

KGID Partnership Week 2022

Introduction to Korea Expressway Corporation's Green Projects

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살기 좋은 국토, 편리한 교통



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Korea Expressway
Corporation



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Introduction of Korea Expressway Corporation (KEC)

- One of the largest state-owned enterprises (SOE) in Korea: plan, design, construction, and O&M of expressways
- The annual budget on average of last three years (2020-2022): 12.7 billion USD
- Expressway O&M for 4,929km in Korea
- ITS is deployed on the all sections of expressway, the largest level of ITS operator world-widely.
- As a SOE, KEC leads ESG (environmental, social, and governance) projects for road transportation infrastructure in Korea.





KEC's Current Carbon Emissions: 957,447 ton/year in total

1. Carbon emissions by road operational vehicles and facilities

Categories		Amounts (ton/year)	
Total		270,620	
Direct emission	Buildings	7,418	30,252 (11.2%)
	Vehicles (for operation)	22,834	
Indirect emission	Tunnels	149,243	240,368 (88.8%)
	Buildings (roadside)	56,095	
	Streetlights	26,723	
	Others	8,308	

2. Carbon emissions by road construction works and service works

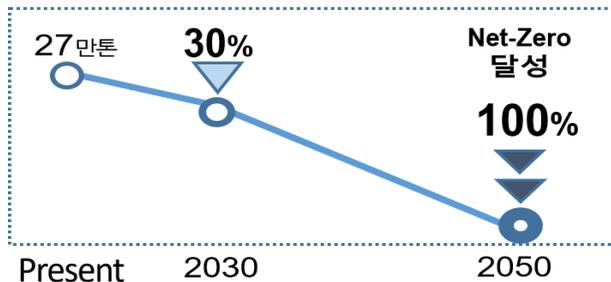
Categories	Amounts (ton/year)		Remarks
Total	686,827		
Construction works	549,367	(80.0%)	New roads, expansions
Rest area services	62,470	(9.1%)	
Maintenance works	49,787	(7.2%)	
Toll collection process	24,321	(3.6%)	Stop & Go
Waste disposal	882	(0.1%)	



KEC's 2050 Master Plan for Carbon Neutrality

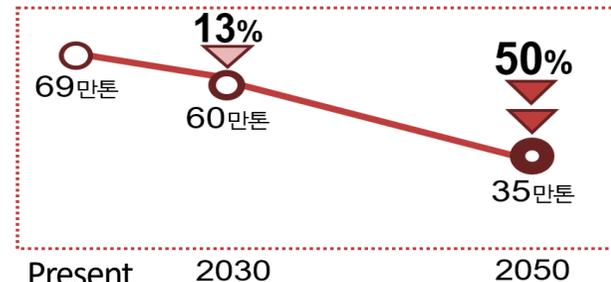
1. Carbon emissions by road operational vehicles and facilities

Energy Independence	Transition into Green Road-infrastructure
Self-generation of renewable energy (including Piezoelectricity)	Super-efficient road asset management
RE 100	EV 100
Carbon-absorbing environment	Green remodeling



