Council of Asian Liberals and Democrats

더불어민주당 민주연구원 The Institute for Democracy

Seoul's Innovative Challenges for a Smart Mobility Society

2024 CALD Smart Mobility Conference

25 October 2024

Jeeyoung BAE

The Institute for Democracy

- **Develops long-term national strategies and policies**
- **Engages in collaborative projects with expert networks and civil society organizations**
- **Offers democratic citizenship education and talent development program**

- Research Fellow, Energy and Environment Sector, Democratic Party of Korea (current)
- Team Leader, Policy Headquarters, Korean Great Transition Presidential Election Campaign, Democratic Party of Korea
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1. Meaning & Background of Smart Mobility in Korea

Challenge for Carbon Neutral 2050

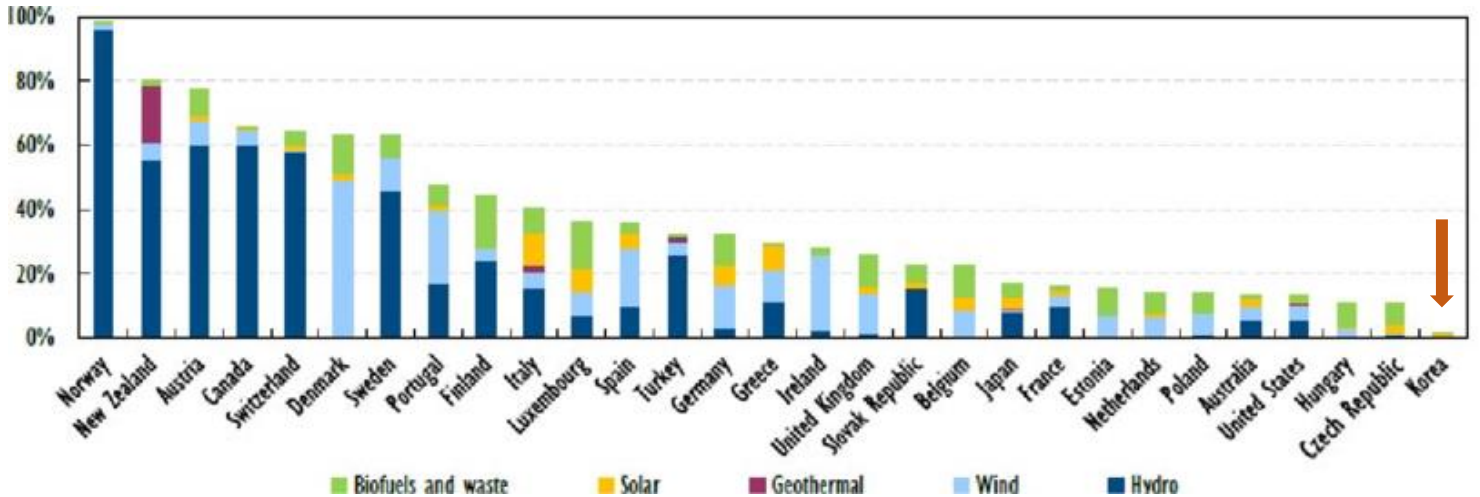
Environment

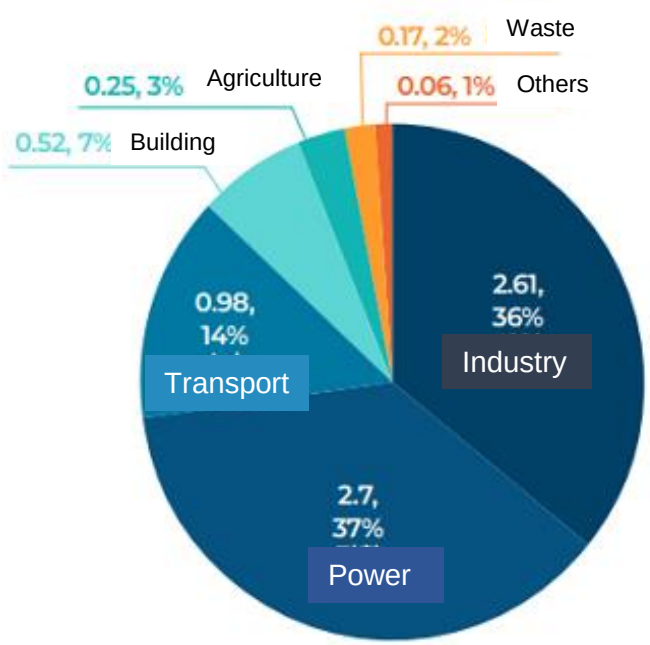
The shift to smart mobility is crucial for reducing GHGs

- **South Korea's share of renewable energy : the lowest in the OECD**
  - Only 7.7% in 2022 & renewable energy target for 2030 is 21.6%

