GSTIKC

中国国际可持续交通创新和知识中心

GLOBAL SUSTAINABLE TRANSPORT
INNOVATION AND KNOWLEDGE CENTER

No.11 Jianguomennei Avenue, Dongcheng District

Beijing, China

Global Sustainable Transport **Best Practices**

——Highlighting Success Stories in Sustainable Transport

Global Sustainable Transport

Innovation and Knowledge Center

Introduction

In an era marked by rapid globalization and increasing environmental awareness, the importance of sustainable transport cannot be overstated. Transport systems are not only vital for economic growth and social development but also play a crucial role in addressing the pressing challenges of climate change, urban congestion, and social equity. The Global Sustainable Transport Best Practices is a testament to the collective efforts of nations, organizations, and individuals around the world to transform our transport systems for the better.

The journey towards sustainable transport began with the First UN Global Sustainable Transport Conference in 2016, hosted by Turkmenistan in Ashgabat, and continued with the Second UN Global Sustainable Transport Conference in 2021, hosted by China in Beijing. These conferences set the stage for a global transformation in transport, emphasizing the need for innovative solutions and collaborative efforts. In December 2023, the UN General Assembly declared 2026 - 2035 as the United Nations Decade of Sustainable Transport, calling for a comprehensive implementation plan to accelerate progress.

The primary objective of this initiative is to promote sustainable transport technology, innovation, and the adoption of best practices globally. The UN General Assembly, in its Resolution 78/148, underscored the importance of integrating science, technology, and innovation into sustainable, multimodal transport systems. By sharing best practices and fostering international cooperation, we aim to enhance transport connectivity and drive transformative change across the sector.

Transport is a cornerstone of the United Nations' Sustainable Development Goals (SDGs) by 2030. The Global Sustainable Transport Best Practices seeks to collect and showcase the best practices from around the world, highlighting achievements in sustainable transport development. These practices cover a broad range of areas, including transport connectivity, digital development, green and low-carbon initiatives, public transportation, and safety and inclusiveness. They provide innovative and replicable policies, projects, initiatives, technologies, mechanisms, and organizational activities that offer valuable insights for global transport development,aligned with sustainable transport values, demonstrating innovation, measurable impact, scalability, and synergy across economic, social, and ecological progress.

As we embark on this journey, we recognize the significance of each contribution. The Global Sustainable Transport Best Practices initiative is not just a collection of case studies; it is a beacon of hope and a roadmap for a sustainable future. We invite all stakeholders—governments, international organizations, NGOs, academia, and the private sector—to join us in this endeavor. Together, we can transform our transport systems and build a world that is more sustainable, equitable, and prosperous for all.

We hope this forward sets the stage for the inspiring stories and innovative solutions that follow in this compilation.

GSTIKC
supported by UN DESA

Forward

Rooted in the UN Charter and guided by the 2030 Agenda for Sustainable Development, the UN Department of Economic and Social Affairs (UN DESA) upholds the UN's development pillar, serves as a pioneer of sustainable development and the home of the Sustainable Development Goals (SDGs), and uses its expertise to support Member States in implementing the 2030 Agenda during multiple crises, building their capacities for a transformative recovery and resilience. It contributes to the realization of international development goals and showcases its role in gauging trends, building capacities, and shaping solutions. With significant challenges in achieving the SDGs, the SDG Summit's political declaration must be turned into actions, bold action must be taken now to create a better more sustainable and inclusive world by 2030.

Sustainable transport systems are crucial for achieving a 2030 agenda for sustainable development and the Paris agreement on climate change. Recognizing this, In 2023, the UN General Assembly declared 2026-2035 as the United Nations Decade of Sustainable Transport, calling for accelerated actions to transform the transport sector and align it with the SDGs.

In this spirit, we welcome the initiative of the Global Sustainable Transport Best Practices launched by the Global Sustainable Transport Innovation and Knowledge Center. We believe that learning from each other and sharing innovative solutions will inject the boost we need to make efficient progress in reaching the SDGs. These best practices serve as a powerful tool to showcase remarkable achievements in global sustainable transport and expand their impact through replication and dissemination.

I call upon all UN member states, international organizations, and relevant stakeholders to actively participate in and support the Global Sustainable Transport Best Practices initiative. By joining forces and contributing to this endeavor, we can collectively drive progress toward the UN Sustainable Development Goals and forge a more sustainable and inclusive future for all.

Li Junhua
Under-Secretary-General for Economic
and Social Affairs

On Global Sustainable Transport Best Practices

" I commend Global Sustainable Transport Best Practices 2025 for offering a clear overview of how sustainable mobility is already greening the sector, while also compiling diverse case studies that will allow us to turn broad aspiration into usable guidance. Grounded in the 2030 Agenda's call for inclusive, low-carbon connectivity and in the General Assembly's newly proclaimed United Nations Decade of Sustainable Transport (2026-2035), the compendium highlights twenty-two initiatives and distills them into a coherent narrative of systems change.

Rather than prescribing a single pathway, the editors show how policy coherence, digital innovation and blended finance can converge to reduce emissions, widen access and create decent jobs. The uniform template: context, solution, achievements, makes cross-comparison effortless, while frequent references to the Paris Agreement and wider COP processes stress that transport transformation is essential to keeping 1.5℃ goal alive.

The report's greatest contribution is catalytic: by translating success stories into replicable lessons, it arms governments, cities and industries with the confidence to act swiftly. As COP30 approaches, I urge stakeholders to closely review this timely report, adapt the insights and scale investment. Delivering the SDGs depends on moving people and goods sustainably, both in China and around the world. "

Siddharth Chatterjee

THE UN Resident Coordinator In China

" As China's Special Envoy for Climate Change and former Under - Secretary - General of the United Nations , I commend this " Collection of Best Practices of Global Sustainable Transport " for its robust representativeness. The cases span diverse geographies and transport modalities, effectively mirroring the global landscape of efforts to achieve the 2030 Sustainable Development Goals (SDGs). They vividly capture the evolving trajectory of sustainable transport—from urban transit innovations to rural mobility solutions—highlighting how inclusive mobility systems underpin climate resilience and equitable development.

This Collection aligns perfectly with the UN's mandate to foster multilateral cooperation for sustainable development. By showcasing tangible examples of policy integration, technological innovation, and community engagement, it provides a vital roadmap for all countries to accelerate progress toward 2030 and beyond. I fully endorse this initiative and encourage its continued advancement as a catalyst for global action."

Zhenmin LIU

Special Envoy for Climate Change Affairs of China

" Green transport stands as a pivotal domain in the global transition toward green and low-carbon development, playing an indispensable role in environmental and climate governance as well as sustainable development. The Global Sustainable Transport Best Practice Cases compiled by the GSTIKC systematically documents cutting-edge innovations in sustainable mobility worldwide, offering vital references for low-carbon development. This initiative embodies the spirit of the Global Development Initiative (GDI), i.e. fostering international cooperation to bridge infrastructure gaps, advancing climate-resilient solutions, and collectively accelerating progress toward shared green development goals.

Knowledge-sharing and experience-exchange are fundamental to achieving global sustainable development goals. This compendium presents 22 rigorously selected cases from five continents, covering aviation, railways, highways, and urban mobility. These cases demonstrate strong regional synergies and offer diverse solutions to drive the green transport transition. The compendium will serve as a critical resource for developing countries in balancing economic growth with environmental protection while advancing green development.

The launch of this report at the UN High-Level Political Forum carries profound significance. It is my hope that this collection will become a key tool to accelerate the global transition in green transport by informing policymakers and practitioners, so as to support the 2030 Agenda for Sustainable Development and the Paris Agreement goals, and contribute wisdom and actionable solutions toward a future of harmony between humanity and nature. "

Yingmin ZHAO

President of BRI International Green Development Coalition (BRIGC) , Former Vice Minister of the Ministry of Ecology and Environment (MEE) of The People's Republic of China

" Transport connects people, powers economies, and shapes the future of our planet. This compilation of Global Sustainable Transport Best Practices comes at a time when evidence-based approaches to sustainability are urgently needed. It brings together practical examples of what is being done and what can be done to make transport systems cleaner, fairer and more efficient.

Much of the work featured in this compilation addresses diverse challenges, including rising freight emissions, unsafe roads, unequal access to public transport, and urban congestion. Climate policy, economic development and social inclusion are interconnected through transport. None of these initiatives stands alone. Each one has been shaped by co-operation across institutions, sectors, and borders.

The ITF contributed two examples to this collection. One draws on the IRTAD platform, which helps countries strengthen road safety policy through harmonised definitions and data. The other comes from our work with emerging economies to develop emissions models and support climate-aligned policy decisions. These cases sit alongside many others that offer valuable lessons in policy design, technical tools, and collaboration.

The ITF will continue supporting this effort by enabling peer learning, facilitating exchanges, and helping countries apply insights to local contexts. There is still much to be done, but we are not starting from zero. This compilation shows that practical progress is already underway and that good practices can travel far when shared."

Young Tae Kim

Secretary-General of the International Transport Forum

" As someone closely engaged with the International Science Council (ISC) and the UN's Intergovernmental Panel on Climate Change(IPCC), I fully recognize the urgent need for global cooperation in addressing climate change. The Global Sustainable Transportation Best Practice Case Collection is a timely and valuable initiative that strongly aligns with the ISC's mission to promote international collaboration for a more sustainable future.

In my research on climate dynamics and global environmental change, I have consistently emphasized the importance of transitioning to sustainable systems. The cases presented in this collection clearly illustrate how innovative transport solutions—such as the widespread adoption of electric vehicles and improvements in public transit—can play a crucial role in reducing greenhouse gas emissions. These examples reflect the kind of systemic transformation that I have long argued is essential for climate change mitigation.

The ISC has consistently advocated for mobilizing the global scientific community and other stakeholders to tackle complex, interconnected challenges. This collection reflects that vision by showcasing successful efforts from around the world. It offers a valuable platform for sharing knowledge, allowing countries to learn from one another and scale up proven approaches. In doing so, it not only supports progress toward the Sustainable Development Goals but also promotes replicable models that enhance climate resilience in the transport sector — an essential contribution to our shared efforts against climate change."

Deliang CHEN

Distinguished Chair Professor Department of Earth System Science Tsinghua University

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Thank you all for your contributions to the 2025 Global Sustainable Transport Best Practices. Together, we are paving the way for a more sustainable and equitable future in transport.

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ESCAP

Accelerating the Transition to Electric Mobility for Public Transport in Asia and the Pacific

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13 CLIMATE ACTION

Location / Global

Period / Since 2021

Overview

- Asia and the Pacific leads in the adoption of electric public transport, yet many countries face barriers to adoption across policy and infrastructure readiness and financing. ESCAP's project supports countries through: Capacity building to strengthen e-mobility policies in 5 countries; implementation of pilot electric bus systems in 4 countries. The Asia-Pacific Initiative on Electric Mobility was also launched by ESCAP to foster regional cooperation and share best practices.

Solutions

ESCAP supports the transition to electric mobility through capacity building, technical assistance, and regional cooperation.

- National Policy Frameworks: Tailored frameworks were developed in Cambodia, Fiji, Georgia, Lao PDR, Nepal, Sri Lanka, and Thailand to define institutional roles, address financing, and guide infrastructure planning.
- National Workshops: 5 workshops brought together key stakeholders to review policy frameworks, align national priorities, and enhance coordination across sectors.
- Knowledge Products: ESCAP launched key publications, including a step-by-step guidebook for Asia-Pacific countries to transition to electric mobility.
- Regional Cooperation: The Asia-Pacific Initiative on Electric Mobility fosters collaboration and knowledge sharing to scale best practices for e-mobility regionally.
- Pilot Projects: ESCAP will operationalize these insights in Phase II through pilot electric bus projects in Lao PDR, the Philippines, Sri Lanka, and Tajikistan.

Major Achievements

- 7 national electric mobility frameworks were developed with Cambodia's approved and Sri Lanka's submitted for Cabinet endorsement. Thailand has further integrated electric mobility into its transport policies, while Fiji ismoving toward a transport decarbonization implementation plan.
- The success of the national policy frameworks and capacity-building efforts demonstrates how the project'smodel can be adapted to different national contexts.
- 100 per cent of participants in workshops in Nepal, Lao PDR, and Thailand reported an increased understanding of electric mobility, leading to further requests for ESCAP's support.
- The Asia-Pacific Initiative on Electric Mobility was endorsed at the 7th Committee on Transport session as avaluable platform for knowledge sharing and collaboration.

ITF

Decarbonizing Transport in Emerging Economies

Location / Global

Period / Since 2019

Overview

- The ITF's Decarbonising Transport in Emerging Economies (DTEE) project, launched in 2019 and funded by Germany's Federal Ministry for the Environment (BMUV), supports Argentina, Azerbaijan, India, and Morocco in aligning transport with climate goals. Through tailored modelling tools, capacity-building, and stakeholder engagement, DTEE enables countries to assess emissions, test policy scenarios, and develop practical, inclusive low-carbon strategies.

Solutions

- Country-specific models were built using detailed transport data to forecast emissions and test decarbonisation scenarios.
- Each country addressed key priorities, freight in Argentina, mobility planning in Azerbaijan, energy transitions in India, and intermodal strategies in Morocco.
- Broad participation ensured policy relevance, institutional buy-in, and alignment with national climate goals.
- Local teams were trained to use the tools independently, supported by regional peer learning and knowledge exchange.

Major Achievements

- **Argentina:** Produced a freight decarbonisation roadmap, now part of the National Action Plan, with an interactive emissions dashboard for policymakers.
- **Azerbaijan:** Developed its first long-term transport emissions forecast, now guiding national strategy and used by the Ministry of Transport.
- **India:** Informed EV, public transport, and fuel policy; tool adopted by NITI Aayog and aligned with national climate goals.
- **Morocco:** Supported freight and urban transport policy, highlighting mode shifts and clean fleets; enabled inter-ministerial climate coordination.
- **Cross-Cutting:** Built modelling capacity, fostered peer learning, and created a scalable model for low-carbon transport planning.

Global Sustainable Transport Best Practice

Safe Accessible Efficient Green Economical Inclusive Resilient

DHL Group

Driving Sustainable Supply Chain Innovation in Green Logistics Revolution

Location / Global

Period / Since 2024

Overview

- DHL is the world's leading logistics company, with about 594,000 employees in more than 220 countries and regions, and revenue of 81.8 billion euros in 2023. DHL set the logistics sector's first climate target in 2007, pledged net-zero emissions by 2050 in 2017. In 2024, DHL established the "2030 Strategy-Accelerating Sustainable Growth" to accelerate sustainable growth as a top green logistics partner and defined the sustainable development strategy for the next six years.

Solutions

- Electrification of logistics and transportation. As of now, DHL has put into operation 35,000 electric delivery and collection vehicles globally, achieving an electrification level of 37.6%.
- Promoting the use of clean energy. DHL aims to increase the proportion of Sustainable Aviation Fuel (SAF) in overall air transport to 30% by 2030.
- Green logistics solutions. DHL has successively launched the GoGreen and GoGreen Plus services to support the sustainable development goal of "achieving net-zero carbon emissions by 2050."

Major Achievements

- As of 2023, DHL has 123,400 vehicles globally, of which 36,200 are electric vehicles; 25,000 bicycles, including 14,000 electric tricycles and 5,500 electric bicycles.
- Currently, DHL Express has established cargo flights using SAF in San Francisco, East Midlands, Amsterdam, and Malpensa.
- Optimizing green logistics services. As of March 2024, over 30,000 corporate customers in the DHL Express China region have adopted the GoGreen Plus service.

MoT, Brazil

Enhancing the Resilience of Transportation Infrastructure to Climate Change in Brazil

Location / Brazil

Period / Since 2014

Overview

- The AdaptaVias Project is a partnership between Brazil's Ministry of Transport and the German international cooperation agency GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). The project's aim is to assess the impacts and risks of climate change on Brazil's federal terrestrial transport infrastructure, encompassing both existing and planned highways and railways. This initiative seeks to provide a solid foundation for the development of adaptation strategies in the sector.

Solutions

- The AdaptaVias Project aims to conduct a survey of the impacts and risks of climate change on the existing and planned Brazil land transport infrastructure (roads and railways) to provide grants for decision-making to adapt to the impacts caused by climate change.
- Risk is defined as the potential for consequences, where something of value is at stake and where the outcome is uncertain. The risk of climate-related impacts results from the interaction between the risk components: climate threat, exposure and vulnerability (sensitivity and adaptive capacity) and impact.

Major Achievements

The AdaptaVias Project has driven significant progress in climate resilience for Brazil's transport infrastructure, resulting in important regulatory milestones and technical tools.

Highlights include:

- Unprecedented Data: Release of data on climate risks for over 100,000 km of federal highways and railways, identifying vulnerabilities such as flooding and landslides, on the AdaptaBrasil platform, in collaboration with the Ministry of Science, Technology, and Innovation (MCTI).

Public Policies:

- Ordinance No. 622 (June 28, 2024): Guidelines for resource allocation in highway concessions, mandating a percentage of revenue to be directed towards resilient infrastructure projects.
- Ordinance No. 689 (July 17, 2024): Criteria for priority projects and issuance of incentivized debentures for climate adaptation.
- Ordinance No. 64 (January 23, 2025): Institutionalization of the PRO-AdaptaVias Program, promoting innovation and partnerships for infrastructure adaptation.
- Resolution No. 6,057 National Land Transport Agency (ANTT) (November 28, 2024): Sustainability Program for Regulated Highway and Railway Infrastructure, focusing on adaptation to extreme weather events.

The PRO-AdaptaVias Program encompasses areas such as planning adaptation measures, economic incentives, social communication, and technology development, featuring the SIM-ADAPTAVIAS tool for risk analysis.

Global Sustainable Transport
Best Practice

Safe Accessible Efficient Green Economical Inclusive Resilient

CEEC

Expressway's Green Energy Integration Project in China

Location / Shandong, China

Period / Long Period

Overview

- Shandong Province, on China's eastern coast, comprises a peninsula and inland area with varied topography under a warm temperate monsoon climate. The project follows the concept of "four networks integration" of energy networks, transportation networks, digital networks, and industrial networks, and implements the integrated source-grid-load-storage, intelligent vehicle-road-energy-cloud integration, green energy use in transportation, and industrial clustering of transportation and energy.

Solutions

- Integrated source-grid-load-storage construction. The project integrates a 130-kilometer photovoltaic power generation system, a regional microgrid, large-capacity energy storage facilities, and smart electricity equipment.
- Intelligent vehicle-road-energy-cloud integration.
- Green energy use in transportation.The project adopts a wind-solar-storage complementary model, utilizing photovoltaic power generation across various scenarios.
- Industrial clustering of transportation and energy.

Major Achievements

- As of the end of July 2024, the first phase of the project in the Jinxiang section generated 27 million kWh of clean electricity, yielding direct economic benefits of approximately 11 million yuan.
- The project is expected to generate an average of 24.37 million kWh annually, saving 7,444 tons of standard coal and reducing carbon dioxide emissions by approximately 20,200 tons per year.
- Apply advanced demonstration technologies, including photovoltaic mirror self-cleaning systems, automated cleaning systems for dust accumulation on photovoltaic panels etc.

ITDP

Fostering Green Mobility in Cycle Revolution

Location / Copenhagen

Period / Since 2011

Overview

- Copenhagen is the capital of the Kingdom of Denmark and the political, economic, cultural and transportation center of Denmark. The roads in the center of Copenhagen are narrow, and for many years, motor vehicles have occupied a large amount of land. To solve this problem, the Copenhagen government realizes the need for a protracted war by expanding the bicycle network and public transportation, while restricting and reducing motor vehicles.

Solutions

- Formulate development plans and policies for bicycles. Since 1980s, Copenhagen has formulated a series of plans and policies for the development of bicycles.
- Bolster bicycle infrastructure. Promote the construction of bicycle lanes, optimize the traffic signal system, build cycle superhighways to improve the convenience and safety of cycling.
- Construct bike transfer network. Integrate bicycles with various modes of public transportation to allow cyclists to carry bicycles on public transportation.

Major Achievements

- Copenhagen continuously construct and optimize bike infrastructure.
- The construction and maintenance of bicycle networks are more cost-effective than highways or subways.
- Cycling reduces dependence on cars, reduces traffic congestion, lowers urban carbon emissions, and contributes to achieving sustainable development goals.
- Cycling is beneficial for physical health. According to research, following Denmark's bicycle usage patterns globally may ultimately prevent approximately 620000 deaths due to obesity.
- More bicycle travel has stimulated employment and economic opportunities.

Global Sustainable Transport
Best Practice

Safe Accessible Efficient Green Economical Inclusive Resilient

ITF

Harnessing Data-Driven Solutions for Global Road Safety and Sustainable Transport

Location / Global

Period / Since 1988

Overview

- The International Traffic Safety Data and Analysis Group (IRTAD) of the International Transport Forum (ITF) supports global road safety by collecting, harmonising, and analysing crash data. With over 80 members from more than 40 countries, it promotes evidence-based policymaking, enabling countries to develop targeted strategies to reduce traffic deaths and injuries worldwide, supporting capacity building through workshops and inspires regional observatories.

Solutions

- IRTAD collects, harmonises, and analyses road safety data from over 40 countries, enabling consistent cross-country comparisons and long-term trend analysis.
- It builds capacity through expert meetings, workshops, and training, promoting knowledge exchange and international collaboration.
- IRTAD provides policy support through detailed reports and evidence-based recommendations to inform effective safety strategies.

Major Achievements

- Over the past two decades, IRTAD member countries have reduced road fatalities by approximately 40%, with some achieving reductions of over 60%, resulting in significant socio-economic benefits.
- IRTAD's adaptable model has been implemented in various regions, including Africa and Latin America, proving effective across diverse contexts.
- IRTAD's annual reports provide vital data, trends, and policy insights, supporting transparency, accountability, and ongoing road safety improvements.

C40 Cities

Leveraging Green Shipping Corridors to Decarbonize Shipping

Location / Shanghai, Los Angeles and Long Beach

Period / Since 2022

Overview

- Green Shipping Corridors (GSC) can act as catalysts for shipping decarbonization by testing innovative collaboration models and helping scale zero emission ships and update of zero emission fuels.The Los Angeles-Long Beach-Shanghai GSC was launched on January 2022 and focuses on one of the world's busiest container shipping routes.Its 2023 plan aims to deploy low/zero-emission ships by 2025 and zero-emission container ships by 2030, using shore power and clean fuels to cut emissions.

Solutions

- Effective governance can accelerate the impact of GSCs, providing a model for international collaboration on other climate challenges.
- Defining a clear vision and strategy for the project. GSCs involve diverse stakeholders and need alignment on the expected impact.
- Establishing a collaborative governance structure that facilitates efficient decision-making. GSCs need a clear governance structure to ensure effective decision-making and define roles and responsibilities.
- Prioritizing stakeholder engagement. Stakeholder engagement is essential to set GSCs up for success in the complex Ports & shipping ecosystem.

Major Achievements

- In October 2024, the Los Angeles-Long Beach-Shanghai GSC published its first Annual Progress Report, highlighting the significant progress made by the Partnership.
- GSCs are expected to demonstrate that green shipping can be economically viable, working on engaging all necessary value chain actors, and provide certainty for investments in zero-emission infrastructure.
- On a greater scale, maritime decarbonization could create up to 4 million new jobs by 2050, particularly in the Global South and green shipping corridors are key to facilitating this transition.

Beijing Municipal CoT, China

MaaS Leading the Upgrade of Transportation Service Models

Location / Beijing, China

Period / Since 2019

Overview

- In November 2019, Beijing launched the country's first integrated green travel service platform (referred to as "Beijing MaaS"), which is currently in its 2.0 development phase. The Beijing MaaS employs a "public-private partnership" model, opening and sharing public transport data to integrate multiple modes of transport, including walking, cycling, ground buses, rail transit, parking, private car use, taxis, trains, and aviation.

Solutions

- Establish a positive development ecosystem through public-private collaboration. Create a model characterized by "government guidance, industry support, and internet reach".
- Aggregate and share data to build a solid data foundation.
- Provide precise and efficient services to attract the public to choose green travel. Leverage the platform to offer the public integrated transport service.
- Provide carbon-inclusive incentives to support green and sustainable development.

Major Achievements

- As of now, the Beijing MaaS platform has accumulated over 30 million users, with an average of more than 5.5 million users opting for green travel services daily. The number of registered users for the MaaS carbon-inclusive initiative has surpassed 5.3 million, with a cumulative carbon reduction of nearly 780,000 tons and over 270,000 tons of carbon reduction successfully traded.
- Care for vulnerable groups to improve the inclusiveness of transport.

MoT, Singapore

Multi-Fuel Bunkering and Maritime Decarbonization in Singapore

Location / Singapore

Period / Since 2023

Overview

- A major challenge in maritime decarbonization is shifting from fossil bunker fuels to zero/near-zero carbon alternatives. Aligned with global sustainability goals, Singapore supports the industry's energy transition by preparing for a multi-fuel bunkering future. This involves ensuring safe new fuel handling, conducting alternative fuel bunkering operations to inform operational/safety procedures, and developing a robust regulatory environment.

Solutions and Achievementsd

- Singapore's MPA developed a B50 biofuel standard, plans B100 by 2025, and requires new harbor craft from 2030 to be electric, B100-compatible, or net-zero fuel-ready.The Pampoen Nek project is funded through the National Treasury's annual budget.
- Singapore's MPA and EnterpriseSG are developing 2025 methanol bunkering standards, facilitated key bunkering operations (Laura Maersk in 2023, SIMOPS in 2024), established safety zones with drone monitoring, and launched a regulatory framework attracting over 1 MTPA supply proposals for commercial-scale methanol bunkering.
- Singapore's MPA and EnterpriseSG are developing 2025 ammonia bunkering standards, conducted 2024 trials on the Fortescue Green Pioneer with hazard studies, and partnered with EMA on EOI/RFP for ammonia supply chain and regulatory solutions.
- MPA set up METF to train 10,000 seafarers by the 2030s, aligned with MJTTF's decarbonization framework, and SMA offers an Asia-Pacific first methanol fuel handling course with operational, safety, and firefighting training.
- Singapore shares insights from methanol and ammonia trials at IMO, presenting at CCC, MEPC, and MSC meetings, and submitting papers on interim ammonia guidelines and safety frameworks for alternative fuel ships.

Global Sustainable Transport
Best Practice

Safe Accessible Efficient Green Economical Inclusive Resilient

IMO

Optimizing Tugboat Operations for Emissions Reduction

Location / Malaysia

Period / Since 2024

Overview

- The project focuses on optimizing tugboat operations at a major container port in Malaysia to reduce greenhouse gas (GHG) emissions. The project aims to enhance operational efficiency and align with the port's sustainability goals. The GreenVoyage2050 Programme, in collaboration with the Malaysian government, has provided technical support through data analysis, workshops, and stakeholder engagement to ensure the effective implementation of low-carbon practices within port operations.

Solutions

- Data-Driven Baseline Assessment: A comprehensive assessment of tugboat fuel consumption and operational efficiency was conducted to establish a baseline for emissions and identify areas for improvement.
- Kaizen Workshop for Continuous Improvement: A Kaizen-style workshop was held, involving multiple port stakeholders, to identify actionable solutions. This collaborative approach fostered continuous, incremental improvements in tugboat operations.
- Quick Wins and Long-Term Strategies: Immediate improvements, such as optimizing scheduling through digital platforms, were implemented within two weeks. Mid- and long-term strategies are in place for optimizing fleet utilization and planning future infrastructure needs.
- Stakeholder Collaboration: Key stakeholders, including tugboat operators, port managers, and external partners, collaborated to improve the efficiency of tugboat operations and reduce emissions.

Major Achievements

- Emissions Reduction: The project identified quick wins that have already been implemented, leading to measurable reductions in fuel consumption and GHG emissions.
- Efficiency Gains: The port is set to achieve long-term efficiency improvements by optimizing the coordination of tugboat usage and integrating best practices across its fleet.
- Collaborative Success: By fostering collaboration among stakeholders, the project has enhanced the port's operational transparency, resulting in improved decision-making and increased awareness of sustainability goals.
- Scalability and Replicability: The solutions identified in the project have the potential for replication at other ports around the world, offering a model for reducing emissions through operational optimization.

