



<https://trestpark.org/>

Tender No.: TRP/14/2023/EVPark

Date: 20/09/2024

NOTICE INVITING REQUEST FOR PROPOSAL

Competitive e-proposals in two cover system with Earnest Money Deposit (EMD) are invited from reputed Consultant Agencies / Consultants, with relevant experience in Government and Management Consultancy services for preparation of Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park. The RFP documents can be downloaded from Kerala E-tender Website <https://etenders.kerala.gov.in> as per the schedule given below.

1	Name of Work	Selection of Consultancy Firm ('Consultant') for preparation of Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park (EV Park)
2	Tender ID	2024_TrEST_691625_1
3	Tender type & Currency	Open Tender, Indian Rupees
4	Estimate Amount (PAC)	50,00,000/-
5	Cost of bid documents/Bid processing fee(non refundable)	Rs. 10,000/- (Including GST)
6	Earnest Money Deposit (EMD)	An EMD of Rs. 1.00,000/- shall be remitted through the online payment mechanism for e-Procurement system of Government of Kerala. The EMD of all unsuccessful bidders would be refunded within 30 days of finalization of the selection process (bidder selection).
7	Completion period	6 Months
*Critical Date Sheet		
8	Date of Tender Publishing	20.09.2024
9	Bid Document Download start Date	20.09.2024
10	Last date for receipt of queries for pre bid meeting	27.09.2024
11	Pre Bid meeting	03.10.2024 11.00 am
11	Corrigendum publication, if any	06.10.2024, 10.00am
13	Bid Submission Start Date	08.10.2024 10.00 am
14	Bid Submission End Date	21.10.2024 10.00 am
15	Bid Opening Date	25.10.2024, 03.00 pm
16	Availability of RFP documents	Website http://www.etenders.kerala.gov.in
17	Pre bid meeting	Date and time of the meeting will be indicated in TrEST Park website (trestpark.org).
18	Place of opening BID	Office of CEO, TrEST Park, TC-4/2322, GEM Building, Opp. College of Engineering Trivandrum, Kulathoor Rd, Sreekariyam, Trivandrum, Kerala-695016, trestpark@kerala.gov.in , 0471- 2598555.

Bids shall be submitted online only at Kerala E-tender Website <https://etenders.kerala.gov.in> using valid Digital Signature Certificate. Tenderer are advised to follow the instructions "Instructions to Bidder for Online Bid Submission" provided in the Annexure for online submission of bids available at Kerala E-tender website: <https://etenders.kerala.gov.in>

Intending tenderers are advised to visit TrEST Park website www.trestpark.org, K-DISC website <https://kdisc.kerala.gov.in/en/> and Kerala E-tender website: <https://etenders.kerala.gov.in> regularly till closing date of submission of tender for any 'Corrigendum, Addendum, Amendment'.

Sd/-

The Chief Executive Officer

TrEST Research Park

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1. INTRODUCTION

Trivandrum Engineering Science and Technology (TrEST) Research Park is established to promote partnership and interaction between academic community and industry. The synergy is expected to benefit both and bring about qualitative and quantitative improvements. The model is seen as the vehicle for growth in the knowledge economy and has already been proved in Stanford Research Park in Silicon Valley, IIT Madras Research Park in Chennai, and many more in China and other countries. It is expected that TrEST Research Park will succeed in developing new technologies and foster inventions resulting in new technology companies coming up in the Park in various engineering disciplines. The vision of the Park is to eventually bring in all engineering and technology academic and research institutions in Kerala into its fold. From the State's perspective, TrEST Park will help in generating high quality employment and help in economic development of the State.

The Research Parks are non-profit making facility provided and attached to Universities and Institutions to provide facilities to industries to start research centres. These Research Parks will create an environment whereby industry can leverage the specialized expertise of the faculty of the technical institutions, utilize their research facilities, while providing part time employment and experience to students.

The Government of Kerala (GoK) has adopted an EV Policy with a vision, "To embrace electric mobility as a tool to promote shared mobility and clean transportation and ensure environmental sustainability, pollution reduction, energy efficiency and conservation, and to create an ecosystem for manufacturing EV components in Kerala". This Policy was adopted as per G.O(Ms) No. 24/2019/Trans dated 10/03/2019.

Electric mobility has been one of the key technologies, which has seen exponential growth during recent years. The increased focus on carbon neutrality and net zero emissions have paved the way for the sudden growth of this industry. As a result, there has been the move globally towards less dependence on fossil fuels and focus more on greener technologies. Global Warming and Exhaustion of the fossil fuel reserves have also accelerated the process for adoption and the growth of green technologies.

The number of electric vehicles across the globe has increased in a significant manner during the last decade and is expected to grow exponentially during the next few decades. The global electric mobility market size was USD 230.12 billion in 2020 and is projected to grow from USD 279.45 billion in 2021 to USD 1,507.21 billion in 2028 at a CAGR of 27.2% in the 2021-2028 period.

Most of the countries have framed Electric Vehicle Policies and many of the major Electric Car Manufacturers across the world, have announced that they will be making only electric cars from 2035 or 2040 and so on.

There has been an increased focus in India also, with respect to Electric Vehicles. The net zero carbon emission is targeted in India by 2070. The National Electric Vehicle Policy has been framed and many policies have been put in place and incentives have also been announced, in order to improve the manufacturing of Electric Vehicle components across the nation. There has been an increased focus in the State also towards the Electric Vehicles.

2. KERALA ELECTRIC VEHICLE CONSORTIUM

An Electric Vehicle Consortium has been formed by GoK, with the objective of creating an Electric Vehicle Ecosystem in the state, with Vikram Sarabhai Space Centre (VSSC), Centre for Development of Advanced Computing Thiruvananthapuram (C-DAC T), Travancore Titanium Products Ltd. (TTPL) and Trivandrum Engineering Science and Technology (TrEST) Research Park.

K-DISC is the anchor coordinator for the project. The focus of VSSC is on the development of Lithium Titanate Cells using the raw material provided by TTPL, and C-DAC focuses on the design and development of Battery Management System (BMS) and Power Electronics, whereas TrEST Research Park focuses on EV Motors and Controllers.

The roles and responsibilities of the Consortium Partners are as follows:

Partner	Role
Kerala Development and Innovation Strategic Council (K-DISC)	Anchor Coordinator for project initiation. Execution of strategies and policies throughout the project for the effective implementation of the project.
Travancore Titanium Products Ltd (TTPL)	Manufacture of Electrode Material
Vikram Sarabhai Space Centre (VSSC)	Material characterization, Cell Design, test and evaluation, Production of pilot cells
TrEST Research Park	Management of EV Industrial Park, Drive Train &, Controllers for EV application - Design and Development.
Centre for Development of Advanced Computing (CDAC)	Development of Power Electronic Systems for Battery, WBG Power Electronic Controllers for Drives and Chargers.

Currently, the Consortium plans to expand the scope of activities and plans to develop an EV Industrial and Research Park for the State.

3. EV INDUSTRIAL & RESEARCH PARK

An EV Industrial and Research Park is planned to be established in the State, which includes the setup of common facilities for the EV Companies and Startups, where they can plan to use the facilities on payment basis. The EV Research and Industrial Park is planned to have the complete ecosystem for the design and development, manufacturing, R&D and testing of the Electric Vehicle Components, which include Batteries, Motors, Controllers, Charging Systems and so on, which will be useful to the startups. There will also be the allocation of land for EV Companies, which can assure sufficient investment, and generation of employment in the next 5 years or so. Sketch of the proposed land for the setup of the EV Industrial Park shown in Figure 1. Further details regarding the land will be intimate.

About 50 acres of land is identified at Vilappilsala in Thiruvananthapuram for setting up of the park and for housing a new campus for Trest Park. An approximate area of 23 acres is earmarked for setting up the EV Industrial and Research Park and Incubation Units and Innovation Space (Innovation Hub). It is proposed that a Hub and spoke model should be adopted for scaling up of the park in future. In this proposed park, focus would be on Research, Design, Development and Prototyping of EV and larger manufacturing parks shall be developed in outward areas subsequently.

Based on the in-house domain expertise, an indicative model of management of the park, Proposed Facilities, Units, and details of the Common Facilities to be built up in the park etc. are developed by the Consortium Members which is attached in Appendix 1 of this RFP.

4. REQUEST FOR PROPOSAL (RFP)

This Request for Proposal (RFP) is being invited by TrEST Park, for the selection of a Consultancy Firm (named as, 'Consultant') for the preparation of a Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park (EV Park). Fig.1(shaded in green) shows the draft sketch of the proposed land for setting up of EV Industrial and Research Park. There is a possibility of slight changes in the extend of the land.