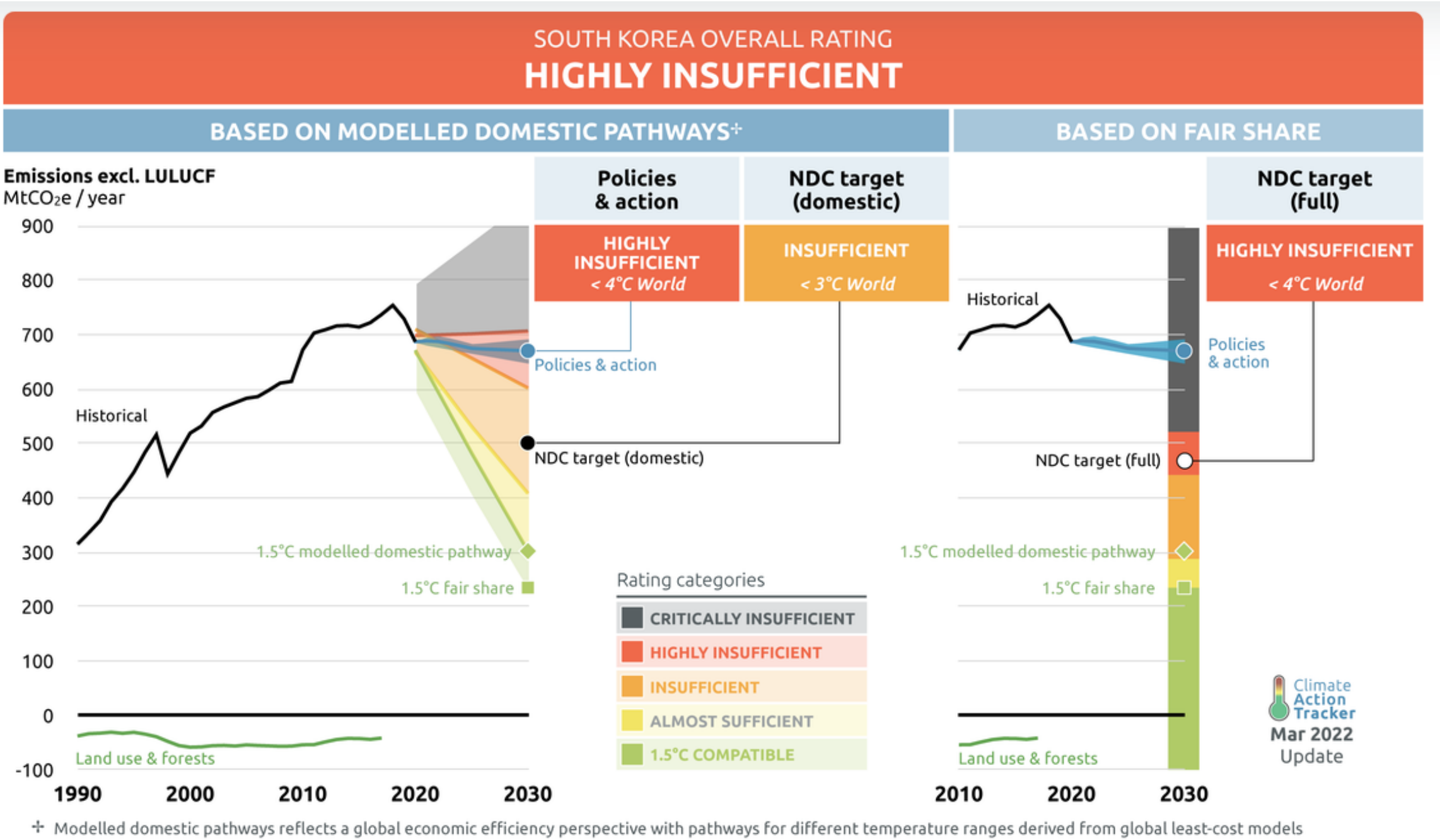
- **South Korea's Greenhouse Gas emissions are about 700 million tons per year**
  - Korea's main industries are fossil fuel-based energy-intensive industries
  - 14% GHGs comes from transportation sector

- **Korea's 2050 Carbon Neutrality Declaration (2020)**
  - Need to reduce GHGs on a steeper path than major economies





GHG emissions by sector (2021)



~ website: Climate Action Tracker

Urban Overcrowding and Traffic Congestion

Transportation

Shifting paradigms to solve urban transportation systems that touch people's lives

- **South Korea Has the Longest Commute Times in the OECD**
  - Congestion in the seven largest cities costs $20 trillion annually
  - Most private vehicles during peak hours are single-occupant
  - 11.15 million people use public transport on weekdays

- **Paradigm shifts: shared cars, autonomous vehicles, electric and hydrogen vehicles**
  - To solve issues of ; **road congestion (car ownership), traffic congestion (autonomous-driving), pollution (electric vehicles)**

Seoul Smart City Master Plan (2021-2025)

- Expanding autonomous driving pilot zones
- Preparing for the 2027 launch **of fully autonomous vehicles**
- Developing a **traffic management system using drones**
- Implementing a **Smart Bus Operations System**
- Providing integrated **real-time parking information**

Is Seoul Embracing the Mobility Paradigm Shift?

- **Electric Vehicles**: 30,000 EVs registered in 2021, 1% of Seoul's 3 million vehicles. Targeting 270,000 EVs (6.6%) by 2025.
- **Ridesharing**: Struggling, with one car per four citizens in Seoul.
- **Autonomous Driving**: Level 3 autonomous vehicles to launch in Sangam-dong by 2025.