Airbus

Pioneering SAF Initiative in China

Location / Tianjin, China

Period / Since 2022

Overview

- China's world-second civil aviation market grows rapidly but needs carbon reduction. Airbus has implemented the regular use of SAF for test flights and customer delivery flights at its Tianjin Final Assembly Line since October 2022. This initiative aligns with Airbus'commitment to sustainable development in China and contributes to the clean transformation of the aerospace industry, supporting the company's achievement of Scope 1 and Scope 3 targets under the SBTi.

Solutions

- Purchase SAF with RSB certification.The SAF fuel is certified by the Roundtable on Sustainable Biomaterials (RSB) .
- Obtained RSB sustainability certification. Ensure that every step in the SAF supply chain complies with sustainability principles and standards.
- Physical segregation for refueling. Achieve regular use of SAF in Tianjin through physical segregation and plans to complete a system upgrade by the end of 2024.

Major Achievements

- From the first delivery to the end of 2023, SAF was used for 36 test flights and 62 delivery flights (including 48 A320s and 14 A350s).
- Airbus promotes the use of sustainable fuel in its Tianjin factory, driving the localized production of SAF tailored to the Chinese market.
- Airbus Tianjin's pioneering use of SAF provides a unique "China model" for the global aviation industry's green transition.

UPU, UNEP SIP, Pos Malaysia

Post Greening First and Last Mile Delivery Infrastructure in Malaysia

Location / Malaysia

Period / Since 2017

Overview

- In Malaysia, the rapid growth of e-commerce has significantly reshaped the logistics sector, leading to a substantial increase in parcel deliveries, especially domestic parcels. The rise in home deliveries raises concerns about road congestion, air pollution and the associated environmental impact. To meet the increasing demands, Malaysia has been at the forefront of integrating sustainable practices into its logistics and e-commerce infrastructure.

Solutions

- Prioritizing environmentally sustainable solutions. Malaysia's urban development strategies increasingly focus on sustainability to ensure livable, resilient and inclusive cities, including sustainable urban transportation and green mobility infrastructure.
- Integrated approaches to green the first and last-mile delivery. By introducing electric vehicle installing solar photovoltaic (PV) technology at its facilities, and implementing telematics across its vehicle fleet, Pos Malaysia is making the first and last mile delivery green.

Major Achievements

- Creating job opportunities. This modernization and expansion of logistics infrastructure has a benefit of creating new job opportunities in the sector.
- Stimulate local businesses. The use of electric vehicles and solar panels can stimulate local businesses by requiring local suppliers and service providers, thereby supporting the local economy.
- Reduce carbon emission. Pos Malaysia is on track to achieve 100% fleet electrification by 2030 and has already reduced emissions by 9.96%, with a 16.79% reduction in its post and parcel segment. The company is also equipping over 400 facilities with solar photovoltaic (PV) technology to strengthen its renewable energy commitment.

C40 Cities

Paris 2024 Olympics Green Transport Legacy and the Path to Sustainable Urban Mobility

Location / Paris, France

Period / 2021-2024

Overview

- The Greater Paris area features a rail transit system—including RER, metro, and trams—meeting regional mobility needs.The Paris Metro, which began operation in 1900, is one of the earliest metro systems in the world. It currently has 16 lines stretching over 211 kilometers, with 305 stations and an average station distance of just 695 meters. The metro's high density, short distances between stations, and frequent service make it the primary mode of public transportation in the Greater Paris area.

Solutions

- Improving Public Transportation Infrastructure. Ensure that all venues are accessible.
- Promoting Bicycle Infrastructure Development. Optimized its bicycle routes, allocate shared bicycles and e-bikes.
- Digital Technology Enhancing Convenient Travel. Develop website to help plan trip, predict potential congestion levels and receive alerts.
- Providing Services for Individuals with Mobility Challenges.Provide accessible taxis. All stations serving Olympic venues are 100% wheelchair accessible and barrier free.

Major Achievements

- 94% of passengers are satisfied with the metro.
- The newly constructed bicycle routes become an important legacy, continuing to serve local, sustainable tourism and transportation transformation.
- Research indicates that the operation, renewal, and expansion of the public transport network in 2023 directly created over 120,000 jobs, with a market scale of €15 billion.

Global Sustainable Transport
Best Practice

Safe Accessible Efficient Green Economical Inclusive Resilient

PIARC (WRA)

Road Network Development and Infrastructure Projects in South Africa

Location / South Africa

Period / Since 2017

Overview

- A new Gauteng-North West link through the Magaliesburg Mountains cuts travel distance by 9.5 km. This initiative is part of a phased strategy to enhance connectivity between major economic zones within South Africa and to integrate with an international corridor linking to Botswana via the N4 National Road. The N4 Bakwena Platinum Corridor Concession (BPCC), operational since 2002, has significantly improved the efficiency, safety, and cost-effectiveness of transport between the two countries.

Solutions

- The N4 BPCC corridor utilizes a PPP model with user-pay toll plazas and a boom-down collection system.
- The Pampoen Nek project is funded through the National Treasury's annual budget.
- The R512 project is a non-toll-funded initiative managed by SANRAL, with funding secured based on a 3-5 year plan contingent on demonstrated efficiency.

Major Achievements

- The project effectively managed complex environmental challenges, including extensive mountain cutting, through strong collaboration among clients, consultants, and contractors, minimizing potential losses.
- It engaged local communities by providing employment opportunities and supporting small business development, enhancing local economic prospects.
- Community members gained valuable experience guided by contractors, contributing to the project's success and fostering long-term local capacity.

Zhejiang Provincial DoT, China

Rural Revitalization for Sustainable Development in Zhejiang, China

Location / Zhejiang, China

Period / Since 2014

Overview

- Zhejiang's Keqiao District overcame fragmented waterways/mountains and scarce funds pre-2003. In June 2003, Zhejiang Province launched the "Thousand Villages Demonstration and Ten Thousand Villages Renovation" project. In December 2004, Keqiao District took the lead in achieving the "double hundred" targets of village road access rate and hardening rate in the province, and becoming one of the first batch of national demonstration counties for "High-quality Rural Roads."

Solutions

- Creating landscapes through interconnected roads to enhance the road network infrastructure. Elevate the level of highways, optimize the highway environment, integrate scenery into the roads, and build beautiful highways.
- Improving management and ancillary facility to ensure travel quality. Establishing the "Road Chief System" scheme, enhancing supporting infrastructure such as charging and parking.
- Developing industries along the roads to stimulate vitality along the routes.

Major Achievements

- Keqiao has invested over 10 billion yuan in the construction and renovation of rural roads, upgrading 574 rural roads with a total length of 722 kilometers; implemented maintenance for 15,000 kilometers of rural roads, with a maintenance rate of 100%, and increased the proportion of roads in good or better condition from 49.19% to 93.43%, achieving bus and express delivery access to every village.

Global Sustainable Transport
Best Practice

Safe Accessible Efficient Green Economical Inclusive Resilient

ADB

SASEC Chittagong-Cox's Bazar Railway Development in Bangladesh

Location / Bangladesh

Period / In Progress

Overview

- The Chittagong–Cox's Bazar Railway project is being implemented in South-eastern part of Bangladesh. This project will connect Cox's Bazar district for the first time to the national and subregional railway network and support efficient development in the Dhaka–Chittagong–Cox's Bazar corridor through improved, reliable, safe, and environmentally friendly railway connectivity, enabling better access to various regions and contributing to the overall development of the national economy.

Solutions

- The project cost is $2.012 billion with ADB financing amount $1.5 billion. For timely completion of the project following best practice were planned and executed: (i) Floating of Bid/Tender ad Proposals for both Civil Works and Consultancy before signing loan agreement with ADB, (ii) finalization of all designs and drawings before publishing the tender, (iii) substantial completion of land acquisition before the civil works contracts are signed.

Major Achievements

- The project output was to construction of 102 km dual gauge single line railway track which is a missing link of the Trans-Asia railway network.
- The project will improve accessibility for 2 million residents living in the project's direct area.
- The project is financially sustainable.
- The project is also environmentally and socially sustainable for following reasons: (i) reduce 46,647 tons of CO2 emissions during operation, (ii) installation of sensor technology for elephant, (iii) construction of elephant overpass, and (iv) completion of land acquisition and resettlement activities following international best practice.

UNECE

Sustainable Mobility Management for Home-School Trips in Italy

Location / Italy

Period / Since 2009

Overview

- Reggio Emilia, a northern Italian city famed for its progressive education, has applied innovation to home-school mobility since 2009 via its "Manifesto,". The municipality leads a stakeholder-driven effort with the School Mobility Manager (SMM) program. Focused on sustainability pillars like safety, green transport, and inclusiveness, it reduces car use through walking/cycling routes, carpooling, and low-cost initiatives, setting a replicable model for child-centric urban mobility.

Solutions

- Physical infrastructure near schools was redesigned with traffic calming measures, safe crossings, and improved signage.
- The city supported carpooling initiatives and expanded school bus access, but particular emphasis was placed on non-motorized mobility.
- The city made sustainable mobility a priority in all urban development plans involving schools.
- Pediatricians became allies in the campaign, attending school events and parent meetings to emphasize how daily physical activity is vital for child development.

Major Achievements

- By 2018, 72% of the city's schools had formally appointed an SMM, embedding mobility planning directly into school governance structures.
- Through a combination of traffic calming, infrastructure redesign, and participatory urban art, the city created five "school streets" areas that are either fully pedestrianized or significantly restricted to car traffic during school hours.
- The city targeted early childhood mobility habits by distributing 99 balance bikes to 34 nurseries and kindergartens in 2014 and 2019

MoT&L, Ethiopia

The Addis Ababa Ring Road and Ethiopia's Path to Sustainable Development

Location / Addis Ababa, Ethiopia

Period / Since 2003

Overview

- Addis Ababa, the capital city of Ethiopia, has long been plagued by chronic traffic congestion and a fragmented road infrastructure system. Through the collaborative efforts of the Ethiopian government and China Communications Construction Company (CCCC), Ethiopia's first expressway — the Addis Ababa Ring Road — was successfully completed in 2003. Spanning 33.4 kilometers, this landmark project has emerged as a pivotal symbol of Ethiopia's modernization drive in the new century.

Solutions

- **Forward-Looking Design upholding Green and Sustainable Development Principles,** integrated with wildlife corridors, wetland buffer zones, rainwater recycling systems, a comprehensive pedestrian green mobility network, intelligent sensor-controlled street lighting systems advancing low-carbon urban infrastructure.
- **Adaptive Solutions to Construction Challenges,** flexible construction methodologies and advanced equipment to minimize disruptions to urban traffic flow and residents' daily routines, prioritizing community welfare.
- **Innovation-Driven Excellence Set New Engineering Benchmark,** "Technology Transfer and Talent Development" cooperation mechanism fostering local expertise.

Major Achievements

- **Economic Growth:** Logistics efficiency boosted by 30%, land values appreciation along road corridors by 300%.
- **Social Well-being:** 1.5 million residents within a 1-hour commute radius, travel time reduced by over 40 minutes.
- **Poverty Reduction:** Creating infrastructure-related job opportunities, including 80,000 new jobs generated by foreign investment.
- **Sustainable Development Model:** Established a replicable development paradigm, serving as a pioneering new direction for infrastructure-driven growth in African countries.

National Authority for Tunnels, Egypt

The 10th of Ramadan Eco-Railway Project in Egypt

Location / Cairo, Egypt

Period / Since 2022

Overview

- The 10th of Ramadan Railway Project, implemented by AVIC International Holding Corporation (AVIC INTL), is Egypt's first electrified light railway and currently the only public rail line connecting Cairo's old city with the new administrative capital. The project, which spans approximately 109 kilometers in four phases, saw the first and second phases (70 kilometers) officially enter commercial operation in 2022. It has enhanced regional transport capacity, addressing urban expansion and commute challenges.

Solutions

- **Utilize digital and innovative technology.** The 27.5 kV AC traction power supply system was applied for the first time.
- **Adopt green and energy saving technology.** Special management plans for noise, dust, and waste.
- **Establish the talent training mechanism.** AVIC INTL trained 100 key rail transport personnel for Egypt.
- **Strengthen the team's international cooperation.**Egyptian local contractors are responsible for construction, and Chinese companies implement the procurement and installation of mechanical and electrical equipment and vehicles.

Major Achievements

- The project benefits 5 million residents commuting between Cairo's old city and the new capital, reducing the travel time between the two locations from 1.5 hours to 56 minutes.
- The operation of EMUs has cut approximately 20,000 tons of carbon emissions, and the air quality index (AQI) in areas along the project route has improved by around 20%.
- Approximately 15,000 jobs were created, and around 3,000 jobs have been generated during the operation and maintenance period.

UNECE

The Ropka Tööstusrajoon Mobility Management Project in Estonia

Location / Estonia

Period / Long Period

Overview

- Tartu, Estonia's RopkaTööstusrajoon Mobility Management project, a public-private partnership backed by EU's MoMa.BIZ, tackles mobility issues in its industrial zone (450+ SMEs, 3,300 employees). Forming a local mobility group, it enhanced public transport, upgraded walking/cycling infrastructure, and promoted sustainable modes via data-driven planning, aligning with safety, green, and efficiency principles.

Solutions

- The project began with the formation of a local mobility group, a multidisciplinary platform that brought together all relevant stakeholders.
- the mobility group collaboratively drafted a comprehensive and context-sensitive mobility plan.
- Once the mobility plan was finalized, the city and mobility group coordinated closely to implement the proposed measures.
- The Ropka Tööstusrajoon mobility initiative was not developed in isolation.
- To ensure accountability and enable adaptive management, Key Performance Indicators (KPIs) were defined from the outset.

Major Achievements

- The significant modal shifts away from private car use towards more sustainable transport modes.
- The initiative brought tangible social and economic benefits to employers, employees, and the broader community
- Its replicability and the role it now plays as a model for similar mobility interventions in other industrial and business zones.

Solartaxi

Taxi Catalyzing Green Transportation Transition in Ghana

Location / Ghana

Period / In Progress

Overview

- Ghana's transport relays primarily on private vehicles and informal "quasi-public transport" systems, including motorcycles, tricycles and minibuses. Currently, Ghana's dependence on imported second-hand vehicles and the widely use of low-standard fuels are leading to increased emissions, affecting urban air quality, becoming a threat to public health, and exacerbating traffic congestion and air pollution. Committed to net-zero by 2070, Ghana is transitioning to sustainable energy.

Solutions

- Solar taxis has made significant technological breakthroughs in solar charging technology.
- By designing, Solar Taxi converts the existing fuel vehicles into electric vehicles for efficient operation.
- Solar Taxi offers a range of flexible renting and purchasing options to meet the diverse needs of customers.
- Solar Taxi launched the Solar Taxi APP, an application designed specifically for shared taxi services.
- Providing cloud based fleet management solutions with regular software updates.
- Provide express delivery services of B2B and B2C models.

Major Achievements

- Reduce carbon emissions. Solar Taxi uses clean and renewable solar energy to meet energy needs and reduce carbon emissions.
- Reduce transportation costs. Solar Taxi integrates imported and local components, strategically combining global and local resources to achieve a significant cost reduction of 40%.
- The Solar Taxi electric vehicle adopts advanced photovoltaic complementary charging technology.
- Solar Taxi provides over 100 full-time positions directly in the local area, indirectly promoting employment opportunities related to vehicle production
- Solar Taxi has launched a solar campus project, collaborating with universities to cultivate students' environmental awareness.

An In-Depth Exploration of the Best Practices

1. Accelerating the Transition to Electric Mobility for Public Transport in Asia and the Pacific

Provided by United Nations Economic and Social Commission for Asia and the Pacific

I. Overview

Asia and the Pacific, home to 60 per cent of the world's population and 53 of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)'s member States, is one of the most diverse regions in the world. It encompasses a wide array of economic, social, and geographical contexts, from densely populated urban centres to remote rural areas, each of which presents distinct challenges and opportunities for sustainable transport. As countries seek to reduce emissions and improve inclusive mobility, electric public transport has emerged as a key solution. The region is at the forefront of these efforts, as over 90 per cent of the world's electric buses are located in Asia, but despite this progress many countries remain in the early stages of adoption and face barriers related to policy development, infrastructure readiness, and financing. As urbanization accelerates and transport emissions continue to rise, projects and platforms aimed at electric mobility are essential to sharing, adapting, and scaling best practices -so that all countries can benefit from sustainable mobility.

ESCAP's work on electric mobility addresses the need for low-carbon transport while responding to the varied development stages of its member States. A cornerstone of this is the project Accelerating the Transition to Electric Mobility for Public Transport in Asia and the Pacific. Funded by the China-ESCAP Cooperation Programme, the project provides an interconnected system of support that operates in two phases: Phase I (2021-2023) focused on capacity building to establish or strengthen electric mobility policies in Fiji, Georgia, Lao PDR, Nepal, and Thailand, while Phase II (2024-2026) provides technical assistance to implement pilot electric bus systems in Lao PDR, the Philippines, Sri Lanka, and Tajikistan. These national-level efforts are complemented by ESCAP's Asia-Pacific Initiative on Electric Mobility (APIEM), which serves as a regional cooperation platform launched under the project to share lessons learned and best practices for electric mobility between countries.

ESCAP's focus on electric mobility for public transport stems from the ability of these fleets to deliver a broader impact compared to private vehicles, as they offer environmental, social, and economic benefits that extend to entire communities. Public transport fleets not

only move more people with fewer vehicles but also reduce congestion and lower per capita emissions. As cities strive to transition to sustainable mobility, electric buses also present an affordable, safe, and green alternative that connects people, especially from underserved communities to essential services. However, while the long-term advantages of electric buses, such as requiring fewer moving parts, reducing maintenance costs, and improving energy efficiency often make them economically attractive, the high initial investment required for procurement and infrastructure, combined with the fact that public transport systems are often publicly owned, places a large financial burden on governments striving to transition fleets at the scale and speed needed to meet climate commitments such as the Paris Agreement by 2050.

Electric Buses in China
Source: Getty Images

II. Solutions

By combining national-level capacity building, technical assistance, and regional cooperation, ESCAP addresses key challenges related to policy development, financing, and operational feasibility, ensuring that the region benefits from targeted support and know-how.

1. Developing National Policy Frameworks for Electric Mobility. A core outcome of ESCAP's support has been the development of national policy frameworks that outline key policy interventions and provide a foundation for transitioning to electric mobility. ESCAP has led to the preparation of tailored electric mobility frameworks in Cambodia, Fiji, Georgia, Lao PDR, Nepal, Sri Lanka, and Thailand, which not only define institutional responsibilities and strengthen coordination across ministries but also address critical challenges related to infrastructure and regulations. The importance of these frameworks is underscored by the fact that 83 per cent of countries in Asia and the Pacific include transport measures in their Nationally Determined Contributions, most of which cover public buses and electric mobility, but many countries still lack the capacity to manage the interactions between traditionally siloed sectors such as energy, urban planning, and transport. Without a policy framework in place, these efforts can become disjointed and slow the transition to electric public transport.

ESCAP National Policy Frameworks

2.Supporting Policy Adoption Through National Workshops. ESCAP organized five national workshops on electric mobility in Fiji, Georgia, Lao PDR, Nepal, and Thailand, providing a platform for policymakers, development partners, multilateral banks, research institutes, and private sector stakeholders to engage with the proposed national policy frameworks. These workshops enabled government ministries to collaboratively review proposed policy interventions to ensure alignment with national priorities. They also facilitated multi-sector dialogue and knowledge exchange, offering country-specific insights and recommendations that helped bridge institutional gaps and promote a more coordinated approach to electric mobility development. Building on the effectiveness of this capacity building, four additional national workshops are to take place in Lao PDR, the Philippines, Sri Lanka, and Tajikistan.

3. Regional Knowledge Products to Share Best Practices. ESCAP has launched three core publications to support the transition to electric mobility across Asia and the Pacific, providing countries with practical guidance and insights drawn from regional and global experiences. Electric Mobility in Public Transport: A Guidebook for Asia-Pacific Countries offers a step-by-step roadmap that guides stakeholders through key stages of the transition, from establishing national standards and selecting suitable vehicle technologies to identifying financing mechanisms and planning for end-of-life battery disposal. Complementing this, New Energy Vehicle Policies and Promotion in China captures the policy and regulatory frameworks that have supported China's transition to electric mobility, while Case Studies on E-Bus Development and Operation in Chinese Cities highlight many of the innovative financing mechanisms and business models that have also been key enablers. In addition, ESCAP has developed an extensive series of knowledge products, including policy briefs and a monograph that address key challenges and opportunities in electric mobility.

4. Strengthening Regional Cooperation for Electric Mobility. ESCAP launched the Asia-Pacific Initiative on Electric Mobility (APIEM) to strengthen regional cooperation and foster peer-to-peer learning among member States. The APIEM provides a platform for policymakers, industry experts, and development partners from member countries to exchange knowledge, share experiences, and collaboratively address common challenges in transitioning to electric mobility. As part of the initiative, ESCAP has facilitated a series of regional and subregional meetings, including in Manila, the Philippines, and Dhaka, Bangladesh, focusing on critical issues such as securing financing and ensuring a Just Transition for electric mobility.

Complementing the APIEM, the Regional Cooperation Mechanism on Low-Carbon Transport was also launched by ESCAP to provide an avenue for countries to request direct bilateral capacity-building and technical assistance for public transport. It serves as an extension of ESCAP's inter-governmental processes, offering member States an opportunity to request assistance outside of formal sessions such as the Committee on Transport.

Subregional Meeting for the Regional Cooperation Mechanism on Low Carbon Transport, 12-13 Dec 2022, Bangkok, Thailand

5. From Policy to Practice: The Need for Pilot Projects. With national policy frameworks and capacity-building efforts laying the foundation for action, ESCAP also operationalizes these policies through practical implementation and is deploying pilot electric bus systems in Lao PDR, the Philippines, Sri Lanka, and Tajikistan under the next phase of its electric mobility work. These pilot projects will serve to assess technical and financial feasibility, which will build confidence among stakeholders and create a pathway for further adoption. A key component of these pilots will be the establishment of national coordination mechanisms for electric mobility in public transport, which will empower governments to ensure effective cross-sectoral and vertical cooperation across different levels of governance. To maximize regional impact, the lessons learned from these pilot projects will be shared through the APIEM to ensure that the key learnings contribute to collective progress toward sustainable mobility.

III. Major Achievements

The project's success is highlighted by the development of national electric mobility policy frameworks across the region. Cambodia's electric mobility policy has been approved, while Sri Lanka's has been submitted for Cabinet endorsement. Thailand, already at an advanced stage of e-mobility development, has benefited from ESCAP's technical support to further integrate electric mobility into its transport policies. Fiji, with an existing policy context, is moving toward a transport decarbonization implementation plan. The success of these efforts is underscored by formal requests from more member States for ESCAP to support the development of national electric mobility roadmaps.

The success of the national policy frameworks and capacity-building efforts in these countries demonstrates how the project's model can be adapted to different national contexts. The pilot projects planned by ESCAP will further validate this approach by offering practical insights into the operational and financial feasibility of electric mobility. The project's alignment with Sustainable Development Goals (SDGs) including energy (7), industry and infrastructure (9) sustainable cities (11), and climate action (13) highlights its contribution to regional development, while the demand for ESCAP's support and the increasing interest from member States to host additional workshops and policy dialogues further reflect the project's impact and potential for replication and expansion.

Evaluations of ESCAP's national workshops in Nepal, Lao PDR, and Thailand revealed that 100 per cent of respondents increased their understanding of electric mobility, underscoring the effectiveness of these capacity-building efforts. These positive outcomes have led to additional requests for ESCAP's continued support. Similarly, surveys conducted during regional meetings in Bangladesh and the Philippines confirmed that 100 per cent of participants found the APIEM to be a valuable platform for knowledge exchange and collaboration. The APIEM's impact was further reinforced by its endorsement at the 7th Session of the Committee on Transport, while the Regional Cooperation Mechanism for Low-Carbon Transport was endorsed at the 8th Session of the Committee on Transport for its role as a valuable consultative forum for advancing low-carbon transport.

2.Decarbonizing Transport in Emerging Economies

Provided by International Transport Forum

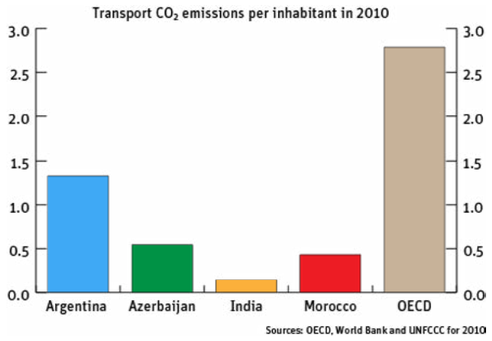
I. Overview

Transport emissions are rising rapidly, particularly in developing economies facing growing demand for mobility. To help countries tackle this dual challenge of driving economic growth while aligning with climate goals, the International Transport Forum (ITF) launched the Decarbonising Transport in Emerging Economies (DTEE) project in 2019. This initiative supports Argentina, Azerbaijan, India, and Morocco by providing tailored assessment tools, enhancing institutional capacity, and co-creating low-carbon transport strategies that are both practical and ambitious.

Funded by the German Federal Ministry, BMUV, through the International Climate Initiative (IKI), DTEE provides each partner country with an evidence-based framework for long-term planning. The project brings together ministries, agencies, and stakeholders to jointly analyse the countries' transport systems and test the impact of various policy options. The assessment frameworks capture all passenger and freight transport modes and enable countries to forecast emissions to 2050 under different scenarios.

Each country faces distinct challenges. Argentina's vast geography and reliance on road freight have driven emissions growth, but it is investing in multimodal solutions. Azerbaijan seeks to reconcile rapid infrastructure development with climate goals. India's soaring demand for mobility in urban and rural areas creates pressure to decarbonise without compromising accessibility. Morocco, meanwhile, is looking to integrate informal urban transport and rebalance freight movement away from road dominance.

Despite differences, all four countries share a common need: a robust, locally adapted tool to assess their transport emissions and support cross-sectoral dialogue. The DTEE approach is participatory, building ownership and enabling national teams to use the developed tools independently. It reflects the values of sustainable transport: safety, efficiency, inclusiveness, and resilience, underpinned by green and economically viable solutions. DTEE helps countries move from aspiration to action by supporting data-driven planning and stakeholder collaboration.



II. Solution

The DTEE programme offers a tailored yet structured approach to help emerging economies model and plan for low-carbon transport systems. Built around a strong modelling foundation, the solution is implemented through national and local stakeholder engagement and tailored policy analysis in each of the four countries: Argentina, Azerbaijan, India, and Morocco.

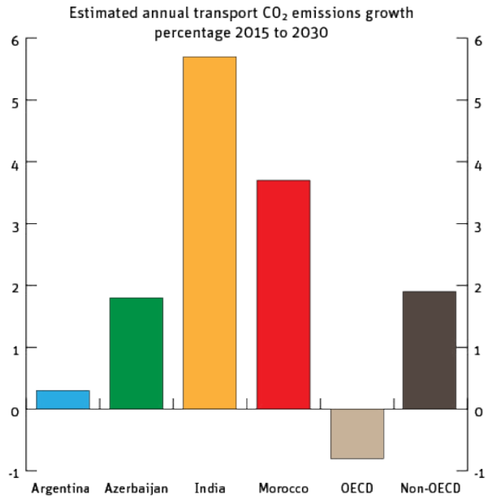
The first step in each country involved a detailed mapping of the transport system and a collection and validation of available data on vehicle fleets, fuel use, infrastructure, travel demand, and policy frameworks. This laid the groundwork for adapting the ITF's travel demand and emissions model to each national context. The modelling tool forecasts emissions by mode, vehicle type, and geography for various scenarios, offering insights into trends up to 2050. Each model was built collaboratively with national experts, ensuring local relevance and institutional buy-in.

Argentina focused its DTEE work on decarbonising the freight sector. With a vast but underutilised rail network and a logistics system heavily reliant on road transport, the project used the DTEE framework to model a shift toward rail and more efficient trucking operations. The analysis explored how improvements in freight efficiency could reduce emissions while enhancing overall system performance. Implemented in collaboration with national stakeholders, it helped refine modelling inputs and inform realistic scenario development. The work assessed the potential of high-capacity vehicles, multimodal freight corridors, and strategic public investment to support a more sustainable and competitive freight system aligned with Argentina's climate and economic objectives.

