



## Sustainable Mobility

### EFFICIENT, SAFE, AND GREEN MOBILITY FOR ALL

CTCN works with developing countries to accelerate, develop and transfer technologies for low carbon, climate resilient development.

## Why transport matters

In 2021, CO<sub>2</sub> emissions from the transport sector accounted for 36 per cent, with an annual increase of 8 per cent, to nearly 7.7 Gt CO<sub>2</sub>. Reducing greenhouse gas (GHG) emissions and transitioning towards net-zero mobility is essential to combat climate change, representing not only a significant challenge but also a great opportunity for a comprehensive innovation-driven transformation throughout the entire value chain and in policy and research and development (R&D).

In recent years, electric car markets have seen exponential growth boosted by strong regulations, fiscal incentives, and investment in zero and low-carbon vehicle operations. But countries need stronger innovation capacities to deploy cutting-edge technologies, including battery, electric and fuel cell electric vehicles, and alternative fuels. Digital

technologies can bring additional services to transform the sector by making car-sharing, battery charging and smart monitoring services available to users.

CTCN enables transformational change in systems by supporting sustainable mobility including:

- ▶ Mobility regulations development
- ▶ Deployment of low-emissions vehicles
- ▶ Improvement in vehicle fuel economy
- ▶ Use of digital technologies to enhance intelligent urban transport systems

Investing in innovative solutions unlocks economic opportunities. As countries transition to low-carbon transport systems, new markets for electric vehicles, renewable fuels, and smart mobility services emerge.

CTCN case studies, pilot projects, RD&D, and concept notes can be leveraged/are pivotal to attract investments and funds. CTCN collaborates with The Green Climate Fund, The Global Environmental Facility, The Adaptation Fund Climate Innovation Accelerator, and several regional and national development banks, supporting systems transformation in over 30 countries.

# CTCN enables regulatory frameworks and policies to support innovation in transport

For over a decade, CTCN has been working with National Designated Entities (NDEs)<sup>1</sup> and over 800 Network members, providing a range of technical assistance, capacity-building, and knowledge-sharing, such as:

- ▶ Developing policies and sectoral policy roadmaps for deploying and scaling up e-mobility and supporting sustainable infrastructure;
- ▶ Providing feasibility studies for low-carbon modes of transport including EVs and urban transport;
- ▶ Development of low-emission mobility policies and financing proposal; and
- ▶ Creating opportunities for the internationalization of the hydrogen energy research and development network.
- ▶ Enabling intelligent transport systems (ITS) leveraging digitalization and the integration of advanced technologies into transport systems. ITS solutions, such as real-time traffic management, smart parking and connected vehicles, enhance efficiency, reduce congestion and minimize emissions.
- ▶ Devising solutions for mobility as a service (MaaS), introducing digital platforms that integrate multiple transport options (e.g., buses, bikes, car-sharing) into seamless, user-friendly services.

In parallel, technical assistance and interventions work to strengthen national systems of innovation<sup>2</sup> (NSI) and digitalization<sup>3</sup> as proven technology enablers.

## Jakarta drives sustainable mobility in Indonesia



Since the economic boom several decades ago, traffic and air pollution in Jakarta has significantly worsened. It is estimated that the greenhouse gas (GHG) emission in Jakarta will rise to 117 million tons of CO<sub>2</sub> in which the contribution from transportation will be about 25 per cent.



CTCN, working with the Institute for Transportation Development Policy and Cadmus Group LLC, supported the development of Transjakarta: the longest bus rapid transit system in South-East Asia.

CTCN worked closely with relevant e-mobility stakeholders and provided:

- ▶ an investment and business model
- ▶ policy recommendations and an operational plan
- ▶ a charging strategy and implementation road map
- ▶ an assessment of grid and renewable energy adoption

As a result, Transjakarta is using the electrification road map and investment plan developed by CTCN to deploy 1,635 e-buses (50 per cent of Jakarta's bus fleet) by 2030. Around US\$1.4 million in investment opportunities has been identified to support Jakarta's charging facilities and grid infrastructure with the potential to integrate solar roofing for buses and the Mass Rapid Transit (MRT) stations.