Automotive Paradigm Shift

Economy

Transition to smart mobility service companies is essential for Korean automakers

- **The Automotive Paradigm Shift: C.A.S.E**
  - **Connected**: Increasing connectivity between vehicles and IoT driven by the rise of smart devices and growing consumer digital demands
  - **Autonomous Driving**: The race to develop driverless cars is accelerating with advancements in AI and Big Data
  - **Mobility Services**: The shift from car ownership to car usage is expanding due to the sharing economy and smart phone development
  - **Electric**: Transition from internal combustion engines to electric motors as the primary power source

- **CES 2024: SDX**
  - Beyond vehicles, everything software-defined
  - Increasing data and platform connectivity as software-driven vehicles (SDVs) proliferate
  - Deliver SW B2B solutions with real-time data analytics
  - Future Logistics Systems Unveils Autonomous Robots

- **CES 2024: PBV**
  - Purpose-Based Vehicle (PBV) Concept Car
  - Provide interchangeable structures in the space behind the driver's seat, and can be designed for specific purposes such as ride-hailing, delivery, etc.

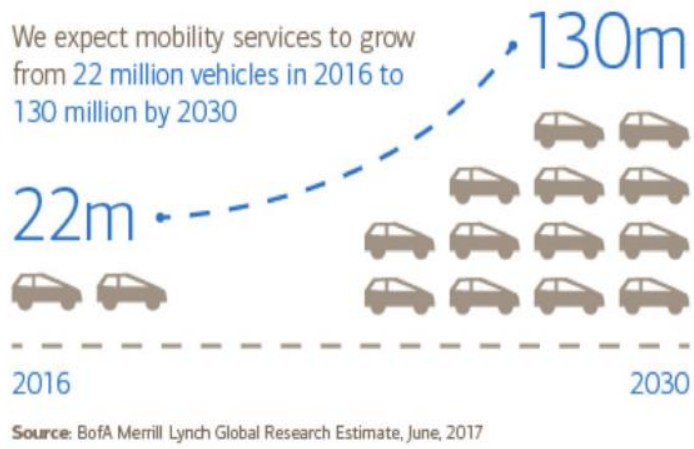
2. Smart Mobility Key Policies & Assessment in Korea

Key Concepts in Smart Mobility

What is "Smart Mobility"?

- **EU (2016):** "Systems and services that decarbonize transport, reduce traffic congestion, and improve accessibility.“
- **Seoul Institute (2019):** "A new form of service that efficiently solves transportation challenges.“
- **Gyeonggi Institute (2020):** "Personal transport, car-sharing, integrated reservation services, and smart infrastructure.“
- **Korea Transportation Research Institute (2018):** "Utilizing ICT innovations to create personalized transport solutions based on user and operator preferences.“
- **World Economic Forum (2021):** "A holistic approach to urban mobility, integrating clean energy solutions with intelligent, connected transport systems for sustainable urban development.“

Smart Mobility Services Trends and outlook



- **Key Differences from Traditional Public Transportation Models**
  - Led by private companies offering commercialized services
  - Provides personalized, on-demand services tailored to individual needs
  - Integrates people, vehicles, and services through digital connectivity

Seoul's Smart Mobility Policy

- **Building the foundation for autonomous vehicles**
  - **Fully autonomous passenger vehicles** on the road by 2027
  - Expanding autonomous driving pilot zones in areas like Gangnam and Yeouido, including paid transportation services
  - Developing future transportation infrastructure, with 1,860 km of digitized roads (4 lanes) by 2025: **Build 1,860 kilometers (4 lanes) by 2025**

- **Provide information about walkable transit connections**
  - Providing information on walking transfers, such as bus stop transit map services around subway stations (~'25)
- **Smart Maintenance Platform for Road Facilities (by** 2030)
  - Utilizing 4th industrial technology to maintain and proactively manage aging infrastructure.
- **Building a traffic management system using drones**
  - Three-dimensional traffic monitoring and field application using drones and AI technology ('23~)

- **Real-Time Parking Information Integration**
  - IoT-based real-time parking information service to optimize parking space usage
  - Integrated platform for parking management, including sharing and reservation services

Smart Mobility - (1) Autonomous Driving

- **Self-driving cars: The World's Third Partially Autonomous Vehicle (Lv3) to Be Commercialized This Year**