Azerbaijan, aiming to decarbonise a transport sector responsible for a significant share of national emissions, applied the DTEE framework to explore low-carbon mobility pathways and strengthen its position as a regional transport hub. The project focused on developing tailored emissions scenarios and assessing mitigation strategies across the passenger and freight sectors. Implemented by the ITF in close coordination with the Ministry of Digital Development and Transport, the study combined data-driven analysis with policy dialogue to identify realistic, effective solutions. By engaging stakeholders from government, academia, and civil society and building national modelling capacity, the initiative supported evidence-based policy development aligned with Azerbaijan's climate commitments and sustainable transport objectives.

India, facing the rapidly growing demand, used the DTEE framework to assess urban mobility, freight logistics, and energy transitions. The project focused on developing a comprehensive modelling tool to assess greenhouse gas (GHG) emissions within the transport sector, adopting a life-cycle perspective. This initiative, implemented by the ITF in collaboration with the Wuppertal Institute and coordinated with NITI Aayog, aimed to support the creation of effective policy strategies for GHG mitigation. By building local capacity and engaging stakeholders from government, industry, academia, and civil society, the project sought to enhance transport research and policy development, contributing to India's climate goals and sustainable development.

Morocco directed its DTEE work toward two key pillars: freight and passenger mobility. With road freight dominating national logistics and a fragmented public transport system in urban areas, the project used the DTEE framework to assess decarbonisation pathways through intermodality, rail development, investment in public transport, and improved regulation of informal public transport. Implemented in close collaboration with national ministries and local authorities, the study developed both urban and non-urban transport models to evaluate sustainable infrastructure investment, fleet renewal, clean vehicle technologies, pricing incentives, and behavioral change strategies. Through multi-stakeholder workshops and scenario co-design, the initiative supported Morocco's efforts to align transport policy with its broader climate and development goals.



Beyond technical modelling, DTEE fostered robust stakeholder engagement. National workshops in each country brought together ministries, agencies, researchers, and civil society. This helped align transport and climate objectives, ensured realistic assumptions, and supported inter-ministerial coordination—especially in Morocco and Azerbaijan, where horizontal planning has historically been limited.

Capacity building was a core pillar throughout. A great number of officials and researchers were trained to use and interpret the models that were developed in this project. In each country, government teams now have ownership of the tool and the ability to update it as new data and policy needs emerge. Peer learning through regional policy dialogues further amplified results. For example, Morocco, with its Middle East and North Africa (MENA) counterparts, exchanged insights on urban mobility policy and experiences on freight efficiency.

The flexibility and openness of the DTEE approach allowed each country to adapt the model and methodology to its institutional context. Whether addressing EV rollout in India or logistics reform in Argentina, the project grounded policy discussion in evidence.

III. Main Achievements

The DTEE programme has produced significant, tangible outcomes across all four participating countries.

In Argentina, the project delivered a national freight decarbonisation roadmap grounded in detailed scenario modelling. Seven policy options were tested, showing that a shift to rail and modern logistics corridors could meaningfully reduce emissions while improving competitiveness. These insights fed directly into Argentina's National Action Plan on Transport and Climate Change and are informing current freight infrastructure decisions. The project also developed a user-friendly dashboard, enabling policymakers to explore emission impacts interactively.

Azerbaijan used DTEE to develop its first long-term transport emissions forecast. The modelling revealed that emissions would rise by 25% by 2050, even with current policies. However, a more ambitious policy mix could flatten or reduce this curve. These results were incorporated into the national transport strategy under development, ensuring climate considerations are embedded in Azerbaijan's planning processes. The Ministry of Transport has since adopted DTEE tools for ongoing analysis.

In India, the modelling tool provided a critical analytical foundation for scaling sustainable mobility. The model helped quantify the impact of EV uptake, public transport investments, and fuel economy standards. Outputs are now used by NITI Aayog and other agencies to guide national planning and urban mobility strategies. The tool complements India's work under the NDC–Transport Initiative for Asia, ensuring coherence between modelling and national commitments.

Morocco applied DTEE to assess emissions across freight and passenger transport. The project highlighted that 75% of freight emissions could be tackled through rail and maritime mode shifts. Urban modelling informed policy debates on regulating informal minibuses and expanding clean fleets. The findings support Morocco's national logistics and mobility strategies, and inter-ministerial dialogues (e.g. The Ministry of Interior, the Ministry of Transport and Logistics, and the Ministry of Environment) are now aligning infrastructure investments with climate goals.

Across all countries, DTEE has built lasting capacity. Government teams were trained to use and adapt the model, ensuring continued application beyond the project. Peer exchanges have seeded a broader community of practice, while public reports and dashboards make results transparent and accessible. As the methodology is adopted by more countries, DTEE is proving itself as a scalable and impactful model for sustainable transport transition.

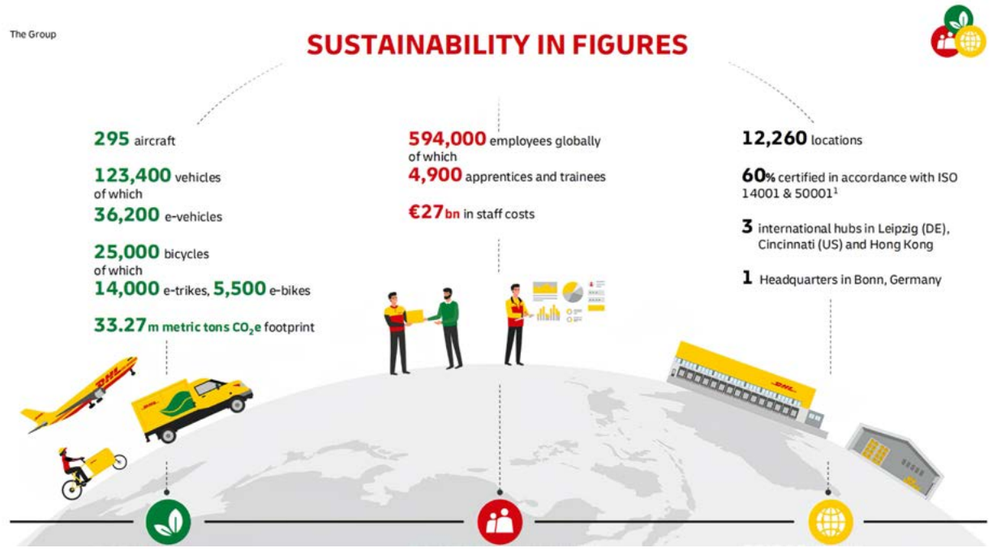
3.Driving Sustainable Supply Chain Innovation in Green Logistics Revolution

Provided by DHL Group

I. Overview

According to calculations by the International Energy Agency, the transportation sector accounts for 25% of the world's total carbon dioxide emissions. The postal and express delivery industry is an integral part of the modern integrated transportation system. While promoting economic development, the use of vehicles, airplanes, and other transportation tools also increases energy consumption. The low-carbon transition process of this industry is a key measure in addressing global climate challenges, achieving the United Nations' 2030 Sustainable Development Goals, and promoting sustainable global transportation development.

DHL Group (hereinafter referred to as DHL) is a global leader in logistics, with approximately 594,000 employees in over 220 countries and regions worldwide, achieving a revenue of 81.8 billion euros (92.2 billion USD) in 2023. In 2007, DHL set the first quantifiable climate protection target in the global logistics sector, and in 2017, it announced its commitment to achieving net-zero emissions for all logistics-related greenhouse gases by 2050. In 2024, DHL established its Strategy 2030–Accelerating Sustainable Growth, which clarifies the company's sustainability strategy for the next six years. By adopting sustainable practices, DHL aims to become the employer, customer, investor, and green logistics partner of choice, thereby promoting more convenient, efficient, green, and resilient sustainable transportation development (Figure 1).



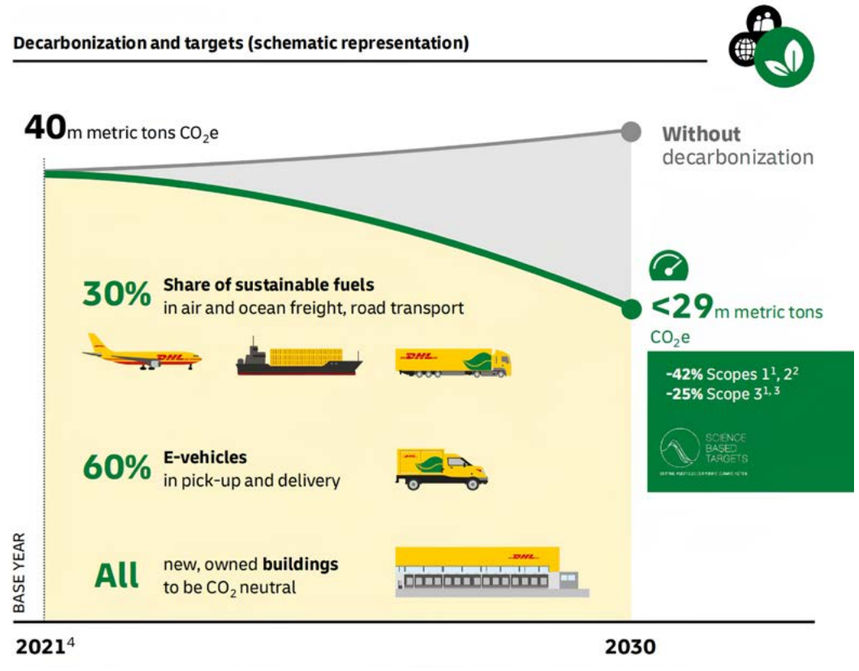
Source: DHL Group
Figure 1: DHL Group's 2023 Sustainability Highlights

II. Solutions

1. Electrification of logistics transportation: As of now, DHL has put into operation 35,000 electric delivery and collection vehicles globally, achieving an electrification level of 37.6% (Figure 2). DHL is actively promoting the construction of an electrified aviation network and has taken a pioneering step towards sustainable aviation by ordering 12 *Alice* all-electric cargo planes in 2021.

Source: DHL Group
Figure 2: Electric pickup and delivery vehicles

2. Use of clean energy: Since approximately 90% of DHL's carbon footprint comes from its aviation network, the most critical aspect is to transition the air transport segment towards greener alternatives. According to its sustainability roadmap, DHL aims to increase the proportion of Sustainable Aviation Fuel (SAF) in overall air transport to 30% by 2030. In 2023, DHL Express signed a long-term strategic agreement with World Energy, a producer of SAF and provider of low-carbon solutions, to purchase approximately 668 million liters of SAF through the purchase of sustainable aviation fuel certificates, accelerating the decarbonization of air logistics. This seven-year contract will last until 2030 (Figure 3). In 2024, DHL signed a strategic cooperation agreement with the Chinese company Envision Group, covering four major areas: logistics solutions, sustainable aviation fuel, green energy, and *zero-carbon industrial parks*.



Source: DHL Group
Figure 3: Illustration of DHL's decarbonization goals

3. Green Logistics Solutions: DHL has successively launched the GoGreen and GoGreen Plus services to support the sustainable development goal of Achieving net-zero carbon emissions by 2050. The GoGreen service allows customers to offset carbon emissions through climate protection projects certified outside of DHL's value chain; the GoGreen Plus service is an important component of DHL's net-zero goal for 2050, offering customers the option to choose their desired level of greenhouse gas reduction and the amount of SAF usage through a *carbon embedded* mechanism.

III. Major Achievements

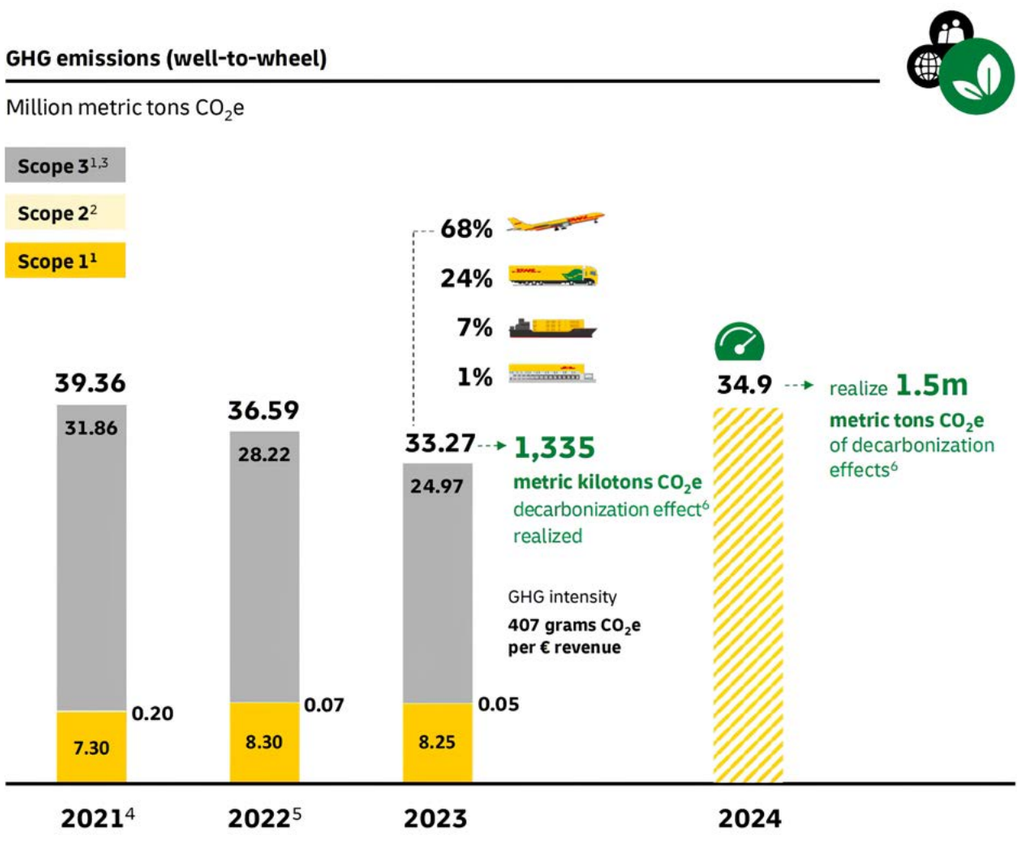


Figure 4: DHL carbon emissions from 2021 to 2024

1. Continuous Improvement in Fleet Electrification. As of 2023, DHL has a global fleet of 123,400 vehicles, including 36,200 electric vehicles; and 25,000 bicycles, of which 14,000 are electric tricycles and 5,500 are electric bicycles. DHL Express in China has extensively collaborated with local automotive companies such as SAIC Maxus, Dongfeng, and BYD to advance the electrification of its fleet. By the end of 2023, the electrification ratio of DHL's pickup and delivery fleet in China reached 26%, and the first fleet composed of eight hydrogen-powered trucks was put into operation, which can reduce carbon emissions by over 170 tons annually. Two new electric trucks and two new electric container tractors deployed in Shanghai cover a total monthly mileage of over 20,000 kilometers, and are expected to reduce carbon emissions by over 300 tons annually.

2. Breaking the SAF Dilemma. The commercialization of SAF is a complex systems engineering challenge. To address this issue, DHL has joined the Future of Clean Skies initiative launched by the World Economic Forum, collaborating with other leading companies, government departments, and international organizations in various aspects to accelerate the green transformation of the aviation industry. Within two years, DHL Express has gradually established a full-chain carbon emission tracking system from pickup to delivery, making emissions reductions traceable and quantifiable. Currently, DHL Express has established cargo flights using SAF in San Francisco, East Midlands, Amsterdam, and Malpensa.

3.Optimizing Green Logistics Services. As of March 2024, over 30,000 corporate customers in DHL Express China have adopted the GoGreen Plus service; in July 2024, DHL announced a partnership with Google, and the Google Devices and Services division will utilize the GoGreen Plus service to use SAF in air express shipments across the Americas, Asia, and Europe.

As a global logistics company, DHL's green development experience is not limited to specific regions or countries. The enhancement of fleet electrification, the use of sustainable aviation fuel, and the development of green logistics services all hold significance for other express and logistics enterprises as a reference.

4.Enhancing the Resilience of Transportation Infrastructure to Climate Change in Brazil

Provided by Ministry of Transport, Brazil

I. Overview

The AdaptaVias Project is a partnership between Brazil's Ministry of Transport and the German international cooperation agency GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). The project's aim is to assess the impacts and risks of climate change on Brazil's federal terrestrial transport infrastructure, encompassing both existing and planned highways and railways. This initiative seeks to provide a solid foundation for the development of adaptation strategies in the sector.

Addressing this issue is crucial, as Brazil recorded over 8,000 instances of infrastructure damage due to climatic factors between 1995 and 2014, resulting in total losses of R$ 26.9 billion (Ceped UFSC; World Bank, 2016). Transport infrastructures are directly exposed to extreme climatic conditions such as high temperatures, heavy precipitation, storms, flooding, and landslides (PBMC, 2014).

The project focuses on terrestrial transport infrastructure, considering the increasing vulnerability to extreme weather events, which can lead to significant disruptions, economic damages, and potential loss of life. In this context, it is essential to acquire knowledge about the impacts of climate change on Brazil's transport infrastructure assets. This understanding will facilitate reflection on the best measures to integrate control and response strategies throughout all phases of the lifecycle of these assets. Climate risk assessment is a valuable tool for identifying the need and importance of adaptation actions, as well as assisting in the planning and allocation of essential resources (Arent et al., 2014; German Environment Agency, 2017; UNECE, 2020).

Source: Projeto AdaptaVias, Brazil Ministry of Transport

II. Solutions

The AdaptaVias Project conducts a comprehensive assessment of the impacts and risks of climate change on terrestrial transport infrastructure in Brazil, aiming to provide support for decision-making regarding adaptation to these impacts.

The project employs the IPCC's concept of climate risk, which considers the interaction between climatic threats, infrastructure exposure, vulnerability (sensitivity and adaptive capacity), and the resulting impact. After identifying the main climate risks and scenarios of climate change, the project seeks to enhance awareness and adaptive capacity within terrestrial transport modes, promoting the identification of adaptation measures.

- **Threat:** the potential for an event or physical impact.
- **Exposure:** the presence of elements in locations and environments that could be negatively affected.
- **Vulnerability:** the tendency to be adversely affected (sensitivity and adaptive capacity).
- **Impact:** a term used to refer to the effects on natural and human systems due to extreme weather, climate events, and climate change.

The approach of the AdaptaVias Project involves assessing climate risk at all stages of the infrastructure lifecycle, encouraging reflection and the incorporation of control measures as well as the establishment of regulatory standards.

III. Main Achievements

The AdaptaVias Project has driven significant progress in climate resilience for Brazil's transport infrastructure, resulting in important regulatory frameworks, technical tools, and strategic initiatives. A major achievement was the release of unprecedented data on climate risks for over 100,000 kilometers of federal highways and railways, identifying vulnerabilities such as flooding, landslides, and temperature extremes on the AdaptaBrasil platform, in collaboration with the Ministry of Science, Technology, and Innovation (MCTI). This data has informed the development of public policies, including:

- Ordinance No. 622, dated June 28, 2024, which sets guidelines for resource allocation in highway concessions, mandating that a percentage of the gross revenue from concessionaires be directed toward resilient infrastructure projects, greenhouse gas emission mitigation, and energy transition.
- Ordinance No. 689, dated July 17, 2024, which enhances this impact by establishing criteria for priority projects in road and rail transport, facilitating the issuance of incentivized debentures for projects focused on climate adaptation.
- Ordinance No. 64, dated January 23, 2025, which institutionalizes the PRO-AdaptaVias Program, ensuring the continuation of efforts to promote climate resilience in the transport sector. This ordinance outlines a strategic plan for adapting infrastructure, encourages innovation in engineering solutions, promotes research and development of nature-based solutions, and strengthens partnerships with universities and the private sector.

Additionally, Resolution No. 6,057, dated November 28, 2024, issued by the National Land Transport Agency (ANTT), establishes the Program for Sustainability in Federal Regulated Highway and Railway Infrastructure. This resolution includes IX-PDS 9: Adaptation and Resilience of Infrastructure, which focuses on adapting transport infrastructure to the impacts of climate change, extreme weather events, and climate emergencies, thereby promoting resilience.

The PRO-AdaptaVias Program's key areas of action encompass planning and implementing adaptation measures, providing economic and financial incentives, facilitating communication and social engagement, and advancing research and development. An important aspect is the technological tool SIM-ADAPTAVIAS, designed for risk analysis forecasting and the creation of response plans.

5.Expressway's Green Energy Integration Project in China

Provided by China Energy Engineering Corporation

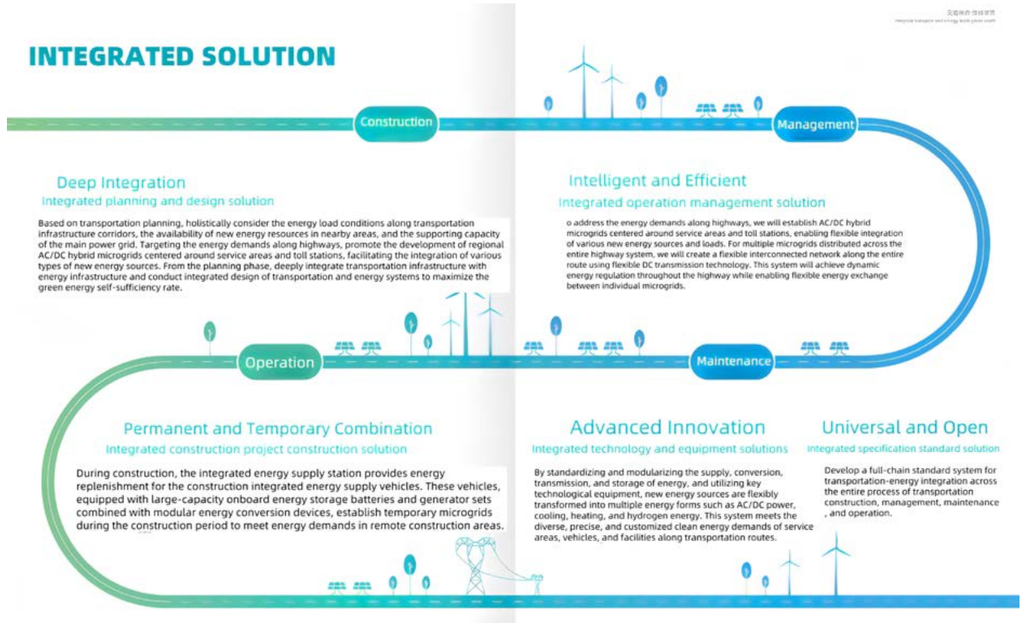
I. Overview

Shandong Province is a provincial-level administrative region of the People's Republic of China, located on the eastern coast of China along the lower reaches of the Yellow River. Its territory consists of both a peninsula and an inland area, with the Shandong Peninsula extending into the Bohai Sea and the Yellow Sea. The central region of Shandong is mountainous, while the southwest and northwest are low and flat, and the eastern part consists of gentle hills, all of which fall under a warm temperate monsoon climate. Situated on the vast Qilu Plain, Shandong is renowned for its extensive highway network due to its advantageous geographical location and flat terrain. By utilizing land resources along the highways and leveraging key projects, the province has deeply explored transportation-energy integration. Major efforts have been made to develop new systems such as large-scale, long-linear slope PV installations, zero-carbon smart service areas, integrated solar-storage-direct-flexible buildings, and a unified transportation-energy control platform. These innovations have resulted in a comprehensive transportation-energy integration solution, offering a positive demonstration for advancing the development of integrated highway transportation and energy systems.

II. Solutions

Source: China Energy Engineering Corporation Limited
Figure 1: Large-scale Linear Slope Photovoltaic Installation

The project follows the concept of "four networks integration", which includes energy networks, transportation networks, digital networks, and industrial networks, and implements the integrated source-grid-load-storage, intelligent vehicle-road-energy-cloud integration, green energy use in transportation, and industrial clustering of transportation and energy. By practicing these principles, the project promotes the comprehensive planning, collaborative construction, and integrated operation of energy usage, supply, and reception systems, converting green electricity into smart, economic, and green transportation capacity, thereby advancing high-quality green development in the transportation industry.



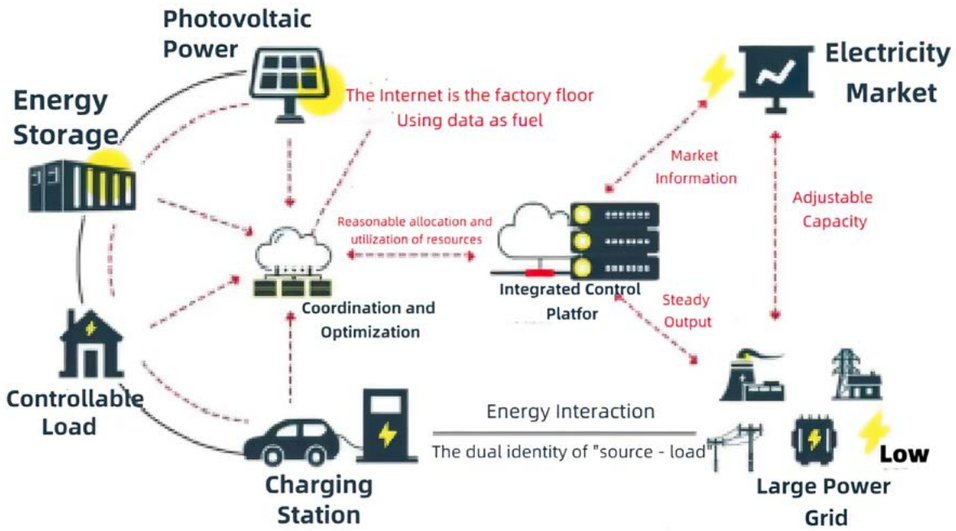
Source: China Energy Engineering Corporation Limited
Figure2: Integrated Solution

1. Integrated source-grid-load-storage construction. Building on the traditional "grid-load" transportation power supply system, the project integrates a 130-kilometer photovoltaic power generation system, a regional microgrid, large-capacity energy storage facilities, and smart electricity equipment. This forms a multi-tiered transportation-energy integration system that fuses source, grid, load, and storage, providing continuous green and clean energy for infrastructure, vehicles, and industries derived from road-related activities.

Source: China Energy Engineering Corporation Limited
Figure3: New Energy Storage System

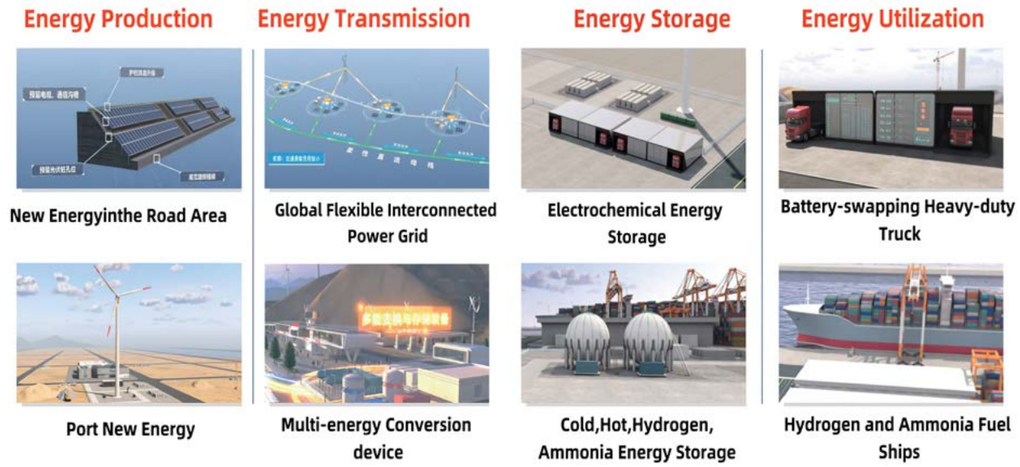
2. Intelligent vehicle-road-energy-cloud integration. Using next-generation information and communication technologies, the project has built a smart management platform that collects real-time data on vehicle information, road conditions, and energy management. It balances and adjusts energy distribution based on time and spatial discrepancies, optimizing the global scheduling of green electricity and transportation capacity. This enables efficient coordination of active vehicle safety controls, road operations, and energy station management, realizing intelligent management of the vehicle-road-energy-cloud system.