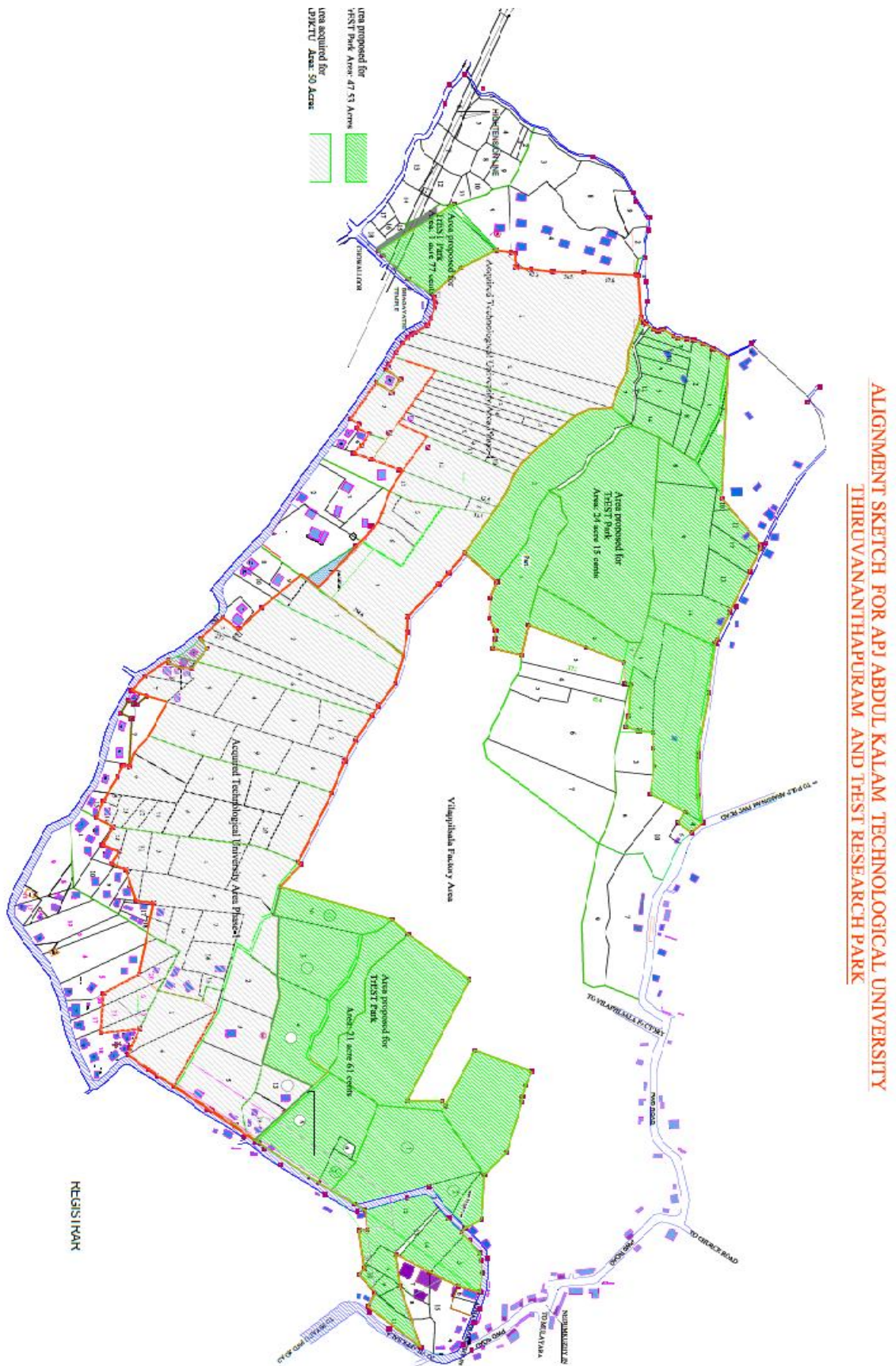


Figure 1. Sketch of the proposed land for the setup of the EV Industrial Park

4.1. Scope of services of the consultancy firm/ consultant

The scope of services shall have 3 components, structured into 2 phases of the assignment.

Phase I	Component 1 of the scope comprises preparation of a Conceptual Master Plan for the EV Research and Industrial Park.
	Component 2 of the scope of work covers preparing a Strategic Roadmap for the development, operation, and management of the park through market and investor outreach
Phase II	The scope of work covers the preparation of a Detailed Project Report including detailed engineering designs, architectural drawings, and costing for the EV Park.

4.1.1 Phase I – Component 1 activities

The details of Phase I – Component 1 activities are described below:

Preparation of Conceptual Master Plan, covering the following elements, but not limited to;

4.1.1.1 As Is Assessment

Review and assessment of the proposed facilities and units of the EV park and furnishing recommendations on the indicative model of management of the park and details of the Common Facilities to be built up in the Park etc. as developed by the EV Consortium Members which is mentioned in **Appendix 1** of this RFP.

4.1.1.2 Assessment of Future EV Mobility Ecosystem and Market Potential

Identifying the value chain to be established in the EV Research and Industrial Park comprising of components including – Battery Manufacturing, Charging Infrastructure, Battery Management System (BMS), Autonomous Vehicles, Sensors, Advanced Transportation vehicles, Fuel cells and E- Vehicles, etc. The Consultant shall study the technologies/ activities that will drive the sector and suggest appropriate sectors / segments amenable to Kerala and can be positioned in the industrial park duly considering the existing core technological capabilities, vision, and growth strategies of the Consortium Members for value creation through synergy.

The Assessment may also include global examples, growth patterns, adaptability to the Indian context and technologies adopted for the development of the sector, etc.

4.1.1.3 Site Appreciation and Analysis

The Consultant shall make field visits to the Site to ascertain the physical aspects of the Site. The consultant shall carry out an analysis of the identified site and its surroundings. The site analysis shall include, but not limited to;

- Location Study
- Condition of existing roads and traffic pattern
- Land use pattern, Catchment study.
- Existing utilities
- Details of nearby water sources, power supply and status of availability for the project
- Identification of environmentally/ecologically sensitive areas

The above information shall be supported with the data reference and maps of relevant scale (wherever applicable).

4.1.1.4 Stakeholders Consultation

Consultation with key stakeholders – Automotive Component Manufactures Association of India, Society of Indian Automobile Manufactures (SIAM), Confederation of Indian Industry (CII), Automotive Research Association of India (ARAI), The Energy and Resource Institute (TERI), EV Industry associations, Industrial Investors for business, Original Equipment Manufacturers (OEMs), etc. to identify possible potential user industries and assess the demand for various activities in the proposed park. The consultant shall also explore potential end applications of the technologies being developed by the EV Consortium members.

Additionally, Consultation with Industry experts, lead start-ups, and mobility-related associations is to be carried out to assess the demand for Innovative products as follows.

Future Mobility Components	List of Sectors in e-Mobility
<p>Innovative Industrial Manufacturing products in Future mobility Sector</p>	<ul style="list-style-type: none"> • Includes Battery Manufacturing • Charging Infrastructure • Battery Management & Power Electronics. • Robotics • Powertrains • Autonomous driving • Sensor Systems • Intelligent Transport systems • Vehicle Computing • Assisted Driving • Retrofitted EV's

Future Mobility Components	List of Sectors in e-Mobility
Transportation Vehicles / Alternate Sustainable Mobility Manufacturing units in Future mobility	<ul style="list-style-type: none"> • Hybrid Vehicles • Hydrogen Fuel Cell based vehicles • Methanol based vehicles • Ethanol based vehicles • Solar based vehicles • Power Trains • Hyperloop/ Ultra-fast Transport Vehicles • E-Vehicles • Other Advanced Transportation Vehicles

Note: Consultants are requested not to limit the study to the above-listed sectors and should explain additional components and sectors that have the potential for development in the park and Kerala.

4.1.1.5 Benchmarking

The Consultant should provide an assessment of any such parks/ Special Economic Zone (SEZs) / Cluster focusing on future mobility within India and outside India. Benchmarking should provide points for the development of the park.

4.1.1.6 Conceptual Master Plan

The consultant shall prepare a Conceptual Master Plan for the development of EV Park. The master plan shall be guided by the applicable development guidelines of the Department of Town & Country Planning, Government of Kerala. The design philosophy should prioritize various aspects viz., circulation, land suitability, environmental sustainability, and topography to optimize various land uses.

The guiding principle for validating & updating the master plan should be to incorporate the principles of an eco-industrial park by maximizing green space and open spaces, and provision of green belts. Thus, the design should envisage functional and accessible workplaces by incorporating prudent and scientific planning principles including the following:

- Location of industrial activities based on the processes and outputs.
- Providing efficient access to the main road from all sides of the park.
- Common facilities and units to support research and industrial activities.
- Testing facility to be set up.
- Incubation units that can be set up.
- Decentralized facilities for easy access to the users of the park.

- Provision of infrastructure facilities based on the site characteristics, topography, and functionality.
- Exclusive zones for ready-built factory buildings, ancillaries, and support services.

