway lines in the metropolitan area is a total of 24 routes, buses are operated on a semi-public system, and 7,383 are operating on about 384 routes on 2025.



Ref: Eco Friendly Transportation Policy of Seoul, by SMG Sangshin.Kim



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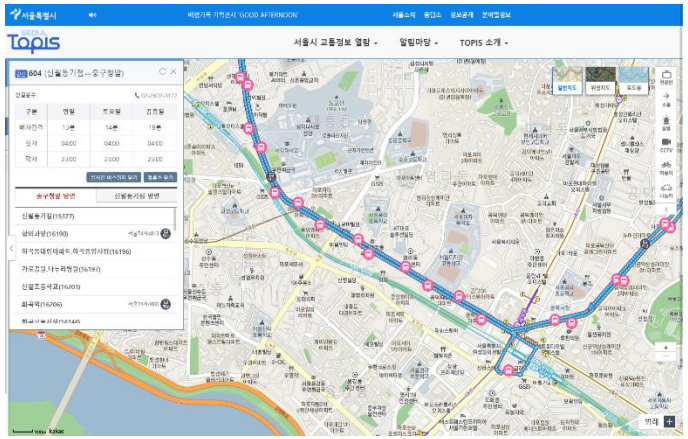
Public Transit System in Seoul(2/7)

SMG manages real-time bus operations through GPS and provides bus information to users to ensure convenience, and is also used for public transportation policies such as transparent and fair management through the automatic fare collection system and adjustment of bus routes through big data analysis.

# of Bus stop with BIT (a)	# of Bus stop (b)	Ratio of BIT installation (a/b)
5,645	6,608	85.42%

BIS(Bus Information System)

- It provides bus arrival information(bus number, expected arrival time, etc.)
- It provides convenience to public transit users



BMS((Bus Management System)

- It provides real-time location information for the
- bus
- It can keep the interval between buses
  Identify the number of people getting on and off at each stop and the O/D of public transit by time zone.

Transit card use ratio

AFCS(Auto Fare Collection System)

- Distance-based fare system and integrated transfer discount policy in the metropolitan area can be
- implemented
  Transparent and fair management, securing convenience for public transit users

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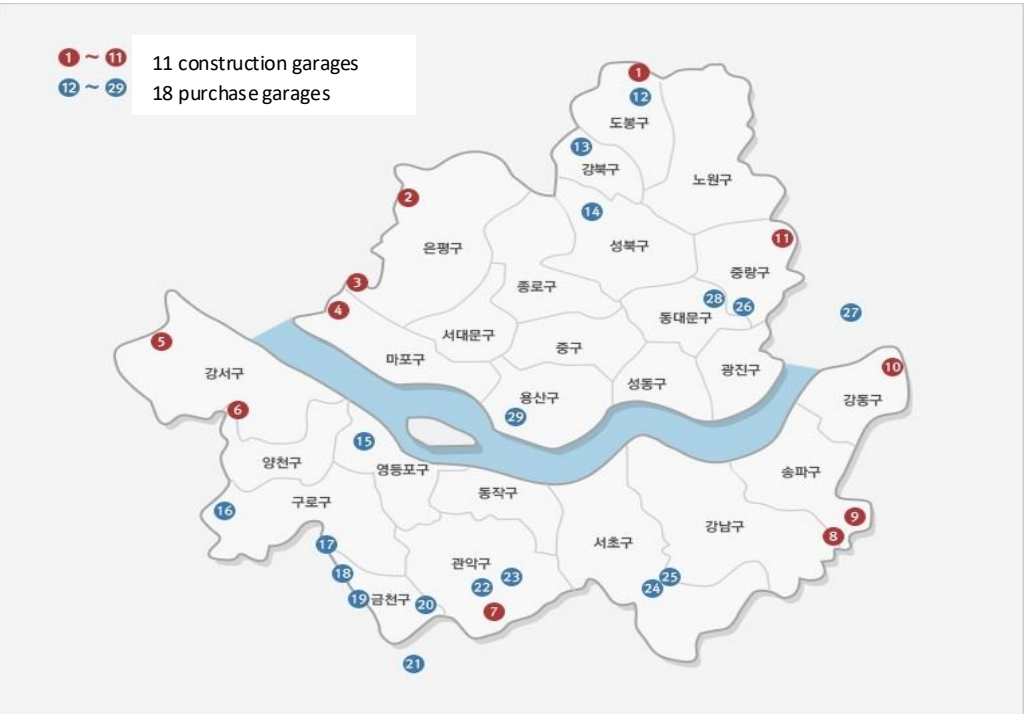
Public Transit System in Seoul(3/7)