3. Green energy use in transportation. The project adopts a wind-solar-storage complementary model, utilizing photovoltaic power generation across various scenarios such as slopes, interchange ramps, rooftops, and carports. It primarily uses solar energy generated from a range of materials, including monocrystalline silicon and cadmium telluride components, supplemented by wind energy. Combined with energy storage systems, this setup produces green electricity, which is then converted into green transportation capacity through charging stations and battery swapping facilities.



Source: China Energy Engineering Corporation Limited
Figure 4: Green Energy Solutions for Transportation

4. Industrial clustering of transportation and energy. In the follow-up development plan, high-energy-consuming industries such as hydrogen production, ammonia production, cold chain logistics, and scenarios like battery swapping for heavy trucks and electrified highways will be introduced for joint development. This will further enhance the consumption of green electricity. Additionally, the project will leverage the transportation sector's role as a connector and the clustering effect of the energy industry to promote the large-scale and clustered development of related upstream and downstream industries along the road. This will further amplify the economic and social value of transportation-energy integration.



Source: China Energy Engineering Corporation Limited
Figure 5: Integrated Technical Equipment Solution

III. Major Achievements

Zaozhuang-Heze Expressway transportation-energy integration project has successfully transformed the theoretical concept of integrating highways with energy production into practical reality. In the process, the project addressed various real-world challenges such as safety and light environment impacts, laying a solid foundation for the further development of transport-energy integration industries and providing a feasible practical solution.

Source: China Energy Engineering Corporation Limited
Figure 6: Multi-Scenario Photovoltaic Deployment

1.Economic benefits: As of the end of July 2024, the first phase of the project in the Jinxiang section generated 27 million kWh of clean electricity, yielding direct economic benefits of approximately 11 million yuan (1.53 million USD). The project has played an active role in alleviating local electricity demand during summer peak periods while reducing energy costs for the expressway and its surrounding areas. The Zero-Carbon Smart Service Area in Jinxiang generated 450,000 kWh of clean electricity by the end of July 2024, covering 48% of the service area's total energy load and reducing energy costs by about 360,000 yuan.

2. Environmental benefits: The photovoltaic installation along the slopes of sections 1-4 of the Zaozhuang-Heze Expressway in Jinxiang was completed in May 2024, spanning a total of 32 kilometers with an installed capacity of 22.09 megawatts. Currently, the system provides around 7% of clean energy for local consumption. The project is expected to generate an average of 24.37 million kWh annually, saving 7,444 tons of standard coal and reducing carbon dioxide emissions by approximately 20,200 tons per year.

3. Standards development: The project took a full lifecycle approach, covering planning, design, construction, operation, and maintenance, and introduced China's first Highway and Energy Integration Standards System. It also led the development of five critical standards for the implementation of transport-energy integration projects, including "Photovoltaic Design for Highway Roadside Areas", "Construction and Light Impact Evaluation", "Safety Evaluation", and "Operation and Maintenance Technology".

Source: China Energy Engineering Corporation Limited
Figure 7: Building Integrated Photovoltaic (BIPV)

4.Pioneering new technologies: The project continues to explore and apply advanced demonstration technologies, including photovoltaic mirror self-cleaning systems, automated cleaning systems for dust accumulation on photovoltaic panels, automated monitoring of slope and structural stability, the use of cadmium telluride photovoltaic glass, diversified applications of photovoltaic components and brackets, and drone patrols with fault diagnosis capabilities.

Source: China Energy Engineering Corporation Limited
Figure 8: Jinxiang Zero-Carbon Smart Service Area Night View

The project combined the "supply, transmission, storage, and utilization" aspects of the energy system with the "construction, management, maintenance, and operation" functions of the transportation sector. It proposed an integrated solution that includes "five-in-one" aspects: integrated planning and design, integrated construction, integrated operation management, integrated technical equipment, and integrated standard specifications, providing experience of the transportation-energy integration development for other countries and regions.

6.Fostering Green Mobility in Cycle Revolution

Provided by Institute for Transportation and Development Policy

I. Overview

Copenhagen is the capital of the Kingdom of Denmark and the political, economic, cultural and transportation center of Denmark. In 2013 it was selected as "the most livable city in the world" by UN Habitat, and was rated as "the best designed city". At present, the population of Copenhagen is about 1.38 million. According to data from the Technical University of Denmark, approximately 45% of residents in Copenhagen commute to work or school by bicycle in 2023, with a total length of 560 kilometers of bike lanes.

Traffic congestion and emission reduction are thorny issues faced by major cities around the world. The roads in the center of Copenhagen are narrow, and for many years, motor vehicles have occupied a large amount of land. To solve this problem, the Copenhagen government realizes the need for prolonged efforts by expanding the bicycle network and public transportation, while restricting and reducing motor vehicles.

The Copenhagen government formulated the "Copenhagen Bicycle Strategy 2011-2025" in 2010, which aims to renovate the existing bicycle lanes in the city center and outskirts, and construct new cycle superhighways to establish a bicycle transportation network that meets safe, speedy, and comfort standards. At present, there are four types of bicycle lanes in Copenhagen: bicycle lanes, roadside bike lanes, green bike lanes, and cycle superhighways.

II. Solutions

Formulate development plans and policies for bicycles. Since the 1980s, Copenhagen has formulated a series of plans and policies for the development of bicycles, such as the Transport and Environment Plan, Ecological City, 2025 Climate Plan, Cycle Track Priority Plan 2017-2025, and Visionsplan 2021-2045 - Concept for Cycle Superhighways Routes, placing the development of bicycles in an extremely important position, clarifying the development goals of bicycles, and introducing a series of bicycle development measures, continuously improving the public's awareness and satisfaction with bicycle travel, thereby increasing the citizens' willingness to use bicycles for travel and the proportion of bicycle travel.

Table 1: Copenhagen Cycle Development Policies

Time	Document	Main Content
1980	*Cycle Network Plan*	Comprehensively plan and construct the bicycle network within the city.
1997	*Transport and Environment Plan*	Control the growth of automobile transportation and vigorously develop bicycles and public transportation.
2000	*Traffic Improvement Plan*	Refined the development goals for bicycles
2001	*Copenhagen Traffic Safety Plan*	Propose to reduce the mortality rate of bicycle accidents by 40% from 2001 and 2012.
2002	*Cycling Policy 2002-2012*	For the first time, a series of plans were formulated around the development of bicycles.
2006	*Cycle Track Priority Plan 2006–2016* *Action Plan for* *Safe Bicycle Traffic 2007–2012*	Newly construct 70 kilometers of bicycle lanes within 10 years. Complete the renovation of 20 high-risk intersections by 2012.
2007	*Ecological City*	Propose to build Copenhagen into the "World's Best Bicycle City" and strive to increase the city's bicycle commuting share by at least 50% by 2015.
2011	*Bicycle Strategy 2011–2025*	The best bicycle city in the world, with a bicycle commuting ratio increasing from 34% in 2010 to 50% in 2025. Compared to 2005, the proportion of serious cycling injuries will decrease by 60% by 2020, and by 2025, the proportion of residents feeling safe while cycling will reach 90%.
2012	*2025 Climate Plan*	By 2025, Copenhagen will be built into the world's first carbon neutral city, with the development of bicycles as a key focus for reducing emissions in the transportation sector.
2017	*Cycle Track Priority Plan 2017–2025*	Clear list of bicycle lane construction and improvement
2017	*Superhighways Routes*	Cooperate with 23 suburban towns to build 45 bicycle highways by 2045, covering approximately 750 kilometers.
2017	*Vision Zero*	Reduce the risk of traffic accidents to zero by 2025.
2019	*Visionsplan 2021-2045 - Concept for Cycle Superhighways*	Cooperate with 29 suburban towns to build over 60 bicycle highways, covering more than 850 kilometers, by 2045.

Safe and convenient, perfect bicycle infrastructure. First, promote the construction of bicycle lanes. Most bicycle lanes have been elevated and curbstones have been added to create a physical separation between bicycle lanes and motor vehicle lanes, effectively enhancing driving safety. Second, optimize the traffic signal system. At a large number of crossroads, priority is given to bicycle signals and "green waves" are set up for bicycles (adjusting traffic lights according to the needs of cyclists during peak hours). Bicycles are usually given at least 4 seconds of signal priority to avoid conflicts with right turning vehicles and improve the traffic capacity of bicycle lanes. Third, build cycle superhighways that connect the Copenhagen region, improve the convenience and safety of cycling, and encourage more people to choose cycling as a commuting method. In 2023, Copenhagen opened two new cycle superhighways, the Aved ø re route and the Ryparken Valby route.

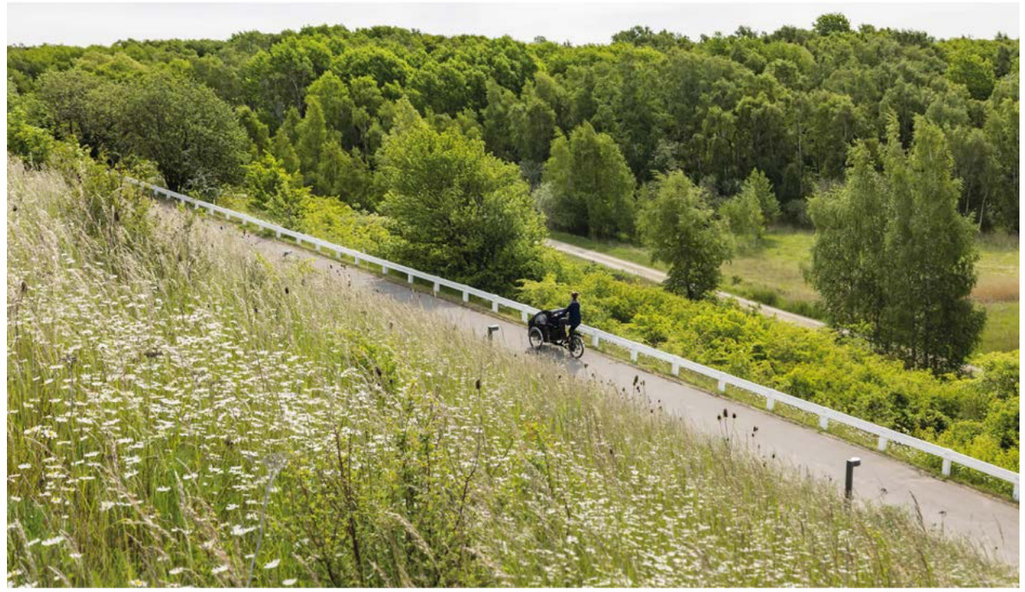


Photo: Avedøre Superhighway

Seamless connection to create an convenient bike transfer network. Copenhagen integrates bicycles with various modes of public transportation, including trains, subways, buses, and taxis, all equipped with bicycle carriages or frames, allowing cyclists to carry bicycles on public transportation. At the same time, large rail stations and hubs are also equipped with large-scale above ground and underground bicycle parking facilities, and even include supporting services such as bicycle maintenance. In addition, Copenhagen has integrated the design of ground bus stops and bicycle lanes, which can avoid interference with bicycles caused by buses entering or leaving the station, regardless of whether the bicycle lane is located behind or in front of the bus stop.

III. Major Achievements

According to data from the Technical University of Denmark, in 2023, Copenhagen has 397 kilometers of dedicated bike lanes, 33 kilometers of roadside bike lanes, 66 kilometers of green bike lanes, and 64 kilometers of superhighways, collectively forming the city's bike network; The number of bicycles has reached 744500, which is more than five times the number of cars; 44% of people are satisfied with the overall bicycle infrastructure in Copenhagen; 76% of people feel that cycling in Copenhagen is very safe.

Table 2: Copenhagen Cycle Routes Length (kilometer)

Type	2020	2021	2022	2023	2025
Cykelstier i alt	386	388	392	397	423
Cykelbaner i alt	33	33	33	33	18
Cykelbaner i alt	64	65	65	66	115
Supercykelstier i Københavns Kommune, i alt	35	35	55	64	136
Total	518	521	545	560	692

From an economic perspective, the construction and maintenance of bicycle networks are more cost-effective than highways or subways. Over the past 10 years, Copenhagen's average annual investment in the bicycle industry was 171 million kroner, while in comparison, building a subway costs 1.4 billion kroner per kilometer and building an additional kilometer of road on Copenhagen's Third Ring Road costs 200 million kroner. According to ITDP research, the construction and maintenance cost of motor vehicle infrastructure is approximately $1.5 billion per 1000 person kilometers globally, while the construction and maintenance cost of bicycle infrastructure is only $10.4 million per 1000 person kilometers.

Cycling reduces dependence on cars, reduces traffic congestion, lowers urban carbon emissions, and contributes to achieving sustainable development goals. According to a study by the Danish Cycling Union, if all factors are taken into account, bicycles emit an average of 21 grams of carbon dioxide per kilometer, and cars emit an average of 271 grams of carbon dioxide per kilometer, which is approximately 13 times that of cycling. People who choose to ride bicycles can reduce Copenhagen's carbon dioxide emissions by 90000 tons per year.

Cycling is beneficial for physical health. According to research, following Denmark's bicycle usage patterns globally may ultimately prevent approximately 620000 deaths due to obesity.

In addition, more bicycle travel has stimulated employment and economic opportunities. Industries related to bicycles can provide employment opportunities, especially in areas with relatively high demand for bicycles.

The development path of bicycles in Copenhagen has important reference significance for many countries, especially as bicycle travel is increasingly valued by governments and the public. Cities can learn from Copenhagen's experience, clarify the position of bicycles in sustainable development, strive to improve the convenience, safety, and comfort of bicycle facilities, and promote low-carbon urban development.

7.Harnessing Data-Driven Solutions for Global Road Safety and Sustainable Transport

Provided by International Transport Forum

I. Overview

The International Traffic Safety Data and Analysis Group (IRTAD) of the International Transport Forum (ITF) plays a central role in promoting and enhancing global road safety. Since its establishment in 1988, IRTAD has evolved into a respected platform for international cooperation, serving as a permanent working group of the ITF dedicated to enhancing road safety through the rigorous collection, standardization, analysis, and dissemination of road traffic crash data.

The group brings together a wide range of stakeholders, committed to reducing road traffic fatalities and serious injuries. Today, IRTAD comprises more than 80 members and observers from around 40 countries, including national administrations, international organizations, research institutes, academia, automobile associations, insurers, manufacturers and other non-governmental organizations. This broad and diverse membership base facilitates a rich exchange of knowledge, experiences, and best practices across borders and sectors. The IRTAD Group is open to non-ITF member countries too.

At the core of IRTAD's mission is the recognition that high-quality, reliable data is essential for effective road safety policy. To this end, IRTAD maintains and continually enhances an internationally recognized database of validated road crash data. This database allows for consistent cross-country comparisons, providing invaluable insights into trends in road deaths for different user groups and road types. By offering this empirical foundation, IRTAD supports evidence-based policymaking and strategic planning in road safety at both national and international levels.

One of IRTAD's defining features is its commitment to methodological rigor and data standardization. The group works to harmonize definitions, data collection methodologies, and reporting standards among member countries, ensuring comparability and accuracy. Furthermore, IRTAD publishes detailed annual reports summarizing traffic safety performance in participating countries, highlighting progress and areas requiring further action. These reports serve as benchmarks for policymakers and researchers, aiding in evaluating existing policies and formulating new, targeted interventions. The annual report is completed with country-specific chapters for all countries of the IRTAD Group, providing detailed analysis for each country and summarizing current road safety strategies and plans ahead to further reduce the number of road deaths and serious injuries. These individual country chapters are a mine of information and can be a source of inspiration for other countries.

Beyond data collection and analysis, IRTAD also plays a critical role in capacity building and technical cooperation. Through workshops, training sessions, peer reviews, and knowledge exchange, IRTAD assists countries in strengthening their own road safety data systems and analytical capabilities. These initiatives are instrumental in fostering institutional development and supporting the implementation of comprehensive, data-driven road safety strategies.

The IRTAD Group has inspired the work of regional road safety observatories, including in Latin America, Africa and Asia-Pacific. These observatories largely use the structure of the IRTAD database and the annual report for their reporting. The IRTAD Group regularly organizes coordination meetings between these observatories to share information on respective safety challenges in the different regions, data collection issues, programmes of work, training seminars, etc. IRTAD's work directly contributes to global efforts to achieve the road safety targets outlined in the United Nations Sustainable Development Goals (SDGs), particularly those aimed at halving the number of road traffic deaths and injuries.

Building upon this foundation, the following sections explore IRTAD's key solutions and achievements, highlighting how its integrated data systems, analytical tools, and capacity-building efforts contribute to safer and more sustainable transport systems worldwide.

II. Solutions

Data-Driven Insights through Harmonized Collection and Analysis

At the core of IRTAD's work is the systematic collection, harmonization, and rigorous analysis of road safety data from over 40 member countries. By promoting the use of standardized definitions, classification systems, and data collection methodologies, IRTAD enables consistent and comparable insights across different national contexts. This alignment is crucial for identifying international trends, assessing policy effectiveness, and informing the development of robust, evidence-based road safety strategies.

The data collected and curated by IRTAD covers a wide range of indicators, including road crash statistics, information on fatalities and serious injuries, vehicle fleet composition, and various exposure metrics such as traffic volume and kilometres travelled, as well as performance indicators on seatbelt and motorcycle helmet use. This information is stored in a centralized and publicly accessible database hosted via the OECD statistics portal. The database includes validated data spanning back to 1970, offering a uniquely rich and longitudinal perspective on road safety developments.

Having access to decades of harmonized data allows policymakers, researchers, and transport professionals to identify long-term trends, compare safety performance across countries, and model the potential impact of various interventions. By providing a consistent and transparent analytical framework, IRTAD enables stakeholders to make informed decisions that enhance road safety outcomes.

Capacity Building and Knowledge Exchange

Beyond its data-driven focus, IRTAD serves as a collaborative forum for knowledge exchange and professional development. It provides a platform for road safety experts, policymakers, researchers, and practitioners to come together and share the latest findings, tools, and innovations in the field. The biannual IRTAD meetings provide valuable opportunities for members to discuss current developments in data collection practices, emerging policy directions, and advances in analytical techniques.

To further strengthen national road safety systems, IRTAD organizes targeted workshops, practical training sessions, and country-specific road safety data reviews, depending on available resources and budget. Such activities are especially beneficial for countries seeking to enhance the reliability and usability of their own road safety data. By providing technical support and guidance, IRTAD assists countries in building institutional capacity, enhancing analytical skills, and aligning with international standards.

This exchange of experience and expertise fosters a culture of continuous learning and cooperation. Countries at different stages of road safety development can benefit from shared knowledge and lessons learned, leading to more effective outcomes.

Policy Support and Strategic Guidance

IRTAD complements its analytical and capacity-building efforts with strong policy support. Through publications such as the Road Safety Annual Reports, IRTAD offers comprehensive overviews of road safety performance across its member countries. These reports consolidate national data, present comparative analyses, and highlight policy actions that have proven effective in reducing road traffic injuries and fatalities.

In addition to detailed statistical overviews, the reports provide evidence-based recommendations that support strategic decision-making. Governments and institutions can leverage these insights to inform national safety plans, identify key risk factors, and allocate resources more effectively. The practical value of these publications lies in their ability to connect empirical evidence with real-world policy design and implementation.

III. Main Achievements

Source: AVIC INTL

Reduction in Road Fatalities and Socio-Economic Impact

Over the past twenty years, IRTAD member countries have collectively recorded a substantial reduction in road traffic fatalities, with overall Figures showing a decline of approximately 40 per cent. In several member countries, this reduction has been even more pronounced, exceeding 60 per cent. These results underscore the impact of consistent, data-informed policymaking and demonstrate the potential for significant progress when evidence-based interventions are implemented at scale.

The improvement in safety outcomes has been achieved through a combination of targeted strategies, including stricter enforcement of road safety laws, investment in safer infrastructure, enhanced vehicle standards, and widespread public awareness campaigns. This IRTAD's data-driven approach allows policymakers to focus efforts where they are most needed.

Beyond the vital benefit of saving lives, these advancements in road safety have also led to considerable socio-economic gains. Reducing the number of crashes, fatalities, and serious injuries has helped alleviate the financial burden on healthcare systems and emergency services. It has also led to a reduction in productivity losses associated with injury-related work absences and premature deaths, as well as decreased property damage. Collectively, these improvements have saved billions of euros in public and private sector costs. These savings are often reinvested into further safety improvements or other public priorities, creating a positive cycle of social and economic development.

Global Influence and Replicability

One of IRTAD's most significant strengths lies in the global applicability of its approach, as reflected by the development of regional road safety observatories. Its structured model of data harmonization, statistical analysis, and evidence-based policy guidance has been widely recognized as adaptable to various national and regional contexts.

Through initiatives such as twinning programmes, peer learning, and targeted capacity-building efforts, IRTAD has played a crucial role in supporting low- and middle-income countries in strengthening their road safety systems. The success of these efforts demonstrates that, with the right support and guidance, the benefits of IRTAD's approach are both scalable and transferable across different socio-economic settings.

Strategic Reporting and Knowledge Dissemination

A key feature of IRTAD's contribution to global road safety is its commitment to transparency and shared learning. Each year, the ITF, through IRTAD, publishes the Road Safety Annual Report. This flagship publication provides detailed overviews of national safety performance, identifies emerging trends, and highlights the policy actions taken across member countries.

The report serves as a valuable tool for decision-makers, offering a comprehensive source of up-to-date statistics, comparative indicators, and analytical commentary. It supports policymakers in assessing the effectiveness of their strategies, identifying areas for improvement, and aligning national efforts with international targets such as those defined by the United Nations Sustainable Development Goals.

In addition to informing national policy, these reports contribute to a broader global dialogue on road safety. They foster accountability and encourage continuous progress by promoting the open exchange of data, experiences, and innovations. Through these strategic publications, IRTAD continues to shape best practices and strengthen the global commitment to safer roads for all.

8.Leveraging Green Shipping Corridors to Decarbonize Shipping

Provided by C40 Cities

I. Overview

Source: Port of Shanghai

The shipping industry currently accounts for 2-3% (World Economy Forum, 2024) of global CO2 emissions, a Figure that could rise to 17% by 2050 without action (European Environment Agency, 2018). The shipping industry is a high-emissions sector powered almost entirely by fossil fuels.

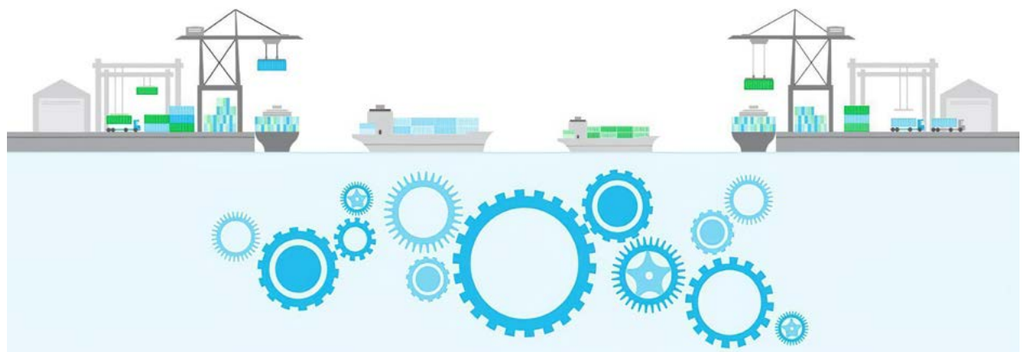
As shipping decarbonization is advancing, Green Shipping Corridors (GSC) have emerged as a collaborative space for catalysing the technical, commercial, and regulatory feasibility of zero emission shipping, particularly supporting supply and demand development for scalable zero emission fuels. The concept of GSC was introduced by the Clydebank declaration in 2021 (UK Department for Transport, 2023). GSC are generally defined as "specific trade routes where the feasibility of zero-emission shipping is catalyzed by public and private action". These projects can act as catalysts for shipping decarbonization by testing innovative collaboration models and helping scale zero emission ships and update zero emission fuels.

According to Global Maritime Forum, by November 2024, it is reported that globally 62 corridors have been launched, with the world's first GSC being the Los Angeles - Long Beach - Shanghai Partnership (LA-LB-SH GSC). It is jointly led by the Port of Los

Angeles (POLA), Port of Long Beach (POLB), and the Shanghai Municipal Transportation Commission (SMTC), supported by C40 Cities (a global network of megacities working together to tackle climate change through ambitious policies and collective action). Participating partners include the City of Los Angeles, A.P. Moller - Maersk, CMA CGM, COSCO Shipping Lines, Ocean Network Express (ONE), Evergreen, Shanghai International Ports Group (SIPG), China Classification Society (CCS), and the Maritime Technology Cooperation Centre (MTCC) – Asia.

This corridor connects the largest ports in the United States and China and focuses on one of the world's busiest container shipping routes, with the aim of showcasing cutting edge goods movement technologies, decarbonization applications, and best management practices to enhance efficiency. It also aims to catalyse technological, economic, and policy efforts to progressively decarbonize shipping and port-related activities.

In September 2023, during the North Bund Forum in Shanghai, the GSC Partnership unveiled its Implementation Plan (GSCIP) Outline (C40 Cities, 2023), which detailed the scope of the Green Shipping Corridor, key definitions used by the Partnership, as well as its goals. As part of the historic plan, the carrier partners will begin deploying reduced or zero lifecycle carbon emissions ships on the corridor by 2025, and work together to demonstrate the feasibility of deploying the world's first zero lifecycle carbon emission container ship (s) by 2030. Participants of the GSC Partnership also committed to taking steps to reduce carbon emissions and harmful pollutant emissions impacting air quality, through methods such as expanding the use of shore power and supporting the development of clean marine fueling infrastructure. The partners will work together to develop metrics to track decarbonization progress.



Source: C40 Cities

II. Solutions for ensuring Green Shipping Corridors' success

Green Shipping Corridors such as the LA-LB-SH GSC have emerged as a new form of collaboration that can advance climate action. They are crucial to catalyze shipping decarbonization, but also complex to navigate because of numerous factors, such as:

Cross-value chain collaboration: partnering organizations belong to different sectors have different ways of working and priorities;	International cooperation: the partnerships are working across political, cultural and administrative boundaries;	Voluntary partnerships: GSC partners make commitments willingly as "first movers", and not out of compliance with regulation;	Trade and competition: partners are used to being customers or competitors, rather than collaborators.

Effective governance can accelerate the impact of Green Shipping Corridors, catalyzing decarbonization of this globally critical sector and providing a model for international collaboration on other climate challenges (C40 Cities, 2024).

1.Defining a clear vision and strategy for the project

Green Shipping Corridors involve diverse stakeholders, so it is vital that these Partnerships are aligned on a clear vision, describing which impact the partners are expecting the corridor to have. As the corridor continues to progress and develops its strategy and workstreams, they should be linked with the corridor vision to have the partners prioritize certain activities.

Transparency and knowledge sharing between partners are also fundamental in order to foster trust, accountability and embrace the culture of learning - all of which can accelerate the progress of Green Shipping Corridors.

The LA-LB-SH GSC defined its high-level vision early on (C40 Cities, 2022) and used it as a foundation for developing a more detailed Implementation Plan Outline. In order to promote transparency and encourage knowledge sharing, the Partnership holds regular all-Partnership and working groups, thus presenting partners with an opportunity to share their progress. Finally, the LA-LB-SH Partnership published its Annual Progress report in October 2024.

2. Establishing a collaborative governance structure that facilitates efficient decision-making

It is crucial for GSC Partnerships to agree on a governance structure early on, in order to ensure efficient and effective decision-making. Given the voluntary nature of these Partnerships, having clarity regarding roles and responsibilities, as well as the scope of partner obligations, is key to allow the Green Shipping Corridor to progress.

Green Shipping Corridor partnerships can also benefit from the facilitation of a neutral convener (for example, a governmental agency, a local government or a non-governmental organization) which can provide guidance to the corridor without the risk of commercial conflict of interest. A convener can support the partnership in aligning on a clear strategy, facilitate sharing of confidential information, and help implement a governance structure.