The Conceptual Master Plan shall cover the following –

1. **Overall master plan** at a scale of 1:2500 illustrating general delineation of proposed land uses, building massing, vehicular and pedestrian circulation, open space relationships, and development character.
2. **Land use mix and land area allocation** for various uses in the form of land use map with illustrative building footprints and tabulation of land areas.
3. **High-Level Road Network Map** showing the primary, secondary, and tertiary roads. Circulation plan at the level of arterial, sub-arterial, and collector street network, including site ingress/egress, vehicular circulation patterns, pedestrian circulation, and vehicular parking. Further design the BT pavement as per the IRC: 37-2018 Guidelines for the Design of Flexible Pavements.
4. **High-Level Infrastructure Map** showing the location and network of all identified infrastructure components (such as water supply, power supply, storm water drainage, solid waste management, etc.) duly consulting with prospective industries and specialists in the field to arrive at the appropriate scale of infrastructure.
5. **Common facilities, Testing facilities, and Incubation units** that can be set up in the park.
6. **Green Areas Map** showing all the proposed green belts, green buffers
7. **Urban Design guidelines** supplement statutory development control regulations to bring about a cohesive development pattern and design element into the development.
8. **Numbered plot plan with sizing** for each developable parcel within the proposed development.
9. **Open space and landscape strategy** with typical details for three typologies of landscape—maintained parks and gardens with hardscape, softscape, and street/park furniture; basic ground-covered landscape areas with shrubs and planting; natural areas with native vegetation and managed landscapes.

10. **Final land and building area** statement with ground coverage, the concept of Green building, Floor Space Index (FSI), building mass, and bulk metrics.
11. **Cost estimation:** Preliminary capital and operational cost estimates have to be worked out on the basis of the suggested master plan.

The Master Plan should incorporate phase-wise development, if required so, without comprising on the original form and shape. The Master Plan shall be in accordance with the enlisted set of components and activities as identified in consultation with important stakeholders in the project. The layout plan shall include but not be limited to **land use distribution, proposed activities, magnitude of activities, proposed phasing for development, development regulations, common facilities, including the number of facilities, dimensions of each facility, layout of the facility etc. proposed infrastructure, environmental and social infrastructure** other modifications or proposals as may be required for the project.

4.1.2 Phase I – Component 2 activities

4.1.2.1 The details of Phase I – Component 2 activities are specified as,

The strategic roadmap for the development, operation, and management of the park through market research and investor outreach. The Consultant shall support TrEST Research Park in the following activities for preparing a strategic roadmap for the development, operation, and management of the Park including marketing, branding, investment promotion, and facilitation activities as mentioned below;

1. A strategic plan for the development, operation, and management of the Park shall be devised for accelerating the technology developed in the Park to prototyping and manufacturing stages via appropriate technology transfer arrangements for commercializing the technologies.
2. Wherever feasible, joint development models for commercially scalable and potential or allied products shall be suggested by partnering with Startups, OEMs, or other Public Sector Undertakings (PSUs).
3. Investment promotion – Identify appropriate strategy, and plans for investment promotion, and reach out to potential investors and OEMs for facilitating investments into the EV Park.
4. Provide content for the creation of information memorandums, brochures, and other

relevant promotional material.

5. Develop an Investment Promotion plan with a calendar of events for a period of 3 months for promoting the EV Park and facilitate Government participation/event organization as per the approved calendar.
6. Knowledge management support for investment promotion events for promoting the clusters – webinars, roadshows, investor summits, one-on-one meetings, etc.
7. Assess different potential **development, operation, and management models with proper recommendation of an IT system** for the Park including **preliminary financial viability analysis** based on the investor outreach and revenue streams identified from the study, and recommend the best model for the proposed EV Park with detailed justification.
8. The Conceptual Master plan shall be encompassing all the takeaways from the Component 2 study.

4.1.3 Phase II Activities

4.1.3.1 Preparation of Detailed Project Report (DPR)

Upon acceptance of Conceptual Master Plan and deliverables of Phase I, TrEST Research Park shall finalize the most desired business model for developing, operating and managing the Park. The consultant shall then prepare a **Detailed Project Report by carrying out proper surveys, investigations, and designs for the selected development model**. Sufficient details should be included to ensure proper appraisal, approval, and implementation of the project in time. DPR shall cover the following aspects, but not limited to:

1. Existing Situation Assessment- Assessment report of the existing condition of infrastructure/facilities of the study area with respect to the prevailing norms, standards, or regulations.
2. Analysis of competencies and synergies of technology developed by the EV Consortium members with a few rounds of brainstorming with consortium members.
3. Finalize appropriate Facilities, Units, and details of the Common Facilities. The consultant shall specify and finalize appropriate and strategic common facilities and units to be built in the Park.

4.1.3.2 Site Surveys and Investigations

- **Ocular/Reconnaissance Survey:** The consultant shall carry out an

ocular/reconnaissance survey of the project site and the surrounding to understand the presence of various physical features, external and internal infrastructure facilities available at site and off site, and all shall be documented in this section.

- **Topographical Survey:** Analysis of the topographical survey of the entire site area. The level of detailing for the survey work will depend on the type of the project and site condition.
- **Soil Investigation:** Analysis of soil investigation/soil test report for all architectural and detailed engineering works need to be furnished.
- **Hydro-Geological Study:** Analysis of hydro geological survey report of the project area, as required for engineering design calculations.
- **Primary Surveys:** Analysis of the data from primary survey(s) depending upon the need of the project.

4.1.3.3 Functional Design

- This section should present an analysis of different options available to achieve the objectives. The reasons for selecting the proposed option should be substantiated.
- The functional design of the project is mainly achieved through field study and documentation using existing information and specifications from various standards with a view to achieving maximum utility.
- The buildings shall preferably be one which demands minimum land acquisition.
- The field study shall also include demand surveys and it should be prepared based on the relevant guidelines of The National Building Code of India (NBC) 2016.

4.1.3.4 Engineering Design

- Consultant shall elaborate on the technology choices, structural aspects, foundation options, and evaluation of the technology option, as well as the basis for the technology for the proposed project.
- A detailed description of the site including topographical and geotechnical investigations adequate to choose the suitable foundation shall be furnished.
- The structural layout shall be so planned that the viability of adopting state-of-the-art large-span arrangements like flat slab, grid floor slab, ribbed slab, pre-stressed panels, etc. shall be explored with a view to bring in maximum utility, aesthetics, economy, etc.

- Detailed engineering designs need to be furnished. The design shall consist of architectural drawings of the proposed buildings, including floor plans, elevations, sections, site plans, etc. conforming to the guidelines laid down in the relevant building by-laws and manuals.
- New innovations like the green building concept may be incorporated in the design of the buildings.

4.1.3.5 Environmental & Sustainability Aspects:

- An Environmental Management Plan (EMP) is to be developed explaining the possible environmental issues that may arise during the construction and operation of the infrastructure and associated facilities depending upon the size of the project.
- Environmental impact assessment study if mandatory and measures identified to mitigate the adverse impact, if any shall be conducted and documented in detail.
- Issues relating to land acquisition, diversion of forest land, wildlife clearances, rehabilitation, and resettlement, if any, should be addressed in this section.
- Inclusion of international best practices in sustainable infrastructure management including potential low carbon emission, low energy, zero pollution etc. is desirable.

4.1.3.6 Detailed Financial Estimates & Cost Projections:

- This section should focus on the cost estimates, budget for the project, means of financing and phasing of expenditure.
- Cost estimates have to be worked out on the basis of a detailed bill of quantities (with detailed measurements of length, breadth, and depth/height for each item), using the current Schedule of Rates of the State Government (PRICE) or relevant SOR as applicable.
- Applicable taxes, contingencies, and investigation charges including any O&M cost for a specific period shall be clearly specified.

4.1.3.7 Capital and Revenue streams

- Options for cost recovery shall be explored
- Innovative ideas for additional revenue generation may be indicated.

4.1.3.8 Financial viability assessment

- Cost Benefit Analysis (CBA) is a technique whereby the costs of and benefits from a scheme are quantified over a selected time horizon and evaluated by a common yardstick.
- Cost-Benefit Ratio (CBR - benefit to cost ratio), EIRR (Economic Internal Rate of Return), etc. shall be worked out in detail with all supporting data
- The project cash flow projections for the life cycle along with underlying assumptions have to be presented.

4.1.3.9 Risk Assessment and Mitigation Measures

- Identification and assessment of implementation risks which can lead to time overrun, cost escalation, scope reduction etc. is the primary stage in risk assessment.
- Risk analysis could include legal/contractual risks, environmental risks, revenue risks, project management risks, regulatory risks etc.
- The mitigation plans including risk avoidance, risk transfer, and risk elimination are to be well analyzed and documented.

4.1.3.10 Contract Management Strategy

- Contracting methodology for the execution of the project should be specified in detail for the recommended business model.
- The system followed in the bidding document and manuals of reference etc. shall be explained (PWD/CPWD/ FIDIC) etc.
- Any variation proposed from the current practices acceptable under govt of Kerala (Arbitration, escalation, etc.) in the system due to any specific technical aspects associated with the project needs to be explained with justification.
- Any contract clause which may likely lead to additional financial liability shall be identified and reported with suggestions to overcome such issues.