2. Carbon emissions by road construction works and service works

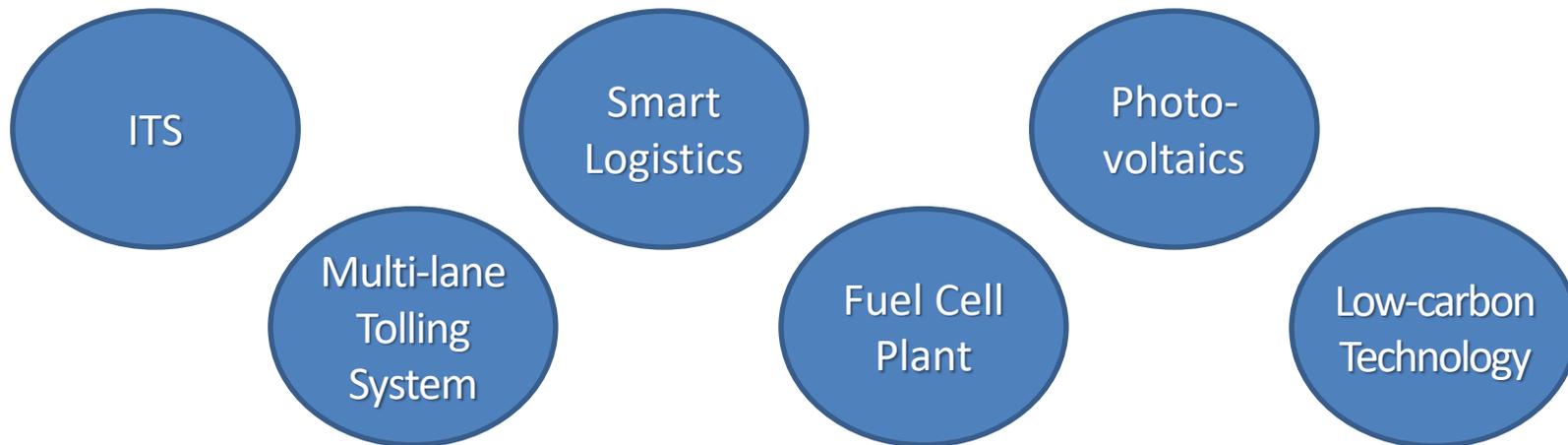
Carbon Reduction from Driver's Perspective	Low-carbon Technologies
Smart traffic management supporting autonomous vehicles	Low-carbon materials development
V2X (C-ITS) infrastructure (roadside)	Low-carbon construction methods development
Carbon capture, utilization and storage	Recyclable construction tools and materials





Current KEC's Green Projects

When the brand-new energy systems by means of climate-friendly solutions are combined with digital technologies, telecommunications, and interconnected with transportation and civil infrastructures, they will become smart and robust then finally trigger a game-changing opportunity for socio-economic development.





ITS since 1990s

Type of ITS	Main Features
Conventional	Traffic Management Center with VDS, CCTV, VMS, etc. TCS, WIM, and enforcement system
Advanced	V2X, Platoon Driving, Autonomous vehicle

Objectives: In Korea, KEC operates currently both conventional and advanced ITS. A conventional ITS aims to reduce carbon emission by providing not only traffic information service but also efficient traffic management.

Furthermore, KEC develops the advanced ITS including V2X (C-ITS) and autonomous vehicle.



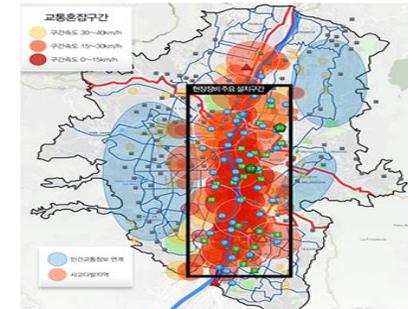
ITS Projects in Other Countries

KEC works with international partners for deploying ITS in their countries based on KEC's abundant and long-term experiences. ITS projects in developing countries generally focus on a conventional type in line with conditions of those countries.

ITS for Nagpur-Mumbai Super Communication Expressway in India (2019-)



Downtown Traffic Management with ITS in Medellin, Colombia (2018-)



Improving the Reliability and Safety on National Highways of Bangladesh by Introduction of ITS (2020-)



ITS and Road Facilities on the East-West Motorway in Algeria (2014-)

