



ISGF

India Smart Grid Forum

STUDY ON INFRASTRUCTURE AND ENABLING ENVIRONMENT FOR ROAD ELECTRIC TRANSPORT IN SAARC MEMBER STATES



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by

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Report

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Executive Summary

The economies of the SAARC nations have grown over recent years, with growth in the industrial and service sectors. In parallel to economic growth, the countries have witnessed an increase in their contribution to climate change. The SAARC region is geographically extremely vulnerable to the adverse effects of climate change. In light of this, each of the SAARC nations have ratified the Paris Agreement (COP21) declaring Intended Nationally Determined Contributions (INDCs) to tackle climate change.

The transportation sector is observed to be one of the most energy intensive and polluting sectors in the SAARC region and continues to be one of the largest oil consuming sectors with transport fuels accounting for significant shares of the total petroleum and diesel consumption. The increased use of oil in the transport sector has also increased the import dependency of the SAARC states, which will not only increase GHG emission but will also have substantial impact on the energy security scenario of the countries.

Considering this, some of the governments of the SAARC states, such as Bhutan, Bangladesh, India, Nepal and Sri Lanka, have undertaken various initiatives and introduced policies towards transformation of the transportation sector by replacing the fossil fuel run vehicles with electric vehicles which are not only very efficient drive mechanisms. The dilemma for some of these nations (that do not have domestic “fuels” for electricity generation – Coal, Hydro, Gas) is the imported fuel consumption cannot be reduced substantially.

India Smart Grid Forum has conducted this study to identify and evaluate key enablers of electric vehicle implementation and assess the readiness of SAARC member countries in terms of policy, technology, commercial and institutional aspects. Based on the assessment, implementable recommendations have been provided to facilitate electric vehicle penetration in SAARC member states. An Electric Vehicle Maturity Model (EVMM) has been created to assess these parameters.

Chapter 1 provides the broad objective and scope of the study, that includes the assessment of EV infrastructure requirement and subsequent formulation of EV implementation plan for the respective SAARC member nations in order to ensure sustainable EV deployment in near future. The approach and methodology adopted for the assignment is based on comprehensive desk research on the EV infrastructure requirement, policy & technology adopted etc. in each of the SAARC member states along with the evaluation of international best practices followed and adopted by leading EV markets in the world, which are evaluated in the next chapters. This section further emphasized on the limitations or constraint faced by the ISGF team in conducting the research in terms of limited project budget, time frame, minimal client support, limited data availability etc.

In **Chapter 2**, we have assessed the detailed socioeconomic overview of the SAARC nations and the key drivers for Electric Vehicle deployment which shows that India, Bangladesh, Maldives, Pakistan and Sri Lanka, which are high energy intensive countries are mainly dependent on fossil fuels including oil, gas and coal to meet their majority of energy requirements. The transport sector which is one of the major drivers of SAARC economies, contributes almost 7% in the respective GDPs of the member states with a share of 7% in the overall primary energy consumption and contributes 6% to 27% of total GHG emissions for each SAARC member state. The low energy resource availability, small crude oil refining capacity, increasing energy imports and primary energy consumption of the transport sector coupled with surging fuel prices, growing GHG emissions and the INDC commitments have been

identified as the key drivers or the push factors for electrification of transportation sector in the SAARC member states.

Chapter 3 highlights the current status and forecast of EV implementation in the global context for the various vehicle segments considering two scenarios: i) The New Policies Scenario (NPS) and ii) The EV30@30 Scenario. This chapter also forecasts the price trajectories for batteries of the different vehicle segments. This section also evaluates the policy support provided by the countries leading in EV deployment, in terms of subsidies and incentives, which can then be modified and suitably adopted to address the potential implications on EV markets in the SAARC nations.