4.1.3.11 Implementation Schedule and Work Breakdown Structure (WBS)

- The time-bound work schedule is an important part of every project because it helps in better handling of projects in planning, implementation, etc.
- This section should indicate the proposed zero date of commencement and also provide a Bar chart / Project Schedule, wherever relevant.
- Phasing of project activities, proposed contract packages, and schedule of implementation for each phase.
- Identify critical dependencies in the project and expected timelines for completion of key milestones and associated process indicators for the same.
- The DPR should provide a time-bound action plan including tendering, appointment of contractors, construction schedule, quality assurance & quality control, and post-construction activities, including project delivery.

4.1.3.12 Statutory Clearances

- This section should elaborate on the statutory clearances to be obtained from the various authorities.
- Statutory approvals as per bye-laws, master plan, fire safety norms, environmental clearance, etc. as applicable for the project are to be taken.

4.1.3.13 Quality Management Plan

- The DPR shall include information relating to the institution to be engaged in the quality assurance & quality control of the project execution.
- The methodology to be adopted to ensure the quality of construction should be clearly mentioned in the report.
- Quality management plan including the internal inspection and testing procedure shall be documented.
- Third-party quality control mechanism, if adopted, its structure and plan shall be specified in detail.

4.1.3.14 Operations & Maintenance Plan

- The DPR shall incorporate/include information relating to the institution to be engaged in the O&M of the created infrastructure assets/enhanced infrastructure assets.
- A brief description/analysis of the key issues and obstacles in regard to Operations & Maintenance (O&M, including billing/collection issues) and proposed countermeasures to overcome them for the project should be contained.
- Periodical requirements of funds for operation and maintenance of assets should also be included in the report.

4.1.3.15 Following Reports to be furnished:

- 1 Key Map of The Project Location
- 2 Common Facilities and Units
- 3 Approved Architectural Drawing
- 4 Detailed Estimate
- 5 Geo-Technical Investigation Report
- 6 Hydrological Investigation Report
- 7 Topographical Investigation Report

5. DURATION OF ENGAGEMENT

The duration of the engagement (Phase I and II) will be valid for a period of 6 months from the date of signing of the contract.

5.1. Timeline of Deliverables

Sl. No.	Activity/Deliverable	Timeline
Phase I		
1	Conceptual Master Plan, report on strategic roadmap for development, operation and management of the Park through market and investor outreach.	3 months from the date of agreement
Phase II		
2	Detailed Project Report	3 months from date of acceptance of Phase 1 deliverables

6. TENDER PROCESS THROUGH E-PROCUREMENT SITE OF GOK

The RFP is being published by TrEST Park inviting for the Selection of Consultancy Firm (named as, ‘Consultant’) for preparation of Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park. The RFP for the prescribed work is in two cover system through e-procurement portal of Government of Kerala (www.etenders.kerala.gov.in), in the prescribed form, from competent and eligible agencies/firms who fulfil the eligibility criteria prescribed. The RFP timeline is available in the critical date section of this RFP published at www.etenders.kerala.gov.in.

The two-cover system consists of:

Cover 1- Pre-Qualification cum Technical bid

Cover 2 – Commercial / Financial bid

6.1. Pre-Qualification cum Technical bid

The proposal shall contain the scanned copies of the following documents which every bidder has to upload:

Cover 1 shall contain, Part-I (this document in PDF form)/scanned copies of:

- i. RFP documents downloaded (signed with office seal).
- ii. Summary of Bid qualification requirement (Annexure A)

- iii. Undertaking of the agency in the prescribed format (Annexure B) on Govt. of Kerala stamp paper worth Rs.200/-.
- iv. Power of Attorney for the authorized signatory to sign the documents on behalf of the Consultancy firm (Annexure C).
- v. Copy of the Registration Certificate of the bidder firm.
- vi. Copy of GST Certificate
- vii. Copy of PAN card / TAN
- viii. Declaration by the bidder (format as in Annexure – D)
- ix. Undertaking for No Blacklisting & No Banning (Annexure - E)
- x. Certificate of financial qualification (Annexure F)
- xi. Project credential Format (Annexure G)
- xii. Curriculum vitae of proposed resources (key personnel) (Annexure H)

6.2. Commercial / Financial bid

The Document Fees and EMD is specified as below:

The Bidder shall pay a fee of Rs. 10,000/- (incl. GST) for the cost of the bid documents/bid processing fees, non-refundable.

An EMD of Rs. 1,00,000/- shall be remitted through the e-procurement system of the Government of Kerala. The EMD of all unsuccessful bidders would be refunded within 30 days of the finalization of the selection process (bidder selection).

Online Payment modes: The fees can be paid through e-payment facility provided by the e-procurement system.

7. BID QUALIFICATION PROCESS

The bid qualification processes are listed below:

7.1. Pre-qualification process

- a. The Bidder's Pre-Qualification Proposal will be evaluated as per the requirements specified in the document and adopting the pre-qualification criteria spelled out. The Bidder is required to submit all required documentation in support of the pre-qualification criteria specified, as per ANNEXURE A.

b. The Bidder shall meet all the mandatory compliance requirements. Failure in meeting the mandatory compliance requirements will result in disqualification of the Bidder.

c. An undertaking in Rs.200/- Kerala stamp paper as per the format given in ANNEXURE B must be submitted online.

7.1.1. Pre-Qualification Criteria (Cover 1- Pre-Qualification cum Technical bid)

Sl. No.	Criteria	Documents Required
1.1	The Applicant should be a Legal Entity continuously operational for at least a period of 10 Years. Legal Entity of the firm i.e., <ul style="list-style-type: none"> ● Sole Proprietorship Private Limited ● Public Sector Undertaking ● Limited Company ● Partnership firm ● LLP 	a. In case of Company – Copy of Registration/Incorporation Certificate issued by the Government.
		b. In case of Limited Liability Partnership (LLP) – Copy of the Deed of Partnership along with registration certificate issued by the Government.
		In case of Partnership – Copy of Deed of Partnership . In case of Sole Proprietor – Duly notarized Undertaking from Sole proprietor
1.2	The Applicant entity should have a minimum average annual turnover of Rs. 100 Crore (from the consultancy segment alone) in the last three financial years.	Audited Statements of the Last 3 Financial years (FY 2022-23, 2021-2022, 2020-21) and Certificate as per Annexure F
	Corporate Identification Number (CIN)	Proof of Corporate Identification Number (CIN)
1.3	Bidder must have GST Registration	Copy of GST registration certificate with GSTIN.
1.4	The Bidder must have valid PAN Number	Copy of Pan Card
1.5	The Applicant should be in existence in the Government and Management Consultancy services business for the last 10 years	Proof of incorporation should be submitted.
1.6	The Applicant should have undertaken at least one consultancy project in preparation for the Conceptual Master	Copies of Work order/ Completion Certificate to be submitted

	Plan/ DPR for setting up an EV or e-mobility Park	
1.7	The bidder should be having unblemished record and must not be blacklisted or declared ineligible for corrupt & fraudulent practices by “any state/ central government” department/ company /entity” as on date of bid opening.	The bidder shall provide an Undertaking as per the format provided as Annexure E

7.2. Technical Qualification Process

The Bidder's technical proposal will be evaluated as per the requirements specified and adopting the following technical evaluation framework given in this document. The proposals will be scored out of total of 100 marks by an Evaluation committee to be appointed by CEO, TrEST Park/ Government for this purpose.

7.2.1. Technical Evaluation Criteria

Criteria for the Technical Evaluation of Bids shall be based on the following;

- a) **Applicant’s Experience and Credentials (50 marks)**
- b) **Technical Presentation (20 marks)**
- c) **Experience of proposed Key Personnel (30 marks).**

The technical evaluation of bids is detailed as below:

- a) **Applicant’s Experience and Credentials (50 marks)**

The scoring criteria to be used for the evaluation of the Applicant’s Experience and Credentials shall be as follows:

Sl No	Criteria	Score	Proof to be submitted
1	Specific consultancy experience in Parks: Experience in preparation of Conceptual Master Plan or DPR for setting up of Parks in any of the	For State Government, Central Government, any PSU or Private entity as Clients in the last 5 years;	<ul style="list-style-type: none"> • Project Credentials as per format provided in Annexure-G • Copies of work order/ Letter of Engagements/Contrac

	<p>following sectors in the last 5 years prior to bid due date;</p> <ul style="list-style-type: none"> i. e-Mobility ii. Aerospace and Defence iii. Logistics iv. Medical devices v. Electronics vi. Industrial Corridors 	<p>2-4 Projects: 8 marks 5-10 Projects: 14 marks 11 or more projects: 20 marks Sub Total- 20</p>	<p>t.</p>
2	<p>Specific consultancy experience in e-mobility:</p> <p>Experience in providing consultancy services in e-mobility sector for preparation of DPR reports, advisory services for e-mobility projects in the areas of formulation of policy/regulatory/guidelines, program management and strategy support for e-mobility projects in the last 5 years prior to bid due date.</p> <p>E-mobility sector shall also include charging infrastructure domain.</p>	<p>For State Government, Central Government, any PSU or Private entity as Clients in the last 5 years;</p> <p>2-4 Projects: 8 marks 5-10 Projects: 14 marks 11 or more projects: 20 marks Sub Total- 20</p>	<ul style="list-style-type: none"> • Project Credentials as per format provided in Annexure-G • Copies of work order/ Letter of Engagements / Contract.
3	<p>Specific consultancy experience in investment promotion, facilitation, and Program management:</p> <p>Experience in providing consultancy services for investment promotion and facilitation for the State Government, Central Government, or any PSU in the last 5 years prior to bid due date</p>	<p>1-2 Projects: 2 marks 3-4 Projects: 3 marks 5 or more Projects: 5 marks Sub Total- 5</p>	<ul style="list-style-type: none"> • Project Credentials as per the format provided in Annexure-G • Copies of work order, Letter of Engagement / Contract.