A total of 30 garages are secured for maintenance, car washing, and operation inspection of buses, and electric buses have been gradually increasing since 2018

Public garages

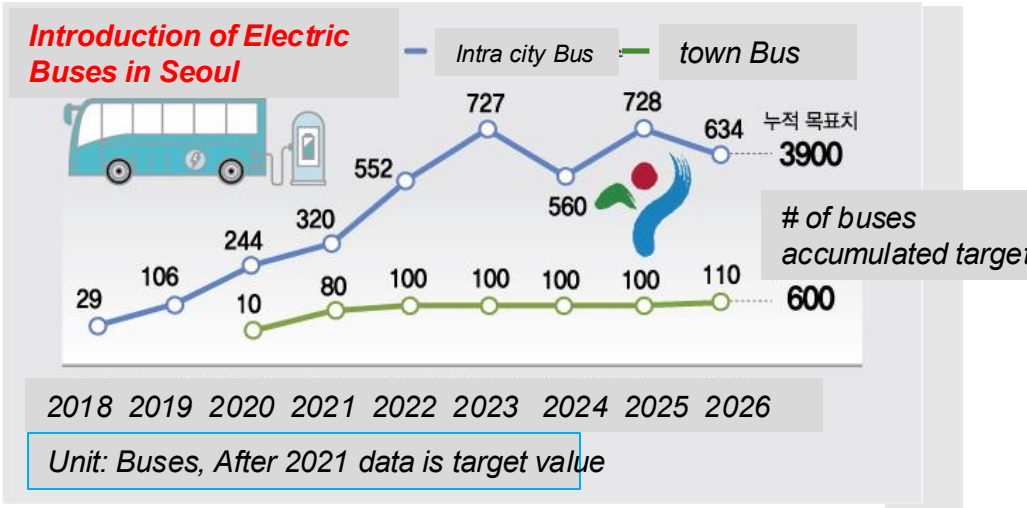


11 Garage Construction Sites, 18 Garage Purchases
Total 29 public garage is working.

Ref. : https://www.sisul.or.kr/open_content/traffic/intro/present.jsp

Electric Bus

Total : 7,399 units(Based on 2022), → Eco-friendly Bus : 1,252(16.9%)



Ref. : https://news.mt.co.kr/mtview.php?no=2021093014165436270

Public Transit System in Seoul(4/7)

Facilities such as bus rapid transit and modernization of bus stops are improved to secure the convenience of public transit users.

BRT

- Ensuring the punctuality of the bus through BRT
- Enhancing the mobility of buses

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Public Transit System in Seoul(5/7)

The complex transfer center is handling a large number of wide-area public transportation travel.

TOD(Transit Oriented Development(Jamsil·Station)

- Seoul's First Underground Transfer Center
- A total of 31 bus stops (38 lines and 2 subway lines, BRTs are above ground (inter-buses))
- A huge scale with a total length of 371m and a total floor area of 19,797㎡

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Public Transit System in Seoul(6/7)