In 2022, Jakarta<sup>4</sup> adopted the policy recommendations and successfully procured its first 30 e-buses.

“CTCN technical assistance provided the technical and feasibility robustness to prepare the transition of the existing fleet to electric buses as part of the next steps that the country must take towards sustainable mobility.”

*Ligia Castro de Doens, Climate Change Director, main focal point for UNFCCC, International Technical Cooperation Office of the Ministry of Environment, Panama*

## How CTCN is enabling transformative solutions

CTCN supports systems transformations in countries by facilitating the flow of know-how, experience and solutions for sustainable mobility. Developing countries can leverage national systems of innovation to foster collaboration among government, industry, academia and civil society. By creating conducive environments for knowledge sharing, research and development, these frameworks enable the co-creation of sustainable transport solutions.

Building upon its expertise in developing and strengthening enabling environments, CTCN has developed national electric vehicle roadmaps and regulatory frameworks, converging innovative solutions and policy development in several countries, including Ghana and Papua New Guinea.



**15** technical assistance projects totaling US\$3 million



**18** developing countries supported, 1 multi-country project



**Thousands** of stakeholders participated in capacity-building



**2** on Digitalization and 13 on national systems of innovations

Led by a demand-driven process working with National Designated Entities, CTCN also supports national decision-making, market assessment and feasibility studies of various innovative technologies for mobility.

### Selected examples of CTCN sustainable mobility technical assistance, including anticipated country impacts

Examples of CTCN technical assistance	Countries	Impacts
Developing a national framework for deploying and scaling up e-mobility	Cambodia, Ghana, Papua New Guinea, Solomon Islands, Tanzania, Vanuatu, Zimbabwe	National Electric Vehicle <b>framework and roadmap</b> officially proposed, adopted, or implemented
Development of framework for real-time transport information systems for public transport in Greater Dhaka	Bangladesh	Feasibility study ongoing on the development of a real-time information system on vehicle location, waiting time and route information for public transport
Technical capacity enhancement for planning an urban public transport system in Vientiane, Lao PDR	Lao PDR	Pre-feasibility study ongoing to improve the urban public transport system in Vientiane
Accelerating the transition to sustainable mobility and low-carbon emissions in Panama City	Panama	Economic assessment and technical evaluation conducted to support decision on the electrification of buses in Panama City

## Transition to sustainable mobility

Sustainable mobility refers to equitable access to secure, safe and efficient modes of transport supported by climate-responsive infrastructure<sup>5</sup> for the movement of goods and people. Electrification of road, marine and aviation transport all matters to achieve the net-zero goals.

Transport is fundamental to economic growth, connecting people to essential services such as health care, education, social services and business. As such, it is one of the critical sectors that require more financing and investment to create both the innovation and digital infrastructure, and the policy-ecosystem that can enable and incentivize a fast and just transition.

## Mainstreaming gender in public e-mobility services

Engagement processes in formulating roadmaps for transitioning towards sustainable mobility can be powerful tools to promote gender equality. In Papua New Guinea, CTCN supported the development of a national policy for deploying and scaling up e-mobility, aiming to advance gender equality by accelerating the provision of accessible, affordable, reliable and safe public transport – issues that are central to women, as the initial gender analysis pointed out. A gender training was conducted to help raise awareness and provide options for enhanced gender mainstreaming in transport policy and enhance equity and inclusion among users of public e-mobility services. Mainstreaming gender in public e-mobility services also means enhancing autonomy as well as professional and economic opportunities for women.



# Next-generation sustainable mobility systems

Next-generation sustainable mobility systems integrating AI, digitalization and new energy sources offer transformative solutions to reduce carbon emissions, enhance efficiency and create smart transportation networks.

