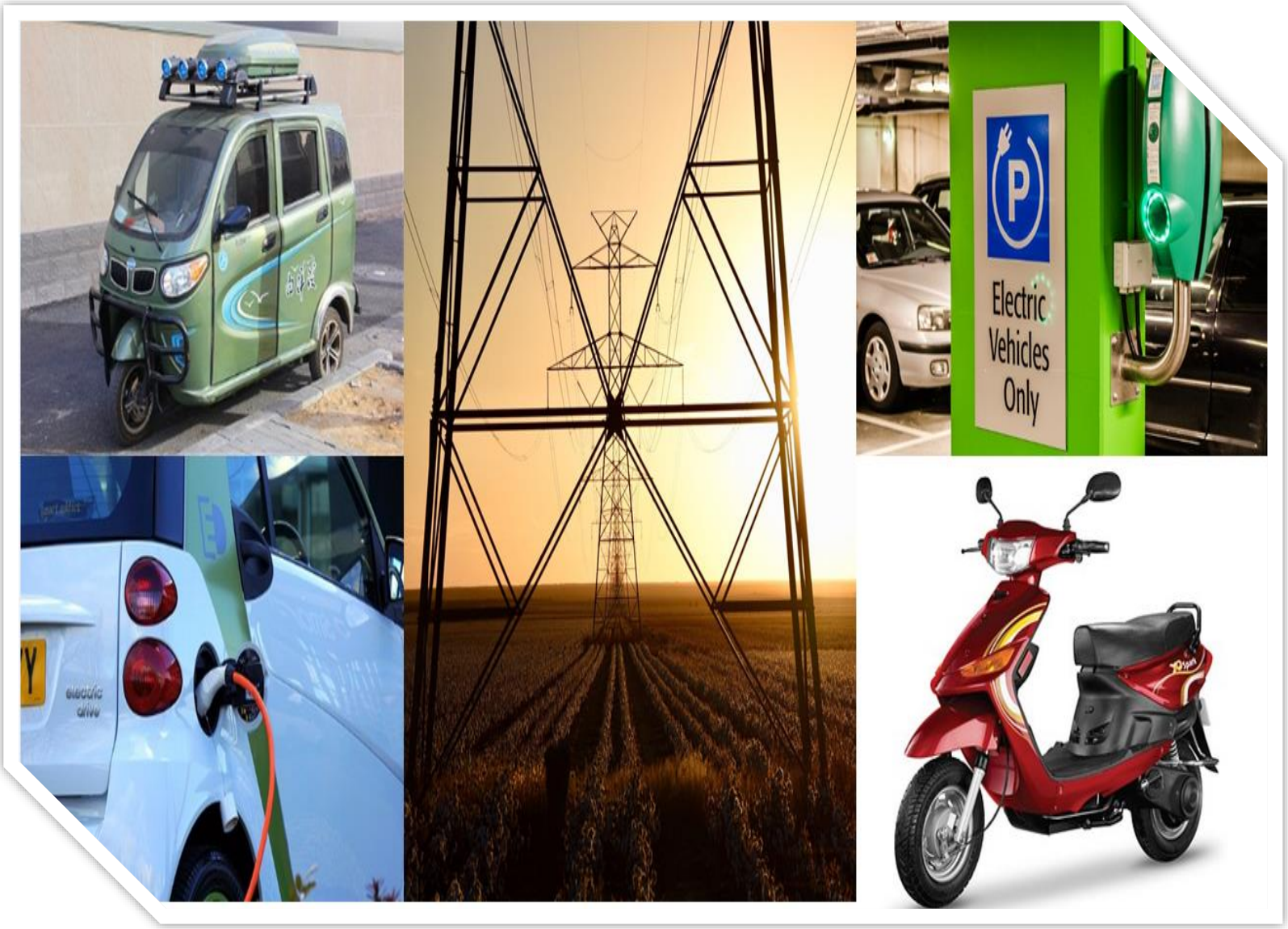
SHAKTI SUSTAINABLE ENERGY FOUNDATION

15 IRADe Integrated Research and Action for Development

ELECTRIC VEHICLES - CHARGING PATTERNS & IMPACT ON DISCOMs



PROGRAM BROCHURE SEPTEMBER 2019

"Shift to EVs is a critical step towards sustainable transportation, it takes off the burden from the earth's natural resources such as Oil, Natural Gas and Petroleum, which take millions of years to replenish and are fast running out."

Background

Urban Air-pollution (UAP) has reached critical levels (hazardous) in many cities of India, including Delhi. It has become imperative for these cities to promote enhanced adoption of Electric Vehicles (EVs), thereby resulting in considerable emission reduction from the transport sector. High levels of noise pollution and rapid depletion of fossil fuels are two other critical reasons that propel India towards E-mobility. Petroleum imports have been increasing every year, thereby threatening energy security of the country. Thus, shifting to EVs will gradually insulate the country from global oil price volatility.

Cities make the best case for EVs, as charging infrastructure requires critical EV density. In order to promote E-mobility in Delhi, the State Government has prepared a comprehensive EV policy, which emphasizes on complete replacement of BS-II and BS-III: two-wheelers, taxi fleets, and commercial goods carriers, with EVs. Also the draft EV policy envisages rapid adoption of Battery Electric Vehicle (BEVs), in a manner that their contribution reaches 25% out of the total new vehicle registrations by 2023.