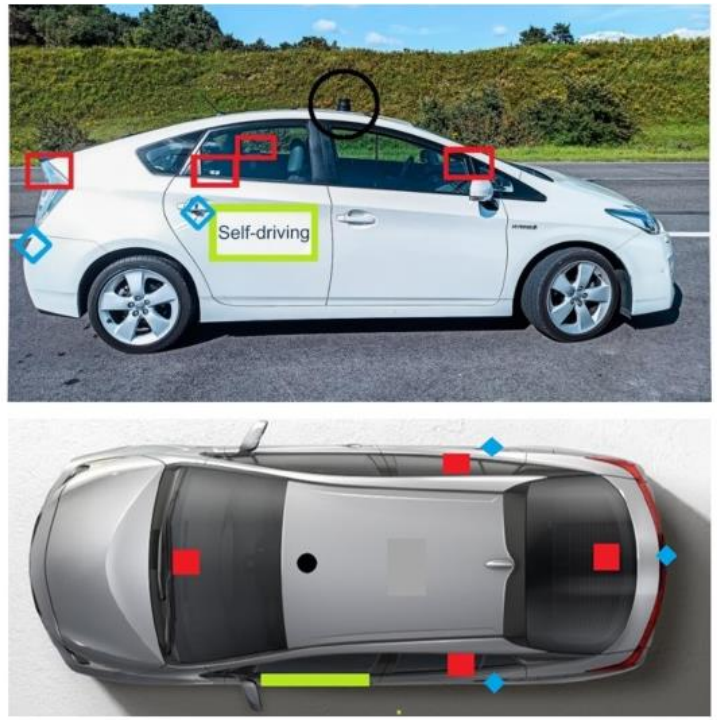
- **(Current Status)**: Temporary operation permits since Feb '16 (246 vehicles); pilot operation districts since May '20 (14 locations)

  - **Regulation**: Partially autonomous driving (Lv3) can be manufactured, sold, and operated under existing regulationsLv3 allows autonomous driving on highways, but drivers must take control when necessary

  - **Expectation**: South Korea will become the third country in the world to commercialize Lv3 autonomous vehicles later this year

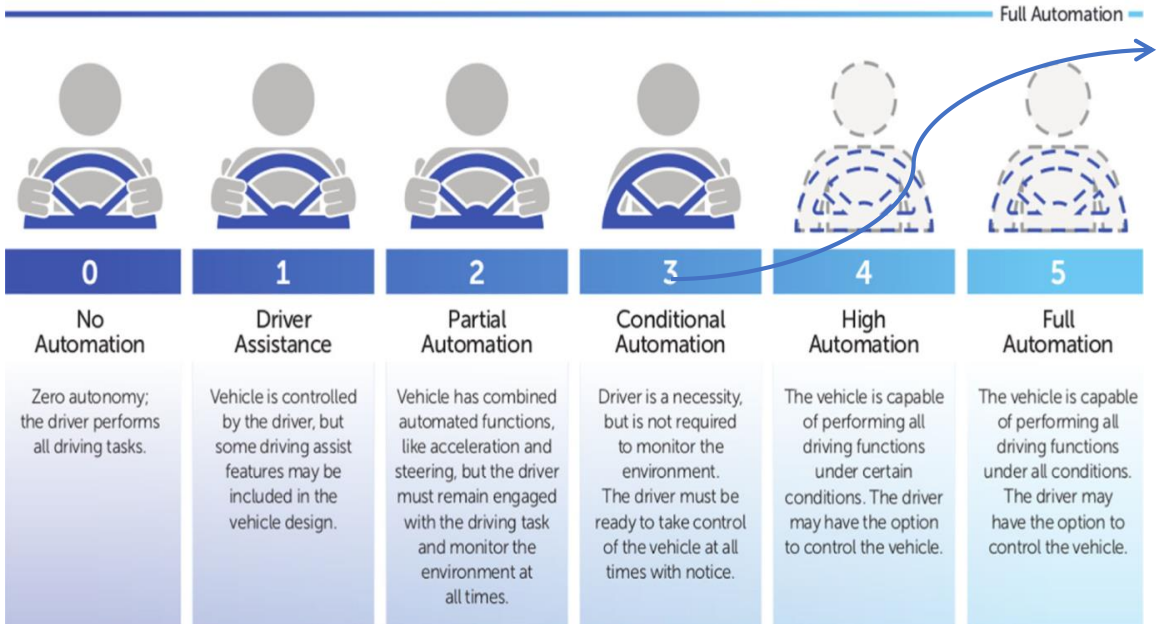
- **(Assessment)** Ranked 7th globally in competitiveness (KPMG, 2020), South Korea must actively respond to global competition to secure the future market for fully autonomous driving (Lv4)

* Global rankings: #1 Singapore, #4 US, #11 Japan, #14 Germany, #20 China



~ Shubham et al. (2022)

Autonomous driving stage categorization



~ Bachute et al.(2021)

- Set destinations via the 'TAP' app for Seoul's autonomous vehicles.
- Operated by 42dot and SWM in partnership with Seoul city.
- First ride free, offering Level 3.5 autonomous driving on real roads.

Phase 3 Autonomous vehicles in operation in Seoul

--	**Sangam**	Cheonggye cheon	Yeouido (Capitol)	Hapjeong Station-Dongdaemun
Featured services	**On-demand Services**	Sightseeing and short-distance shuttle buses	Parking Lot Shuttle Bus	Late night buses
Open for business	**February 2022**	November 2022	July 2023	December 2023
Number of vehicles	**8 passenger cars**	3 minibuses	2 minibuses	2 motorcoaches

- **Seoul to Pilot Phase 4 Self-Driving Cars in Sangam This Year!**
  - RideFlux is autonomous using Hyundai GV80 SUVs to offer ride-hailing services, testing Level 4 riving on a 3.2 km route in Sangam.
  - The test driver will be seated in the passenger seat, not the driver's seat.