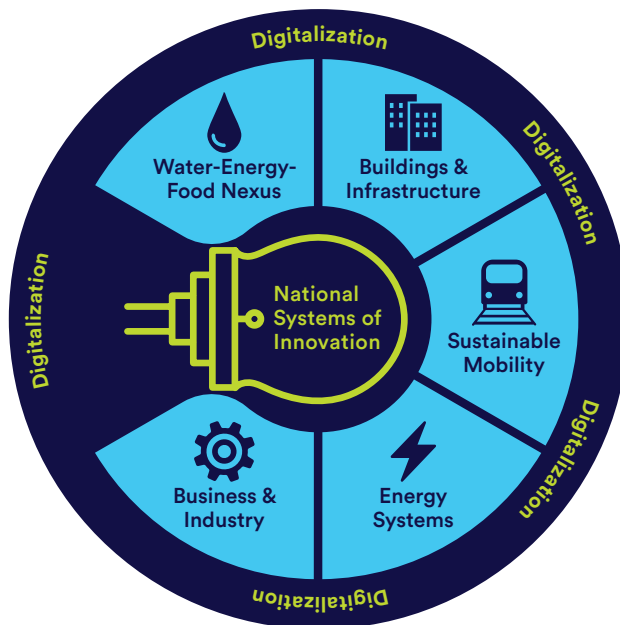
CTCN is exploring emerging and cutting-edge technologies and solutions, including:

- ▶ Use of digitalization and AI for smart monitoring systems for traffic management (e.g., Bus Rapid Transit system)
- ▶ Bi-directional charging, and optimization of EV charging infrastructure in countries, specifically in small island developing states (SIDS)
- ▶ Innovative and efficient battery chemicals, energy storage systems (ESS) and its end-of-life management
- ▶ Electrification of medium to heavy-duty vehicles using low-emission fuels, (e.g., power to-x)
- ▶ Modernize fleets by adopting low-carbon or zero-carbon and alternative fuels
- ▶ Create stronger linkages with innovative energy systems transformations
- ▶ Intelligent logistics and supply chain management
- ▶ Electric vehicle charging infrastructure/smart grid integration. The integration of AI and digital technologies with renewable energy sources creates a symbiotic relationship between sustainable energy generation and transportation. AI algorithms can analyse energy generation patterns, predict supply-demand fluctuations, and optimize the allocation of energy resources. This enables smart grid integration with EV charging infrastructure, enhancing grid stability and maximizing the use of renewable energy.
- ▶ Strengthening National Systems of Innovation to create incentives for emerging technologies and switch to fuel substitution through alternative energy carriers such as green hydrogen, bioenergy and ammonia as substitutes.

## About CTCN

The Climate Technology Centre and Network (the implementation arm of UNFCCC's Climate Change Technology Mechanism, mandated under the Paris Agreement) provides accelerated development and transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries.

CTCN provides a portfolio of technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries by harnessing the expertise of a global network of technology companies and institutions. CTCN is hosted by the UN Environment Programme and is headquartered in Copenhagen, Denmark.



1 NDEs are technology representatives selected by each country's government representing 164 parties to the UNFCCC <https://www.ctc-n.org/about-ctcn/national-designated-entities/national-designated-entities-by-country>

2 National Systems of Innovation (NSI): IPCC defines NSI as: "the set of institutions to create, store and transfer the knowledge, skills and artifacts which define technological opportunities" (Metcalfe, 1995). National systems of innovation reflect a complex mixture of institutions (e.g., financial; legal; scientific and technological; educational), public policies (regarding, e.g., taxation; export/import promotion; science, technology, and innovation), and business and social relationships.

3 Digitalization: Digital technologies impact positively and negatively on GHG emissions through: their own carbon footprint; technology application for mitigation; and induced larger social change. Whether the digital revolution will be an enabler or a barrier for decarbonisation will ultimately depend on the governance of both digital decarbonisation pathways and digitalization in general (medium evidence, high agreement). The CTCN will use this approach that positive impacts of digitalization is realized for emission reductions and creation of resilience.


4 <https://jakartaglobe.id/news/thirty-electric-buses-hit-the-streets-of-jakarta>

5 World Bank, 2017

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