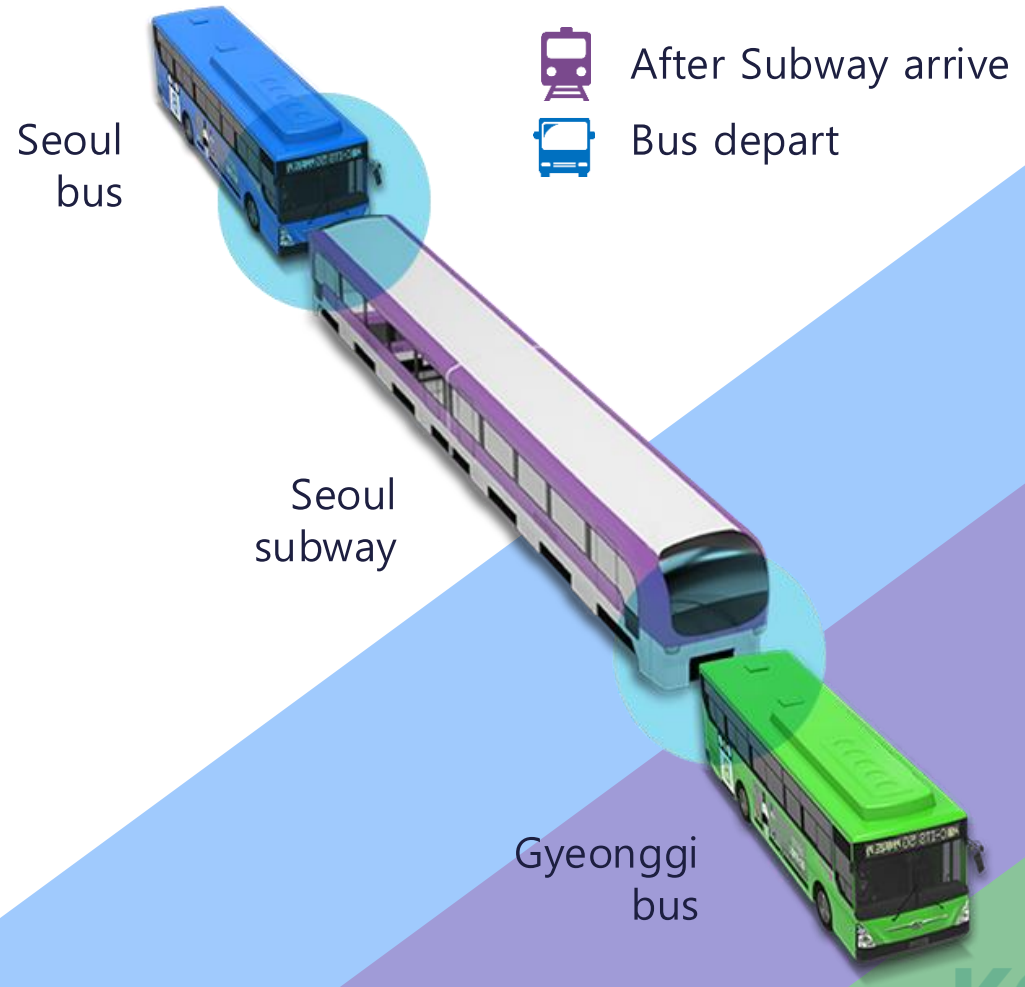
It must be connected not only physically but also operatively to create uninterrupted traffic connection conditions.

Linkage between transportation modes

If each transportation mode don't compete with travel distance but complement each other, public user's mobility increase.

It could be core element of seamless transport to be made a decision running schedule considering access time to bus stop based on arrival time of metro.

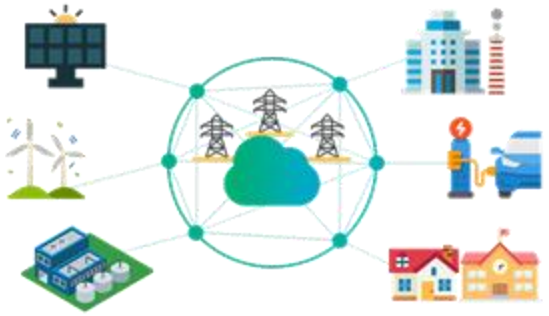
Bus dispatch operation taking into account access time from subway station to bus stop



Public Transit System in Seoul(7/7)

You should be able to answer some questions.

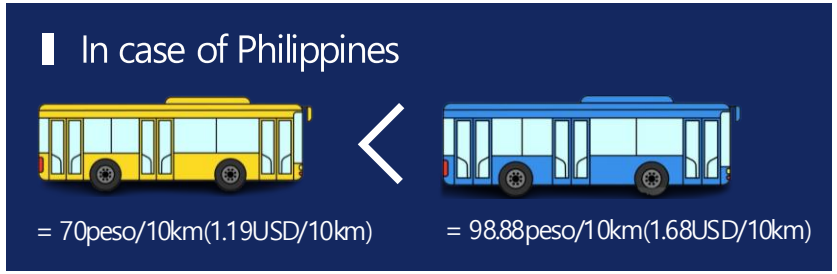
1. What is the energy source of electricity generation that supplies electric buses?