4	Turnover of the Firm: Average annual turnover (from the consultancy segment alone) in the last three financial years	Applicant entity having average annual turnover (from consultancy segment alone) in the last three financial years; <ul style="list-style-type: none"> • 100 -200 Crores: 2 Marks • 201-400 Crores: 3 Marks • >400 Crores: 5 Marks Sub Total- 5	<ul style="list-style-type: none"> • Certificate as per Annexure F – Certificate of Financial Qualification with required documents
Total Score		50	

b) Technical Presentation (20 marks)

Sl.No	Approach & Methodology	Score	Remarks
1.	Technical Presentation on 1. Approach & Methodology for the proposed assignment 2. Experience of the firm in undertaking similar assignments in EV domain (2 Relevant Case Studies) 3. Work Plan for the Proposed Assignment	20	PowerPoint Presentation (max. 40 slides)
Total Score		20	

The Entity will be called for a technical presentation before the Evaluation Committee where in a detailed presentation shall be made in accordance with the Scope of Services detailed in Section 19 (above) of the RFP.

c) The scoring criteria to be used for the evaluation of experience of proposed Key Personnel

SI No	Role of resource	Score	Qualification	Work experience	Proof to be submitted
Advisory role					
1	Industrial Parks and Infrastructure expert-Team Leader	5	MBA / MBE / PGDM or any post-graduation degree	<p>Minimum of 15 years of experience in providing consultancy services in the following;</p> <ol style="list-style-type: none"> 1. Infrastructure planning, financing, end-to-end implementation of large PPP infrastructure projects encompassing project design and structuring. 2. Preparation of Feasibility Reports, Integrated Master Plans, Detailed Project Reports (DPR) for setting up of Parks, setting up of special purpose vehicles 3. Transaction advisory for both public and private sector in industrial and infrastructure sector. 4. Strong experience in leading projects in the Industrial development domain with focus on corridor and cluster development in India and abroad across sectors with the core objective of promoting economic growth and industrial development. 5. Proven track record of experience in advising national and state governments and bilateral 	CV as per Annexure H

				<p>and multilateral agencies in formulating Industrial and infrastructure policies, focusing on charting out Economic and Industrial Growth plan for Government.</p> <p>6. Strong PPP experience, investment promotion and facilitation, formulating governance and institutional frameworks, conceptualizing cross-sectoral strategies.</p> <p>7. Experience in assessing potential future trade and investment opportunities, identifying commercial opportunities for Government, exporting firms and investors.</p>	
Working resources					
2	E-Mobility / EV specialist	5	MBA/ MBE/PGDM or any post-graduation degree	Minimum 15 years of experience in consulting in E-mobility domain undertaking assignments such as preparation of master plans, feasibility and DPR reports undertaking project structuring and commercial due diligence. Experience of working on Government, Private, bilateral and multilateral assignments, emerging segments in power sector such as energy storage, electric vehicles (EVs), battery and charging infrastructure, new technologies, smart grids etc.	CV as per Annexure H
3	Investment promotion expert	4	MBA/ MBE/PGDM or any post-graduation degree	Minimum 8 years of work experience in investment promotion and facilitation, market research, demand assessment for new projects and growth areas in infrastructure sector.	CV as per Annexure H

4	Finance and PPP expert	4	MBA/ MBE/PGDM or any post-graduation degree in Finance	Minimum 8 years of work experience in financial planning, structuring, analysis of revenue realization and estimation of viability and profitability of infrastructure projects, preferably under public private partnerships, including IRR and NPV estimation of projects	CV as per Annexure H
5	Urban Planner/ Urban Designer	4	Master's degree in Planning	Minimum 8 years of experience in planning, designing and development of industrial parks including preparation of master plans, DPRs and costing specifications.	CV as per Annexure H
6	Structural designer	4	Masters degree in Structural design/ structural engineering	Minimum 8 years of work experience in structural design and planning of townships, industrial projects, infrastructure projects, large scale commercial developments.	CV as per Annexure H
7	Architect	4	Master's Degree in Architecture	Minimum 8 years of work experience in design, planning, supervision, project appraisal of area development projects, townships, industrial projects, infrastructure projects, large scale commercial developments.	CV as per Annexure H
	Total Score	30 Marks			

Note: Only those entities with a Technical Score greater than or equal to 70 (Pass Score), will be considered for financial evaluation.

7.3. Commercial / Financial qualification

The Bidders shall quote for the entire scope of contract on an “overall responsibility” basis such that the total contract value covers all obligations of the Bidder mentioned in or to be reasonably inferred from the Bidding documents in respect of providing the services. The

Financial Bid shall be submitted in the format (BoQ) given as in the e-portal. **Bidder has to quote the total fee for undertaking work as detailed in the Scope of Work covering all costs/expenses in the BoQ. The quoted fee shall be sum of fee for undertaking phase 1 and phase 2 activities.** TrEST Park reserves the right to increase the number of personnel if it felt so and the Consultancy shall arrange for additional personnel for a limited period as desired by TrEST Park keeping the total cost unchanged.

Prices quoted by the Bidder shall remain firm during the entire contract period and shall not be subject to variation on any account except change in applicable tax rates. A Bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.

7.3.1. Commercial / Financial Evaluation Criteria

- a. TrEST Park will review the Technical bids to determine whether the technical bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at TrEST Park's discretion.
- b. The bidder's technical solutions proposed in the bid document will be evaluated as per the requirements specified in this document
- c. Each Technical Bid will be assigned a technical score out of a maximum of 100 marks. Only the bidders who get an aggregate Technical score of 70% or more will qualify for commercial evaluation stage. Failing to secure minimum marks shall lead to technical rejection of the Bid and Bidder

Note: The commercial bids for the technically qualified bidders will only then be opened on the notified date and time and reviewed to determine whether the commercial bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at TrEST Park's discretion. Commercial Bids that do not meet the conditions mentioned above shall be liable for rejection.

8. EVALUATION PROCESS

8.1. Evaluation of Received Bids

TrEST Research Park shall evaluate the responses and scrutinize the supporting documentary evidence. Inability to submit the requisite supporting documents, may lead to rejection. The decision of TrEST Research Park in the evaluation of proposals shall be final. No

correspondence will be entertained outside the process of evaluation. Each of the responses/Proposals shall be evaluated as per the criteria and requirements specified in this tender document.

An Evaluation Committee will be constituted to evaluate the technical and financial proposals and recommend award of the works. The proposals will be evaluated in three stages.

Stage 1: - Pre-Qualification Cum Technical Bid

- a. Each of the Pre-Qualification condition mentioned in Section 7.1 is MANDATORY. In case the Bidder does not meet any one of the conditions, the bidder will be disqualified.
- b. Response to the Pre-Qualification Requirements shall be evaluated in accordance with the requirements specified in this document; A checklist has to be created with proper page-wise indexing of all supporting documents
- c. TrEST Research Park will review the technical bids of the short-listed bidders to determine whether the technical bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified.
- d. The bidders' technical solutions proposed in the bid document will be evaluated as per the requirements specified in the document and technical evaluation framework as mentioned in Section 7.1.2.1.
- e. In case of no response by the bidder to any of the requirements with regard to the contents of the Technical Bid, he shall not be assigned any marks for the same.
- f. If the numbers of eligible candidates are deemed to be low, TrEST Research Park can extend/cancel the invitation to bid or call for a new one. Eligible applicants may be required to make presentations before a selection committee on their technical proposal.
- g. Each Technical Bid will be assigned a technical score out of a maximum of 100 marks. Only the bidders who get an aggregate technical score of 70% or more will qualify for commercial evaluation stage. Failing to secure minimum marks shall lead to technical rejection of the Bid and Bidder.

Stage 2: - Commercial Bid

- a. The bid should include all taxes, duties, fees, levies, works contract tax and other charges as may be applicable in relation to the activities proposed to be carried out.

