

Towards Safe, Sustainable and Smart Highways

Datuk Nik Airina Nik Jaffar

Managing Director, PLUS Malaysia Berhad (PMB)

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Managing Director of PLUS





Datuk Nik Airina Nik Jaffar Managing Director, PLUS Malaysia

- More than 30 years of experience in the project development as well as concession, project & asset management in both Malaysia and internationally.
- Currently the Managing Director of PLUS Malaysia Berhad, the largest toll expressway operator in Malaysia and one of the largest in Southeast Asia, while serving on the Boards of the Construction Industry Development Board (CIDB) and Universiti Teknologi MARA (UITM).
- Developed, implemented & managed major infrastructure projects in Malaysia and internationally, including the North-South Expressway (NSE), LRT Extension, Pan Borneo Sabah, Cikopo-Palimanan Toll Road (Indonesia) and Manila-Cavite Expressway (Philippines).
- Past leadership roles include Managing Director of Opus Group Berhad, Group Chief Business Development Officer of UEM Group Berhad and Managing Director of UEM Builders Berhad.
- Active involvement in industry associations & institutions and previously serves as the Vice Chairman of CIHT Malaysia and Council Member of the Road Engineering Association of Asia & Australasia as well as the Road Engineering Association of Malaysia.

Our Operational Footprint

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CONFERENCE ON 2024 SIA ROAD SAFETY 2024 "Safer Journey, Sustainable Future" 4 SEPTEMBER CONFERMATION CENTRE (PAC)

Introduction to PLUS Malaysia Berhad

- **PLUS** is **Malaysia's largest highway operator**, covering over **1,130 km of highway network**, transversing across 7 states in Malaysia.
- Since the development of the highway, PLUS has been playing a **catalytic role for the socioeconomic development of towns and cities** across its operational footprint.
- Today, PLUS is recognised as the **nation's road transportation backbone**, serving more than **1.8 million daily highway customers**, ensuring the **safe transportation of people**, goods and services.

Our Highways North-South Expressway (NSE) Penang Bridge (PB) 1 New Klang Valley Expressway (NKVE) North-South Expressway Central Link (ELITE) 2 Seremban-Port Dickson Highway (SPDH) Butterworth-Kulim Expressway (BKE) 3 Malaysia-Singapore Second Crossing (Linkedua) 8 Kuala Terengganu – Jabor (LPT2) **Our Corporate Structure** Khazanah Nasional Berhad **Employees Provident Fund Board** 100% 49% 51% **UEM Group Berhad** Cours ED City 100% (\mathbf{X}) Projek Lebuhraya Usahasama Berhad Teras Teknologi Sdn Bhd Lebuhraya Pantai Timur 2 Sdn Bhd Teras Control Systems Sdn Bhd* ٠ Terra Plus Sdn Bhd Zoom Interactive Sdn Bhd ٠ •







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Our Sustainability Framework