2. Who is responsible for supplying, operating, and managing electricity?
2-1. Is it managed and operated by the private sector?
2-2. If it is operated by the public, does it have the authority to adjust electricity rates?

MERALCO KEPCO 파워그리드 POWERGRID 엔티피씨 NTPC adani Power

3. If the power ratio is worse than the fuel ratio, who would use electric cars?



4. Do you have an electric bus authentication system?

5. Do you have a manufacture that can produce electric buses?

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INNOVATIVE SOLUTIONS FOR URBAN MOBILITY IN ALMATY AND TASHKENT (2021-2023)

Project developed jointly by the WBG and Seoul to provide project identification/preparation and policy advisory support Almaty (Kazakhstan) and Tashkent (Uzbekistan) by bringing international experience in smart solutions to tackle urban mobility issues mainly congestion and transport emissions, supported by the WBG's Korea Green Growth Trust Fund

Challenges & Issues

Traffic Congestion

- Increasing car ownership
- Old car issues

Congestion in Tashkent

Congestion in Tashkent

Air Pollution

- Air quality decreasing
- Traffic congestion's influence

Pollution in Tashkent

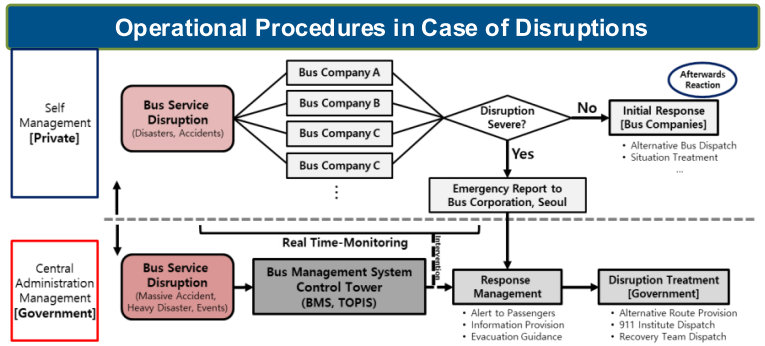
Pollution in Tashkent

Disasters (Flooding, Heavy Snow, Pandemic)

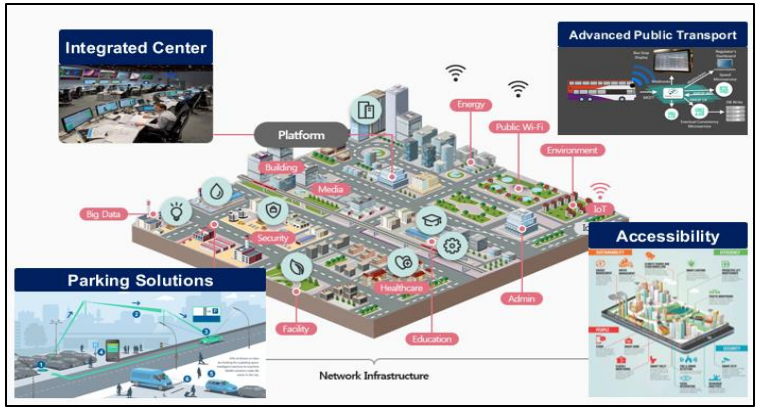
- Flooding caused by heavy rains, melting Snow
- Annual heavy snow issues
- Abnormal climate situations
- Response to COVID-19