- b. The taxes quoted in the offer should be as per the prevailing tax rates. Any subsequent increase in the tax rates or introduction of new tax will not be paid by TrEST Research Park. Similarly, if any benefits arising due to downward revision in tax rates, or any exemptions availed by the Bidders organization should be passed on to TrEST Research Park.

8.2. Quality cum Cost Based System (QCBS)

The Evaluation criteria proposed to be adopted for accepting the tender will be Quality cum Cost Based System (QCBS). The Technical Bid Score (TS) will get a weightage of 75% and the Financial Bid Score (FS) a weightage of 25%.

8.2.1. Score calculation through QCBS:

- a) The bidder would be technically evaluated out of 100 marks. All the bidders who secure overall minimum of 70% (70 Marks out of 100 across all the components together) will be considered as technically qualified.
- b) The Bid having the Lowest Commercial bid shall be termed as the Lowest Evaluated Bid and awarded 100 marks. The Normalised Commercial score of all other bidders will be calculated as mentioned below:

Normalised Technical Bid Score (NTB) =

$$\frac{\text{Marks obtained in Technical Bid}}{\text{The highest marks of Technical Bid}} \times 100$$

Normalised Financial Bid Score (NFB) =

$$\frac{\text{Lowest quoted price}}{\text{Price quoted by the Bidder}} \times 100$$

$$\text{Combined Evaluation Score (CES)} = 0.75 \times \text{NTB} + 0.25 \times \text{NFB}$$

where the Weightage (WT) of Technical Bid Score = 75%, and

Weightage (WF) of Financial Bid Score = 25%

The bidders could be ranked based on CES in descending order and the bidder who secures the highest CES, would be selected.

In the event of a tie (two or more bidders attaining the same final score), the following rule shall apply in their order of preference for ranking: -

i. The bidder with the highest Weighted Technical Score (ST * WT) gets the higher ranking

“If Tied even after”

ii. The bidder with the highest Weighted Financial Score (SF * WF) gets the higher ranking.

“If Tied even after”

iii. The bidders will be considered as equally good and shall be called upon for another round of negotiations and the winning bid will be chosen based on mutually agreed terms thereafter failing which the tender will be re-tendered.

c) TrEST Research Park is not bound to accept the best evaluated bid or any bid and reserves the right to accept any bid, wholly or in part.

d) In the event of the highest ranked applicant fails to deliver as promised or is deemed to be ineligible due to legal, financial or personal factors coming to the notice or arising subsequent to the award of the consultancy, the next ranked applicant will be invited to take up the assignment at the price quoted by the L1 bidder or at the rate quoted by them after negotiations.

Example:

Bidder	TS	FS	NTB	NFB	CES	Status
Bidder A	80	500	86.95	90	87.71	L4
Bidder B	78	700	84.78	64.28	79.65	L5
Bidder C	85	450	92.39	100	94.29	L1
Bidder D	90	650	97.82	69.23	90.67	L3
Bidder E	92	600	100	75	93.75	L2

* Values are arbitrary and only for demonstration purpose.

8.2.2.Special Conditions

Each bidder should submit only one (1) bid. Any bidder who submits/participates in more than one bid for the work shall be disqualified.

If the due date for opening the RFP happens to be declared holiday, then the RFP will be received and opened on the very next day, for which no prior intimation will be given.

During the RFP evaluation, TrEST Park may seek more clarifications/details from any or all of the bidders, if felt necessary.

The ownership of all documents, reports, projects etc. being created as part of the assignment will vest with TrEST Park.

Any information furnished by the Bidder, if found to be incorrect at any stage, would render them being declared as ineligible.

Incomplete proposals may be summarily rejected. TrEST Park reserves the right to reject any or all the bid without assigning any reason thereof.

9. AMENDMENT OF RFP DOCUMENTS

At any time prior to the deadline for submission of the RFP, TrEST Park may for any reason, modify the RFP document. The amendment document/ corrigendum shall be notified through the website www.etenders.kerala.gov.in and such amendments shall be binding on all the bidders.

9.1 Pre-bid Meeting:

TrEST Park will convene a pre-bid meeting if necessary with prospective bidders to clarify any ambiguity in the tender document with respect to conditions or specification of BoQ. Date and time for such a meeting will be indicated in TrEST Park website (trestpark.org). Queries regarding RFP or BoQ can be sent to the mail id trestpark@kerala.gov.in on or before 27.09.2024. We will issue corrigendum or addendum for such clarifications, if required.

Bidders shall account such amendments also while bidding.

10. RIGHTS TO ACCEPT/REJECT ANY OR ALL PROPOSALS

TrEST Park reserves the right to accept or reject any proposal, and to annul the RFP process and reject all Bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidders or any obligation to inform the affected Bidders of the grounds for TrEST Park's action.

11. FAILURE TO AGREE WITH THE TERMS & CONDITIONS /CONTRACT

Failure of the Bidder to agree with the Terms & Conditions of the RFP shall constitute sufficient grounds for the annulment of the award of contract. The contract may be awarded to the next most responsive bid among other bidders.

TrEST Research Park shall on best effort basis undertake review of the deliverables submitted by the Bidder and furnish comments in 15 days from the date of submission of the deliverables. TrEST Research Park shall accord all required approvals to proceed to the next component of work in not more than additional 15 days of time from submission of revised deliverables incorporating the suggested comments.

12. PAYMENT TERMS AND TIMELINES

Sl. No.	Milestone	Payment as % of Awarded Fee
1	Upon submission of draft Phase 1 deliverable	25%
2	Upon submission of final Phase 1 deliverable and approval by TrEST Research Park	15%
3	Upon submission of draft Phase 2 deliverable	35%
4	Upon submission of final Phase 2 deliverable and approval by TrEST Research Park	25%

12.1. Performance Bank Guarantee (PBG)

The amount of the Performance Security shall be 5% of the contract value. The performance security/PBG shall be received within 21 days, normally. However, TrEST Park has the powers to extend the time frame for submission of Performance Security (PS). The PBG/PS shall, however, be furnished well before the completion period (6 months). The decision of the TrEST Park will be final on granting time to the Bidder for furnishing of PBG. Even after extension of time, if the PS is not received, the contract is liable to be cancelled provided that TrEST Park, on being satisfied that it is not a case of cartelization and the integrity of the procurement process has been maintained, may, for cogent reasons, offer the next successful bidder an opportunity to match the financial bid of the first successful bidder, and if the offer is accepted, award the contract to the next successful bidder at the price bid of the first successful bidder.

13. APPLICABLE LAW

This RFP shall be governed by the laws and procedures established by the Government of Kerala, within the framework of applicable legislation and enactment made from time to time concerning such commercial dealings. Any default in the terms and conditions of the document by the service provider will lead to rejection of work order.

14. CONTACTS

The bidders can contact through the following e-mail id and telephone numbers:

e-mail: trestpark@kerala.gov.in,

Phone : 0471- 2598555, 9400995567, 9446484904

FORMAT FOR COVERING LETTER

(This letter to be submitted on the official letter head of the bidder, signed by the authorised signatory.)

Sir,

I/We hereby e-tender to render the services under annexed terms and conditions of contract, the whole of the articles referred to and described in the attached specification and quantity decided by the TrEST Park, at the rates quoted against each item.

I am/We are remitting herewith the required amount of Rs..... towards the Registration Fee by electronic payment vide transaction No dtd.....

Yours faithfully,

Place::

Signature

Name

Date

Designation

(Office Seal)

**ANNEXURE A – SUMMARY OF BID QUALIFICATION
REQUIREMENTS**

(To be filled in by the bidder in Letter Head)

1.	Name of the applicant and address with email, phone etc.	
2.	Main area of Business	
3.	Registered Office in Kerala	
4.	Details of Power of Attorney	
5.	Proof for Experience	

Documentary evidence for the bid qualification requirements are submitted along with this document and the details furnished above are true and correct.

Signature of authorised signatory

Name

Designation

Date:

(Office seal)

ANNEXURE B – UNDERTAKING

(To be provided on Rs.200 Non-Judicial Kerala Stamp paper)

Subject: Selection of Consultant for preparation of Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park.

With reference to the RFP Document for the captioned Project, I/we, I (Name, Designation) authorised signatory of (Name and full address of the bidder) having examined all relevant documents and understood their contents hereby undertake that the Proposal is unconditional and unqualified.