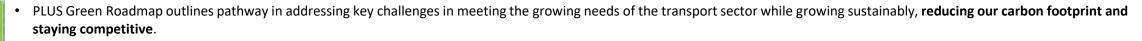


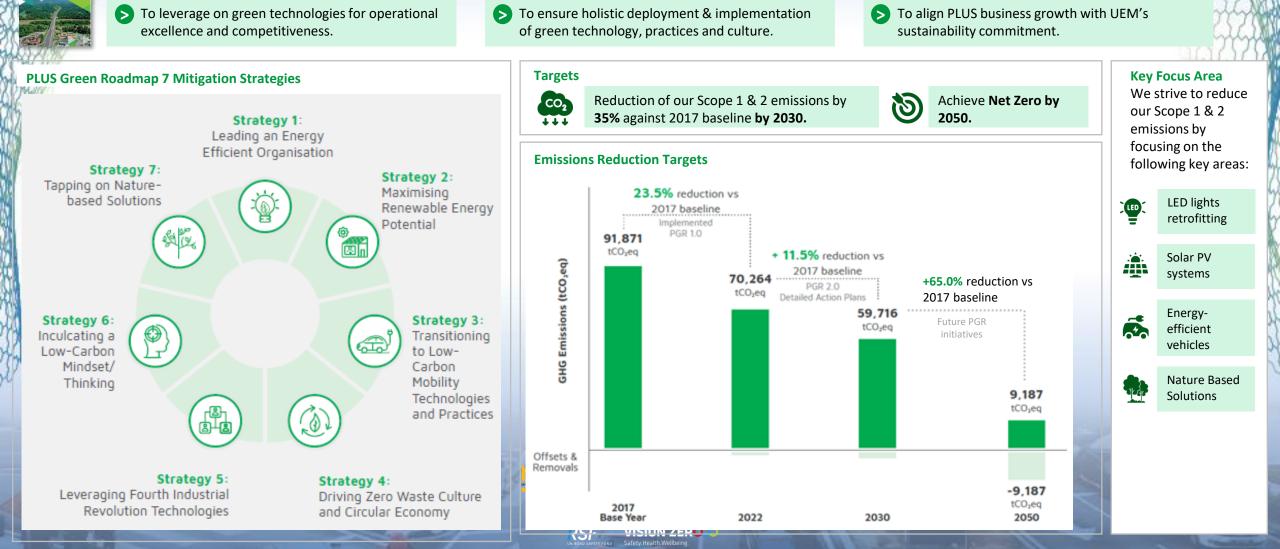
Communication & Awareness

Our Green Roadmap, as a guidance to charting a sustainable future



PLUS Green Roadmap







Supporting the Nation's Transition to Low Carbon Mobility

We are taking proactive measures in our journey towards Net Zero through generating renewable energy & optimizing our electricity consumption through the following initiatives:

Harnessing Renewable Energy using Solar PV System

Solar Panel PV Systems

8 locations including our headquarters, Rest Service Areas (R&R) and Overhead Bridge Restaurants (OBRs), with a plan to extend to more locations in the coming years.



Persada PLUS



R&R Machap Northbound



R&R Dengkil Northbound



Energy Efficient Practices

Retrofitting LED Lights 🤣 Retrofitting of **37,000+ LED** lights across our operations, with an additional of 8,000+ LED lights in the next 2 years.



Installing Motion Sensor Lighting 🤡 Installation of sensors at our headquarters to prevent lights from being left on unnecessarily.



R&R G. Semanggol Southbound

OBR Sungai Buloh



R&R Gurun Northbound



R&R Dengkil Southbound



OBR Ayer Keroh

Our solar PV systems generated 2.5 million kWh of energy, reducing 1,742 tCO2eq annually which is the same amount of energy needed to charge ~200mil smartphones.









Solar Panel System on Covered Carpark To construct a solar panel-covered carpark at our headquarters in progressing towards a Net Zero Energy Building status.

Solarised Streetlighting

Installing solarized streetlights at the Putrajaya Link, with similar scope embedded into the on-going LED retrofitting project.

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Accelerating the Transition to Low-Carbon Lifestyle



Expanding the EV Charging Station Network Across Our Highways

We continue to support national effort to accelerate the national EV adoption rate through our in-house **EVCS Development Roadmap** to install **100 DCFC charging points** along our highways by 2025.







Layby Pedas Linggi NB

Layby Juru SB

R&R Skudai SB

Facilitating the Roll Out of Innovative EV Charging Solutions



Modular EV chargers, enabling commercial power banks to be mobilized at low utilization areas



Solar-powered EV chargers from existing grid-powered modules



EV charging stations for heavy vehicles

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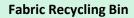




- Seremban R&R SB will enrich the overall travel experience of approximately 3,600+ visitors daily, an avenue for approximately 1.3mil Malaysians annually to partake in our sustainability journey by embracing sustainable practices through touchpoints at our facilities.
- The rejuvenated R&R Seremban SB offers stalls/ kiosks/ retail space, providing business opportunities to 39 individuals and enterprises whereby 70% are from local communities residing within 30km from our highway. This aims at improving the socioeconomic status of Malaysian entrepreneurs.

Features of R&R Seremban SB









Circular Economy – Developing Malaysia's First Sustainable R&R

3R Bins





Return-to-Me (RTM) Stations





Biodegradable Foodware

Experiential Learning Area



Waste Composting Machine



Self-Healing Concrete

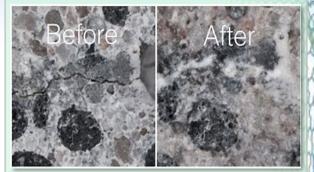


Illustration of the 'self-healing' properties in concrete.

- Researchers from MIT found that the ancient Roman's concrete chemically repairs any cracks or pores.
- The presence of lime clasts result in a reaction with moisture that seeps through any cracks or pores, which crystalizes to exhibit the 'self-healing' property.
- Self-healing concrete enhances asset longevity & maintains its structural integrity over a long period of time. > This optimizes repair works which in turn reduces emissions from maintenancerelated activities.