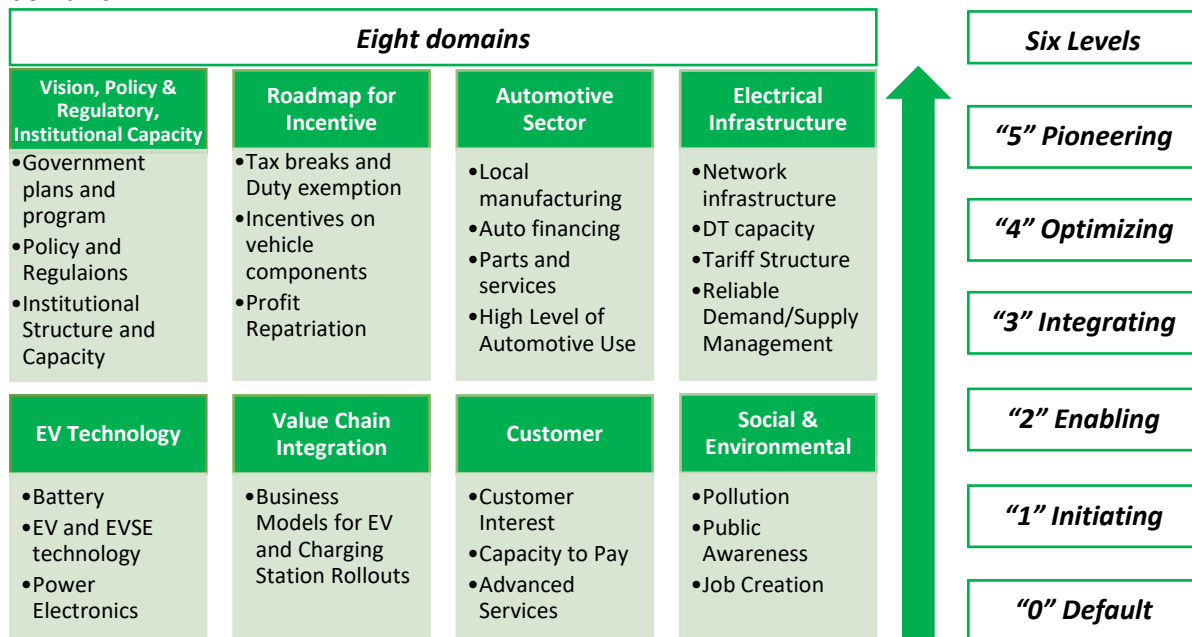
Chapter 4 discusses various components of EV ecosystem in terms of policy, technology and business models that have been adopted globally like types of electric vehicle, charging infrastructure and standards, battery types and chemistry, motors etc. This section also evaluated their technical specifications, characteristics, designs like specifications of DC charging standards like CHAdeMO, CCS2, GB/T etc., battery specifications of different lithium ion batteries and their pros and cons. In addition, various business models like aggregator model, integrated infrastructure model, independent e-mobility model and EV related policies innovative tariff structures adopted by various utilities across the world have also been evaluated to understand their requirement and benefits which will help us to analyse their fitment in the SAARC member states to accelerate the EV deployment process.

Chapter 5 discusses the EV rollout procedure for the top 3 global leaders, namely Norway, China and USA and evaluated the cases of Oslo, San Jose, San Francisco, Los Angeles, Shanghai, Shenzhen and Beijing in terms of metropolitan population, total electric vehicle sales, Electric vehicle share of total vehicle sales, electric vehicle sales share relative to country average, public electric vehicle charge points per million people, Grid CO₂ emissions, financial incentives, non-financial incentives, charging infrastructure etc. which have helped us to figure out the key factors responsible for successful EV deployment in these countries.

Chapters 6 to Chapter 13 assessed the existing scenario in terms of policy, automobile industry, EV initiative etc. in each of the SAARC member states and provided key recommendations related to above mentioned parameters based on ***Electric Vehicle Maturity Model Assessment***.

India Smart Grid forum has developed an ***Electric Vehicle Maturity Model (EVMM)*** to assess the readiness of each of the SAARC member states for EV adoption in terms of policy, infrastructure, technology, institutional structure, market dimensions, customer willingness etc. which will help the concerned stakeholders including concerned ministry, transport utilities etc. to identify and implement the required steps that need to be taken in phases to ensure sustainable EV adoption across the country.

The EVMM is a new framework formulated by ISGF for assessing the EV readiness of cities/countries and preparing EV Rollout Roadmaps. EVMM is structured across eight categories, including vision, policy and regulation; institutional capacity, automotive sector, electrical infrastructure, incentive, EV technology, value chain integration, customer, social and environmental and 6 Levels of maturity to assess the preparedness and measure the progress of the cities/countries in each of the respective domains.



Based on the assessment using EVMM framework, the recommendations for various steps that need to be taken by the SAARC member states in different phases till 2030 for electrification of transport sector are presented in this report. Policy actions include the launching of national EV mission with clear implementation plan and fixed targets, setting up of nodal agency through the collaboration of relevant ministries, local municipalities/city governments and other stakeholders for overseeing the EV implementation process, attractive FDI policy, provision of incentive mechanisms like subsidised loans, reduced tax, creation of EV-only areas, etc. In addition, appropriate business models for EV and EVSE rollout have also been recommended along with the activities that power utilities need to undertake to support the EVSE deployment process in terms of upgradation to the electricity infrastructure, effective grid management etc.

The electrification of the transport sector in SAARC member states will lead to direct benefits like reduced GHG emissions, improved air quality, creation of business opportunities in automotive sector and subsequent increase in employment opportunities, improved electrification rate, affordable transport etc. In addition, this will not only allow the member states to reduce their fuel imports but will also facilitate in diverse usage of fuel besides transportation, thus positively impacting the economies of the respective SAARC countries. More importantly, the transport sector can be insulated from price fluctuations in the international oil market.