1. I/We confirm that I/we have examined the terms and conditions published in the RFP and accordingly submitted the application. The proposal is unconditional and unqualified.
2. All information provided in the Proposal is true and correct and all documents accompanying such Proposal are true copies of their respective originals.
3. This statement is made for the express purpose of providing consultancy services.
4. I/We shall make available to TrEST Park any additional information it may deem necessary or require for supplementing or authenticating the Proposal.
5. I/We acknowledge the right of the TrEST Park to reject our application without assigning any reason or otherwise and hereby waive our right to challenge the same on any account whatsoever.
6. I/We certify that in the last three years, I/we have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or Judicial Court or a judicial pronouncement or arbitration award against us, nor have been expelled from any project or contract nor have had any contract terminated for breach on our part.
7. I/We declare that:
 - a. I/We have examined and have no reservations to the RFP Documents, including any Addendum thereto, issued by the TrEST Park;
 - b. I/We do not have any conflict of interest in accordance with provisions of the RFP Document;
 - c. I/We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in the

RFP document, in respect of any tender or request for proposal issued by or any agreement entered into with the TrEST Park or any other public sector enterprise or any Government, Central or State; and

- d. I/We hereby certify that we have taken steps to ensure that in conformity with the provisions of this RFP, no person acting for us or on our behalf will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.
8. I / We understand that you may cancel the Selection Process at any time and that TrEST Park is neither bound to accept any Proposal that you may receive nor to select the Consultant, without incurring any liability to the Applicants in accordance with the RFP document.
9. I / We certify that in regard to matters other than security and integrity of the country, we or any of our Associates have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory authority which would cast a doubt on our ability to undertake the Consultancy for the Project or which relates to a grave offence that outrages the moral sense of the community.
10. I / We further certify that in regard to matters relating to security and integrity of the country, we have not been charge-sheeted by any agency of the Government or convicted by a Court of Law for any offence committed by us or by any of our Associates.
11. I / We hereby irrevocably waive any right or remedy which we may have at any stage at law or however otherwise arising to challenge or question any decision taken by the TrEST Park (and/ or the Government of Kerala / India) in connection with the selection of Consultant or in connection with the Selection Process itself in respect of the above mentioned Project.
12. I / We agree and understand that the proposal is subject to the provisions of the RFP document. In no case, shall I/we have any claim or right of whatsoever nature if the Consultancy for the Project is not awarded to me/us or our proposal is not opened or rejected.
13. I / We agree to keep this offer valid for (180) days from the date of opening of technical bid.
14. I/We have studied RFP and all other documents carefully. We understand that we shall have no claim, right or title arising out of any documents or information provided to us by the TrEST Park or in respect of any matter arising out of or concerning or relating to the Selection Process including the award of Consultancy.
15. The Technical Proposals and Financial Proposals are being submitted in separate Covers available in the e tenders portal.

16. I/We agree and undertake to abide by all the terms and conditions of the RFP Document. In witness thereof, I/we submit this Proposal under and in accordance with the terms of the RFP Document.

Signed by Sri

(Date)

in the presence of witnesses

1.

2.

ANNEXURE C – POWER OF ATTORNEY

(On Stamp Paper of requisite Stamp value)

Know all men by these presents, we,(name of Firm and address of the registered office) do hereby constitute,.....nominate, appoint and authorise Mr / Ms..... son/daughter/wife and presently residing at, who is presently employed with us and holding the position of as our true and lawful attorney (Hereinafter referred to as the —Authorized Representative) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Proposal for and selection as the Consultant for including but not limited to signing and submission of all applications, proposals and other documents and writings, participating in pre-bid and other conferences and providing information/ responses to the TrEST Park, representing us in all matters before the TrEST Park, signing and execution of all contracts and undertakings consequent to acceptance of our proposal and generally dealing with the Authority in all matters in connection with or relating to or arising out of our Proposal for the said Project and/or upon award thereof to us till the entering into of the Agreement with the TrEST Park.

AND, we do hereby agree to ratify and confirm all acts, deeds and things lawfully done or caused to be done by our said Authorised Representative pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Authorised Representative in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE,

THE ABOVE - NAMED AUTHORISED

REPRESENTATIVE HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF

....., 2024

For

(Signature, name, designation and address) Witnesses:

1.

2.

Notarized

Accepted (Signature, name, designation and address of the Attorney)

ANNEXURE D – DECLARATION BY THE BIDDER

RFP notification no:, dtdfor RFP for the Selection of Consultancy Firm ('Consultant') for preparation of Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park

To

The CEO

TrEST Park

We, the undersigned, declare that:

1. We have examined and have no reservations to the Bidding Document, including Addenda No. (if any)
2. We offer to supply in conformity with the Bidding Document and in accordance with the delivery schedule
3. Our Bid shall be valid for a period of 6 months from the date fixed as deadline for the submission of RFPs in accordance with the Bidding Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
4. If our Bid is accepted, we commit to submit a Security Deposit of 5 percent of the Contract Price for the due performance of the Contract;
5. We are not participating, as Bidders, in more than one Bid in this bidding process;
6. Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by the TrEST Park or Government of Kerala;
7. We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed.

Signature

Date

Name

ANNEXURE E – UNDERTAKING FOR NO BLACKLISTING & NO BANNING

(To be provided on Rs.200 Non-Judicial Stamp paper. In Case of JV the following format is to be provided by Each Member of the Joint Venture on their respective letterhead, signed by respective authorized Signatory along with Authorized Signatory for which POA is attached with Bid))

Undertaking for No Blacklisting & No Banning

To

The CEO
TrEST Park

Sub: RFP for the Selection of Consultancy Firm ('Consultant') for preparation of Conceptual Master Plan and Detailed Project Report (DPR) for setting up of Electric Vehicle Research and Industrial Park

I / We hereby declare that presently our Company/Limited Liability Partnership/ Partnership Firm/ Sole Proprietorship is having an unblemished record and is not declared ineligible for corrupt/fraudulent practices by any State/Central Government/PSU on the date of Bid Submission.

I / We further declare that presently our Company/Limited Liability Partnership/ Partnership Firm/ Sole Proprietorship is not blacklisted and not declared ineligible for reasons other than corrupt/fraudulent practices by any State/Central Government/PSU on the date of Bid Submission.

If this declaration is found to be incorrect then without prejudice to any other action that may be taken, our security may be forfeited in full and the RFP if any to the extent accepted may be cancelled.

(Signature & Seal of Authorized Signatory
for which POA attached) Name of
Authorized Signatory:

Designation:

Date:

Place:

ANNEXURE F – CERTIFICATE OF FINANCIAL QUALIFICATION

(On Letterhead of the respective entity for which the below details are provided.)

Financial Qualification Certificate

(Rupees in Crores)

S/N	Financial parameters	FY 22-23	FY 21-22	FY 20-21
1.	Net Worth			
a)	Paid up Capital			
b)	Free Reserves and Surplus*			
c)	Misc expenses to the extent not written off			
	Net Worth (a+b-c)			
2.	Annual Turnover **			

* Free Reserve and Surplus shall be Exclusive of Revaluation Reserve, written back of Depreciation Provision and Amalgamation.

** Annual total Income/ turnover as incorporated in the Profit and Loss Account excluding non-recurring income, i.e., sale of fixed assets etc.

It is certified that all the figures are based on audited accounts read with auditors report and Notes to Accounts etc.

(Signature & Seal of Authorized Signatory

Name of Authorized Signatory: Certifying
Chartered Accountant (CCA): Designation:

Name of Firm:

Date: UDIN No:

Place: Date:

Place:

Note:

1. In addition to the above certificate from Chartered Accountant, Bidder is required to submit the Firm's Annual Audit Report, Balance sheet, Profit & Loss and Income Tax Returns / CA certificate for the last Three years i.e., F.Y: 2020-21, 2021-22 & 2022-23.

2. In case the figures in the certificate are not explicitly available in the balance sheet, an explanatory note just highlighting the details may be added with certification by the CCA.

ANNEXURE G – PROJECT CREDENTIAL FORMAT

(To be submitted on the official letter head of the bidder, signed by the authorised signatory Details of all relevant projects undertaken shall be submitted separately. Only those projects with proof and reference will be considered for marks)

Project name:	Estimated Capital cost of the project:
Country:	Duration of assignment (months):
Location within Country:	
Name of Client:	Total no. of staff:
	Total no. of staff-months:
Address of Client:	Approx. value of contract:
Start date (Month/Year):	Completion date (Month/Year):
Sectors (Provide tick mark to the corresponding experiences in the sectors):	e-Mobility <input type="checkbox"/> Aerospace and Defence <input type="checkbox"/> Logistics <input type="checkbox"/> Medical devices <input type="checkbox"/> Electronics <input type="checkbox"/> Industrial Corridors <input type="checkbox"/>
Name of associated consultants, if any: Copy of P.O or Agreement Reference for validation	Name of senior professional staff of your firm involved, and functions performed (indicate most significant profiles such as Project Director/Coordinator, Team Leader):
Narrative Description of Project:	
Description of actual services provided by your staff within the assignment:	

Signature of authorised signatory

Date:

(Office seal)

Name

Designation

**ANNEXURE H – CURRICULUM VITAE OF PROPOSED RESOURCES
(KEY PERSONNEL)**

1.	Name of Staff				
2.	Proposed Position LinkedIn Profile or Research Gate Profile				
3.	Employer				
4.	Date of Birth		Nationality		
5.	Education	School, college and/or University Attended	Degree/certificate or other specialized education obtained	Date Obtained	
	Professional Certification or Membership in Professional Associations:				
6.	Other Relevant Training:				
7.	Countries of Work Experience				
		<i>Language</i>	<i>Read</i>	<i>Write</i>	<i>Speak</i>

8.	Languages				
9.	Employment Record:				
	From	To	Company	Position Held	
10.	Brief Profile				
11.	Adequacy for the assignment (Works undertaken)				
	Name of Assignment or Project: Year: Location Client: Main Project Features: Position held: a..n. Activities Performed: Reference (Name, Mobile no. only, mail id): Testimonials if any, on the project:				

Note: Only applicants with reference or testimonial and proof of involvement in project would be considered for marks.