Since its conception, the Los Angeles-Long Beach-Shanghai GSC has been supported by C40 Cities in the role of a neutral convener. As the Partnership moved from planning to implementation, it adopted a working structure in 2024 featuring a steering committee and three working groups to manage various aspects of its activities (the Energy Supply Working Group, the Carriers Working Group, and the Ports Working Group). The working structure helps ensure that:

- Partnership decisions can be made effectively and efficiently;
- Corridor leadership and members understand their roles, expectations, and responsibilities;
- Reporting and communication within and between the groups are defined;
- Information can be shared between partners with confidence.

3. Prioritizing stakeholder engagement

Green Shipping Corridors are an integral part of a complex Ports and shipping ecosystem, and stakeholder engagement is essential to set them up for success. The reasons for stakeholder engagement include:

- Knowledge Sharing: Essential for informed decision-making and effective implementation.
- Support and Collaboration: Critical to gather financial, political and technical support.
- Goal-Oriented Engagement: Aligning stakeholder efforts towards common decarbonization goals.
- Broad Perspectives: Engage diverse viewpoints to uncover hidden challenges and opportunities.
- Public Awareness: Raising awareness can generate broader support and acceptance.

The Los Angeles-Long Beach-Shanghai GSC Partnership initiated its stakeholder engagement activities early on and is working on establishing a comprehensive stakeholder engagement strategy.

III. Major Achievements

In October 2024, the Corridor Partnership published its first Annual Progress Report (C40 Cities, 2024), highlighting the significant progress made by the Partnership:

- Expanding SMTC's shore power facilities.
- Enhancing the Port of Shanghai's clean energy refueling capacity.
- Engaging with POLA/POLB fuel and bunkering service providers.
- Developing the Corridor alternative fuel demand/supply status.
- Developing a timeline for the planned vessel, fuels, and technology launches.
- Nominating carrier services that will be part of the LA-LB-SH GSC.
- Collecting the carriers low carbon emission fleet development roadmap.

The Report also outlined its next steps:

- Improve bunkering service efficiency in Shanghai
- Develop a framework for metrics and monitoring
- Address questions about fuel standards and supply, carbon intensity, and availability
- Establish a production/supply schedule or the Corridor fuel demands
- Establish a fuels standard within the Corridor framework
- Align POLA/POLB incentive programs to meet Corridor needs

The progress made by the Los Angeles-Long Beach-Shanghai GSC Partnership over the past 3 years serves as an inspiration for Green Shipping Corridor projects all over the world. All in all, GSCs are expected to demonstrate that green shipping can be economically viable, working on engaging all necessary value chain actors, including fuel producers, shipowners, operators, cargo owners, and regulators, and provide certainty for investments in zero-emission infrastructure, potentially leading to cost savings through more efficient operations and reduced environmental compliance costs. On a greater scale, maritime decarbonization could create up to 4 million new jobs by 2050, particularly in the Global South (C40 Cities, 2025) and green shipping corridors are key to facilitating this transition. Finally, Green Shipping Corridors and shipping green transition will reduce emissions and improve air quality, thus contributing to healthier environments for port communities. This can lead to reduced healthcare costs and improved quality of life for residents, which can be quantified in terms of cost savings and health outcomes.

9.MaaS Leading the Upgrade of Transportation Service Models

Provided by Beijing Municipal Commission of Transport

I. Overview

Beijing, located in the northern part of the North China Plain, is the capital of the People's Republic of China. It serves as the national political center, cultural center, international exchange center, and technological innovation center. The total area of the city is 16,000 square kilometers, with a permanent resident population of 21.86 million. Beijing is one of the first batch of demonstration cities for public transportation development in the country. As of 2023, the city has 27 subway lines in operation, covering a total distance of 836 kilometers, and 4 suburban railway lines with a total distance of 400 kilometers. There are 1,285 regular bus routes in operation, with an average daily ridership of approximately 38.1 million in the central urban area, and the proportion of green travel (an environmentally friendly way of traveling that aims to minimize carbon footprint and protect the natural and cultural environments while supporting local sustainable development.) is about 74.7%.

As the urban travel radius continues to expand and the variety of transportation modes increases, single-mode transportation services can no longer meet the travel needs of citizens. Transportation modes are not well integrated. Public transport connections and transfers are inconvenient and less attractive. The high proportion of car travel remains a significant issue. To address major traffic issues such as congestion and air pollution faced by mega-cities, it is essential to enhance the attractiveness of public transport by providing diverse, multi-modal "door-to-door" integrated green travel services. This approach focuses on creating rich combinations of transportation scenarios that encourage the use of public transport and promote sustainable travel options.

MaaS (Mobility as a Service) refers to the integration of various transport services into an on-demand, unified travel service platform. Its core objective is to shift travelers from car ownership to using transport services, improving the public transport experience for citizens. This concept has become a significant international trend that many major cities around the world are focusing on. In November 2019, Beijing launched the country's first integrated green travel service platform (referred to as Beijing MaaS), which is currently in its 2.0 development phase. The Beijing MaaS employs a "public-private partnership" model, opening and sharing public transport data to integrate multiple modes of transport, including walking, cycling, ground buses, rail transit, parking, private car use, taxis, trains, and aviation. Leveraging social mobility service platforms such as Amap and Baidu Maps, Beijing MaaS provides the public with "door-to-door" integrated travel services. This initiative has effectively enhanced the attractiveness of public transport and promoted sustainable green development in transportation.

II. Solutions

Beijing MaaS adheres to the development philosophy of "green and integrated", focusing on building platform systems, providing product services, and exploring sustainable development, which has achieved good results and positive social response.

Establish a positive development ecosystem through public-private collaboration. Beijing MaaS adheres to the principles of "effective market and proactive government" and focuses on public service positioning, fully leverages the advantages of government, transportation enterprises, and internet platforms, creating a model characterized by "government guidance, industry support, and internet reach". The government mainly oversees MaaS development planning, the open sharing of public transport data, platform operation supervision, and policy mechanism support. Transportation enterprises are primarily responsible for building transportation infrastructure, ensuring capacity, and collecting and aggregating data. Internet platforms focus on the application of public transport data, travel scenario services, and platform operation and maintenance. Together, these parties have built a cooperative and mutually beneficial ecosystem linked by data.

Aggregate and share data to build a solid data foundation. Beijing was the first in the country to issue regulations for the management of open transportation data. Leveraging the transportation industry's big data center, it has integrated and publicly shared 14 categories of public transport data across four main areas: ground buses, rail transit, static traffic, and road network operations. Standardized processes have been established for data aggregation and process, open data application, sharing and evaluation, ensuring that public transport data is reliable, controllable, and efficiently circulated. This framework provides comprehensive oversight throughout the data lifecycle and establishes a strong data foundation for Beijing MaaS.

Provide precise and efficient services to attract the public to choose green travel. Beijing MaaS fully leverages the expertise and wide reach of social mobility service platforms such as Amap and Baidu Maps. It offers the public integrated travel planning, real-time bus and crowding information, subway arrival forecast and crowding information, comprehensive navigation and stop reminders, barrier-free guidance, and assistance for senior people to get cars. The platform's user base continues to grow, with an average of 5.5 million users opting for green travel services daily. It has become an essential tool for citizens' everyday commuting.

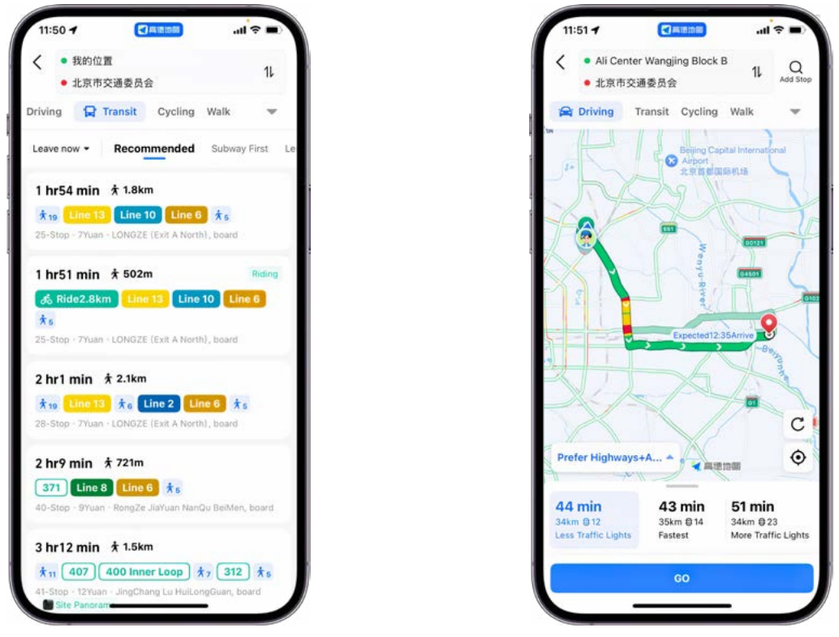


Figure 1: Integrate travel plan of Amap

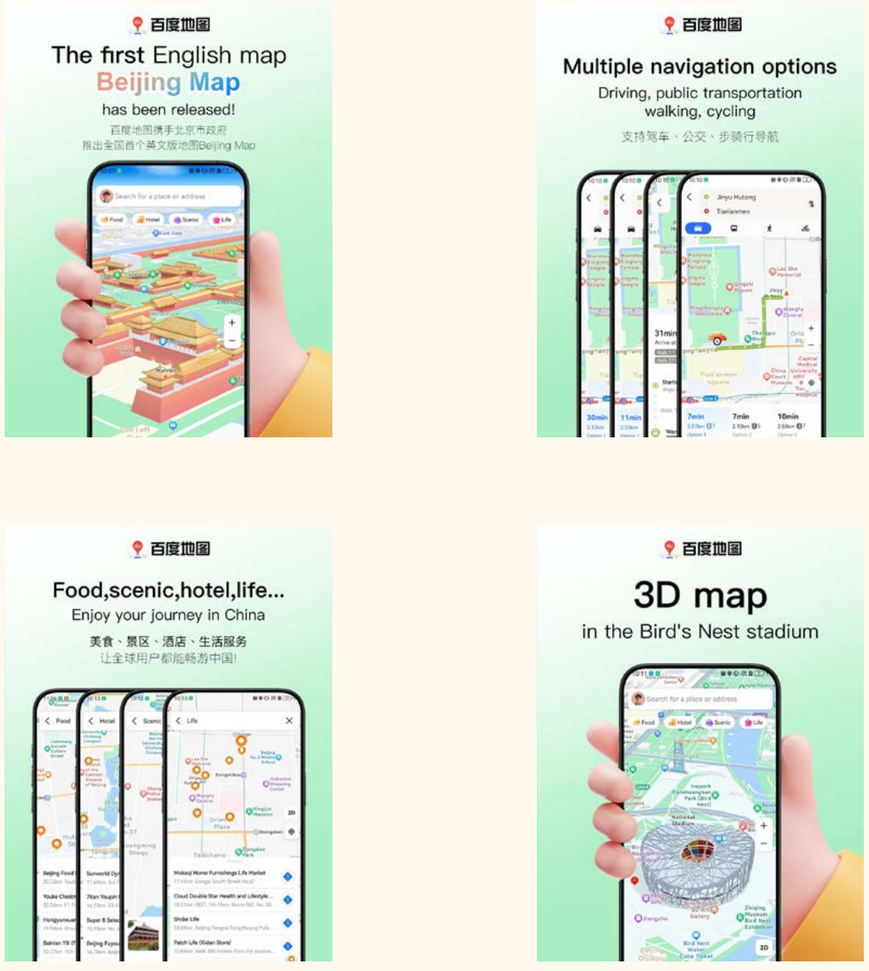


Figure 2: Baidu Map

Provide carbon-inclusive incentives to support green and sustainable development. Beijing is the first in the country to issue a methodology for carbon reduction in green travel- "Beijing Low-Carbon Travel Carbon Emission Reduction Methodology (Trial Implementation)". Leveraging platforms like Amap and Baidu Maps, Beijing regularly conducts the "MaaS Travel, Green Movement Across the City" carbon-conscious incentive campaign. This initiative converts users' green travel mileage into carbon reduction metrics and achieved the world's first market transaction of carbon reduction from green travel, creating a closed-loop carbon trading system. The revenue generated from these transactions is returned to green travelers in various forms, such as public transport cards, shopping vouchers, gifts, or charitable donations. This has established a positive incentive mechanism that promotes green travel, effectively driving sustainable development in transportation.

III. Major Achievements

As of now, the Beijing MaaS platform has accumulated over 30 million users, with an average of more than 5.5 million users opting for green travel services daily. The number of registered users for the MaaS carbon-conscious initiative has surpassed 5.3 million, with a cumulative carbon reduction of nearly 780,000 tons and over 270,000 tons of carbon reduction successfully traded. The multi-dimensional, mutually beneficial ecosystem created by Beijing MaaS has been operating steadily for five years. The development of the Beijing MaaS system is expected to drive the entire industry chain, including new transportation infrastructure, intelligent transportation applications, and autonomous driving, potentially forming an industry scale of hundreds of billions.

The integrated green travel services provided by Beijing MaaS better meet the public's demand for a "better travel" experience, and the vision of "people enjoying their journeys" is gradually becoming a reality.

Promote more people to choose green travel to facilitate the city's low-carbon transition. Surveys show that since the launch of the Beijing MaaS carbon-conscious initiative, 13% of users who initially traveled less than 3 times a week unclear passage, needs revision have transitioned into green travel advocates, effectively contributing to carbon reduction in transportation.

Facilitate people's travel by public transport to enhance public transport convenience. By offering integrated travel planning, real-time bus updates, comprehensive navigation, and stop reminders, Beijing MaaS has improved the travel experience for citizens using the "bus + cycling/walking" combination, thereby increasing the attractiveness of public transport.

Care for vulnerable groups to improve the inclusiveness of transport. Beijing MaaS has introduced services such as barrier-free way navigation and assistance for senior people to get cars to provide thoughtful and comprehensive travel support for vulnerable groups, including the elderly and people with disabilities. This ensures that the benefits of transportation development are shared by the entire society.

Beijing MaaS has explored and practiced construction experiences that serve as a model for cities both domestically and internationally. It has been included in the Ministry of Ecology and Environment's "Beautiful China, I Am an Actor" exemplary list and recognized as a demonstration project by the State Administration for Market Regulation regarding energy measurement services. Additionally, it has been showcased as a highlight achievement at the China International Fair for Trade in Services for three consecutive years. Many cities in China are learning from Beijing's experience to develop their own MaaS initiatives. Macau has successfully implemented local MaaS services, launching features such as real-time bus and real-time parking space information. Future plans include offering more integrated travel services for scenarios like cross-border vehicles, barrier-free travel, and hotel shuttle buses. Cities like Changchun and Xi' an are also planning to undertake similar initiatives.

10.Multi-Fuel Bunkering and Maritime Decarbonization in Singapore

Provided by Ministry of Transport, Singapore

I. Overview

One of the biggest challenges of decarbonization of the maritime industry is transitioning from conventional fossil-based bunker fuels to zero or near-zero carbon emission alternative fuels. Singapore is supporting the industry's energy transition by preparing for a multi-fuel bunkering future and supporting the use of alternative fuels to reduce carbon emissions in line with global sustainability goals. This includes ensuring safe handling of new fuels, and conducting operations for bunkering of alternative fuels to inform and assess the development of operational and safety procedures, and developing a robust regulatory environment.

II. Solutions

a. Biofuel

Biofuels are produced from living matter, including waste, crops and plants. As the carbon dioxide released when biofuels are used originates from the atmosphere, biofuels are carbon neutral and are a viable alternative to Heavy Fuel Oil (HFO), although they are not zero-carbon.

The Maritime and Port Authority of Singapore (MPA) has developed a marine biofuel provisional standard for biofuel blends of up to 50% (B50) and plans to expand the standard to include biofuel blends of up to 100% (B100) by 2025. MPA has also set targets for all new harbor craft operating in Singapore's port to be fully electric, capable of using B100 biofuel or compatible with net-zero fuels like hydrogen from 2030. Over the years, the maritime industry has progressively bunkered higher amounts of biofuels and at higher blends.

b. Methanol

Methanol is gaining traction for use in international shipping in the near-term, with increasing orders for methanol-fuelled ships. EnterpriseSG and MPA are developing the Singapore standards for methanol bunkering by 2025. The standards will cover custody transfer requirements, safety procedures and crew competencies, to ensure safe bunkering operations and handling of these fuels.

In Jul 2023, the world's first ship-to-containership methanol bunkering operation was conducted in Singapore for the Laura Maersk on her maiden voyage to Copenhagen. MPA, together with the relevant government agencies and industry partners, facilitated the successful bunkering of approximately 300 metric tonnes of green bio-methanol for the container vessel, before she continued her journey to Copenhagen.

More recently in May 2024, the first simultaneous methanol bunkering and cargo operation (SIMOPS) was successfully completed in Singapore. This followed the successful ship-to-ship methanol bunkering of close to 1,340 metric tonnes of blended methanol for the vessel Stena Prosperous a few days prior. With the completion of two milestone methanol bunkering operations in May 2024, MPA is taking steps to develop full capability to deliver methanol bunkering at a commercial scale.

First simultaneous methanol bunkering and cargo operation

Ship-to-ship bunkering of blended methanol for the Stena Prosperous

Safety zones have also been established, with response vessels positioned, and environmental, metocean and safety risk modelling conducted by various research organizations and institutions. Drones equipped with methanol detectors and infrared cameras are also deployed for additional detection ports. These operations will also contribute to the development of mass flow meters and digital bunkering solutions for alternative fuels.

MPA is also developing a regulatory framework, including the licensing of methanol bunkering suppliers, and the local methanol bunkering ecosystem. To this end, MPA issued an Expression of Interest (EOI) on 14 Dec 2023 inviting industry stakeholders to propose solutions for the supply of methanol as a marine bunker fuel in the Port of Singapore. The EOI would allow MPA to better understand a) the sources of methanol supply for the Port of Singapore, and b)

the feasibility of developing an end-to-end bunkering supply solution for methanol procurement, storage, sale and delivery as a marine fuel in Singapore at commercial scale from

Proposals received showed that there was interest for more than 1 million tonnes per annum (MTPA) of low-carbon methanol to be supplied as a marine fuel in Singapore before 2030, subject to commercial decisions and global developments.

c. Ammonia

Green ammonia is carbon-free but carries associated risks because it is a colorless, highly toxic gas that is harmful to humans and marine life. Similar to the approach for methanol, Enterprise SG and MPA are developing the Singapore standards for ammonia bunkering by 2025. The standards will cover custody transfer requirements, safety procedures and crew competencies, to ensure safe bunkering operations and handling of these fuels.

Singapore has also embarked on operations for ammonia bunkering to similarly inform the development of operational and safety procedures, especially given ammonia's toxicity. In March 2024, Fortescue, with the support of MPA, government agencies, research institutes, and industry partners, successfully conducted the world's first use of ammonia, in combination with diesel in the combustion process, as a marine fuel onboard the Singapore-flagged ammonia-powered vessel, the Fortescue Green Pioneer, in the Port of Singapore.

In preparation for the operation, Hazard Identification Study and Hazard and Operability Study workshops were jointly organized by MPA, Fortescue, Vopak, research institutes, and industry partners. The workshops aimed to identify the potential risks during fuel transfer and engine trials and to develop the necessary prevention, control, and mitigation measures. A second trial took place over a period of seven days in May 2024, where the vessel used 4.4 tonnes of ammonia in combination with HVO to conduct propulsion and manoeuvrability trials.

MPA, in collaboration with the Energy Market Authority (EMA), has also taken steps to build up the local ammonia supply chain and develop regulatory frameworks for ammonia bunkering. MPA and the Energy Market Authority (EMA) launched an Expression of Interest (EOI) to invite proposals from industry stakeholders on developing end-to-end low or zero-carbon ammonia power generation and bunkering solutions in Jurong Island in Dec 2022. Following the conclusion of the EOI, MPA and EMA conducted a Request for Proposal (RFP) and worked with select interested industry stakeholders on a pre-Front End Engineering Design (pre-FEED) study for ammonia import terminals, ammonia bunkering and ammonia power generation to further develop and refine the proposed solutions. MPA and EMA will select a lead developer to implement the project with the government by 2025.

Fortescue Green Pioneer

d. Seafarer and Port Worker Training to Handle New Fuels

Maritime workers need to acquire new skills to safely handle alternative fuels and operate alternative-fueled vessels. To bridge the skills gap, MPA established the Maritime Energy Training Facility (METF), supported by the industry, to train the global maritime workforce. METF targets to train approximately 10,000 seafarers and other maritime personnel by the 2030s, with facilities progressively developed by 2026. METF aims to align with the efforts of the Maritime Just Transition Task Force (MJTTF) by implementing the Baseline Training Framework for Seafarers in Decarbonization, which is under development. This initiative will directly support the joint IMO–MJTTF project to establish training standards for seafarers in decarbonizing shipping, complementing the IMO's ongoing comprehensive review of the International Convention and Code on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW).

Industry partners at the first wave of onboarding in Apr 2024

The Singapore Maritime Academy (SMA) has introduced one of the first training courses in the Asia Pacific region focused on handling methanol as ship fuel. AcSourceed by MPA, this course covers operational and safety procedures during methanol refueling, which were developed by MPA following the first-ever ship-to-containership methanol bunkering operation in Singapore in July 2023. It also includes a practical methanol firefighting component addressing both shipboard and terminal fire scenarios.

e. Multilateral and Plurilateral Collaborations

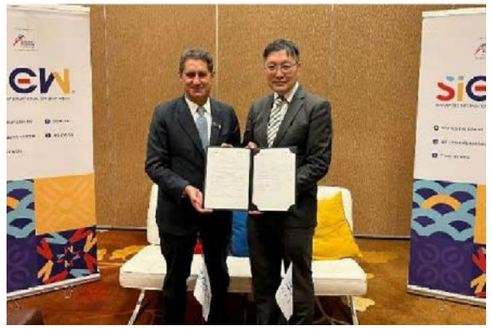
MPA also works through multilateral platforms and with international organizations such as like the International Energy Agency, International Renewable Energy Agency (IRENA) and the International Maritime Organization (IMO), to advance the energy transition and encourage value chain collaboration. MPA signed an MOU with the International Energy Agency in Apr 2024 to work together on projects relating to the decarbonization of the maritime and port industries. This collaboration focuses on advancing development and transition to zero and near-zero emission fuels, technologies that aid maritime decarbonization, exchanging best practices across the maritime and energy sectors through capacity-building training programs, and leveraging networks and expertise.

MPA and IRENA formalized collaboration through a MOU aimed at accelerating the energy transition of global maritime and port sectors in Oct 2024. This initiative aligns with the goals of the IMO and Singapore's Nationally Determined Contributions (NDCs). Under the MOU, MPA and IRENA will bring

together their expertise in renewable energy and maritime innovation to promote knowledge exchange and best practices across the maritime and energy industries, focusing on clean energy infrastructure and supply chains for zero and near-zero emission fuel. Additionally, MPA and IRENA will support countries in their transition to and adoption of zero and near-zero emission fuels and technologies through capacity-building training programmes.

MPA Chief Executive and IEA Executive Director at Singapore International Energy Week 2024

MPA and IEA signed a collaboration MoU in Apr 2024



MPA and IRENA signed a collaboration MoU in Oct 2024

f. Knowledge Sharing and Standards-Setting at IMO

Singapore actively shares the learning points from our methanol-and ammonia-related trials with other member States at the IMO. For methanol, we conducted a presentation at the 9th Carriage of Cargoes and Containers (CCC) subcommittee meeting in Sep 2023 on our first ship-to-ship methanol bunkering trial. For ammonia, we presented learnings from our ammonia bunkering trial at the 81st Marine Environment Protection Committee (MEPC) meeting in Mar 2024 and 108th Maritime Safety Committee (MSC) meeting in May 2024.

To further provide concrete proposals to guide discussions at the IMO, Singapore submitted a paper to the 8th CCC meeting in Sep 2022 on the development of interim guidelines for the use of ammonia as a fuel on board ships and another paper at the 108th MSC meeting in May 2024 on the development of a safety regulatory framework for ships using new technologies and alternative fuels.

11.Optimizing Tugboat Operations for Emissions Reduction

Provided by International Maritime Organization

I. Overview

Ports around the world play a crucial role in international trade but are also significant sources of greenhouse gas (GHG) emissions. Given the critical role tugboats play in facilitating port operations, optimizing their use presents a powerful opportunity to reduce emissions while improving efficiency. Tugboats, responsible for guiding larger ships into port, are often underused or inefficiently scheduled, leading to higher emissions and unnecessary fuel consumption. Understanding how tugboats are deployed and how their fuel consumption can be optimized is key to reducing the environmental footprint of port operations.

The main problem is the inefficiency in the use of tugboats, which leads to higher-than-necessary emissions in ports. Many ports lack a clear understanding of how tugboat operations contribute to their overall fuel consumption and emissions. Improving the scheduling, coordination, and planning of tugboat operations can reduce fuel consumption, cut operational costs, and contribute to the port's overall sustainability goals.

This project focuses on assessing and optimizing tugboat operations through a data-driven approach. The process begins with a mapping of port processes and assessing current operations to establish a baseline of fuel consumption and emissions. Next, key inefficiencies are identified, and a Kaizen-style workshop, which focuses on continual improvement, is conducted, involving all relevant stakeholders, to identify actionable solutions. The International Maritime Organization's (IMO) Green Voyage 2050 Programme provided technical support to a major container port in Malaysia in this work. GreenVoyage 2050's role is to assist developing countries in implementing practical, low-and net zero carbon solutions and to foster collaboration across various stakeholders within the maritime industry.

The optimization of tugboat operations aligns with key sustainable transport values:

- **Safety:** Improved planning and coordination lead to safer operational practices.
- **Convenience:** Streamlined processes reduce tugboat idle times and enhance scheduling efficiency.
- **Efficiency:** Optimizing fuel consumption and operational hours reduces costs and improves overall port efficiency.
- **Green:** Focused efforts to reduce emissions from tugboats directly contribute to sustainable transport goals.
- **Economy:** Optimizing tugboat operations leads to cost savings through better resource utilization.
- **Inclusiveness:** The involvement of multiple stakeholders promotes a more inclusive approach to decision-making.
- **Resilience:** Continuous improvement enhances the resilience of port operations to future challenges.

Source: IMO

II. Solution: Best Practices for Optimizing Tugboat Operations

Assessing the Baseline: Collecting and Analyzing Data

To begin optimizing tugboat operations, ports must first assess their current performance. This includes collecting data on fuel consumption, operational hours, and emissions, along with information on how tugboats are scheduled and deployed. Ports can use this data to identify inefficiencies in scheduling, periods of peak demand, and overuse or underuse of the tugboats. A major container port in Malaysia worked with the Government of Malaysia and the GreenVoyage2050 programme to assess its tugboat operations, revealing that optimizing scheduling could lead to emissions reductions. The baseline analysis also used AIS data to develop a heatmap identifying waiting areas or zones for the tugboats while not on a job. This helps to further assess potential efficiency gains.

Implementing Process Improvements: The Kaizen Approach

The Kaizen approach is an effective method for optimizing tugboat operations. After gathering data, ports should organize "Kaizen workshops" involving all relevant stakeholders to brainstorm and prioritize solutions. These can include quick wins—such as sharing digital platforms to better coordinate tugboat scheduling—or mid-term solutions like optimizing tugboat mooring orientations. At the container port in Malaysia, a Kaizen workshop identified several improvement actions, which included quick wins that could be implemented within two weeks, such as streamlining digital communication between departments for more efficient tugboat requests. Mid-term projects, like adjusting the orientation of ships for better tugboat manoeuvrability, are being implemented, with long-term infrastructure changes planned to further optimize tugboat deployment.

Collaboration and Stakeholder Engagement

Stakeholder engagement is crucial to the success of this process. Ports should bring together a wide range of internal and external stakeholders, including marine services, port operations, and commercial teams. Each stakeholder has valuable insights into the operational processes, and a collaborative approach ensures that the most effective solutions are identified and implemented.