Intervention

1) Enhancing Public Transport Resilience



2) Smart City Solutions (Mobility Management) + Pilot



3) Capacity Building

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Big Data

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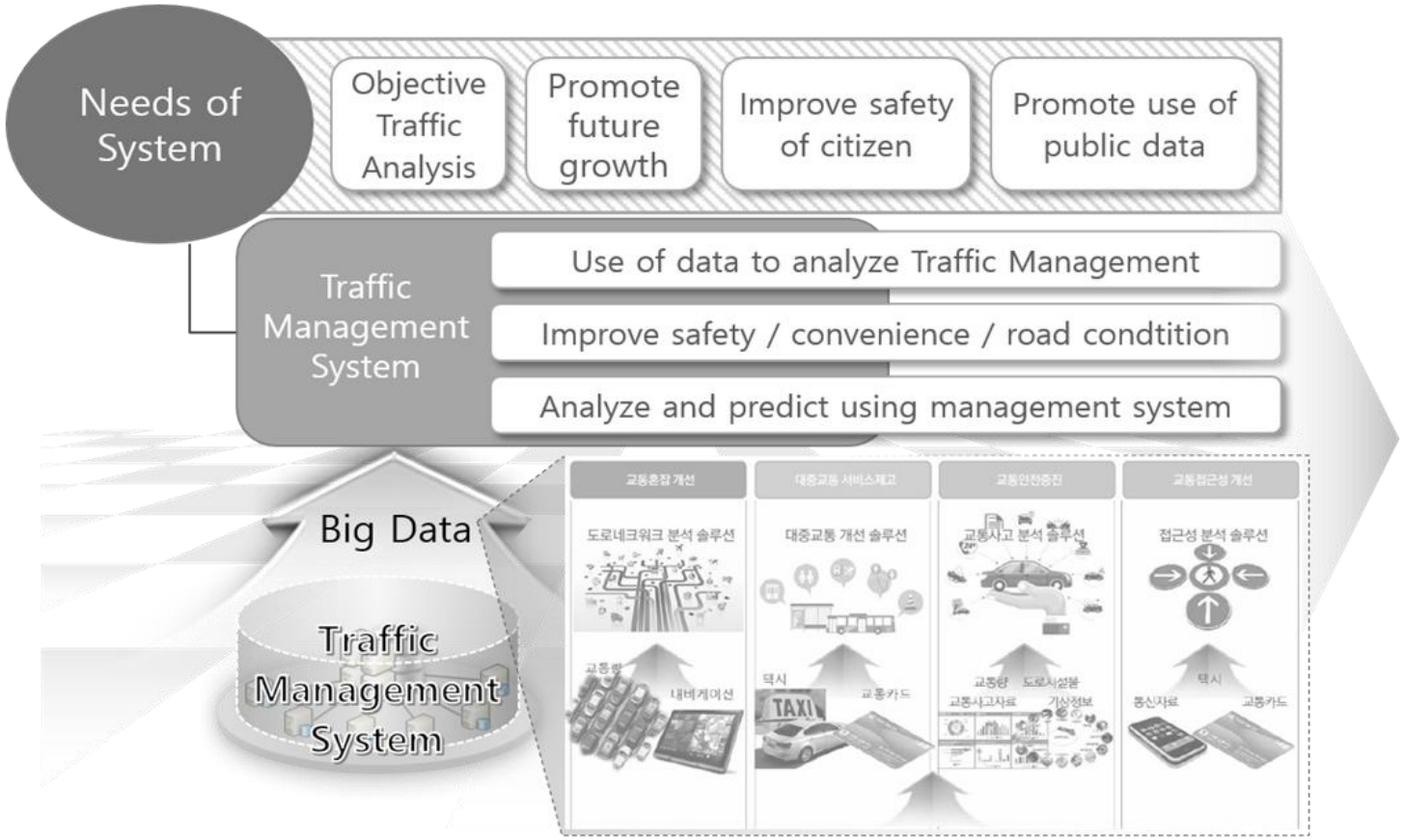
KOREA GREEN GROWTH TRUST FUND

Big Data(1/3)

Preparing for changes of future transportation environment based on C-ITS, autonomous navigation, objective and efficient traffic management system needs to be established.



Implications

- ✓ Establish environment that can collect and use traffic data
- ✓ Establish a system that can collect / store / analyze traffic data
- ✓ Create continuous development of traffic management system through research supporting system
- ✓ Use of big data in management system for followings :
  - Analyzing effect of road geometric structure
  - Improving communication of different transportation through management system

