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Electric mobility in developing economies: Lessons drawn from UNIDO experience

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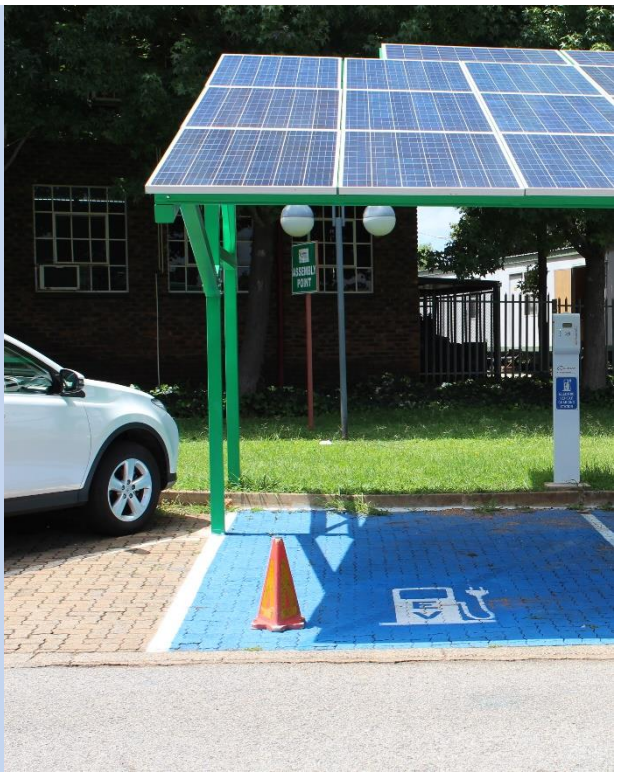
Key Messages

- There are common barriers to scaling up the deployment of electromobility in developing countries, but others are context-specific due to local factors, including dominant mode of transport, climate, and behavioural attributes.
- Achieving a shift towards cleaner modes of transport requires policies beyond the electrification of mobility and consideration of the characteristics of power supply in the country including coupling the shift with renewable energy integration.
- Subnational entities like cities and municipalities are key agents for change but need tailored support.
- International technical cooperation can accelerate the rate of deployment by facilitating broader stakeholder engagement, providing pilot demonstrations, building capacities, and expanding access of policy makers to tailored policy tools necessary for market transformation.



Introduction

Developing countries are increasingly considering the potential of electric mobility as a means to address urban pollution and mitigate climate change by reducing and preventing transport related greenhouse gas emissions [1]. This policy brief seeks to highlight common and specific challenges in deploying electric mobility schemes drawn from international technical cooperation programmes in selected case countries. In particular, it discusses the challenges and barriers in electric mobility rollout schemes, as well as the role that international organizations through technical cooperation initiatives can play in facilitating this transition. Identifying context-specific barriers can give policy makers and climate policy professionals a better understanding of the issues to be addressed by regulatory schemes. At the same time, the role of international technical cooperation initiatives can further be enhanced through effective technology and learning facilitation.

This brief focuses on different modes of transportation, including buses and minibuses, private cars, and three-wheelers in cities in the global south. According to International Energy Agency's Stated Policies Scenario [1], the global electric bus fleet is expected to increase 6 fold by 2030. Some developing countries (e.g., Cabo Verde, Colombia, India, Pakistan, Thailand) already have policies and targets in place on converting their public transport fleets. In Southeast Asian countries, last-mile connectivity is mainly based on three wheelers, minibuses, and buses. Shifting these fleets to electric mobility has a significant potential to reduce urban air pollution and GHG emissions.

Approach

This brief draws insights from the United Nations Industrial Development Organization's (UNIDO) past and on-going technical cooperation projects in electric mobility in the following countries: China, Malaysia, South Africa [2], Albania, Jordan, Tunisia, and Philippines.[1] The overall objectives of these technical cooperation projects are to support the countries with upscaling electric mobility and associated renewable energy generation through pilot projects, financial and regulatory capacity building, and stakeholder coordination.

The three projects in China, Malaysia, and South Africa are in the final stage of completion and were analysed through consultations with stakeholders, project teams, and project monitoring and evaluation reports.

The four new projects in Albania, Jordan, Tunisia, and Philippines are in the final design phase, and are expected to start implementation in 2022. The data on these countries have been collected through baseline study and stakeholder consultations (which are a key part in the design process and typically target the relevant government counterparts, municipalities, and private sector and international development partners).

Based on the set of case studies this brief aims to identify key elements for policy makers to take into account, and for international organizations to enhance their role in transferring knowledge and strengthening local capacities.

Findings — Existing Interventions in China, Malaysia, South Africa

The electric vehicle (EV) upscaling projects in Malaysia and South Africa helped to highlight the current barriers that these countries face. The main issues are the lack of infrastructure, insufficient incentives and skills on the market, as well as lack of stakeholder coordination and awareness of electric mobility (including EV–RE coupling — opportunities to couple charging infrastructure with renewable energy (RE)) benefits. Most of these barriers appear to be less present in Malaysia than in South Africa, as implementation of stakeholder coordination initiatives has commenced in the former, as well as knowledge sharing on the EV solutions for two-wheeler fleets, such as delivery companies and traffic police patrols.

Unlike other developing nations, the situation in China is somewhat unique, as the country has become a global leader in EV sales. While the quantity and variety of electric vehicles is large, the power generation is still highly polluting, preventing China, as of yet, from transitioning to what would be considered truly clean transportation systems. Lack of relevant policy as well as lack of awareness among both government officials and the public on the feasibility and benefits of EV–RE integration are the barriers for implementing renewable energy systems and electric mobility.