Highway Sustainability Practices From Around the World



World's first bamboo crash barrier in India.

- The world's first 200-meter bamboo crash barrier on the Vani-Warora highway in Maharashtra, India.
- The bamboo barrier, coated with recycled High-Density Polyethylene (HDPE), has gone through rigor testing and received accreditation by the Indian Road Congress.
- Study showed bamboo guardrails to be \mathbf{S} safer than steel guardrails as it exhibits better impact absorption capabilities.
- Bamboo is favourably economical and an environmentally friendly material.



Onetai Bridge, NZ on state highway 26.

- Onetai Bridge is the first state highway bridge in NZ to return to a more sustainable design by using timber beams & deck.
- An engineered timber product called glulam is made up of responsibly sourced pine wood, with a negative carbon footprint during its production phase.
- Glulam is **2x stronger** than steel (per kg), \mathbf{S} strengthening the structural integrity of bridges.
- > It requires **minimum maintenance** and hence minimizes emissions throughout its life cycle.

Hydrogen-Powered Machineries



Illustration of a hydrogen-powered excavator.

- National Highways aims to procure over 6 million kgs of hydrogen for its Lower Thames Crossing project, replacing 20 million liters of **diesel**.
- This will be UK's first large-scale use of hydrogen to power its major construction vehicles (e.g. excavators, dump trucks).
- S Hydrogen-based engines are **cleaner** and quieter, creating a more pleasant working environment for operators.
- Retrofitted diesel engine enables the use of hydrogen-diesel mix which can reduce CO2 emissions by ~85%.

Safety Benefits S Environment Benefits Legend

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Road Safety – Providing Safe & Reliable Roads for All

Safety is our top priority and strive to ensure the safety of our 1.8 million daily highway customers.

Our road safety initiatives aim at supporting Malaysia Road Safety Plan 2022-2030, which seek to achieve the national aspiration of 50% reduction in road accident fatality by 2030.

Robust Safety Framework

We adopt the 3E (Engineering, Education & Enforcement) road safety framework, which extends to Warga PLUS, business partners and fence line communities along our highways.



Advocacy Through Community Based Programs (CBP)

We collaborate with our safety partners (i.e. MIROS, PDRM, JPJ) to **spread awareness** and **share information** to public audiences, especially to the younger generations to inculcate **road safety culture** at an early age.





10 CBP events were organized in 2024 across our operational footprint, covering more than 2,000 participants.

Adoption of Comprehensive Safety Standards

We work closely with the Malaysian Institute of Road Safety Research (MIROS) to deploy **infrastructure enhancements** & **upgrading** under the Malaysia Road Assessment Program (MyRAP).



MyRAP is an adaptation of a global safety framework which adoption across 72 countries have **prevented** ~700k deaths & injuries.



Collaboration with Authorities to Strengthen Enforcement

We recognize the importance of **close collaboration** with key **enforcement agencies** (i.e. PDRM & JPJ) to ensure the safety of our highway customers.



Deployment of Safety Vehicles & Truck-Mounted Attenuator

Our safety vehicles and Truck-Mounted Attenuator aid in traffic regulation, **isolating** specific areas of the highway for hazard clearing and execution of maintenance activities **safely**.



24-hours Surveillance via Traffic Monitoring Centre (TMC)

Our TMC plays a vital role as the traffic management hub, monitoring the safety & wellbeing of highway customers 24hours a day and hosts the call centre for our customer care line.





Our TMC personnel manages 1,000+ to 2,000+ customer calls per day.

Occupational Health & Safety – Creating a Conducive Highway Ecosystem For All



- The National Occupational Accident and Disease Statistics recorded 34,216 occupational injury cases in 2022, with 312 fatal cases.
- Hence, we need to intensify health & safety programs. PLUS is committed to share our best practices & learning from our HSSE journey to
 elevate health & safety within the industry & ecosystem.

Robust Framework

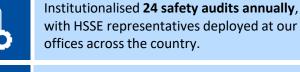
PLUS has a robust health & safety programmes which anchors to our 6C Model for Health, Safety, Security & Environment (HSSE) based on international & local best practices:



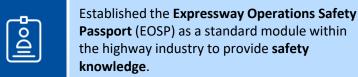
Key Initiatives







concept.