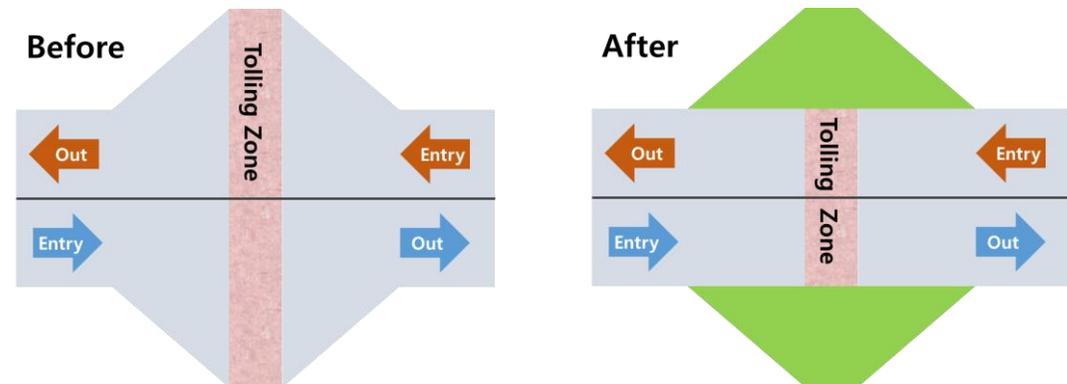




Multi-lane Free Flow Tolling System (MFFT, since 2015)



In comparison to the conventional way of toll collection (single-lane entry), MFFT features the benefit of about 0.006 USD/vehicle in terms of monetary value of environmental cost. (owing to no need for speed reduction)



Objectives: MFFT system reduces carbon emission by eliminating factors of vehicle's speed variation within tolling zone as well as downsizing tolling zone itself.

KEC provides now many countries with advanced systems of MFFT including India, Algeria, Kazakhstan, and Bangladesh.



Smart Logistics (since 2010s)

Objectives: KEC's Smart Logistics aims to decrease carbon emission by enhancing the efficiency of expressway network resulting in reduction of logistics traffic and cost.

Smart Logistics Components

- ① Digitalized and well-organized logistics center with automatic sorting machine and ID tracking OS
- ② Dualized freight: (Center to Center) integrated large cargo + (Local) retail's last mile delivery
- ③ In the long run, expressway will be featuring dedicated lanes to freight allowing platooning and autonomous driving for the maximum efficiency.





Low-carbon Construction Technologies

Objectives: KEC aims to reduce carbon emission during road construction by developing low-carbon technologies with in-house R&D department as well as by applying more portions of green materials into construction works.

- * **Project Status :** Currently KEC practices several green materials and construction methods to make them more practical and feasible such as GGBFS (ground granulated blast furnace slag), GFRP (glass fiber reinforced polymer), and warm mix asphalt.



In addition to this, various recyclable materials are being studied and tested.



Renewable Energy: Photovoltaics (since 2000s)

Objectives: By installing a solar panel on road structures such as sound barrier and road roof, also on idle land adjacent to expressway, KEC contributes to eco-friendly power generation.

* Project Status

There are currently 395 sites of photovoltaics along the expressway in Korea, and the total power generating capacity is up to 183MW.





Renewable Energy: Fuel Cell Plant (since 2012)

Objectives: By providing idle land along expressway for installation of fuel cell plant, KEC contributes to low carbon power generation.

* **Project Status:** Three on-going projects in Korea (total 48 MW), another 4 are being considered.





Promoting Green Transportation: EV and H₂ Stations

Objectives: By installing EV and H₂ charging stations along the expressway (rest or service area), KEC contributes to those vehicles' long distance travel and convenience ultimately aiming at fast market transformation from gas to electricity.

* Project Status

KEC has installed EV charging stations 100% of its service areas (total 199).
Meanwhile, H₂ charging stations are installed at 54 service areas so far.





Q&A and Discussion

- Any question on the presentation?
- Is there an opportunity to begin a project that is related to KEC's green projects in countries of WB's governance?
- KEC is looking for a chance to send a secondee (a transportation expert) in the office of WB to better cooperate with WB. Both HQ and the regional office in Asia are good for sending.

FYI, KEC sends now its employees as secondees to several MDBs such as IDB (HQ), ADB (HQ), and AfDB (HQ).