The Government of India (GoI) is heavily emphasizing acceleration of EV program, they have allocated Rs 10,000 crore in the Union Budget towards Faster Adoption and Manufacturing of Electric Vehicles (FAME II) scheme. Scaling up of EVs will emerge as a significantly positive development for the DISCOMs. EVs can considerably increase the overall demand for electrical energy (growth potential). Further, implemented effectively, EVs can provide means for balancing (demand-supply) the duck curve and thus helping DISCOMs push more energy through their infrastructure.

As the penetration of EV increases manifold in the capital city, their impact needs to be assessed with specific focus on the following aspects:

- Impact of EVs on Electricity Demand and Load Curve
- Revenue & pricing of EVs for promoting mass scale up
- Dynamics and stability of end-to-end charging management system for EVs

Focus of the Study

EV penetration is expected to grow in the near future, with the right kind of business models and Government policies acting as enablers. Currently, e-rickshaws comprise fifty percent of the three wheeler sales in Delhi. This provides an opportunity to understand their existing profile and pattern, as well as estimate the future behaviour pattern of e-rickshaw drivers.

Figure 1: **Delhi region selected for the project**

The existing Government policies, Consumer preferences, and various Technological and Economic aspects of Delhi will be studied to develop scenarios and suggest policies for enabling faster penetration of EVs.

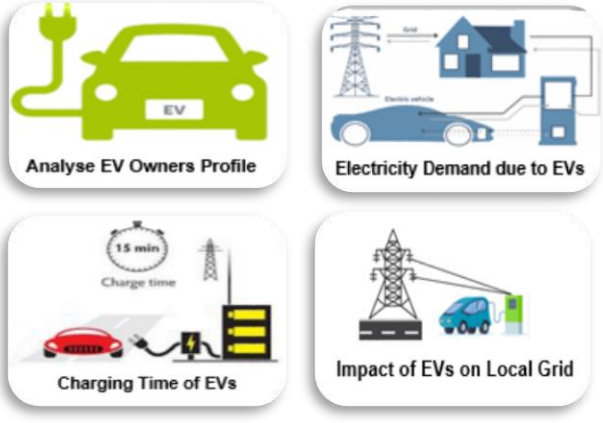


Figure 2: EV scenarios selected for the project

Objectives:

Electricity Distribution Companies (DISCOMs) will play a major role as facilitators for EV integration. The impact of EVs on the supply side of DISCOMs need to be carefully assessed in view of impact on their daily Demand Load Factor and Distribution Transformer (DT) level loading. The objective of this study is to assess the existing EV user profiles, their charging patterns and develop a format to enable distribution utilities to estimate the demand at the DT level through a case study on specific localities of Delhi.

Tactic 1 - Primary Surveys & Key Stakeholder Engagement:

- Questionnaire development for existing EV consumers, dealers, manufactures.
- Data collection & analysis for existing consumer preference, charging behaviour and travel patterns etc.
- Current fuelling/charging patterns and locations of petrol pumps serve as indicators.

Tactic 2 - Assessment of EV Penetration through Scenario based Assessment & Charging Strategy:

- Development of EV scenarios and mode wise contribution estimation in Delhi.
- Additional electricity demand from EV estimation.

Tactic 3 - Assessment of EV Impact on Local Grid & DT level

- Existing load profile and loading at DT level of specific area.
- Scenario based analysis on DT level.
- Impacts of EVs on Electricity Demand and Load Curve.
- Understanding DISCOMs perspective on changes in demand patterns for alternative EV scenarios.

Outcomes

- Knowledge and Capacity Building of key policy makers, project teams and stakeholders in Delhi.
- Stakeholder preferences and awareness for EVs.
- Collection of data relevant for policy formulation.
- Policy insights on how to stimulate EV demand in Delhi & the factors that impact EVs demand and growth.
- Evidence based impact of EVs on grids for Discoms and modification to electricity planning due to EV demand.
- Policies needed to promote and support EVs in Delhi.

About Shakti Sustainable Energy Foundation

Shakti Sustainable Energy Foundation seeks to facilitate India's transition to a cleaner energy future by aiding the design and implementation of policies that promote clean power, energy efficiency, sustainable urban transport and climate action. Advancing smart energy policies will be key to meeting our defining challenge—how to provide millions of Indians with reliable, affordable, secure access to energy in a sustainable manner. The energy choices that India makes today will be of profound importance for our future. Meaningful policy action on India's energy challenges will strengthen national energy security, support development and preserve our environment. For more information visit: **www.shaktifoundation.in**

About Integrated Research and Action for Development (IRADe)

IRADe is an independent advanced research institute which aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, corporations, academic and financial institutions. Energy, Climate Change, Urban Development, Poverty, Gender Equity, Agriculture and Food Security are some of the challenges faced in the 21st century. Therefore, IRADe research covers these, as well as policies that affect them.

IRADe's focus is effective action through multi-disciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development and policy research that accounts for the effective governance of techno-economic and socio-cultural issues. Being Asia Center for Sustainable Development, we have been carrying out policy research and its implementation for enabling socio-economic growth and charting pathways for sustainable development in South-Asia.

IRADe was established under the Society's Act, in 2002 at New Delhi. It is certified as a Research and Development Organization by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology (MoST). It has also been selected as a Center of Excellence by the Ministry of Urban Development (MoUD) for urban development and climate change. In addition, it provides expertise to other ministries, national and international institutions and partners with other reputed organizations.

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