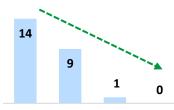
Internalised a holistic wellbeing culture to

promote balance & overall fulfillment,

leveraging on a gamification and reward



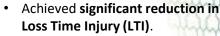
Impact



FY 2020 FY 2021 FY 2022 FY 2023







The last LTI was recorded in Jan 2022 with **724 days zero LTI** as of 31 Dec 2023, indicating **ongoing commitment** for **Goal Zero LTI**.





International Road Safety Practices

The following are several international practices that are being implemented to enhance road safety:



- National Highways deployed a pilot project to utilize ECRU in consolidating 3 separate vehicles into 1 in responding to incidences.
- The ECRU transports all relevant front-line response unit personnel whilst carrying a greater variety of tools needed to carry out repairs and cleaning debris. This facilitates a safer, faster and more efficient accident clearance.
- Improve the journey times of incident respondents for on-site deployment during emergencies and crisis.
- Accelerate asset inspection and defect repairs, avoiding prolonged traffic congestions.

Variable Speed Limits (VSL)



- The US Federal Highway Administration deploys VSLs, using traffic condition data to vary speed limits.
- This provides ample time for highway users to reduce their driving speed in anticipation of congestion, incidents, work zones and adverse weather conditions.
- Strengthen highway safety by minimizing speed variances between different stretches of the road.
- Provide timely information of slowdowns and potential lane closures, reducing secondary crashes.

Sensor Technology Integration



- Transurban conducts **self-driving truck trials** on its highways in Melbourne.
- They leverage on sensor technology to share real-time traffic data to autonomous trucks in expanding their information horizon. This allows the trucks to make safer driving decisions by anticipating traffic conditions ahead.
- Enable **smoother driving** and fuel savings by facilitating trucks to **change lanes seamlessly.**
- Improve traffic flow and safety of other vehicle classes by facilitating efficient operations of heavy vehicles.



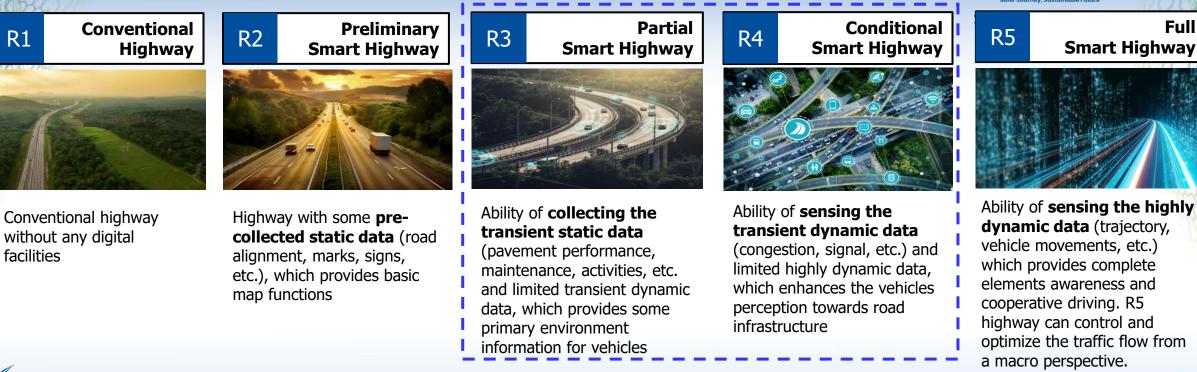
Intelligent Flood Alert System (iDrain)



- National Highways co-developed a low-cost sensor, called iDrain, that is triggered when drainage systems reach critical water levels.
- The detection mechanism allows real-time data gathering to facilitate decisions for deployment of lane closures and activation of necessary traffic diversion.
- Reduce accidents caused from skidding, aquaplaning and loss of control due to excessive surface water on pavement.
- Facilitate the identification of hotspot locations which require reinforced preventive measures.