IMO-GreenVoyage2050 Support for Ports in Developing Countries

The IMO's GreenVoyage2050 Programme works with developing countries to support their transition towards a net-zero carbon maritime sector. The programme helps countries assess and reduce emissions from their shipping sectors by providing tailored technical assistance. In addition to supporting port optimization, GreenVoyage2050 helps develop National Action Plans for reducing GHG emissions, including strategies for implementing alternative fuels and sustainable port operations, and is providing technical assistance to undertake feasibility studies for pilot project demonstrations of low and zero carbon solutions in the maritime sector. The Programme enables both ships and ports to adopt cleaner, more efficient practices, benefiting both the environment and the local economy.

Additional Recommendations for Ports:

- **Invest in Training and Capacity Building:** Training staff to understand the environmental impact of their actions and how to optimize operations is crucial for long-term sustainability.

- **Leverage Technology and Innovation:** Ports should explore technological innovations, such as advanced analytics or AI, to predict tugboat usage patterns and optimize scheduling in real-time.

- **Plan for Long-Term Sustainability:** Consider investing in alternative fuels or fuel-efficient tugboats as part of the long-term optimization plan to further reduce emissions.

- **Benchmarking:** Ports should consider benchmarking their performance against similar ports to identify best practices and track progress over time.

Source: IMO

III. Main Achievements: Measuring Impact and Replicability

The key outcome of optimizing tugboat operations is a reduction in fuel consumption and emissions. The implementation of quick wins, like optimizing scheduling, leads to immediate reductions in operational costs and fuel use. Mid-and long-term improvements, such as optimizing tugboat fleet utilization and enhancing infrastructure, deliver ongoing benefits.

In addition to environmental benefits, optimizing tugboat operations contributes to economic efficiency. By reducing fuel consumption and improving coordination, ports can lower operational costs and enhance their competitiveness in the global market. This optimization also improves service delivery for port users, helping attract more business and furthering the port's reputation as a leader in sustainable operations.

The solutions identified in the Kaizen workshops are highly replicable and can be applied to ports around the world. By focusing on data collection, stakeholder collaboration, and continuous improvement, ports can optimize their tugboat operations, reduce emissions, and achieve cost savings. The success of this project serves as a model for other ports seeking to reduce their environmental impact. With the right tools, training, and collaboration, ports worldwide can follow a similar path to optimize their operations and contribute to global sustainable transport efforts.

12.Pioneering SAF in Aviation

Provided by Airbus

I. Overview

The Chinese civil aviation market is currently the second largest in the world, characterized by rapid growth and significant challenges in carbon reduction. Sustainable Aviation Fuel (SAF), compared to traditional fossil fuels, can reduce carbon dioxide emissions by an average of 80% over its full lifecycle. The large-scale application of SAF is therefore crucial to achieving low-carbon development in the aviation industry.

China's civil aviation market now ranks the second largest in the world with rapid growth. It is difficult for the aviation industry to reduce carbon emissions.

Airbus is the largest aeronautics and space company in Europe, providing products, services and solutions for the commercial aircraft, helicopter, defence and space sectors. Drawing on over half a century of aerospace engineering expertise, Airbus products are defined by innovation. Airbus has implemented the regular use of SAF for test flights and customer delivery flights at its Tianjin Final Assembly Line since October 2022. This initiative aligns with Airbus' commitment to sustainable development in China and contributes to the clean transformation of the aviation industry, while also supporting the company's achievement of Scope 1 and Scope 3 targets under the Science Based Targets initiative (SBTi).

Source: Airbus (China) Enterprises Management and Services Co., Ltd.
Figure 1: Airbus A320 in Tianjin, the first aircraft delivered using SAF

II. Solutions

Purchase SAF with certification from the Roundtable on Sustainable Biomaterials (RSB). Airbus signed three proc urement agreements with China National Aviation Fuel Group Corporation (hereinafter referred to as "China Aviation Fuel"), securing a total purchase of 3,570 tons of SAF (with a blending ratio of 40.9%) to meet Airbus Tianjin's operational needs until the end of 2025. SAF is produced by Sinopec Zhenhai Refining & Chemical Co., Ltd., which is certified by the RSB.

Obtain RSB sustainability certification. To ensure that every step in the SAF supply chain - from raw material collection to fuel production and refueling transport - complies with sustainability principles and standards, Airbus Tianjin obtained the RSB sustainability certification.

Physical segregation for refueling. Currently, Airbus achieves regular use of SAF in Tianjin through physical segregation and plans to complete a system upgrade by the end of 2024. Once upgraded, the system will utilize a mass balance approach for refueling, improving operational flexibility and efficiency, and ensuring that higher SAF ratios can be adopted in the coming years.

Source: Airbus (China) Enterprises Management and Services Co., Ltd.
Figure 2: Airbus Tianjin uses a dedicated SAF tanker for physical segregation

III. Major Achievements

With the Chinese aviation market in a rapid growth phase, Airbus introduces its sustainable development strategy and the vision of leading the aviation industry's clean transition locally, contributing to balanced growth and carbon emissions reduction.

Promote energy saving and emissions reduction in China's aviation industry. From the first delivery in Oct. 2022 to the end of 2023, SAF was used for 36 test flights and 62 delivery flights (including 48 A320s and 14 A350s). A total of 240.07 tons of pure SAF was consumed, reducing 523.45 tons of carbon dioxide equivalent (CO2e) over the lifecycle.

Bolster the localized production of SAF. By collaborating with local energy enterprises, Airbus promotes the use of sustainable fuel in its Tianjin factory, driving the localized production of SAF tailored to the Chinese market. A key innovation in this field is the successful integration of the local supply chain, establishing China's first sustainable aviation fuel supply network.

Airbus Tianjin's pioneering use of SAF establishes a unique Chinese model for the global aviation industry in its transition towards more sustainable solutions, demonstrating strong adaptability and foresight in addressing global climate change challenges. This success not only serves as a benchmark for the Chinese aviation industry, but also offers innovative insights for sustainable development in other countries and regions worldwide.

The project is highly replicable. By the end of 2023, Airbus has normalized the use of SAF for test and delivery flights at four campuses worldwide, and intends to continue this practice until 2030, raising SAF targets to meet the Scope I and Scope III targets of Airbus' commitment to the SBTi.

13.Post Greening First and Last Mile Delivery Infrastructure in Malaysia

Provided by Universal Postal Union, United Nations Environment Programme (Sustainable Infrastructure Partnership), Pos Malaysia

I. Overview

Malaysia, with a population of approximately 33.9 million, ranks as the fifth largest economy in the Southeast Asia region, boasting a nominal Gross Domestic Product (GDP) of approximately USD 430.9 billion as of 2023. Historically, Malaysia's economy was largely dependent on agriculture and commodities, particularly rubber and tin. Over the past few decades, the government has implemented policies to diversify the economy, reducing reliance on these traditional sectors. Malaysia's economic expansion is driven by its diversifying sectors, including manufacturing, services and the digital economy.

Malaysia's technology and service sector have seen significant growth, becoming a major contributor to Malaysia's GDP. Among the areas that have shown significant growth in recent years are e-commerce and logistics. In Malaysia, the rapid growth of e-commerce has significantly reshaped the logistics sector, leading to a substantial tail increase in parcel delivery, especially domestic parcels, with a rise from MYR 34.26 million (approximately USD8.08 million) in 2017 to MYR 623.18 million (approximately USD146.98 million) in 2021. This expansion of e-commerce has necessitated innovations in first and last-mile delivery, as traditional home delivery methods struggled to keep up with the rising demand. In parallel, the increase in home deliveries raises concerns about road congestion, air pollution and the associated environmental impact. Malaysia's e-commerce market is expected to continue growing, reaching MYR 51.6 billion (approximately USD12.17 million) by 2024. To meet the increasing demand and maintain other societal priorities, Malaysia has been at the forefront of integrating sustainable practices into its infrastructure within the realm of logistics and e-commerce.

II. Solutions

1. Prioritizing environmentally sustainable solutions

Along with promoting economic growth, the government has been focused on prioritizing solutions that bring co-benefits in terms of environmental and social sustainability. A key aspect of Malaysia's development agenda is its commitment towards fighting climate change. The country has set ambitious targets to reduce its greenhouse gas emissions intensity of GDP by 45 percent by 2030, relative to the emissions intensity of GDP in 2005. Among other areas, Malaysia has been promoting renewable energy as part of its sustainability agenda. The government has implemented various incentives and programmes to encourage the use of solar, hydro and biomass energy. The Green Technology Master Plan Malaysia 2017-2030 was adopted to guide the national green technology development, aiming to drive Malaysia towards becoming a green community and further enhance the green technology sector. Furthermore, Malaysia's urban development strategies increasingly focus on sustainability to ensure livable, resilient and inclusive cities, including sustainable urban transportation and green mobility infrastructure.

Transportation is the second largest source of emissions in Malaysia, accounting for 27.4 percent of the national emissions. Malaysia's strategic integration of sustainability in its logistics overhaul reflects a holistic planning approach, addressing the call for cross-sectoral sustainability and life cycle considerations in infrastructure projects.

Integrated approaches to green the first and last-mile delivery

In line with national priorities, Pos Malaysia, as the leading parcel service provider and official designated postal operator for Malaysia, is strongly committed to climate action. Despite facing economic hardships, its efforts in pursuing environmental sustainability are demonstrated by a commitment to sustainable e-commerce expansion and greening first and last-mile deliveries, experimenting with various innovative solutions. With the aim of achieving a 30 percent reduction in its Scope 1 and 2 emissions by 2025 and net-zero emissions by 2050, one of its key initiatives is the introduction of electric vehicles, with a goal of 100 per cent electrification by 2030. As of 2023, a total group emissions reduction of 9.96 per cent from the 2021 baseline has been achieved, with the post and parcel segment realizing a 16.79 percent reduction. This gradual transition to replace the entire aging vehicle fleet, aligned with vehicle replacement schedules, has been initiated with the use of over 5,000 electric bikes for the delivery of mail and packages, achieving a zero-carbon footprint in these operations; but it is gradually being extended to other vehicles. Despite the relatively low cost of fuels in Malaysia compared to global prices, this logistics provider is demonstrating that transitioning to an electric fleet is economically beneficial, with anticipated savings in operational costs and spare parts. The transition's impact is significant, equating to saving 1.2 million litres of petrol and 4.0 million litres of diesel.

Figure: 100% ELECTRIC-POWERED DELIVERY VANS

To power that new fleet of vehicles, new electric mobility infrastructure is being introduced at postal offices -meeting the growing internal demand for powering the electric vehicle fleet. **Moreover, Pos Malaysia plans to equip over 400 of its facilities with solar photovoltaic** (PV) technology, demonstrating a commitment to renewable energy integration in its operations (UPU 2023). These are expected to contribute to the electricity necessary to operate an electric fleet.

In addition to vehicle-related measures, the use of parcel lockers and the establishment of alternative collection points are helping to reduce the number of delivery attempts, thereby decreasing fuel consumption and emissions. This system also enables consumers to pick up their parcels at their convenience. Traditional delivery methods are being reimagined to accommodate the growing demand while reducing carbon emissions. To ensure these new models enable a real transformation, significant resources have been devoted not only to implementing these technologies but also to integrating them effectively into the existing logistics infrastructure. For instance, the transition to automated systems requires significant investment in both technology and personnel training. Additionally, there is a need to educate consumers about the benefits of using these new delivery methods (Mohd Yusoff et al. 2023). While efforts to "green the first and last mile" have predominantly focused on reducing carbon emissions through innovative delivery methods, the significance of extending these sustainability measures to other areas such as resource efficiency remains paramount. Additionally, the exploration of impacts on biodiversity and the integration of practices that support ecological conservation could represent a vital dimension for the advancement of these initiatives.

III. Major Achievements

1. Creating job opportunities

This modernization and expansion of logistics infrastructure has a benefit of creating new job opportunities in the sector. This includes not only direct employment in logistics and postal services but also in ancillary sectors like renewable energy, and maintenance services for electric vehicles and solar installations.

2. Stimulate local businesses

Furthermore, the use of electric vehicles and solar panels can stimulate local businesses by requiring local suppliers and service providers, thereby supporting the local economy. Pos Malaysia has observed an increase in the number of suppliers specializing in green technologies for vehicles and solar energy solutions (Pos Malaysia 2024). By involving MSMEs in the green expansion of its logistics sector, Malaysia is distributing economic growth and fostering local innovation, in line with the emphasis of the Green Technology Master Plan Malaysia 2017-2030 on local enterprise engagement and green technology transfer.

2. Reduce carbon emission

Alongside this undertaking, Pos Malaysia aims to harness digital systems to achieve a deeper transformation by implementing telematics across 100 percent of its vehicle fleet (UPU 2023). This technology has already demonstrated its efficacy in 2023, where it contributed to a 15 percent reduction in emissions per vehicle. This reduction is attributed to enhanced route optimization, improved driving behaviors, better maintenance scheduling, minimized downtime, reduced fuel or energy consumption, accurate measurement of charging station efficacy and the potential to extend the lifespan of each vehicle. Given the demonstrated success of this strategy, the potential to use this information to enable the creation of carbon credits is currently being explored.

In alignment with Malaysia's national commitments to climate action and its ambitious goals to reduce greenhouse gas emissions, enhancing Pos Malaysia's electrification efforts and sustainability is paramount. Creating enabling conditions is essential, for example to incentivize fleet decarbonization and mobilize investment in the necessary grid infrastructure. For instance, strategically placing electric vehicle charging stations at postal offices can attract customers and bridge existing gaps, thereby meeting the growing demand for electrification. Additionally, piloting low emissions zones can further enhance the greening of first and last-mile deliveries, contributing significantly to Malaysia's environmental sustainability objectives.

14.Paris 2024 Olympics Green Transport Legacy and the Path to Sustainable Urban Mobility

Provided by C40 Cities

I. Overview

The Greater Paris area, located in northern France and officially known as the Île-de-France region, is an important economic and cultural center in Europe, as well as the most populous and economically developed region in France. The rail transit system in the Paris region includes suburban (commuter) trains (including the RER and suburban rail), the metro, and trams. Each of these has its own transportation functions and market positioning, collectively addressing the mobility needs of the people in the Greater Paris metropolitan area. The Paris Metro, which started operating in 1900, is one of the earliest metro systems in the world. It currently has 16 lines stretching over 211 kilometers, with 305 stations and an average station distance of just 695 meters. The metro's high density, short distances between stations, and frequent service make it the primary mode of public transportation in the Greater Paris area.

During the 2024 Paris Olympic and Paralympic Games, a total of 14,900 athletes gathered in Paris, including 4,400 Paralympic athletes and 10,500 Olympic athletes. According to data released by the Paris Tourism Office, approximately 11.2 million visitors came to Paris during the Games. To address the transportation pressures brought by athletes and tourists, Paris has launched a series of sustainable transport initiatives. These solutions embody the core values of sustainable transport: convenient, efficient, green, and inclusive.

II. Solutions for Sustainable Transport Development

1. Improving Public Transportation Infrastructure. One of the key sustainable transport strategies for the Paris Olympics is to ensure that all venues are accessible via public transport, such as the metro. Notably, 80% of the venues are within a 10-kilometer radius of the Olympic Village, and travel time from the Olympic Village is under half an hour. To achieve this, Paris has extended several metro lines. For instance, the €3.5 billion extension of Metro Line 14 spans 28 kilometers with 8 new stations. This extension connects Orly Airport in the south to the city center, passing through the Olympic Village, Stade de France, and various other Olympic sites. It is projected that by mid-2025, this line will transport around 1 million passengers daily, becoming Paris's first *super metro.* Additionally, the Paris Olympics will provide 500 hydrogen fuel cell vehicles and buses for athletes, along with thousands of shuttle buses for visitors.

Figure: Paris Métro Line 15

2. Promoting Bicycle Infrastructure Development. Paris is committed to making the city more bicycle friendly. Given that many famous historical sites served as venues for the Olympics, the city has significantly optimized its bicycle routes to encourage cycling during the Games. Since 2021, the national government has invested nearly €24 million in the Île-de-France region to create a 415-kilometer network of bicycle routes connecting all competition venues, along with the addition of 20,000 bicycle parking spaces. The Paris Olympics particularly emphasizes the use of shared mobility tools, allocating 46,000 shared bicycles and 15,000 shared electric bikes. As a result, over 10,000 spectators could cycle to the venues each day, effectively alleviating traffic congestion during the Games and reducing transportation emissions.

Figure: Paris Bicycle Routes Network

Figure: Paris Bicycle Route

Figure: Paris Shared Bicycles

3. Digital Technology Enhancing Convenient Travel. Paris has developed an Olympic website, anticiperlesjeux.gouv.fr, which has garnered 14 million visits, compared to 4.4 million visits for the London 2012 Olympic website. The platform allows 11 million users to utilize interactive maps to plan their journeys in advance and predict potential congestion levels. Additionally, the website has sent out 300,000 subscription alerts. By analyzing data related to visitor information and volunteer participation, the site aims to better serve travel needs during the Games.

4. Providing Services for Individuals with Mobility Challenges. In 2024, France offers 1,000 accessible taxis, an increase of 750 vehicles compared to 2022. All stations serving Olympic venues are 100% wheelchair accessible and barrier free. Additionally, Paris has adjusted the routes between stations and venues, established dedicated parking areas, and enhanced auditory and visual aids to improve accessibility. These measures aim to better serve individuals with mobility challenges during their travel to and from the Venues.

III. Major Achievements

The public is satisfied with the operation of the Paris Metro. According to a study by the French National Railway Company, 94% of passengers are satisfied with the metro's performance, and satisfaction among Olympic spectators reaches as high as 97%.

The infrastructure established for the Paris Olympics will be sustainably utilized after the events. The newly constructed bicycle routes, approximately 120 kilometers in total, become an important legacy, continuing to serve local sustainable tourism and transportation transformation. Paris plans to maintain these bike lanes to facilitate cycling for residents in the Île-de-France region.

The development of public transportation in Paris has effectively promoted employment. Research indicates that the operation, renewal, and expansion of the public transport network in 2023 directly created over 120,000 jobs, with a market scale of €15 billion. Currently, nearly 80,000 people work for the Paris public transport network to ensure an average of 9.1 million trips per day.

The Paris Olympics showcase forward-looking initiatives in urban transportation and environmental responsibility. Through measures such as digital traffic management, extensive bicycle infrastructure, increased use of shared bikes, and extended public transport services, Paris promotes the integrated development of cycling and public transport. These efforts effectively support the hosting of the Olympics and provide valuable insights on balancing the surge in visitors during large events with commitments to sustainable living and carbon neutrality.

15.Road Network Development and Infrastructure Projects in South Africa

Provided by World Road Association

I. Overview

South Africa's road network comprises National, Provincial, and Municipal Roads. A newly constructed link between Gauteng and North West Provinces, traversing the Magaliesburg Mountain Range, has reduced travel distance by 9.5 km. The project, currently 95% complete, will enter a 12-month defects liability period post-construction, after which the South African National Roads Agency (SANRAL) will assume responsibility for routine road maintenance (RRM) to ensure its upkeep.

This initiative is part of a phased strategy to enhance connectivity between major economic zones within South Africa and to integrate with an international corridor linking to Botswana via the N4 National Road. The N4 Bakwena Platinum Corridor Concession (BPCC), operational since 2002, has significantly improved the efficiency, safety, and cost-effectiveness of transport between the two countries.

N4 Bakwena Platinum Corridor Concession (BPCC) Source: MARISWE

The Pampoen Nek project, launched in March 2017, serves as an internal link between Gauteng and North West Provinces, aligning with the N4 BPCC corridor. It operates on a user-pay principle, utilizing conventional toll plazas and a boom-down collection system. Funding for this project was secured by SANRAL through an application to the National Treasury as part of its annual budget allocation.

The R512 Greenfields project involves the construction of a 6 km road through a mountainous region, featuring bridges and underpasses designed to protect wildlife in the surrounding conservation area. SANRAL, a state-owned entity under the National Department of Transport, is funding this non-toll project through allocations from the National Treasury, based on a 3 to 5-year planning cycle. Efficient utilization of government funds by SANRAL ensures continued financial support for such projects.

II. Solutions

The PPP model underpinning the N4 BPCC corridor operates on a user-pay principle, incorporating conventional toll plazas and a boom-down collection system. Similarly, the Pampoen Nek project was initiated by SANRAL through a funding application to the National Treasury, forming part of the annual budget for various infrastructure projects.

As the National Roads Authority, SANRAL has spearheaded both the PPP and Pampoen Nek projects. Routine road maintenance costs are estimated at approximately R 80,000/km per year (EUR 5,300/km per year), while periodic maintenance costs will be determined based on specific requirements at the 8-year mark.

The R512 project is managed by SANRAL, which serves as the implementation arm of the National Department of Transport. Funding is sourced from the National Treasury, making it a non-toll-funded initiative. SANRAL secures funding based on a 3 to 5-year plan, with allocations contingent on demonstrated efficiency and effectiveness in utilizing government funds. Once projects are committed, government funding is generally guaranteed.

A new intersection has been built on the R512.
Source: SANRAL

III. Main Achievements

The project successfully navigated the complexities of its environment, including significant challenges posed by extensive mountain cutting. Effective collaboration among the client, consultants, and contractors ensured that potential losses were mitigated, achieving notable success despite some claims arising from the construction process.

Local communities have expressed enthusiasm for the anticipated economic benefits brought by the project. The initiative also empowered these communities by providing employment opportunities and supporting the establishment of small businesses to contribute to the construction efforts. This not only boosted local economies but also enabled community members to gain valuable experience under the guidance of the contractor.

16.Rural Revitalization for Sustainable Development in Zhejiang, China

Provided by Zhejiang Provincial Department of Transportation

I. Overview

Keqiao District (formerly Shaoxing County) is located in the southern wing of the Yangtze River Delta, in the central-northern part of Zhejiang Province. It governs 5 towns, 11 sub-districts, and 348 administrative villages (residential and community committees) with a regional area of 1040 square kilometers and a population of 698,000. It is one of the first batch of "High-quality Rural Roads" demonstration counties in China.

Before 2003, the northern part of Keqiao District was crisscrossed with rivers, while the southern part was separated by mountains and waters, causing the public to suffer from inconvenient transportation. In addition, there was a severe shortage of funds for rural road construction at the county and township levels of government. Investment was mainly based on the principle of "county autonomy, township self-raising, and farmer voluntariness", with farmers contributing labor during construction, and the roads lacked unified technical standards.

In June 2003, Zhejiang Province launched the "Thousand Village Demonstration and Ten Thousand Village Renovation" project. In December 2004, Keqiao District took the lead in achieving the *double 100%* goal of village road access rate and village road hardening rate in the province. After solving the accessibility issue, Keqiao District began to focus on the issue of "good travel" for the people. In 2014, President Xi Jinping made the important instruction that rural roads should be "well-built, well-managed, well-maintained, and well-operated". As one of the first batch of national demonstration counties for "High-quality Rural Roads", Keqiao District has made remarkable achievements over the past decade. It has built high-quality "High-quality Rural Roads", taken the lead in promoting the three-level "road chief system" for rural roads, and vigorously promoted the "High-quality Rural Roads +" model. In addition, it has pioneered the "Full-scale" transportation stations, first tried the integrated business model of "passenger, freight, and post", and explored the "High-quality Rural Roads" 2.0 version. These measures have provided a pioneering path for the common prosperity of farmers and rural areas. This has promoted the development of "efficient" "convenient" "green" and "inclusive" rural roads.

II. Solutions

Creating landscapes through connected roads and enhancing the road network infrastructure. First, leading by standards to upgrade road grades. The "Shaoxing City Keqiao District County and Township Highway Standardization Construction Implementation Guide" was introduced, implementing standardized renovations for county and township roads and their ancillary projects in a "synchronized design, synchronized implementation, synchronized acceptance" manner. By the end of 2023, the total

mileage of rural roads in the district reached 1296 kilometers, with second-class and above roads totaling 301 kilometers, creating a batch of provincial-level high-quality demonstration roads with Qianmao Line and Chegu Line as models. Second, optimizing the road environment by integrating scenery into the roads to create beautiful highways. Through comprehensive rectification of 65 main rural roads and their corridors in the district, the transition from "road connectivity" to "road cleanliness" has been achieved. A highway tourism element enhancement initiative has been carried out, integrating cultural characteristics and regional landscapes into the construction and renovation of roads, creating scenic highways with different views in every season and connecting 248 scenic spots and scenic villages through a total of 426 kilometers of enhanced scenic access roads.

Figure: Chegu Line

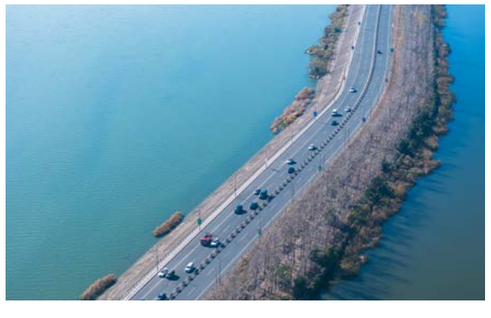


Figure: Integrating Scenery into the Road-Jiangbin Road, Adjacent to the Cao'e River

Improving Management and Supporting Facilities to Ensure Travel Quality. First, establish the "Road Chief System" to facilitate safe travel. By focusing on the construction of the "district, town, village" three-level "Road Chief System" management framework, create a regular management network that is "Grid management non-blind area, full-time cleaning, full-time service, and full-process supervision", achieving 100% coverage in "Road Chief System", participation rate of departments and towns, and the setting rate of Road Chief System public signs, increasing problem disposal efficiency by more than three times. Second, build supporting infrastructure to promote satisfactory travel. Upgrade infrastructure along the roads such as parking lots, walking paths, and charging piles, creating 16 transportation wealth stations, serving a total of 28,000 travelers. Third, optimize public transportation routes to achieve convenient travel. Relying on the "High-quality Rural Roads", coordinate the construction of urban and rural public transportation, with a total investment of 3.5 billion yuan over the past decade, opening 42 urban and rural bus lines, exploring the "community bus" service model, providing short-distance shuttle services through micro-buses to enhance travel convenience.

Prospering Industries Along the Roads and Stimulating Vitality Along the Routes. First, integrating roads and postal services to promote development. Upgrading the "provincial and city transfer, regional distribution, and village-level delivery" three-tier logistics distribution system, enabling agricultural products such as PingShui RiZhu tea, JiDong fragrant hazelnuts, WangTan green plums, and LiZhu orchids to ride the logistics "express train", resulting in an annual increase in the total agricultural output value of nearly 100 million yuan. Second, integrating roads and villages to promote development. By renovating farmhouses, opening up branch lines, reorganizing land supply, and developing in contiguous areas, resources are revitalized to attract rural industry projects such as plantations, health retreats, and agricultural product processing. For example, the PingWang line section implemented the return of 30 acres of land to grain cultivation, circulated over 50 acres of land along the route, and opened up the "last mile" for the transportation of bamboo from mountain villages, promoting a collective annual income increase of 500,000 yuan for ZhuJia village in PingShui town. Third, integrating roads and tourism to promote development. Creating eight demonstration belts of beautiful rural areas under the *million project* of Jishan Jianshui, such as the LanZhu Legacy Belt, Jianhu Fishery Song Belt, and Lakeside Mountain Scenery Belt, and opening special public transportation routes, effectively enhancing the benefits of the tourism industry.

Figure: Road mail integration--rural logistics Express

III. Major Achievements

Over the past decade, Keqiao has invested over 10 billion yuan in the construction and renovation of rural roads, upgrading 574 rural roads with a total length of 722 kilometers; implemented maintenance on 15,000 kilometers of rural roads, with a maintenance rate of 100%, and the proportion of roads in good or better condition increased from 49.19% to 93.43%; all 214 administrative villages in the district have achieved 100% rates in intelligent road inspection, safety facility setup, and streetlight illumination. Keqiao was the first in the province to achieve the goals of eliminating substandard roads, bus access to villages, and delivery access to every village.