Emergency Stop Switches Installed both inside and outside the Phase 4 autonomous vehicles in Sangam-dong ©Rideflux

Smart Mobility - (2) UAM

- **UAM: No global commercialization yet, first commercialization target in '25**
  - **(Current status)** Developing airframe and traffic management technologies ('19) and creating demonstration infrastructure (~'23, Goheung, Jeollanam-do)

- **(Assessment) Slow start to commercialization compared to leading countries (3 years or so)**

K-UAM roadmap for the 1st commercialization in '25 ('20.6)
- Seven consortiums compete in Korea UAM demonstration project

UAM Phase 2 Demonstration Project - Metropolitan Area Routes: Arabatgil, Han River, Tancheon
- Driving UAM services to be as affordable as taxi fares in 2035

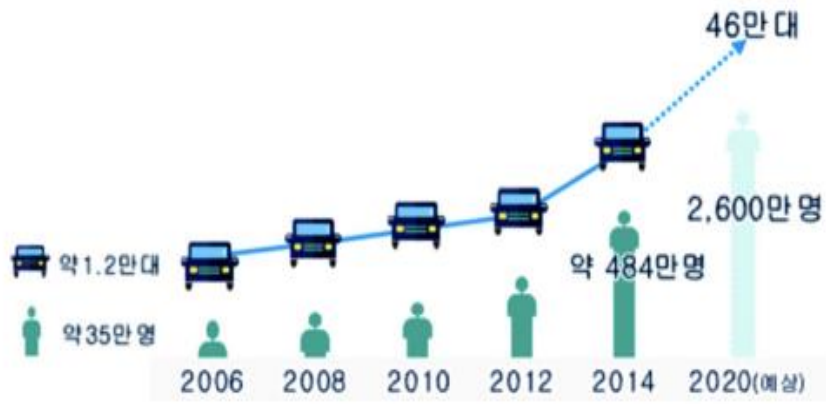
Smart Mobility - (3) Car Sharing

- **Car Sharing :** While global commercialization has not yet been fully achieved, Korea aims for its first large-scale implementation by 2025.
  - Car sharing is one of the fastest-growing areas in mobility services worldwide

- **(Current status**) While car sharing has expanded, ridesharing and carpooling services remain limited in Korea, primarily due to regulatory hurdles and conflicts with established industries, particularly the taxi sector.

* Cars, the second most expensive household asset, sit unused 95% of the time, driving demand for car sharing.

- **(Assessment)** The biggest challenge is regulatory resistance and conflicts with traditional industries.
  - Local services like Kakao T succeeded by complying with regulations, showing that collaboration, not disruption, is key for mobility growth in Korea



~ PwC Strategy&('21

3. A Look at Seoul Citizens' Experience

MaaS as an Ultimate Orientation for Consumers

- **Mobility as a Service(MaaS) : Platforms that deliver all urban transportation as an integrated service**

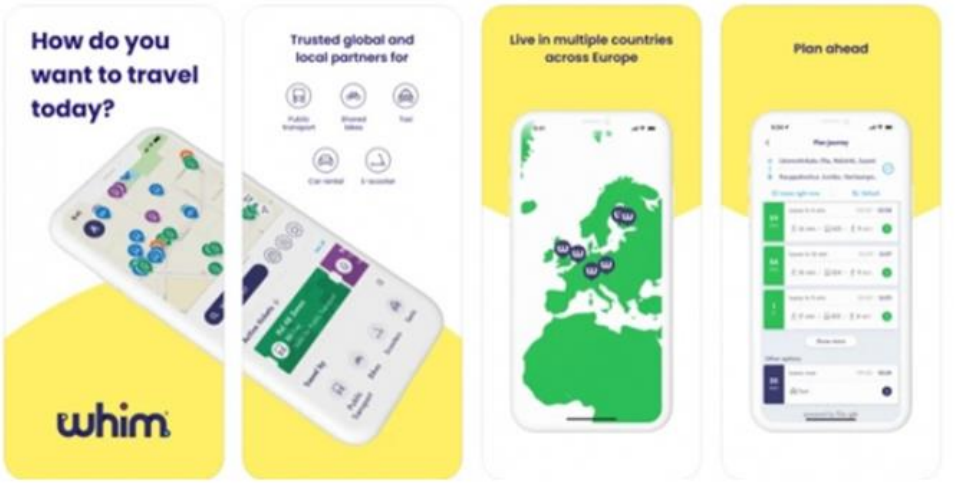
  - Users can book and pay for public transportation tickets and access integrated mobility options (car sharing, bike rental, etc.)
  - Meets transportation needs using only 3% of existing cars
  - Provides data to smart mobility back-end applications, supporting future infrastructure expansion

- **MaaS Best Practices : Finnish 'Whim' [level 3]**

  - Provides optimal travel routes by connecting all modes of transportation (trams, buses, taxis, rental cars, motorcycles, public bicycles, etc.)