⁶ Safer Journey, Sustainable Future ⁹

Full



CPLUS JOURNEY

R1

facilities

The journey in being a Smart Highway

From the Hindawi Journal of Advanced Transportation - https://doi.org/10.1155/2021/9445070

1998 - 2002	2008 - 2017	2018	2019	2020	2021 -2024
 Use of TnG and Smartag as ETC Pilot CCTV and VMS for information dissemination 	 100% ETC at Open & Closed System RFID implementation at Open System PLUSMiles Mobile Apps (2014) 	 PLUSRonda Modernization (PRIME) Data Lake Toll Highway Operational Revolution (THOR) 	 Traffic Monitoring Centre (TMC) Modernization Smart Lanes at NKVE Oversized Vehicle Detection System (OSVD) 	 RFID Implementation at closed system Weight-in-Motion (WIM) & OSVD Automatic Awareness Safety System (AwAS) 	 Unmanned Aerial System (UAS) Automated Highway Asset Defect Detection (AHADD) Automatic License Plate Recognition (ALPR) & RFID validation centre Suicide Attempt Alert System (SAS) Lane Remote Function (LRF) Cashless payment roll out

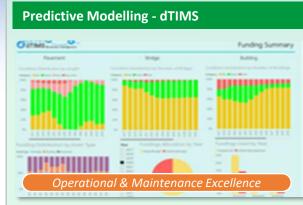
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Pioneering Innovation (1/2)



- Unmanned Aerial Vehicles (UAV) or drones to enhance maintenance efficiency and enable comprehensive checks on our assets.
- We are currently developing the Automatic Highway Asset Defect Detection (AHADD) system to integrate AI and Machine Learning into the existing UAVs.
- Reduced inspection time by 98% for planned maintenance work.
- Enhanced safety of maintenance personnel.

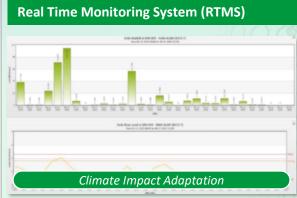


- Strategic asset performance evaluation tools e.g. dTIMS, an application for long term pavement forecasting and strategic planning of pavement works to cater for changing variables(i.e., high traffic volume, climate change & overloaded vehicles)
- This capability integrates all IoTs, intelligent data analytics and modelling for a Total Smart Highway Asset Management System.
- Preserve pavement quality through timely interventions, enhancing the safety of highway users.
- Enhanced resource efficiency and reduced environmental impact through optimized maintenance and planning.

Median Concrete ECO Barrier



- Proof-of-Concept (POC) in using median concrete ECO barrier, an innovative and environmentally friendly precast solution, which incorporates fibre-reinforced green concrete with recycled material.
- The solution meets Test Level 5 (TL-5) of National Cooperative Highway Research Program (NCHRP) Report for high traffic volume highways,



- Data-driven early warning system to detect rainfall threshold especially for Warning and Critical level categories, thus allowing effective communication to relevant parties & early preparation for any climate incident.
- Expanding this capability to other assets and integrating with Asset Management System to facilitate dynamic response.

From the Hindawi Journal of Advanced Transportation - https://doi.org/10.1155/2021/944507

- Strengthened highway **safety at blackspots areas**.
- Prolonged lifespan & strengthened durability of pavement, hence optimizing maintenance requirements.

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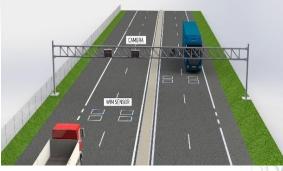
- Utilization of environmentally-conscious materials.
- Enhanced safety of customers, highway workers and the communities living around our highway.
- Strengthened climate impact adaptation measures for operational resilience of our infrastructure and facilities.

Legend S Environment Benefits Safety Benefits

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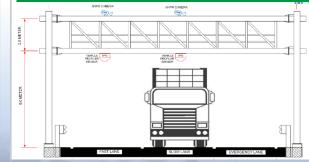


Weight in Motion (WiM)



System able to weigh vehicles while in motion automatically and continuously in real-time to reduce the numbers of overweight vehicle that damages the pavement and jeopardize safety of other highway users.

Oversized Vehicle Detection (OSVD)



An early detection system to mitigate vehicles that exceed permissible height and weight to enter the Menora Tunnel, using laser scanners and Automated License Plate Reader (ALPR) cameras to identify non-compliant vehicles.

Pioneering Innovation (2/2)

Suicide Attempt Alert System (SAS)

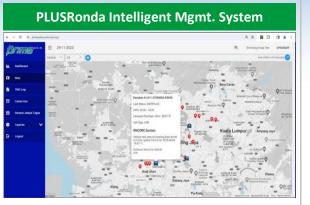


Detects human movements along the laybys along Penang Bridge and **activate emergency response to relevant authorities** for rescue intervention. Al surveillance and monitoring with 3 levels detection at 6 hotspots locations.