UNIDO's involvement as an international organization contributed to the development of these markets. The project in China therefore focused primarily on EV–RE coupling. It included demonstrations of smart charging and solar storage EV charging micro-grids. Two international events held during the project provided opportunities for stakeholder communication and knowledge sharing, while research on such possibilities as vehicle-to-grid charging has begun in preparation of the national roadmap. In Malaysia, UNIDO has been providing assistance in national low-carbon transport policy drafting and implementing national occupational standards for installation and running of charging stations. UNIDO has also supported pilot projects for solar power-based chargers. Finally, in South Africa, the project enhanced stakeholder communication through workshops, facilitated government and industry engagement, demonstrated technology projects, and developed skills for replication.

Findings — Preliminary Analysis for Albania, Jordan, Tunisia, Philippines

The analysis shows how different countries' approaches to electric mobility can be. While the Philippines has a range of incentives, programmes, and a long-standing interest in electric mobility on governmental level, Jordan's commitment has been inconsistent over time, resulting in large fluctuations of EV sales. Tunisia lacks, and yet requires, a developed regulatory framework for EV–RE co-development, as the vast majority of its power generation mix comes from natural gas. On the other hand, Albania's hydropower-based grid provides a potential clean energy source for electric vehicles. However, the seasonality of hydropower and the decreasing precipitation due to climate change shows the importance of an integrated approach to long-term planning of EV-RE systems.

The modes of electric transport also vary across these countries. The Philippines has implemented

[1] UNIDO works with Shanghai and Yancheng in China, Kuala Lumpur and others in Malaysia, and Johannesburg and Durban in South Africa. The new projects target Berat, Belsj, and Tirana in Albania, Petra in Jordan, and Bizerte, Djerba, and Sfax in Tunisia. Target cities have not yet been selected in the Philippines.

Public Utility Vehicle modernization programmes, with e-trikes, e-motorcycles, and e-jeepneys being the most dominant modes of electric transportation [3]. On the other hand, public electric buses are targeted in Amman, Jordan, to accelerate the growth of the domestic market [4]. In Albania, the focus is on electrifying the routes between touristic cities in line with the national development and climate targets. In Tunisia, three cities will be supported for electric buses and taxis and greening the fleet of the local administrations. At the same time, barriers related to infrastructure, capacity, and skill gaps were common for all four countries. In addition, lack of awareness and information hinder the adoption of technology by the public. It is these barriers that UNIDO, as an international organization, seeks to tackle by bringing expertise from outside the national systems.

Conclusion and Recommendations

While the barriers that developing countries face in the transition to clean transport systems can differ, certain challenges, such as lack of infrastructure and stakeholder coordination and awareness, appear to be common throughout.

Policy actions vary from inter-ministerial policy coordination (e.g., Jordan, Malaysia, South Africa) to align the different and at times contradicting policy signals from the different ministries involved in policy-making for mobility (Ministries of Energy, Environment, Finance, Transport) to the development of planning documents, strategies, and roadmaps (e.g., China, Malaysia, Jordan, Albania, Tunisia), be it at national, sectoral, or municipal level.

Other policy actions include more downstream interventions such as regulatory guidelines and technical standards for installation and maintenance of EV charging stations (e.g. China, Malaysia). Finally, the experience from the cases suggests that regarding the scale and speed of EV uptake **it is critical that there is coordination between the central government and subnational entities** (cities and municipalities). The extent to which national planning and legislation supports or hampers an active role of cities – as well as the flow of resources from central government bodies to cities or the relative autonomy of cities – in directly attracting financing for investments in vehicles, charging stations, and related infrastructure may well define the success of mobility policies.

Cities and municipalities can be key agents for change, but need tailored support in order to successfully fulfil such roles: for example, in terms of mobility and capital investment planning, public–private partnerships, and technical capacity in general.

In this context, **international organizations can bring relevant knowledge and experience from other parts of the world** that may not be present in a given country. They can provide a tailored approach for various developing countries and their potential and act as a neutral party to trigger private sector participation. Other factors to consider include the current energy mix, resource potential, and degree of institutional development in the energy and transport spheres. The advancing experience in electric mobility solutions can provide new knowledge and lessons learnt to enable adoption across different developing countries and projects; therefore, international organizations, as was evident from the assessment of UNIDO work, have an important role to play as the transmitters of knowledge and catalysers of change to facilitate scale-up of electric mobility.

References

[1] *Global EV Outlook 2021,* International Energy Agency, 2021

[2] *Best Practices in Electric Mobility*, United Nations Industrial Development Organization, Vienna 2020. Accessed at https://www.unido.org/sites/default/files/files/2020-08/UNIDO_Electric_Mobility_Paper.pdf

[3] *Philippine Energy Plan 2018-2040*, Department of Energy, Republic of the Philippines. Accessed at: https://www.doe.gov.ph/sites/default/files/pdf/pep/pep-2018-2040-final.pdf

[4] *The Mobility Transition in the MENA Region,* Ali Attari *et al.*, Friedrich Ebert Stiftung, 2020. Accessed at: http://library.fes.de/pdf-files/bueros/amman/16656.pdf

Notes

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Ethics Declaration
The authors work for UNIDO, whose work formed the case study for the recommendations given in this brief

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