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Study on Distribution and Sales Planning of Electric Vehicle Charging Concept of an Indian Public Sector Company

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The oil and gas sector have been powering global economic growth over the last few centuries. In 2018, 34% of the world's primary energy consumption was met by oil while gas was responsible for meeting nearly 23% of global energy needs. Since the invention of the first modern steam engine that heralded the world's transformation from an agrarian to an industrial economy, the sector's development has evolved over time, becoming an integral part of several industries over the years. Specifically in India, despite a decline in share in recent years, oil contributed towards nearly 25% of primary energy consumption in 2018. Notably, over the past five years, the country has emerged as the fastest growing oil market, with consumption growing at 7% per annum. On the gas front, India emerged as the fourth-largest Liquefied Natural Gas (LNG) importer in 2018, with imports increasing to 28.69 billion cubic metres (bcm) in 2018–19 from 27.44, 24.48 bcm in 2017–18, 2016–17 respectively.

Nearly 13% of the government's tax revenue (₹ 3.43 lakh crore and ₹ 2.09 lakh crore to the central and state exchequer respectively) in 2017–18 came from the oil and gas sector, besides helping sustain over 1.5 million jobs. While we may expect oil, in particular, to continue playing a significant role in India's energy mix, several economic factors and environmental commitments are pointing towards a shift in the Current Paradigm:

- In 2018, India's total petroleum imports (crude oil and petroleum products) accounted for US \$ 101 billion — approximately 22% of the country's gross imports. In 2017–18, almost 83% of India's domestic requirement for petroleum products was imported. This is expected to rise to about 90% by 2023 unless domestic production increases.
- India, as a signatory to the Paris Agreement in 2015, made three commitments—to reduce its greenhouse gas emission intensity by 33–35% below 2005 levels by 2030, 40% of India's power capacity is based on non-fossil fuel sources, and create an additional “carbon sink” of 2.5–3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030. These commitments point to the need for energy solutions that reduce the country's carbon emissions to help it achieve its pledge. India is already pursuing several initiatives towards achieving the new energy objectives of higher efficiency, lower emissions and reduced overall costs, especially in the mobility sector.
- Electric mobility: Vehicles' internal combustion engines (ICE) are responsible for as much as 12% of the world's greenhouse gas emissions. In the bid to control climate change, countries around the world are already racing to phase out ICE-run gasoline and diesel cars. In 2017, India announced an aspirational target of ensuring that every vehicle sold in the country would be powered by electricity by 2030. With all these regulatory moves coming into play such as The Bharat Stage (BS) norms, Corporate average fuel efficiency (CAFE) norms, More CNG stations, National Policy on Biofuels 2018, The Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, electric mobility, while still in a nascent stage in India, is expected to emerge as a major disruptor in the mobility and transportation sectors across the

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world. The pace of EV adoption has already picked up in several countries, with the largest EV market shares in 2017 coming from Norway (39.2%), followed by Sweden (6.3%) and China (2.2%). In 2017, for the first time, the global sales of new EVs passed a million units, with generous subsidies, ambitious investments and tight regulations continuing to drive most of this growth.

Compared to the developed countries, India is relatively new to the EV ecosystem. At present, both market acceptance and industry dynamics are at an early stage—the EV-adoption rate is less than 1% and domestic OEMs are just starting to launch EV models. With different government measures coming into play, however, the penetration of electric mobility can be expected to accelerate significantly. Technology advances and a rapid fall in the cost of battery storage are attracting significant interest and investments into electric mobility as a scalable alternative to fossil fuel-based models. In 2030, the share of Electric Vehicles (EVs) are expected to range from 40–50% of new vehicle sales.

This paper studies and analyses the various factors that could contribute to India's adoption to EVs using the resource based view framework. Factors like cost of network planning, location of the charging stations, customer satisfaction, psychological need, and capacity of the charging station, etc are used for developing a distribution and sales network model. Competitive strategy to improve the market penetration and retention of customers using efficient network design is also analysed. Load balancing at each charging station is performed to understand waiting lines and level of standardization of charging points i.e., fill to all size strategies are also tested under different scenarios to enhance efficiency. Furthermore, this study tries to throw light on the impact it could have on a major public sector Oil and Gas companies. This study also proposes the role that could be played by the focal firm in achieving India's macro level bets on pollution control, import reduction, EV adoption etc thereby safeguarding its numero uno position in the fuel and transportation energy business.