Building a road, creating a scene, and enriching the people. In the construction of "High-quality Rural Roads", Keqiao District continues to excel in the "transportation+" approach, transforming transportation advantages into developmental momentum to support rural economic growth. Rural roads have been transformed into tourism routes; compared to 10 years ago, the average stay of rural tourists in Keqiao District has increased by over 16 hours, effectively doubling the income of local farmers by 2.6 times. These roads have effectively revitalized idle rural resources, activating over 2,000 vacant farmhouses and transferring more than 760 acres of land over the decade, leading to employment for over 9,000 people in rural areas. The smooth flow of goods has become a reality with these rural roads, as agricultural products have boarded the logistics "express train", increasing the volume of agricultural product transportation by more than 20 times and expanding the range of transported products by over 670 types.

The experience of Keqiao's rural road construction is replicable to some extent. Its concept and measures for "High-quality Rural Roads" and "Beautiful Economic Transportation Corridors" have been promoted in Zhejiang Province. In 2017, Keqiao District was named one of the first batch of "High-quality Rural Roads" demonstration counties in the country, becoming a national model for rural road construction. Keqiao's design philosophy of leading with standards and integrating scenery into roads, the three-level road chief system for road management, and the collaborative development approach with industries such as agriculture and e-commerce hold significance for other countries exploring the construction of more equitable, inclusive, and economical rural roads.

17.SASEC Chittagong-Cox's Bazar Railway Development in Bangladesh

Provided by Asian Development Bank

I. Overview

The Chittagong-Cox's Bazar Railway project is being implemented in the South-eastern part of Bangladesh which borders India and Myanmar and is close to the landlocked countries of Bhutan and Nepal. Bangladesh is also located at the main corridor of the Trans-Asia Railway network linking South and Southeast Asia. Nonetheless, railways account for a low market share in subregional transport. Major constraints to subregional rail connectivity include the lack of interconnected rail networks, differences in rail gauges between countries, incompatibilities in rolling stock, limited line capacity, and the overall condition of the rail network in Bangladesh.

This project will connect Cox's Bazar district for the first time to the national and subregional railway network and support efficient development in the Dhaka-Chittagong-Cox's Bazar corridor, which is part of the Trans-Asia Railway network, through improved, reliable, safe, and environmentally friendly railway connectivity, contributing to the overall development of the national economy. It will facilitate access for the Cox's Bazar district's population and products to subregional markets and trade through constructing dual-gauge track to enable future direct connectivity toward western Bangladesh and India, where railways are constructed mostly in broad gauge, as well as toward northeastern India and Southeast Asia, where railways are mostly constructed in meter gauge. It will also improve connectivity toward Myanmar by intermodal facilities for passengers and freight transferring to road transport toward the Myanmar border and facilitate connection with the deep seaport in Matarbari Island.

Source:Asian Development Bank (ADB)
Figure 1: Cox's Bazar Iconic Railway stations

The project scope also includes innovative measures such as elephant overpasses, use of thermal imaging cameras, and habitat enhancement interventions to avoid rail-elephant collisions and facilitate the continued movement of elephants.

Source:Asian Development Bank (ADB)
Figure 2: Elephant Overpass

Source: Asian Development Bank (ADB)
Figure 3: Elephant Crossing Identification

II. Solutions

The project cost is $2.012 billion with Asian Development Bank (ADB) financing amount $1.5 billion. Bangladesh Railway (BR) has recruited one full-time project director with 34 staff members responsible for the implementation of the project along with a Construction Supervision Consultant for the monitoring of the project. Two contractors are hired for unclear, specify what these two packages are. To ensure the timely completion of the project, the following were planned and executed: (i) Floating of Bid/Tender ad Proposals for both Civil Works and Consultancy before signing loan agreement with ADB, (ii) finalization of all designs and drawings before publishing the tender, (iii) substantial completion of land acquisition before the civil works contracts are signed. The project has a robust performance monitoring mechanism to ensure the smooth implementation as follows: (i) Project performance monitoring—BR has established a project performance management system for the project to track the design monitoring framework, (ii) Compliance monitoring—BR is monitoring the project implementation in accordance with the schedule of the loan agreement to ensure compliance and report to ADB, (iii) Involuntary resettlement monitoring—ADB is monitoring the resettlement progress through semiannual reports, (iv) Environmental safeguards monitoring—ADB is monitoring the environmental safeguard progress through semiannual reports.

III. Major Achievements

The project output was the construction of a 102 km dual-gauge single-line railway track which is part of a missing link of the Trans-Asia railway network. The project is being implemented following BR's technical standards and following the best practice of environmental and social safeguards as follows: (i) robust tree plantation activities, (ii) first elephant overpass over railway track in the world, (iii) Construction of Salt licks and Water holes for Elephant as part of Habitat Enhancement Program, (iv) Installation of a Sensor System in Elephant Detection, (v) training under ILRP for vulnerable groups, (vi) Robust resettlement plan implementation e.g. (a) Ms. Fatema Parvin lives in Lohagara, Chattogram. Her residential structure was affected by the project, and she has built her new house on her own land after receiving the compensation, (b) Middle Lombori Para Jame Mosjid in Ramu, Cox's Bazar, was affected due to the project and a new mosque was built nearby after receiving compensation for their loss.

The project will improve accessibility for 2 million residents living in the project's direct area. The key stakeholders were the affected persons along the project corridor. A robust Stakeholder Communication Strategy was formulated to keep all the stakeholders well informed, e.g. RP implementation NGO has conducted an information dissemination campaign to inform the affected persons about the land acquisition and resettlement timeline, entitlements and contact information to submit grievances.

The project is financially sustainable as BR is supported by a yearly governmental fund to sustain operations, which reflects the systemic importance of BR. The project is also environmentally and socially sustainable for the following reasons: (i) reduction of 46,647 tons of CO2 emissions during operation, (ii) installation of sensor technology for elephants, (iii) construction of elephant overpasses, and (iv) completion of land acquisition and resettlement activities following international best practice. The project incorporates the following climate resilience measures in the design: (i) Increase in rail embankment height by approximately 1.0 m, (ii) The height of major bridges has been increased by 1.0 m. BR also has the required technical and institutional capacity, and currently maintains over 3,000 km of rail tracks through its field-level setup comprises of qualified human resources and equipment for routine maintenance.

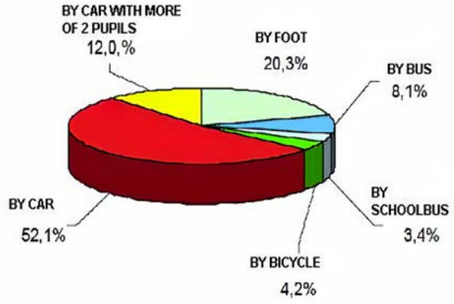
18.Sustainable Mobility Management for Home-School Trips in Italy

Provided by United Nations Economic Commission for Europe

I. Overview

Reggio Emilia, a city in northern Italy known for its progressive education model, has extended its innovation to the domain of home-school mobility management. The city initiated a comprehensive strategy to improve the safety, sustainability, and autonomy of school commutes. Since the launch of its"Manifesto for Safe, Sustainable and Autonomous Mobility for Home- School Journeys" in 2009, Reggio Emilia has developed a wide array of projects that focus on engaging students, teachers, parents, and citizens in shaping a healthier and safer urban environment. This holistic model has now reached 72% of schools in the city, making it a standout example of integrated urban mobility policy for children.

Like many cities, Reggio Emilia faced multiple issues stemming from high car usage for school trips. Congestion near schools, traffic-related dangers, and reduced physical activity among students were central concerns. The excessive use of private cars led to unsafe conditions, especially during school drop-off and pick-up times. Moreover, dependency on vehicles was eroding children's independence and social interaction opportunities. The city needed a sustainable alternative that would reduce environmental impact, improve public health, and ensure road safety around educational institutions.



Source: Survey EC6 2008
Municipality of Reggio Emilia, Sustainable Mobility office

The project operates at the city level and is spearheaded by the Municipality of Reggio Emilia, in collaboration with a wide network of stakeholders. These include school heads, public health agencies, cycling associations, environmental authorities, and parents' groups. The overall goal is to foster a culture of sustainable mobility through education, awareness, infrastructure, and community engagement. The School Mobility Manager (SMM) program has been central to this effort, creating a direct link between schools and the municipality to co-create and coordinate mobility initiatives.

Reggio Emilia's approach addresses multiple sustainability pillars:

- **Safety:** Reduces traffic volumes near schools, minimizing accident risk.
- **Convenience:** Enables seamless and safe walking and cycling through marked routes and collective walking/cycling groups.
- **Efficiency:** Optimizes travel patterns through carpooling, bus systems, and non-motorized mobility options.
- **Green:** Decreases emissions by replacing car trips with walking and cycling.
- **Economy:** Low-cost solutions such as balance bikes and walking buses offer scalable, budget-friendly models.
- **Inclusiveness:** Ensures all children, including those with special needs, have access to safe and active mobility options.
- **Resilience:** Enhances the city's adaptability to changing mobility needs through a flexible and test-oriented implementation model.

By putting children and community co-creation at the heart of its policies, Reggio Emilia offers a replicable example of how mobility management can be seamlessly integrated into urban governance and school culture.

II. Solutions

The city of Reggio Emilia has built an innovative and inclusive mobility ecosystem rooted in a strong vision for sustainable, safe, and autonomous home-school journeys. At the heart of this transformation is the 2009"Manifesto for Safe, Sustainable and Autonomous Mobility for Home- School Journeys", a guiding document that launched an ambitious shift in how the city handles the daily travel routines of its youngest citizens. Rather than focusing solely on infrastructure, the city's approach has been comprehensive—blending education, communication, and community- led action to influence behavior and redesign mobility culture at the grassroots.

One of the foundational principles of the project is interdisciplinary collaboration. The city worked closely with schools, public health institutions, mobility agencies, parents, students, and local associations. This broad coalition allowed for the co-creation of projects tailored to each school's unique context and helped foster a strong sense of local ownership. At the operational level, the city introduced six lines of action: education, communication, promotion, safety, services, and planning. Each line addressed a specific dimension of school mobility while reinforcing the others in an integrated strategy.

Education formed the backbone of cultural change. Schools were equipped with materials and programming that taught children the health, environmental, and social benefits of sustainable mobility. Rather than relying solely on rules, the strategy empowered children to become advocates for safer travel. Simultaneously, a targeted communication campaign aimed at drivers, parents, and local residents helped reinforce a culture of respect for traffic laws and awareness around schools.

Promotion of sustainable travel modes was achieved through experiential projects. Students participated in walking and cycling groups such as the PediBus and BiciBus, where they could travel with peers under adult supervision along pre-set routes. These daily routines didn't just offer a safe commute—they also

strengthened friendships, improved fitness, and built lifelong habits. Additional incentives and school-wide events like Mobility Week gave visibility to these practices and encouraged broad participation.

Safety measures were another pillar of the strategy. Physical infrastructure near schools was redesigned with traffic calming measures, safe crossings, and improved signage. In some areas, temporary car-free zones were introduced at peak times, significantly reducing traffic congestion and risk near school gates. Furthermore, some roads were transformed into "school streets", pedestrian-friendly zones marked with child-designed street art—known as Urban Tattoos—that signaled the presence of schools and reclaimed public space for community use.

Complementary services also played an important role. The city supported carpooling initiatives and expanded school bus access, but particular emphasis was placed on non-motorized mobility. Young children, for instance, were given balance bikes in nurseries and kindergartens to help develop their motor skills and confidence. This early exposure to active travel ensured that by the time they reached primary school, many children could ride a bike safely on their own.

Source: civitas.eu

Planning and governance also evolved. The city made sustainable mobility a priority in all urban development plans involving schools. New school projects had to include safe pedestrian access and cycling infrastructure. Importantly, each participating school was required to appoint a School Mobility Manager (SMM)—a dedicated point of contact between the school and the city. The SMM coordinated projects, communicated with families, gathered feedback, and served as the voice of the school in municipal mobility planning. By embedding this role within the school community, the city ensured continuity and alignment with local needs.

Perhaps one of the most innovative aspects of Reggio Emilia's approach has been its integration with the public health sector. Pediatricians became allies in the campaign, attending school events and parent meetings to emphasize how daily physical activity is vital for child development. This collaboration lent scientific credibility to the initiative and helped overcome parental resistance to non-car commuting.

What sets Reggio Emilia apart is not only its wide range of actions but also its commitment to flexibility and experimentation. Projects were not fixed in stone. If an initiative didn't yield the expected results, it was refined or replaced. Some pilots ran for multiple years, while others evolved based on new challenges or feedback. This agile governance model, supported by cross- sector collaboration, has enabled the city to continuously adapt and scale up successful programs while remaining grounded in the real-life experiences of students and families.

III. Major Achievements

The comprehensive mobility management strategy adopted by Reggio Emilia has led to several tangible achievements that illustrate the transformative power of an inclusive, community-driven approach to sustainable transportation. Central among these is the widespread integration of the School Mobility Manager (SMM) role. By 2018, 72% of the city's schools had formally appointed an SMM, embedding mobility planning directly into school governance structures. This position not only serves as a critical liaison between schools and city authorities but also ensures that mobility issues remain an active part of each school's agenda.

In parallel, the city saw significant growth in structured walking and cycling programs. By the 2017–2018 school year, 12% of schools were operating BiciBus or PediBus programs, offering hundreds of children a safe, active, and social alternative to car travel. These group commutes not only helped reduce vehicle congestion around schools but also reinforced autonomy and built a culture of peer-supported mobility.

Another standout initiative was the shared use of public spaces surrounding schools. Through a combination of traffic calming, infrastructure redesign, and participatory urban art, the city created five" school streets", areas that are either fully pedestrianized or significantly restricted to car traffic during school hours. These changes affected 17% of the student population, transforming the space around schools into vibrant, safer zones that prioritize children's presence and safety.

Additionally, the city targeted early childhood mobility habits by distributing 99 balance bikes to 34 nurseries and kindergartens in 2014 and 2019. This seemingly small intervention had a large impact—by introducing the basics of cycling at a young age, Reggio Emilia laid the foundation for children to transition into confident, independent cyclists by the time they entered primary school.

These results were not limited to statistics. On a broader scale, the city's mobility strategy produced widespread social and environmental benefits. Traffic congestion and car dependency around schools visibly declined, contributing to cleaner air and quieter neighborhoods. Students reported feeling safer and more independent, while parents, teachers, and community members noticed stronger social cohesion and increased interaction during commutes.

Perhaps most importantly, the city's interdisciplinary and community-driven approach attracted national recognition and funding, allowing Reggio Emilia to further scale and refine its programs. Its flexible model of piloting, learning, and adapting has proven to be resilient and responsive, capable of navigating the changing needs of schools and families.

Reggio Emilia has thus emerged as a national and European reference for child-centered mobility planning. Its achievements show that when cities invest in coordinated, inclusive, and context- specific solutions, they can fundamentally reshape the way children experience daily travel—turning what was once a stressful, car-dominated routine into an opportunity for learning, connection, and well-being.

19.The Green Engine of the"Heart of Africa": The Addis Ababa Ring Road and Ethiopia's Path to Sustainable Development

Provided by Ministry of Transport and Logistics, Ethiopia

I. Overview

Addis Ababa, the capital of Ethiopia, is a city with profound historical significance and serves as the political hub of the African Union, known as the "Heart of Africa". However, the city suffers from severe traffic congestion, a lack of systematic road infrastructure, and inefficient connectivity at major entry and exit points. These issues lead to unbalanced resource distribution and constrained economic growth, significantly hindering sustainable socio-economic development.

In the context of global efforts to promote sustainable development, the role of transportation infrastructure is increasingly recognized as critical to fostering economic growth, advancing social well-being, and protecting the environment. Through the joint efforts of the Ethiopian government and China Communications Construction Company (CCCC), the Ethiopia's first expressway, Addis Ababa Ring Road, was completed in 2003, spanning 33.4 kilometers.

Addis Ababa Ring Road has not only significantly expanded the city's development space but has also become a vital engine driving the economic prosperity, social progress, ecological harmony, and sustainable development of the "Heart of Africa". It stands as an iconic project in Ethiopia's modernization journey in the new century.

Figure 1: Addis Ababa Ring Road Opening Ceremony

II. Solutions

1. Forward-Looking Design: Embracing Green and Sustainable Development Principles. The Addis Ababa Ring Road project integrated the core principles of green, low-carbon, and sustainable development from the design stage, demonstrating strong foresight and a global perspective. As a benchmark for road infrastructure development in Ethiopia, the project not only prioritizes traffic efficiency but also incorporates a range of innovative approaches to ecological and environmental protection. Designed as a dual four-lane urban expressway, the road features fully enclosed main lanes and physical separation between main and auxiliary roads, significantly enhancing safety and energy efficiency. Wildlife corridors and wetland buffer zones are established along the route to ensure ecological connectivity, protect regional biodiversity, and promote natural water purification. In addition, an advanced underground drainage system and rainwater recycling facilities have been constructed, greatly improving the road's resilience to extreme weather while promoting both water reuse and environmental protection. Smart sensor-controlled street lighting is implemented along the entire route to systematically reduce the carbon footprint. Three-meter-wide sidewalks on both sides of the road complete the pedestrian system and actively promote green mobility. With its advanced design and comprehensive functionality, the Ring Road project has strengthened the foundation for Addis Ababa's sustainable urban development and marked a solid step toward becoming a modern, green metropolis — setting an important example for sustainable transport infrastructure across Africa.

Figure 2: Addis Ababa Ring Road

Figure 3: Addis Ababa Urban Road

2. Ensuring Public Well-being: Adaptive Solutions to Construction Challenges. During the implementation of the project, the Ethiopian government and CCCC worked in close coordination to address numerous challenges, including complex land acquisition and resettlement processes, frequent planning adjustments, and interference from underground utilities. In response, CCCC promptly adjusted the construction strategy by adopting a flexible approach of "sectional construction and phased delivery," scientifically dividing the entire route into several relatively independent work zones. This strategy minimized disruptions to urban traffic and residents' daily lives from the outset. Meanwhile, advanced and efficient modern construction equipment was introduced to facilitate parallel construction across multiple tasks, ensuring both the quality and progress of construction while effectively limiting its impact on public mobility and the urban environment.

3. Innovation-Driven Excellence: Technical Breakthroughs Set New Engineering Benchmark. During the construction of the Addis Ababa Ring Road project, CCCC successfully overcame a series of unprecedented technical challenges, such as the treatment of expansive black cotton soil and the construction of complex bridge structures, by leveraging its advanced and extensive engineering expertise and experience. The project also actively promoted an innovative mechanism combining "technology transfer and talent development", establishing a systematic and continuous skills training program that significantly enhanced the professional capabilities and competencies of the local workforce. This mechanism not only provided strong support for the smooth execution of the project, but also helped cultivate valuable talents for Ethiopia, injecting sustained momentum into the country's long-term development. Moreover, it has set a replicable and scalable example for cooperation in the fields of technology and talent development.

III. Major Achievements

Figure 4: City of Addis Ababa (Source: Ethiopian News Agency)

The completion and opening of the Addis Ababa Ring Road marks the establishment of an efficient circulation system capable of rapid traffic diversion and multi-directional connectivity, while demonstrating remarkable socioeconomic benefits, ecological harmony, and extraordinary momentum for urban sustainable development.

1. Driving Economic Growth. The Addis Ring Road has reshaped the city's economic geography, boosting logistics efficiency by 30% and revitalizing manufacturing competitiveness. Industrial zones like Bole Lemi have flourished along the corridor, while its connection to the Djibouti Port transport route has enhanced import-export efficiency, increasing foreign exchange earnings by 3.2%. The project drove a 300% appreciation of land values along the corridor, generating over $800 million in government revenue from satellite town development, which was specifically allocated to public welfare programs. The Ring Road Economic Belt has now emerged as Ethiopia's industrial core artery, catalyzing regional industrial clustering.

2. Advancing Social Well-being. The project has integrated 1.5 million low-income residents into a 1-hour commute radius, reducing peak travel time by over 40 minutes. By diverting 40% of transit trucks away from downtown, it has significantly improved urban mobility. The corridor has attracted over 300,000 new residents, with synchronized expansion of healthcare and education services along the urban expansion. Optimized road networks have dismantled spatial barriers, creating development opportunities for marginalized communities and tangibly promoting social equity and inclusive growth.

3. Creating a Poverty Alleviation Prototype. The ring road project directly created tens of thousands of construction jobs and generated employment opportunities in adjacent industrial zones for low-skilled workers. It significantly expanded job access for disadvantaged communities and boosted income levels. Foreign investment has led to the creation of 80,000 jobs. Meanwhile, reduced transportation costs stimulated small and micro businesses, creating vibrant roadside economic ecosystems that diversified local income sources.

4. Establishing a Sustainable Development Model. The successful practices of the Addis Ababa Ring Road have been implemented in Nairobi (Kenya) and Kampala (Uganda), where the innovative "three-tier road network system with ring roads as hubs" has replaced the conventional "radial arterial roads with complex branch networks" approach. This provides a replicable model and new development direction for high-density African countries. The project incorporates underground utility tunnels with smart city interfaces and adaptable designs to accommodate expansion needs for the next 50 years. Furthermore, the Addis Ababa Ring Road's "infrastructure-driven endogenous development" approach actively contributes to Africa's realization of the Agenda 2063 framework.

The Addis Ababa Ring Road has become an iconic symbol of Ethiopia's commitment to sustainable development. Its profound impact extends far beyond physical infrastructure, reigniting national confidence and pride in Ethiopia's modernization journey. More than just a road, the Addis Ababa Ring Road stands as a beacon of progress, transformation, and hope.

20.The 10th of Ramadan Eco-Railway Project in Egypt

Provided by National Authority for Tunnels, Egypt

I. Overview

Located in North-East Africa and Middle East, Egypt has a population of more than 90 million. Cairo, the capital of Egypt, has a population of over 20 million, leading to high population density and insufficient capacity in the old transportation system. To improve the quality of life of residents and foster the urban development, the Egyptian government planned the construction of a new administrative capital, with the core area of Phase I covering 505,000 square meters and accommodating a population of 5 million. The success of relocating the capital hinges on improving transportation efficiency between the new capital, downtown Cairo, and New Cairo.

The 10th of Ramadan Railway (connecting Cairo, the new administrative capital, and 10th of Ramadan City) is an important transportation project in Egypt towards the realization of the national Development to the east strategy and invest in the construction of the Eastern Economic Corridor. The "Development to the East" strategy in Egypt is a core initiative to achieve the national "Vision 2030," aiming to rebalance regional growth and reduce reliance on traditional Western partners by developing infrastructure, attracting investment, and promoting economic diversification in eastern regions. This strategy is crucial for enhancing Egypt's economic resilience, creating employment, and fostering regional equity, helping the country shift from over-reliance on tourism and Suez Canal revenue to meet multiple economic and social development goals by 2030. Egypt's New Administrative Capital is located in the desert 45 km east of Cairo, serving as a flagship project of the strategy to alleviate Cairo's population pressure and establish an economic hub connecting the Suez Canal and the Red Sea.

The 10th of Ramadan Railway Project, implemented by AVIC International Holding Corporation, is Egypt's first electrified light railway and currently the only public rail line connecting Cairo's old city with the new administrative capital, and 10th of Ramadan City. The project, which spans approximately 109 kilometers in four phases, saw the first and second phases (70 kilometers) officially enter commercial operation in 2022. By building a modern railway system and creating a safe, convenient, efficient and fast electrified network, the project has significantly improved regional transportation capacity, effectively addressing challenges such as limited urban expansion and difficult commutes for residents.

Source: AVIC INTL
Figure 1: Real Scene of the 10th of Ramadan City Railway Project Opening

II. Solutions

Utilize digital and innovative technology. The project introduced core railway equipment manufactured in China to Egypt, achieving several "firsts" in the development of Egypt's transportation infrastructure. The 27.5 kV AC traction power supply system was applied for the first time in an Egyptian transportation project, filling the gap in Egypt's AC electrified railways and laying the foundation for the future promotion of AC electrified railways and high-speed railway traction power systems in Egypt and the wider Middle East region. Chinese-manufactured equipment, including the power supply system, signaling system, electric multiple units (EMUs), engineering vehicles, and depot equipment, were introduced to Egypt for the first time. Additionally, the centralized MMS (Maintenance Management System) solution and CBTC (Communication-Based Train Control) signaling system were also employed for the first time. The video surveillance system incorporated internationally leading facial recognition and intelligent detection functions. The integrated low-voltage power system used a compliant uninterrupted dual-machine power supply in line with European standards.

Adopt green and energy saving technology. The project also implemented special management plans for noise, dust, and waste and adopted a range of energy-saving technologies to improve energy efficiency across the equipment.

Establish the talent training mechanism. Through cooperation with the Egyptian Ministry of Transportation and domestic railway academies to establish a rail transport talent training mechanism, AVIC INTL has trained nearly 100 young rail transport business backbone for Egypt who played an important role in the construction and operation of the 10th of Ramadan Railway.

Strengthen the team's international cooperation. Local contractors are responsible for construction operations, and Chinese companies implement the procurement and installation of mechanical and electrical equipment and vehicles. Under the premise of ensuring quality, the construction teams strictly follow the construction plan to advance the progress of the project, successfully overcoming the challenges of construction time and technical difficulty.

III. Major Achievements

1. Provided efficient, safe, and convenient travel services. The project benefits 5 million residents commuting between Cairo's old city and the new capital, reducing the travel time between the two locations from 1.5 hours to 56 minutes. This has decreased overall traffic time in central Cairo by more than 30%, significantly improving the efficiency of urban transportation. The project operates on a fully enclosed line, which greatly reduces traffic accidents compared to private cars and buses, thereby increasing the residents' safety travel. Since the opening to public service in 2022, the system has achieved over 700 days of safe operation, covering a cumulative distance of approximately 6 million kilometers. By August 2024, the average daily passenger volume had exceeded 10,000 trips, with cumulative ticket revenue surpassing 60 million Egyptian pounds (1.21 million USD). It is expected that once the third and fourth phases of the project are completed and opened, daily passenger traffic could reach 100,000.

Source: AVIC INTL
Figure 2: Overview of the Station

2. Promoted green and low-carbon travel. The construction and operation of the project have significantly reduced greenhouse gas emissions and air pollution. So far, the operation of EMUs has cut approximately 20,000 tons of carbon emissions, and the air quality index (AQI) in areas along the project route has improved by around 20%. Once the third phase of the project is connected with the first and second phases, it is expected to shift about 12% of traffic volume, saving approximately 1,750 tons of carbon emissions daily, contributing greatly to local energy-saving and emission reduction efforts.

3. Boosting regional economic development. The project has stimulated commercial, residential, and industrial development in areas along the route, creating new economic growth points. Land and property prices along the route have significantly increased. Adly Mansour Station, the starting point and an interchange station with Cairo Metro Line 3, has already been integrated with some commercial functions. In the future, the new capital interchange station with the Cairo-Suez high-speed railway will plan for a large commercial complex, with corresponding commercial, office, and residential properties being developed around the transport hub. As a large public transportation infrastructure project, the construction of the project will further revitalize the entire industrial chain, including rail transportation survey and design, engineering construction, equipment manufacturing, railway operation, and maintenance.

4. Creating employment and talent development opportunities. The project has provided numerous job opportunities in construction, operation, and maintenance. During the construction phase, approximately 15,000 jobs were created, and around 3,000 jobs have been generated during the operation and maintenance period. Additionally, the project launched the "Elite Talent Program" to cultivate international talent in the rail transportation field for Egypt. So far, three phases of training have been completed, with over 80 graduates, effectively promoting local talent development and enhancing Egypt's railway technical capabilities.

Source: AVIC INTL
Figure 3: Egyptian Trainees Participating in the Talent Development Program Posing for a Group Photo in China

5. Building a multi-level rail transit network to support Egypt's capital relocation. The project connects high-speed rail, suburban rail, monorail, and metro lines, creating a multi-level rail transit network in Greater Cairo. This network strengthens the connection between the new capital and Cairo's existing central urban area, enhancing the comprehensive competitiveness of the new capital and providing strong support for the successful relocation of the capital.

The EPC general contracting model adopted by the 10th Ramadan City Railway Project in Egypt effectively integrates design, procurement, construction and other aspects, simplifying the project management process, applicable to similar large-scale infrastructure projects. The successful implementation of the project demonstrates the good practices of international cooperation between Chinese and foreign enterprises, especially in project management and technology exchange. In addition, the design and equipment of international standards have been adopted in the project, not only improving its interoperability, but also facilitating the subsequent maintenance of equipment. Through localization exploration—including the adaptation of technical standards to Egyptian regulations, integration of local construction materials, and collaboration with Egyptian engineering teams—the replicability of the project has been enhanced.