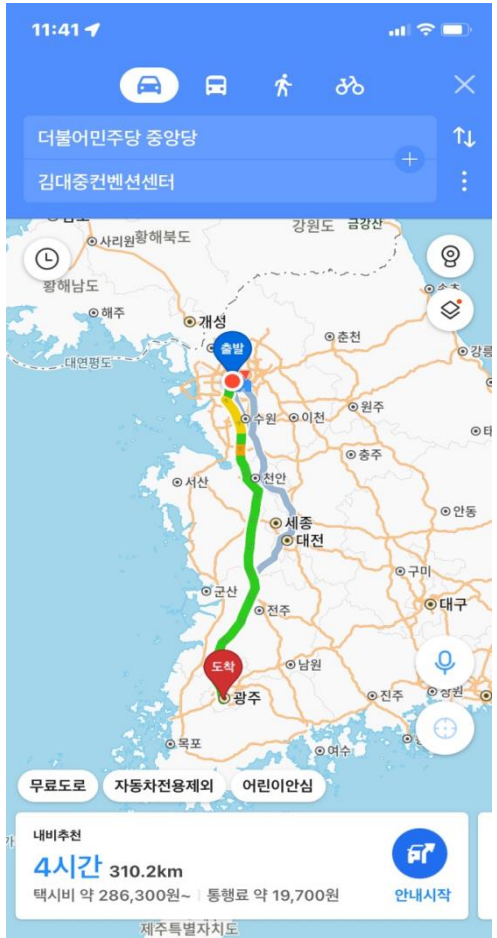
  - Utilizes a mobile app that lets users enter their starting point and destination (since '16)

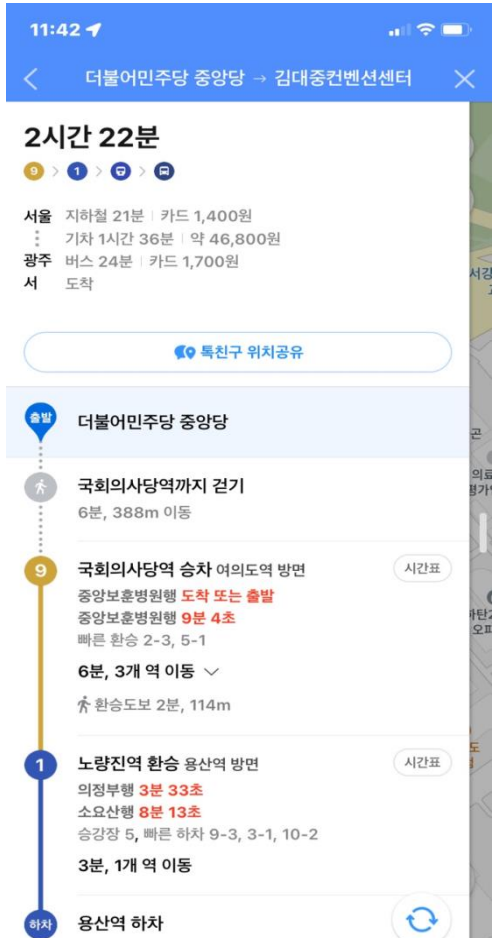
  - Enhances convenience for citizens
    - Offers various monthly plans for lump-sum payments.
    - Provides transportation packages for unlimited use.

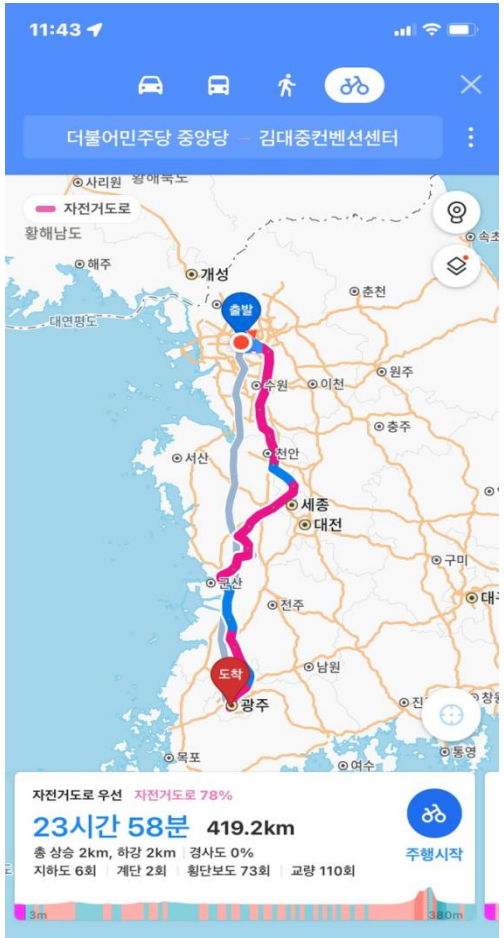


Smart Mobility: The Case of Kakao Mobility

- **Route: From Yeouido, Seoul → To: Kimdaejung Convention Center, Gwangju, Korea**
  - Compares travel options by car, bike, and public transportation (bus, subway, train) regarding time, cost, and method







Data for Seoul's Top Destinations

- **Top destinations: From the Kakao Mobility Report**
  - 1st Rank for KakaoT Taxi Ride: Itaewon Station