AI Defect Detection System (AIRADAR)



Auto-detect pavement defects along our highways, leveraging on the daily patrolling routine, maximizes maintenance inspection efficiency.



Real-Time Data for Response and Reporting to enhance response time to customers needing assistance using technology.

Automatic License Plate Recognition (ALPR)

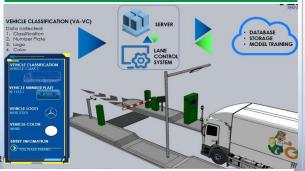


Capturing vehicle license plate, providing validation and facilitating entry-exit matching to complement RFID technology. Future-proof and supports the realization of Multi Lane Fast Flow (MLFF).

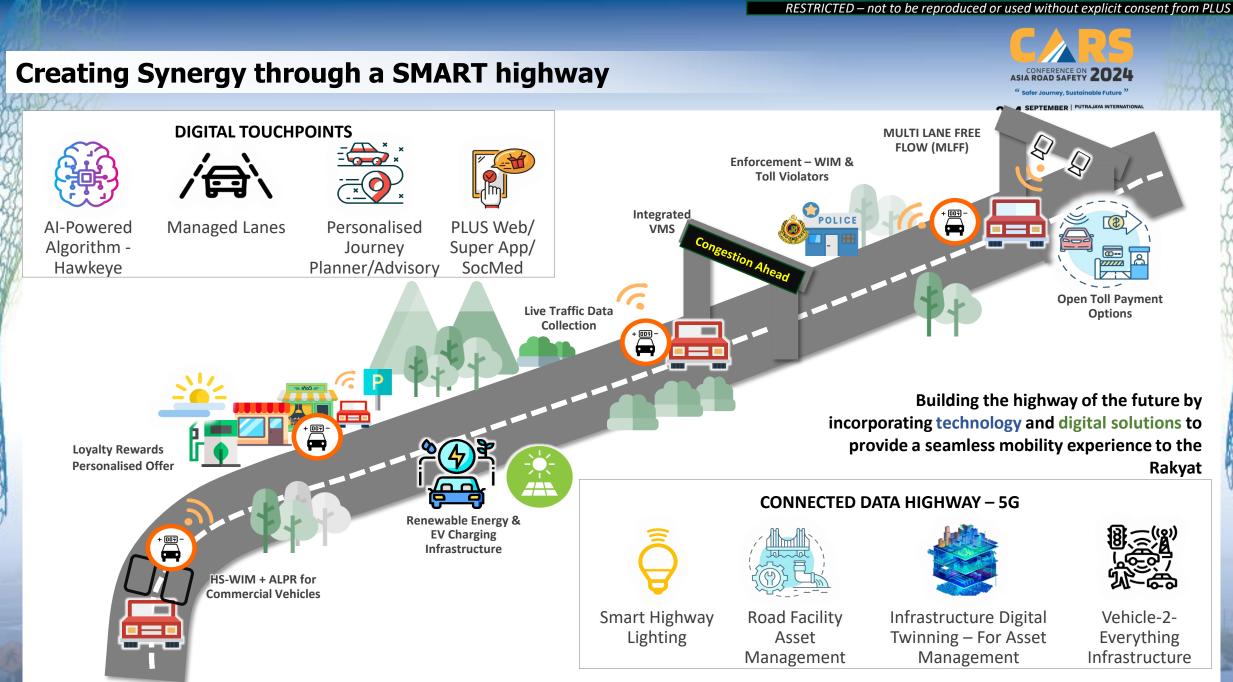


Interactive mapping application, (covering 1,000km area) integrated with PLUS asset information, analytics and simulation for risk and traffic management whilst supporting asset maintenance strategy.

Video Analytics, Vehicle Classification



Leveraging Artificial Intelligence (AI) and Machine Learning (ML) to capture, identify and classify various vehicle classes. To enhance the safety of Customer Service Assistants (CSA) working at lanes.



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Smart

Shaping a Safe, Sustainable and Smart Future

As leaders, we play a critical role in shaping the future of our society, recognising the concerted efforts we have to take together. I invite all of us to collaborate and create a future that is safe, sustainable and smart.

Sustainable

(KoZ)

Let's commit to conduct our business and operations in an environmentally conscious and socially responsible manner, while upholding good governance Let's drive operational excellence and leverage on cutting-edge technology to enhance the safety of our road users. Let's build a seamless travel experience for all through innovation and the integration of technology.





THANK YOU

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