21.The Ropka Tööstusrajoon Mobility Management Project in Estonia

Provided by United Nations Economic Commission for Europe

I. Overview

The RopkaTööstusrajoon Mobility Management project in Tartu, Estonia, exemplifies an effective public-private partnership aimed at fostering a culture of sustainable mobility in a medium-sized city. Tartu, Estonia's second-largest city, has a growing industrial district known as Ropka Tööstusrajoon, located approximately 5 kilometers from the city center. This area accommodates over 450 small and medium-sized enterprises and attracts around 3,300 employees and 6,500 daily visitors. Despite the area's economic significance, it has long struggled with mobility inefficiencies, low public transport use, and car-centric commuting patterns.

The challenge for the city of Tartu was multifaceted. The industrial zone lacked a centralized management body responsible for accessibility, and the businesses operating within it, largely SMEs with varying work schedules, saw limited direct benefits in participating in or promoting sustainable transport efforts. This disjointed landscape made coordinated action difficult. Compounding the issue was a general absence of awareness or interest in mobility management among local stakeholders.

Source: tartu.ee

To address these challenges, the Tartu Municipality, supported by the European Union MoMa.BIZ (Mobility Management for Business and Industrial Zones) project, launched a comprehensive initiative to develop and implement a sustainable mobility plan for the Ropka Tööstusrajoon. The approach focused on stakeholder engagement, data-driven planning, and the promotion of sustainable transport options.

One of the foundational elements of the project was the creation of a local mobility group, a collaborative body comprising the city government, local planners, transport experts, public transport providers, company representatives, and non-governmental organizations.

This group was tasked with assessing existing mobility conditions and co-creating a realistic and effective mobility plan tailored to the industrial zone's specific needs.

Through audits of walking and cycling conditions, desk research on flexible transport models, and stakeholder training, the project established a detailed understanding of the local transport landscape. The resulting mobility plan focused on three core areas: enhancing public transport, improving walking and cycling infrastructure, and promoting sustainable transport modes through awareness campaigns.

In terms of value orientation, the Ropka Tööstusrajoon project reflects multiple sustainable transportation principles:

- **Safety:** Safer infrastructure for cyclists and pedestrians was a central feature.
- **Convenience:** Improved public transport schedules and comfort levels increased usability.
- **Efficiency:** Coordinated planning led to reduced redundancy and better access.
- **Green:** A clear shift away from car dependency helped lower emissions.
- **Economy:** Reduced car commuting lowered transport costs and infrastructure strain.
- **Inclusiveness:** Measures targeted all employees, including new hires, with tailored information packages.
- **Resilience:** The public-private structure ensures adaptability and continued relevance of the mobility plan.

By embedding sustainability into the industrial district's operations and connecting economic productivity with environmental responsibility, the Ropka Tööstusrajoon case offers a replicable model of mobility transformation that contributes meaningfully to the Sustainable Development Goals (SDGs), especially those focusing on sustainable cities, industry innovation, and climate action

II. Solutions

The implementation of the Ropka Tööstusrajoon mobility plan represented a holistic and inclusive approach to tackling transportation challenges in a mixed-use industrial area. The plan was characterized by a participatory process, cross-sectoral collaboration, evidence-based strategies, and a strong emphasis on sustainable and soft mobility solutions. The initiative aimed not only to reduce car dependency but also to create a more connected, accessible, and environmentally responsible workplace district within the city of Tartu.

1. Stakeholder Mobilization and Planning

The project began with the formation of a local mobility group, a multidisciplinary platform that brought together all relevant stakeholders. This group became the cornerstone of the planning and implementation process. It included representatives from:

- Tartu city administration and urban planning departments
- Local public transport operators and authorities
- Businesses and employers located within the Ropka Tööstusrajoon
- NGOs and civil society organizations, particularly those active in sustainable transport and environmental advocacy
- Independent mobility and transportation planning experts

This diverse and inclusive group conducted a comprehensive situational analysis of mobility within the industrial area. The analysis focused on multiple dimensions:

- Infrastructure audit: The team performed a detailed assessment of existing walking and cycling infrastructure. This audit identified safety hazards, discontinuities in the network, missing links, and inadequate facilities that discouraged active travel.
- Behavioral analysis: Surveys and participatory workshops with employees and company representatives were conducted to understand commuting patterns, preferences, and pain points. This feedback was vital in tailoring solutions to real-world user needs.
- European benchmarking: The mobility group also examined best practices from across Europe, studying successful examples of flexible and sustainable transport systems implemented in other industrial zones.

Alongside data collection and analysis, the project delivered capacity-building workshops and training sessions for stakeholders. These sessions introduced mobility management principles, highlighted successful case studies, and fostered a shared understanding of the benefits of sustainable commuting. The goal was to empower stakeholders and create a shared sense of ownership over the project outcomes.

2. Development of the Mobility Plan

Based on the insights gained during the analysis phase, the mobility group collaboratively drafted a comprehensive and context-sensitive mobility plan. The plan centered around three interrelated strategic pillars:

A. Public Transport Improvements

Given the structure of employment in Ropka Tööstusrajoon—marked by shift work and varying schedules—the alignment of public transport with employee needs was crucial. Measures included:

- Revision of bus timetables to better align with common work shift start and end times.
- Increased service frequency on core routes serving the industrial zone.
- Comfort enhancements, such as improved seating, lighting, and onboard information systems.
- Updated signage and multilingual information materials to accommodate non-Estonian- speaking employees.

B. Cycling and Walking Infrastructure

Recognizing the potential of active mobility for shorter commutes, the plan emphasized:

- Upgrading pedestrian pathways and improving safety at road crossings.
- Installation of secure bicycle stands near workplace entrances and communal areas.
- New wayfinding signage and directional information for cyclists and pedestrians.
- Connecting local infrastructure with the broader Tartu cycling network, creating seamless access to and from residential neighborhoods.

C. Awareness and Behavioral Change Campaigns

To encourage a shift in commuting habits, the project launched several soft measures:

- Collaborations with NGOs to run awareness campaigns promoting walking, cycling, and public transport.
- Mobility competitions among companies, with incentives for departments achieving the highest shift away from car use.
- Dissemination of accessibility maps highlighting public transport routes, bike paths, and walkable connections.
- Onboarding packages for new employees, including transport maps, mobility options, and incentives to choose sustainable modes.

3. Implementation Phase

Once the mobility plan was finalized, the city and mobility group coordinated closely to implement the proposed measures. The implementation phase unfolded in several key areas:

Public Transport Enhancements

- Timetables were synchronized with factory and office shifts to maximize convenience for employees.
- Real-time arrival displays and improved bus stops were introduced to enhance the commuting experience.
- Collaborative feedback loops between employees and operators allowed for the fine-tuning of services over time.

Active Mobility Infrastructure

- New bicycle parking stands were installed throughout the zone, particularly near high- traffic workplaces.
- Walking routes were resurfaced and widened, with better lighting and signage to enhance usability and safety.
- Informational kiosks and maps were placed at key entry points to the zone to support wayfinding.

Flexible Transport Study

- A feasibility study was conducted to assess the potential for introducing demand- responsive transport (DRT) services. This was particularly relevant for employees working outside standard hours or those living in less accessible areas.
- The study laid the groundwork for potential future pilots, offering scalable options for flexible transport integration.

Communications and Community Engagement

- Onboarding kits were distributed to over 500 new employees. These included transport maps, step-by-step guides for using public transport, and benefits of sustainable commuting.
- Community events, such as the inter-company mobility challenge, promoted awareness, created a sense of camaraderie, and incentivized modal shift.

Source: tartu.ee

4. Integration and Policy Alignment

The Ropka Tööstusrajoon mobility initiative was not developed in isolation. It was aligned with:

- Tartu's broader Sustainable Urban Mobility Plan (SUMP), ensuring consistency in city- wide transport policies.
- The EU-funded MoMa.BIZ project, which provided technical support, peer learning, and a platform to share experiences with other European cities.
- Environmental and public health objectives, linking mobility to carbon reduction, air quality improvement, and active living goals.

5. Monitoring and Feedback

To ensure accountability and enable adaptive management, Key Performance Indicators (KPIs) were defined from the outset. These included:

Modal split changes (car, public transport, cycling, walking)	Employee satisfaction with commuting options	Public transport ridership levels in the zone	Transport-related CO_2 emissions data

Data was collected through periodic surveys, field observations, and collaboration with transport operators. These insights informed minor course corrections and provided the foundation for replicating the model in other industrial zones.

III. Major Achievements

The implementation of the Ropka Tööstusrajoon mobility plan produced a wide range of benefits, spanning from improved transportation outcomes to broader socio-economic and environmental impacts. The success of the initiative demonstrates the power of integrated planning, local stakeholder involvement, and the cumulative effect of small-scale, well-targeted interventions. The achievements of the project can be categorized into three core areas: tangible project outcomes, socio-economic contributions, and replicability with potential for scaling and international influence.

1. Tangible Project Outcomes

One of the most notable successes of the Ropka mobility initiative was the significant modal shift away from private car use towards more sustainable transport modes. The project achieved measurable gains in mobility behavior across the district:

- Public transport usage increased by approximately 15% during the first year of implementation. This shift was facilitated by the alignment of bus schedules with work shifts, improved frequency and comfort, and the dissemination of clear, multilingual information.
- Bicycle commuting rose by 10%, a result of improved cycling infrastructure, secure bike parking, signage, and the integration of the area into the wider Tartu cycling network. Campaigns that promoted cycling to work further supported this increase.
- Private car usage decreased by an estimated 8–10%, reducing both congestion and greenhouse gas emissions within the zone. This drop also contributed to less pressure on parking infrastructure and improved the overall traffic flow during peak hours.
- Over 500 newly hired employees received tailored onboarding packages, which included information about sustainable commuting options, route maps, and step-by-step guides for using public transport and cycling safely. These kits were instrumental in embedding sustainable behavior early in the employment experience.

These outcomes demonstrated that targeted interventions—when well-coordinated and accompanied by clear communication—can generate significant behavioral change in a relatively short time frame.

2. Socio-Economic Contributions

Beyond transport efficiency, the initiative brought tangible social and economic benefits to employers, employees, and the broader community:

- Employee punctuality improved significantly, as commuting options became more reliable and better aligned with work schedules. Reduced lateness translated into higher workplace productivity and fewer disruptions to operations.
- Companies reported increased job satisfaction and retention, with easier commuting cited as one of the factors that made working in the Ropka Tööstusrajoon more attractive. Some firms noted improvements in staff morale, particularly following the mobility competition events.
- Commuting costs decreased for many employees who transitioned from driving to public transport or cycling. In some cases, monthly expenses related to fuel and parking were cut by 20–40%, which had a direct impact on disposable income and employee well-being.
- Health and environmental benefits were also observed. A shift toward active travel contributed to higher daily physical activity among employees, while reduced car traffic helped improve local air quality and lower noise levels in and around the district.

3. Replicability and Promotability

A major achievement of the project lies in its replicability and the role it now plays as a model for similar mobility interventions in other industrial and business zones:

- The methodology—grounded in local stakeholder cooperation, soft mobility measures, and context-sensitive infrastructure planning—proved adaptable, low-cost, and scalable.
- The success of the Ropka initiative has encouraged the City of Tartu to explore similar mobility planning processes in other parts of the city, including logistics hubs, business parks, and large public service centers.
- The project gained visibility through participation in the European MoMa.BIZ network, enabling Tartu to share its learnings internationally. The city has been featured in knowledge exchange sessions, workshops, and policy dialogues as a leading example of how medium-sized cities can implement effective workplace mobility management.
- The emphasis on multi-level governance and cross-sectoral partnership has been particularly well-received by other cities and regions, offering a transferable governance model alongside the technical and infrastructural interventions.

In summary, the RopkaTööstusrajoon mobility plan not only delivered on its immediate objectives but also laid the groundwork for long-term sustainable mobility planning in Tartu and beyond. Its success affirms that transformative change is possible when strategies are rooted in inclusivity, evidence, and local ownership.

22.Taxi Catalyzing Green Transportation Transition in Ghana

Provided by Solartaxi

I. Overview

Ghana is an important port and cargo distribution center in West Africa, which can radiate the large market of 430 million people in the West African Economic Community, historically known as the Gold Coast. Ghana's transport relies primarily on private vehicles and informal quasi-public transport systems, including motorcycles, tricycles and minibuses. According to the Ghana Ministry of Transport, more than 95% of vehicles are imported second-hand vehicles with an average age of 14.2 years and public transport vehicles are even more outdated.

Like many African countries, Ghana is facing the challenges of rapid urbanization, especially in terms of public transport facilities. Currently, Ghana's dependence on imported second-hand vehicles, the prevalence of all types of vehicles, and the widespread use of low-standard fuels are leading to increased emissions, affecting urban air quality, becoming a threat to public health, and exacerbating traffic congestion and air pollution. CO_2 emissions from the transport sector are a major source of environmental pollution, accounting for 37% of total emissions.

Ghana has an electricity penetration rate of 87%, an excess of 2,000 MW and renewable energy accounts for 34.65% of the national electricity, making it one of the countries with the highest penetration of electric vehicles in Africa. Ghana is close to the equator, with plenty of sunshine, 1,800 to 3,000 hours of sunshine per year, making solar an ideal energy choice, offering huge potential for the electric vehicle industry. Solar cars can save about $0.15 per kilometer traveled in Ghana, saving about $3,000 per year. As the cost of renewable energy declines, Ghana is firmly implementing its climate change commitments under the Paris Agreement and the National Energy Transition Framework, aiming to meet peak demand of 84,000 MW and achieve net zero emissions by 2070. Renewable energy is expected to account for 20% of installed power generation capacity by 2070.

Ghana is in a critical period of transition to a sustainable energy future, actively addressing the challenges of electric vehicle applications, which provides a rare investment opportunity for the integration of solar and electric vehicle ecosystems. Against such a market outlook, Globelink China Logistics has teamed up with SolarTaxi, an innovative company in the field of green energy mobility in Ghana, to launch the flagship project of green transport, Ghana Solar Taxi. The Solar Taxi Project is committed to driving the electric mobility development in Ghana and the African continent, aiming to make electric cars a convenient and economical travel option for the public while creating a cleaner and more environmentally friendly living environment.

Solar Taxi offers comprehensive green transport solutions in seven major cities in Ghana, such as Accra, Kumasi, Tacoradi and Tamari, with a service network covering not only urban centres but also rural areas, and supporting the new energy vehicles sale, rental, car-sharing service (Solar Taxi Ride) and e-bike delivery service platform (Solar Taxi Deliver) through self-operated solar charging stations. At the same time, the establishment of an assembly factory that assembles cars and bicycles in the capital of Ghana, Accra, has also contributed to the popularization of low-carbon mobility in Ghana.

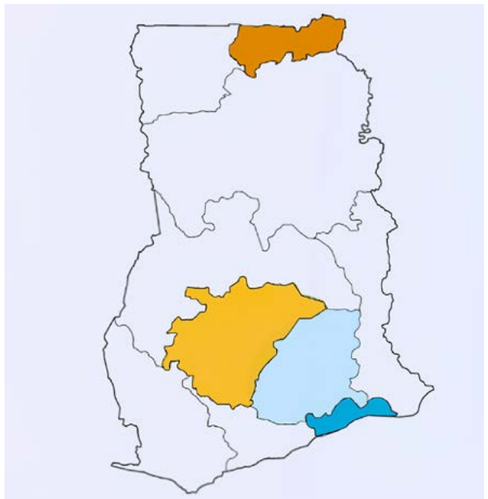


Figure: Charger Station for Solar Taxi

II. Solutions

1.Solar Charger and Battery Design Innovation

Figure: Independent Solar Charging Equipment

Solar taxis have made significant technological breakthroughs in solar charging technology, especially in the development of solar charging infrastructure. Solar taxis integrate solar panels with vehicles to allow vehicles to be charged directly from renewable energy, an innovation that is particularly important in areas where electricity supply is unstable. In addition, solar taxis have introduced independent solar charging devices to meet the needs of different customers.

Figure: Integrated Solar Charging Pile

To further meet the diverse needs of customers, Solar Taxi also offers customized solutions for installing solar charging facilities at home or office. These solutions are not only flexible and efficient, but also ensure that customers enjoy a stable, reliable supply of energy wherever they are, resulting in a more convenient and environmentally friendly electric mobility experience.

2. New Energy Vehicle Design and Assembly

By redesigning the chassis, designing the electronic system (including in-house battery development and controller configuration), integrating the drive devices, and converting the existing fuel vehicles into electric vehicles for efficient operation. Meanwhile, solar taxis use components and parts imported from China and Southeast Asia to assemble small electric bikes, tricycles, cars, etc., which have a range of up to 450 to 600 kilometers. Customers travel no more than 20 kilometers per day on average so they usually only charge the car once a week. Therefore, solar taxi significantly reduces the cost of production and utilization.

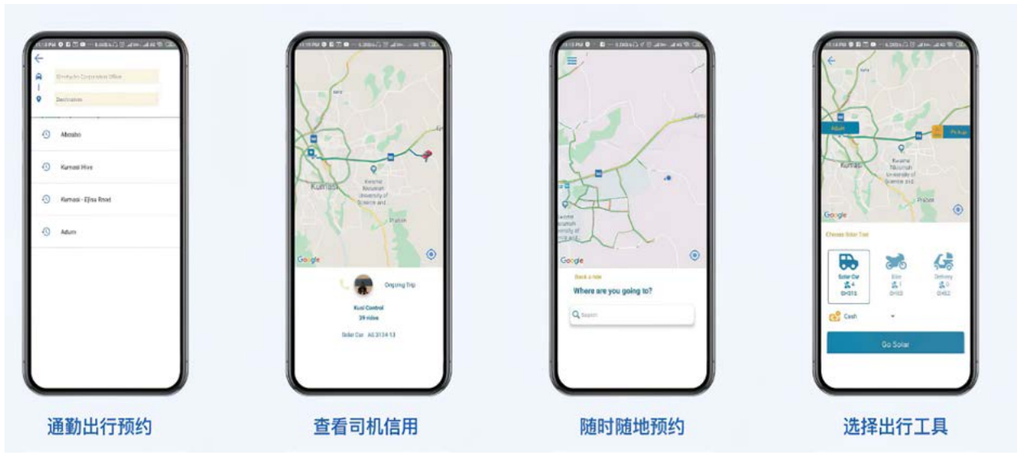
3.Diversified Vehicles Finance and Renting Solutions

Solar Taxi offers a range of flexible renting and purchasing options to meet the diverse needs of customers, including short-term renting, buying after renting, trade-in, and direct purchase. Through these flexible solutions, Solar Taxis aim to provide customized solutions for customers, allowing each customer to easily enjoy the convenience and environmental advantages brought by electric vehicles.

4. New Energy Shared Taxi APP Innovation

In 2022, Solar Taxi launched the Solar Taxi APP, an application designed specifically for shared taxi services, marking an important milestone in the development of Solar Taxi services. Users can download apps on Android and iOS platforms and register SolarTaxi accounts to enjoy affordable and convenient shared travel and courier services. The fleet of Solar Taxis includes solar powered motorcycles, scooters, recreational vehicles, tricycles, and small trucks. Each shared vehicle is equipped with additional portable batteries to respond to emergent situations and ensure service continuity.

SolarTaxi platform gathers dedicated drivers and drivers of self-owned Solar Taxis, and receives customers' orders through the app. Currently, customers can customize their transportation options based on their travel and transportation needs. Solar Taxi has become an emerging force in the Ghanaian market.



5. Fleet Management Cloud Solution

Providing cloud-based fleet management solutions with regular software updates, enables managers to monitor the performance and location of each vehicle in real-time, improve operational efficiency, and ensure timely and appropriate maintenance of vehicles, including repair, recycling, production, and sales of solar chargers and onboard batteries.

6. Express Delivery Services

Provide delivery services of B2B and B2C models. Corporate clients such as local e-commerce giants Jumia and Bolt Food in Ghana have chosen electric motorcycles powered by Solar Taxis for last mile delivery, further demonstrating the reliability and efficiency of Solar Taxi services.

III. Major Achievements

Reduce the impact of carbon emissions on the environment. Solar Taxi uses clean and renewable solar energy to meet energy needs and reduce carbon emissions, significantly reducing the impact of carbon emissions on the environment. This not only reduces dependence on fossil fuels, but also minimizes greenhouse gas emissions, making the transportation system of solar powered taxis more environmentally friendly. The solar integrated charging of Solar Taxi not only provides power for the vehicles, but also feeds back excess energy to the grid, promoting the production and distribution of clean energy. By assembling new energy vehicles locally and constructing charging stations, Solar Taxi has significantly reduced their dependence on oil, laying a solid foundation for the future development of sustainable energy. The Solar Taxi product line includes two wheeled, three wheeled, and four-wheel solar electric vehicles, all of which are powered by renewable energy sources. These efforts not only enhance Ghana's energy self-sufficiency, but also help it achieve its environmental goal of reducing greenhouse gas emissions by 15% by 2030, equivalent to reducing approximately 2 million tons of carbon dioxide.

Reduce transportation costs. The electric vehicles of Solar Taxi integrate imported and local components, strategically combining global and local resources to achieve a significant cost reduction of 40%. This makes the product highly competitive in price, almost on par with second-hand foreign vehicles. Solar Taxi has introduced advanced Chinese technology into the Ghanaian market. Chinese made solar photovoltaic panels have a photovoltaic conversion rate of up to 25%, allowing Solar Taxi to travel at a maximum speed of 110 kilometers per hour, with a range of over 300 kilometers, and operating costs only 20-40% of traditional fuel vehicles. This technological advantage not only reduces operating costs, but also saves an average of up to 10000 Ghanaian cedis in transportation costs for commuters in Ghana each year, further promoting the scale development of economic benefits.

Innovate New Energy Development and Research Achievement. The Solar Taxi electric vehicle adopts advanced photovoltaic complementary charging technology, which consists of two core components: an efficient solar power generation module and a home charging facility. These two systems can operate independently or work together to achieve optimal energy efficiency. The solar power module has a peak power output of up to 600 watts, which can directly convert solar energy into electrical energy, providing clean and renewable energy for vehicles. In terms of performance, the maximum speed can reach 110 kilometers per hour, and its maximum range reaches 332 kilometers. This innovative model that combines solar energy with home charging not only improves energy self-sufficiency, but also reduces dependence on traditional power grids, setting a new benchmark for the sustainable development of green energy electric vehicles.

Figure: Solar Bike-100 and Solar Delivery Motorcycle

Creating job opportunities. Solar Taxi is committed to creating a substantial positive impact in Ghana and bear social responsibilities, providing over 100 full-time positions directly in the local area, indirectly promoting employment opportunities related to vehicle production, and making positive contributions to improving the living standards of local residents and enhancing the community environment. In addition, Solar Taxi has implemented comprehensive training programs to provide professional training on new energy vehicles and solar technology for people from different backgrounds, further expanding employment opportunities.

Solar Taxi upholds a firm commitment to gender equality and youth skills development. Based on this commitment, it has established the Solar Taxi Women's Engineering College, which focuses on cultivating professional skills for youth and women in solar car assembly, safe driving, and vehicle maintenance. Solar Taxi provides training and opportunities for women to enhances their abilities and promotes an inclusive culture within the company. At present, the average age of the Solar Taxi is 26 years old, with women accounting for 60%, technical personnel accounting for 70%, and female engineers accounting for as high as 90%.

Through these projects and initiatives, nearly a thousand female drivers and car maintenance technicians have graduated from the Solar Taxi Academy. They not only gained valuable professional skills, but also significantly improved their confidence and problem-solving abilities.

Promote talent cultivation. Solar Taxi has launched a solar campus project, collaborating with universities to cultivate students' environmental awareness and promote sustainable and innovative transportation methods. Adopting a top-down and bottom-up approach, it encourages students and campuses to reduce their dependence on traditional fuels, making them ambassadors of green and sustainable transportation. Through these efforts, Solar Taxi is cultivating a new generation of leaders and innovators for the future green transportation revolution.

The Solar Taxi program is actively exploring the design of various microgrid solar charging stations. Although the new energy vehicle industry still faces policy, legislative frameworks, and commercial barriers, the demand for sustainable transportation solutions is becoming increasingly urgent with the rapid urbanization process and population growth in Africa.

The manufacturing of new energy vehicles not only provides a way to solve environmental problems, but also has the potential to create employment, promote local economic development, and reduce dependence on imported fossil fuels. Overall, the development prospects of the electric vehicle industry in Africa are optimistic. With the leadership of innovative enterprises and the support of governments and international partners, Africa is expected to become a key participant in the global electric vehicle revolution. Although the road is long, Africa has embarked on a journey towards a cleaner and greener future.

Looking ahead, Solar Taxi plans to expand its business to Ghana and other African countries, establish larger assembly factories, and ultimately achieve the goal of fully manufacturing cars locally. This strategy will not only drive Africa's green mobility revolution, but also bring tangible economic and environmental benefits to local communities, driving Africa towards a more sustainable and environmentally friendly future.

Global Sustainable Transport Best Practices

Highlighting Success Stories in Sustainable Transport

DISCLAIMER

The analysis, conclusions and recommendations of this report do not necessarily reflect the views of the Global Sustainable Transport Innovation and Knowledge Center or its expert groups.

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Global Sustainable Transport Best Practices 2025

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www.gstikc.org

Invitation

We welcome your recommendations of best practices in sustainable transport from around the globe. Please prepare the relevant materials in accordance with the requirements and send them to disi_li@gstikc.org.cn

Criteria

Transport is a key driving force for achieving UN's Sustainable Development Goals by 2030. Collecting global sustainable transport good practices will help showcase achievements in sustainable transport development, leading the global transport transformation and promoting the global sustainable development. Global sustainable transport good practices include but not limited to transport connectivity, digital development, green and low-carbon initiatives, public transportation, and safety and inclusiveness, provide innovative and replicable policies, projects, initiatives, technologies, mechanisms, and organizational activities, to provide valuable experiences for global transport development.

1.1 Relevant: The practices should reflect the value orientation of sustainable transport—safe, convenient, efficient, green, economical, inclusive and resilient—contributing to the achievement of the United Nations Sustainable Development Goals.

1.2 Innovative: The practices should showcase innovative applications in the field of sustainable transport, including new concepts, technologies, policies, and models which should possess a certain level of foresight and serve as exemplary references for others.

1.3 Effective: The practices should have measurable results and demonstrate their effectiveness through practice, effectively promoting transport transformation and contributing to positive changes in status or trends.

1.4 Replicable: There are evidences that the practices can be or has been replicated and/or scaled up, offering experiences and lessons that can be referenced by others around the globe to promote sustainable transport development.

1.5 Synergetic: The practices should demonstrate the synergy between transport and economic, social, and cultural development, as well as a harmonious resonance with ecological progress. They should promote the common development of global transport and contribute to building a community with a shared future for humanity.

Template

Location: Title

I. Overview (No less than 500 words)

This section mainly introduces the background of the case implementation, basic situation, the problems to be solved, and the sustainable transportation value orientation reflected.

1. Project implementation location situation

2. Problems the project aims to solve

3. Basic information of the project

4. Sustainable transportation value orientation reflected by the project, i.e., how it aligns with aspects of "safety, convenience, efficiency, green, economy, inclusiveness, and resilience."

II. Solution (No less than 1000 words)

This section mainly describes the implementation of the project, technical approaches, and measures taken to solve the problems, etc., which can be vividly presented through images, charts, etc.

III. Main Achievements (No less than 500 words)

This section vividly presents the achievements of the case in the form of objective facts, numbers, charts, images, etc., reflecting the support for the concept of sustainable transportation and the United Nations Sustainable Development Goals, and explains the replicability and promotability of the case.

1. Project outcomes (Numerical display required, comparable numbers are better)

2. The project's contribution to the socio-economic aspect (Numerical display required, comparable numbers are better)

3. Replicability and promotability of the case (Whether it has been promoted, and its future promotability for other countries and regions)