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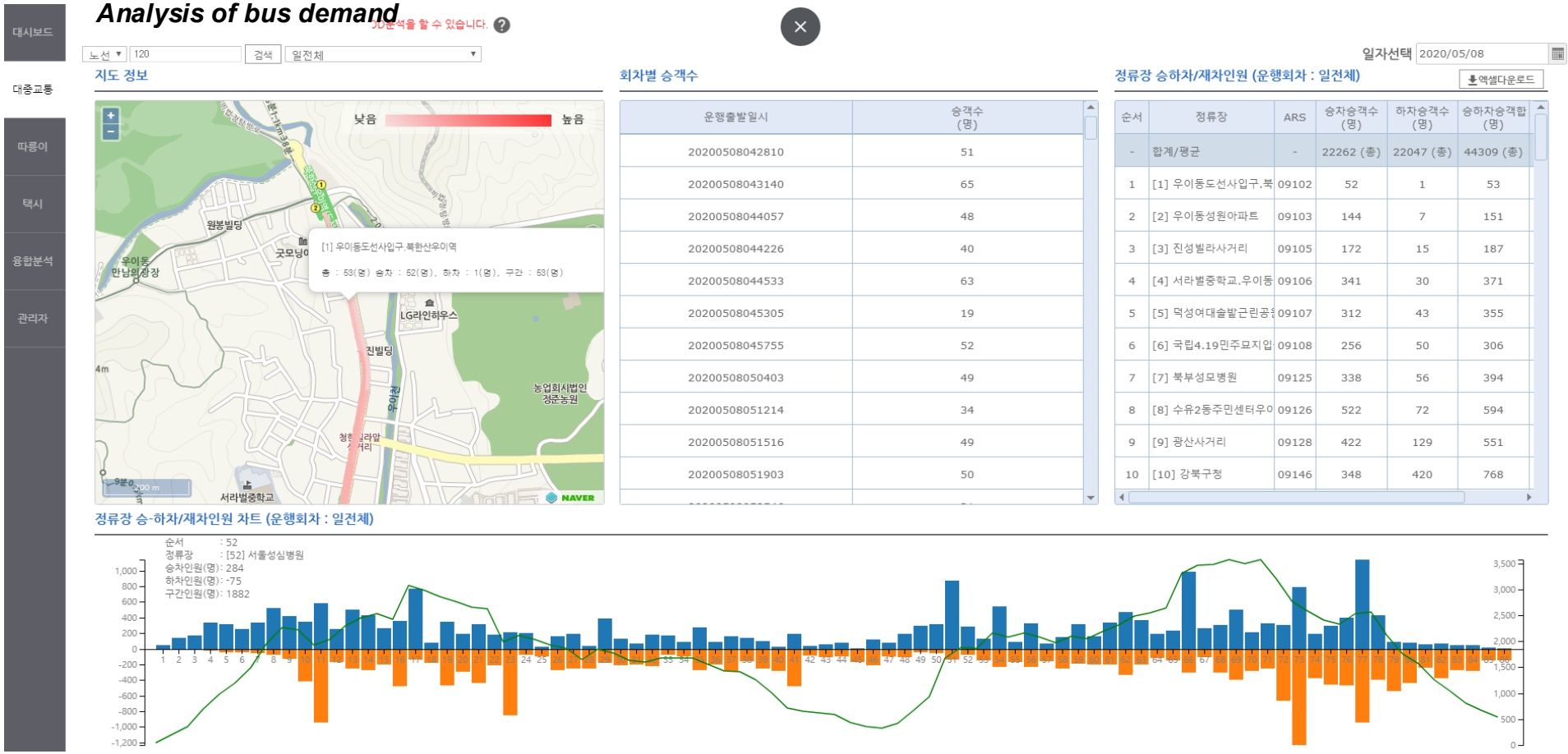
Big Data(2/3)

For each bus stop, it is easy to identify the number of people getting on, getting off, and occupancy in the bus.