Kakao Taxi data Top 10 Popular Destinations in Seoul
- **Departures : 1. Itaewon 2. Mapo(Hongik univ.) 3. Jongno**
- **Arrivals: 1. Kimpo Int'l Airport 2. Seoul station 3. Suseo station**

순위	출발지	지역
1	이태원역 6호선	용산
2	KT&G 상상마당	마포
3	미래에셋 센터원빌딩	중구
4	이태원 관광안내소	용산
5	콘래드 서울	영등포
6	이태원 119안전센터	용산
7	김포국제공항 국내선	강서
8	강남파이낸스센터	강남
9	서울중앙지방검찰청	서초
10	종각역 12번출구	종로

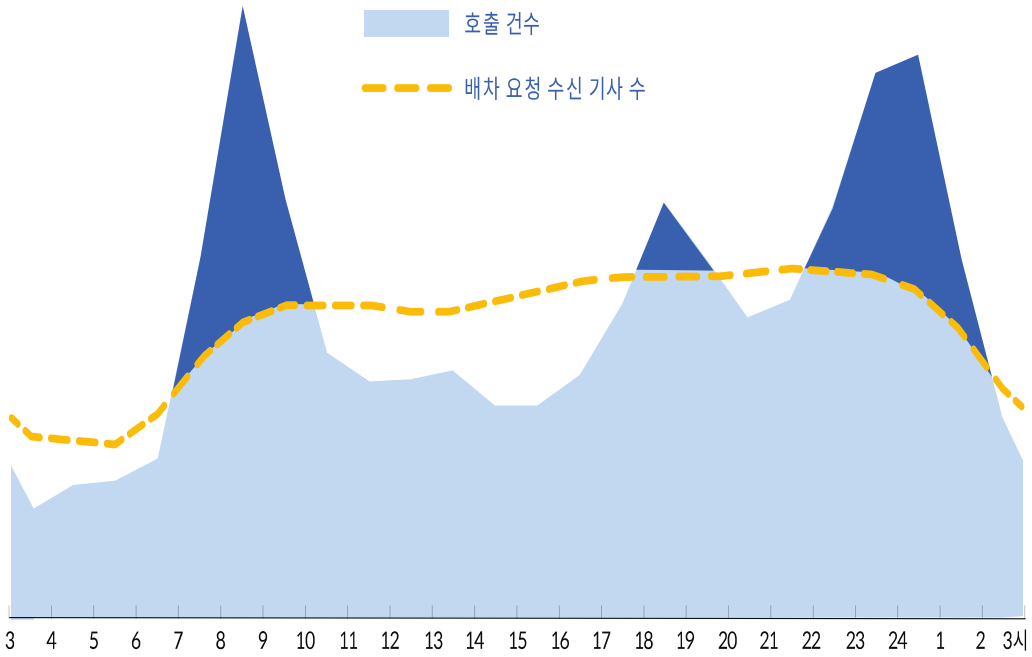
순위	도착지	지역
1	김포국제공항 국내선	강서
2	서울역	용산
3	수서역	강남
4	용산역	용산
5	김포국제공항 국제선	강서
6	홍대입구역 2호선	마포
7	서울고속버스터미널	서초
8	동서울종합터미널	광진
9	강남역 2호선	강남
10	수서역 SRT 1번 출구	강남

