## Training module on Electric Vehicles (EVs), Batteries and Charging Stations

The program is designed to provide individuals with knowledge and skills related to electric vehicles (EVs), batteries, and charging infrastructure. The training program covers the basics of EV technology, including how EVs work, their components, and the benefits of using EVs, types of Batteries and their characteristics, advantages, and disadvantages, Battery Management Systems, types of charging stations available, information on how to use them, their features, and charging times and the safety and maintenance associated with EV ecosystem. Overall, the training program aims to equip individuals with the knowledge and skills needed to work with EVs, batteries, and charging infrastructure safely and effectively.

| **Programme Title** | | **Electric Vehicles, Batteries and Charging Stations** |
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| **Duration** | | 5 days |
| **Venue** | | NTPC School of Business, Noida |
| **Day** | **Time** | **Topics** |
| Day 1 | Forenoon (FN) 3 hours | **Basics of Electric Vehicles**<br>History of EVs, Working of EVs and its main components, Types of EVs<br>Basics of electric vehicles (EVs), plug-in electric vehicles (PEVs), plug-in hybrid electric vehicles (PHEVs), and hydrogen electric vehicles, their advantages and disadvantages, comparison of conventional versus electric vehicles in terms of maintenance and infrastructure, etc.<br>**Electric Vehicles trends**<br>EV adoption trends, outlook and policies of countries having major EV markets, EV industry and its Manufactures, cost and current market of electric vehicles, etc. |
| | Afternoon (AN) 3 hours | **Vehicle dynamics (part-I)**<br>Introduction to vehicle dynamics, aspects of vehicle dynamics; tools and techniques to assess the vehicle dynamics, etc.<br>**Vehicle dynamic (part-II)**<br>Challenges and problems associated with vehicle dynamics, suspension technologies, design and development processes, examples of vehicle dynamics. |
| Day 2 | FN | **Fleet electrification plans & EV acquisition (part-I)**<br>Public transport electrification measures, opportunities and challenges, Indian and global aspects, etc.<br>**Fleet electrification plans & EV acquisition (part-II)**<br>Cases and/or examples |

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| | AN | **EV ecosystem (part-I)**<br>Charging infrastructure and types, Indian and global scenario, key players, etc.<br>**EV ecosystem (part-II)**<br>Concepts of AC and DC charging;<br>Prospects and reality of EVs<br>Global and climate impact, etc. |
| Day 3 | FN | **Electric vehicle batteries**<br>EV battery, requirement of an EV battery, battery history, types of EV batteries, charging process and requirement, swapping, examples of EVs using different batteries, future batteries, roadmap etc.<br>**Battery management system**<br>BMS and its need, general function of BMS and its architecture, various battery packs like voltage sensing, current sensing, temperature sensing, etc., HV contractor control, State of Charge (SOC) and methods to find SOC, cell balancing, applications of BMS, etc. |
| | AN | **Applications of EVs and hybrid vehicles**<br>Application range of EVs and hybrid vehicles, Market scenario of EVs and hybrid vehicles in India and other countries, Future trend and challenges, etc.<br>**Smart applications & grid support by EVs**<br>Vehicle-to-grid (V2G) and Grid-to-vehicle (G2V) systems, V2G and G2V systems requirements and power flow, applications of V2G system like peak load levelling, peak power, spinning reserves, etc.; Applications of G2V system; Global V2G and G2V infrastructure; Social and environmental impact of V2G and G2V systems, challenges to V2G and G2V concepts and way forward; |
| Day 4 | FN | Field visit to NTPC facilities |
| | AN | Visit to battery vendor facilities, charging stations |
| Day 5 | Full Day | Felicitation of participants & closing remarks |