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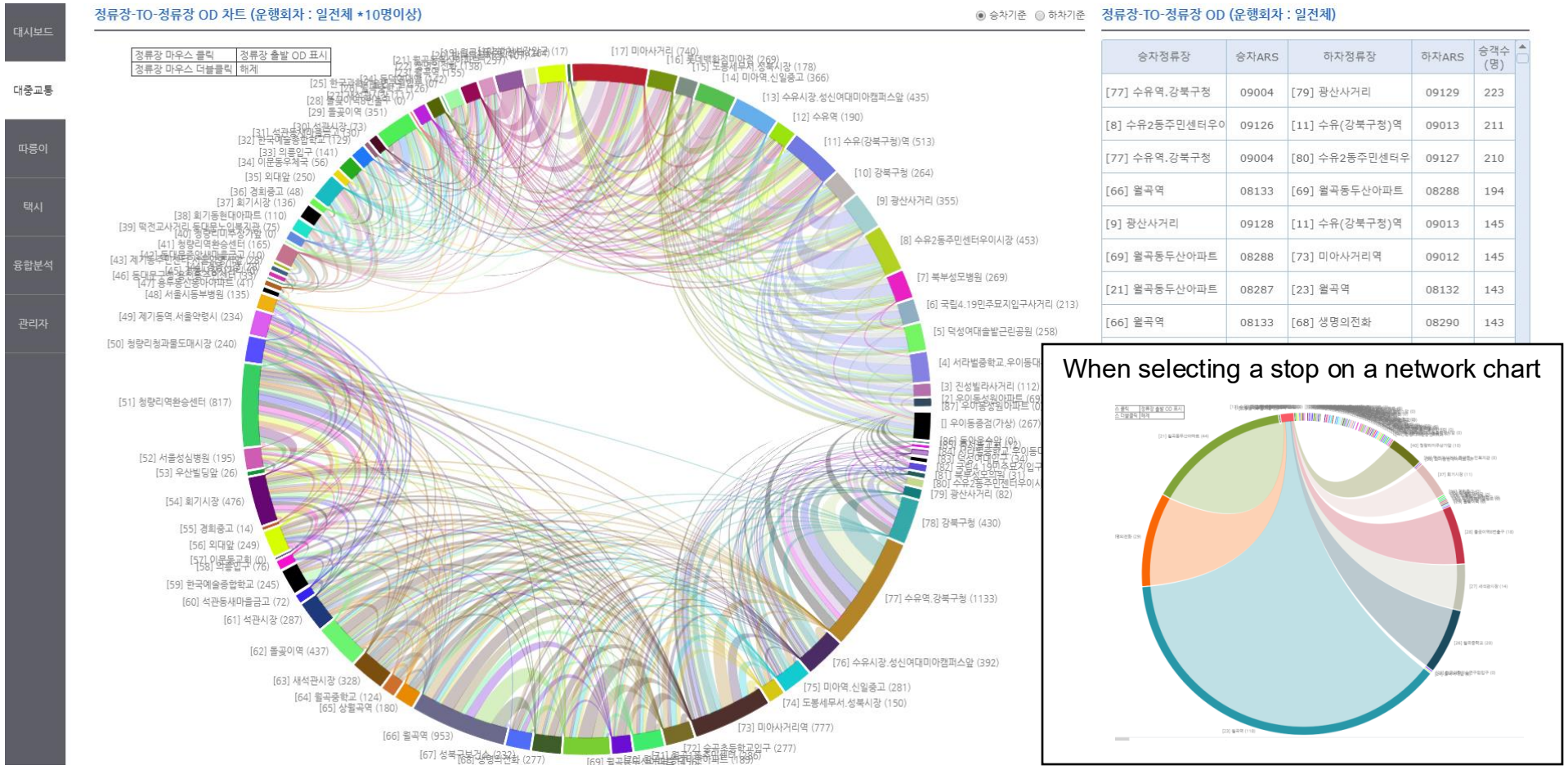
Big Data(3/3)

It can shows O/D by bus stop as network chart, it is possible to intuitively identify the demand by route



정류장-TO-정류장 OD (운행회차 : 일전체)

승차정류장	승차ARS	하차정류장	하차ARS	승객수(명)
[77] 수유역.강북구청	09004	[79] 광산사거리	09129	223
[8] 수유2동주민센터우이	09126	[11] 수유(강북구청)역	09013	211
[77] 수유역.강북구청	09004	[80] 수유2동주민센터우	09127	210
[66] 월곡역	08133	[69] 월곡동두산아파트	08288	194
[9] 광산사거리	09128	[11] 수유(강북구청)역	09013	145
[69] 월곡동두산아파트	08288	[73] 미아사거리역	09012	145
[21] 월곡동두산아파트	08287	[23] 월곡역	08132	143
[66] 월곡역	08133	[68] 생명의전화	08290	143

When selecting a stop on a network chart

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Thank you