18년 7월 ~ 19년 6월, 운행완료 기준

~ Kakao Mobility Report

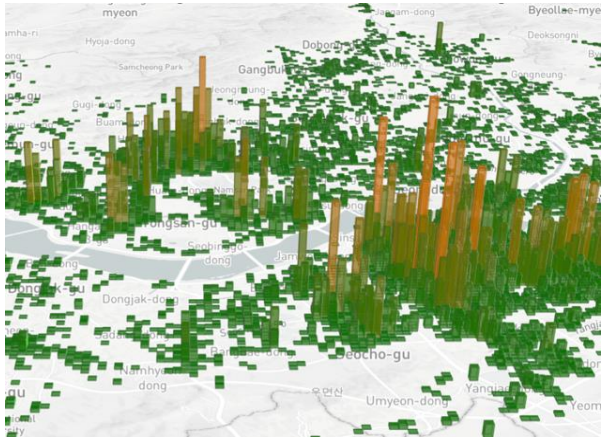
Carhailing Calls on Special Occasions

Kakao T Taxi demand and supply by time



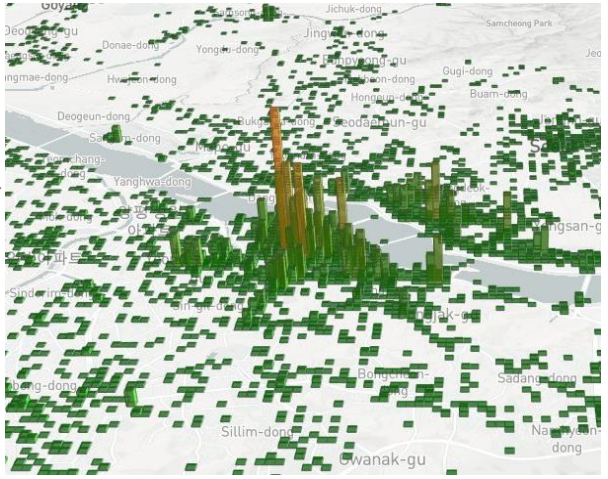
Normal calls

Rainy day calls



Normal calls

Calling during fireworks



4. Issues & Implications of Smart Mobility Society

Issues and Implications

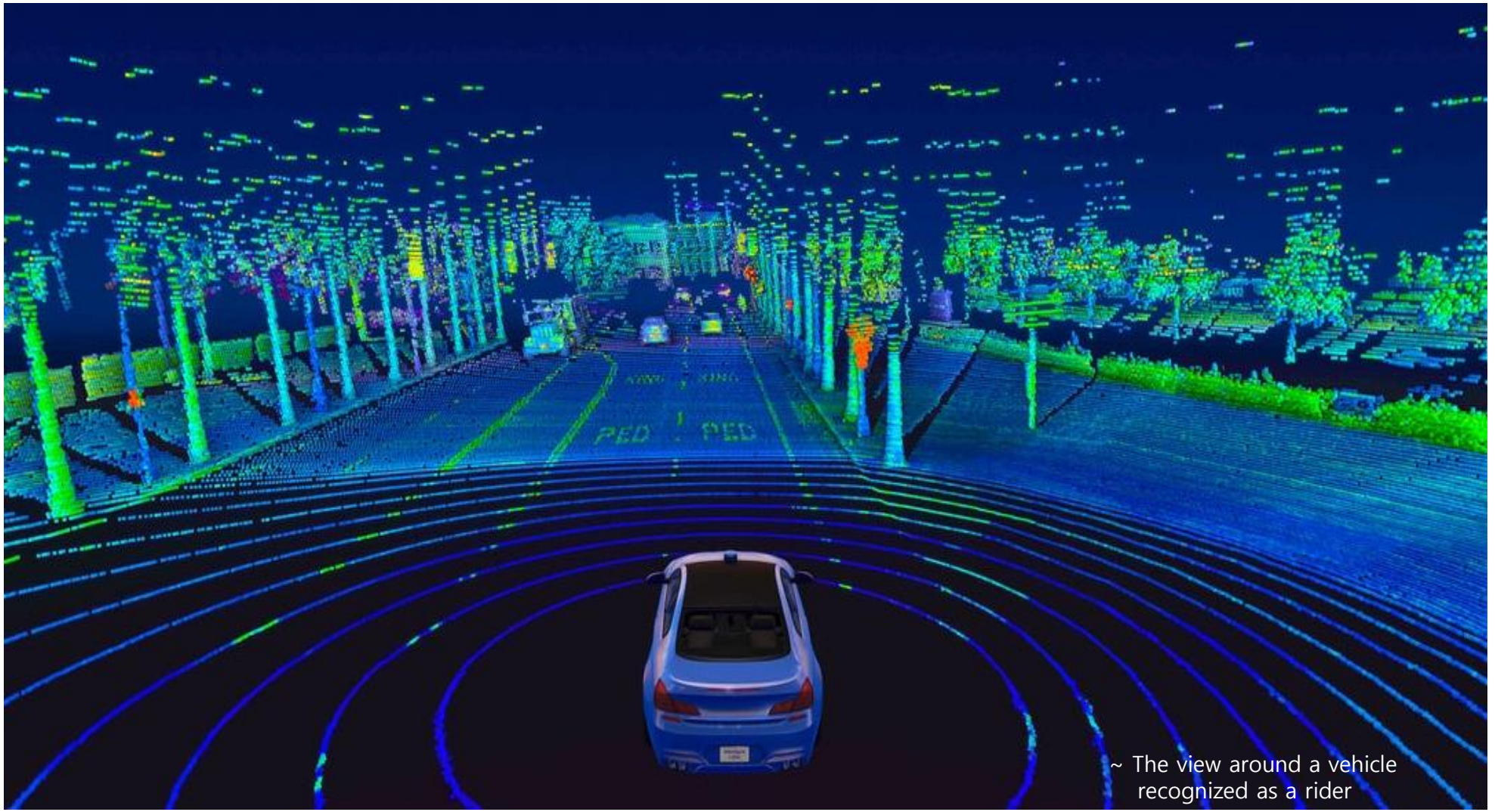
- The importance of social dialog for stakeholder collaboration
  - Addressing social conflicts is crucial to foster private innovation in shared transportation
  - The diversification of ridesharing services into carpooling and ride-hailing is generating tensions with traditional industries

- **Investment in Autonomous Electric Vehicles**
  - Ongoing investment is critical for the commercialization of autonomous electric vehicles
  - The goal is to develop integrated services that provide seamless door-to-door connectivity, with projections indicating that 95% of OECD citizens could use self-driving electric vehicles by 2030

- **Integrating AI and IoT with MaaS**
  - Support the mobility industry's ecosystem with policies that open data to the private sector
  - Strengthen early infrastructure for startups and enhance private sector innovation capabilities

- **Key Questions for Policymakers**
  - How can smart mobility services address climate inequality?
  - How can we strengthen consumer interests when they lack solidarity compared to stakeholder groups?
  - What types of smart mobility services do we ultimately desire for our cities?

Thank you



~ The view around a vehicle recognized as a rider