APPENDIX 1: PROPOSED FACILITIES AND UNITS OF THE EV PARK

1. EV Industrial Parks

An EV Industrial Park is planned to be set up in the State, which includes the setup of common facilities for the EV Companies and Startups, where they can plan to use the facilities on payment basis. The EV Industrial Park is planned to have the complete ecosystem for the design and development, manufacturing, R&D and testing of the Electric Vehicle Components, which include Batteries, Motors, Controllers, Charging Systems and so on, which will be useful to the startups. There will also be the allocation of land for the EV Companies, which can assure sufficient investment, and generation of employment in the next 5 years or so.

2. Management of the Park

The management of the Park will be done by the partners of the Kerala State Electric Vehicle Consortium. It needs to be finalized whether a separate Section 8 Company or Society needs to be formed for this purpose.

Along with the current Consortium Partners, Kerala Startup Mission and Space Park can also be included in the Section 8 Company or Society that is formed.

TrEST Research Park shall be registered as an SPV for the implementation of the Electric Vehicle Industrial Park project.

A separate Governing Body and Organization Structure needs to be framed up, for the governance and the management of the EV Industrial Park.

3. Facilities to be built up in the Park

- Battery related technologies
- Battery Management System
- EV Motors
- EV Controllers
- Power Electronics
- Chargers and Associated Infrastructure
- Emulation of EV systems and its Real Time simulations
- Auxiliary EV subsystems development and validations

4. Units to be established in the Park

- Product Design Centres
- Testing Facilities
- Research and Development Wing
- Administrative Block of TrEST Research Park & TrEST Park campus
- Incubation Centre
- Innovation Wing
- Cell Manufacturing
- Battery packaging
- Space Allocation for Companies, Startups and OEMs
- Academic Interface Cell
- Related Industries
- Certification Facilities

The focus is on two wheelers, three wheelers and four wheelers (Design and Development, Research, Manufacturing and Testing).

5. Details of the common facilities to be built up in the Park

About Industry and R&D facility need

Some of the facilities that needs to be set up in the EV Industrial Park for the subsystem level design, development, test and validate the indigenous components for the EV system are

1. Chargers and its infrastructure with Public Metered operation structure
2. Electric Motor development and validation platforms
3. Drive controller development
4. Battery management and communications
5. Emulation of EV systems and its Real Time simulations
6. Auxiliary EV subsystems development and validations

1. EV Chargers and its infrastructure with Public Metered operation structure

Electric Vehicle Supply Equipment are commonly known as EV Chargers. The widespread implementation of EV chargers is meant to be the solution for range anxiety which is one of the

major hindrances in faster adoption of EVs. The EV Chargers are classified based on the charging speed as slow and fast chargers. The slow charger takes more time for charging compared to the fast chargers. Depending upon the type of power transferred, they are further classified as AC chargers and DC chargers. The AC chargers deliver AC power to the on-board chargers and DC chargers deliver DC charging power to the vehicle battery directly.

R&D Infrastructure requirements of DC and AC chargers are different. AC chargers require R&D in the area of control and instrumentation, RTOS based embedded systems, network communication as per the universal standards like OCPP and mobile applications & user interfaces.

DC chargers convert power from the utility and convert it to DC power as per the battery charging requirements. The AC-DC and DC-DC power converters form the major part of DC EV chargers. Like AC chargers, DC chargers also have RTOS based embedded systems, network communication as per the universal standards like OCPP and mobile applications & user interfaces apart from power converter controller. Another area of research is the EV-EVSE interfaces as per international standards.

R&D Infrastructure should support the power electronics, embedded system, digital communication protocols, centralized charge point management services and user interfaces like mobile Apps.

Pilot production/Manufacturing facility has to support the prototyping activities to support aesthetic design of chargers. Also component level manufacturing line up and assembly line up will aid in productionizing the technologies at a faster pace.

The EV Chargers for commercial/public use need to comply with the standards. The compliance test or pre-compliance screening will enable manufacturers to bring down the time to market.

Testing of chargers include tests for safety, environmental tests, mechanical impact tests, functional tests and testing for communication protocols. Facilities for these tests will aid the development activities.

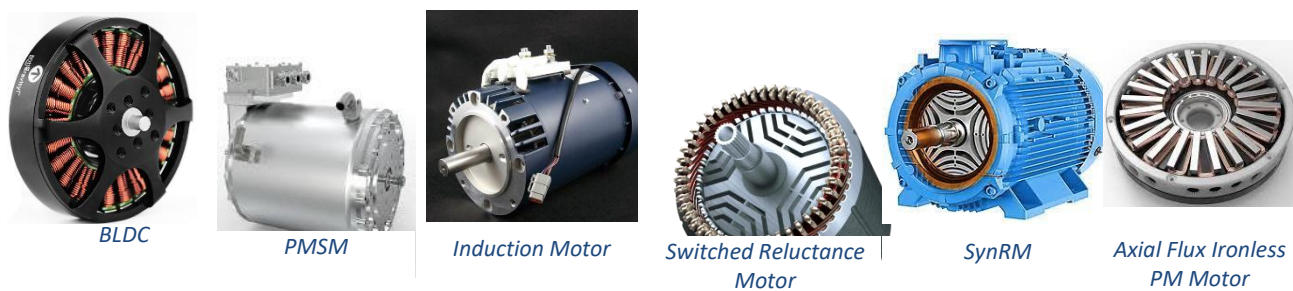
Skilled manpower in various domains is required for R&D in EV chargers, namely power electronics, embedded systems and communication protocols.

2. Electric Motor development and validation platforms

Introduction-Electric Motor in EV

In an EV, the electric motor is one part of a larger unit called the powertrain. Electric vehicle industry uses different types of motors, each having its own strengths and weaknesses. Brushless DC Motor, Permanent Magnet Synchronous Motors, Induction Motor, Switched Reluctance Motor, Synchronous Reluctance Motor and Axial Flux Ironless Permanent Magnet Motor are the major types of EV segmented motors.

Depending upon the number of motors used in electric vehicles and their configurations, existing EVs can be divided into two types. Single Motor Driven Power train and Multi motor Driven



Power train. Selection of any of these configurations is based upon the requirement criteria of the EV.

The proposed EV-Industrial Park needs to focus on the Design, Manufacturing, Characterization and performance analysis and Service of motors.

I. Design of Motors

The focus is on providing R&D and infrastructure facilities for the design and development of Next Generation Motors.

R&D Facility

EV-Industrial Park will provide Research and Development facilities for various companies and Start-ups involved in the design of Next Generation Motors. The R&D facility requires various Electric Motor Design Software, Electromagnetic analysis software, modeling and design of electrical machines software, CAD 3D/2D (Catia, Creo, NX).

Infrastructure Facility

EV-Industrial Park can provide infrastructure for the operation of companies /Startups in the field of design of EV Motors.

Manpower/Skill set

Requirement of manpower with skill set in the design of Motor or PhD in Electrical Engineering with an emphasis in Electromagnetic devices such as motors, actuators and sensors or a Master's

degree in Electrical Engineering or Degree in Automotive Engineering, Mechanical Engineering or a related field.

II. Manufacturing of Motors

The focus is on providing infrastructure facilities for the manufacturing of Next Generation Motors.

R&D Facility

EV-Industrial Park will provide R&D facilities for various companies and Start-ups involved in the manufacturing of Next Generation Motors.

Infrastructure Facility

EV-Industrial Park can provide infrastructure for the operation of companies /Startups in the field of manufacturing of EV Motors or subsystems of EV motors such as Magnet, Stack, Shaft, housing, copper wire or other parts manufacture and the EV-Industrial Park can be a hub or a production plant for EV Motors.

Manufacturing process consists of magnetization of rare earth materials, placing of magnets to motor rim, production equipment, dielectric paper insertion, state of art of auto winding machine, Shaft insertion, sensor insertion, wedge insertion, bearing insertion, fixing side covers etc. EV-Industrial Park can provide facilities for the quality check and reliability checking requirements of motors.

Manpower/Skill set

Motor manufacturing industry requires manpower with skill sets of ITI, Diploma, Graduate and Post Graduate in Electrical Engineering. Also, it requires Production Managers, Operators, Helpers in any discipline.

III. Characterization and Performance Analysis of Motors

EV-Industrial Park focuses on providing infrastructure facilities for the characterization and performance analysis of Next Generation Motors. Inhouse motors quality check and reliability check can be performed with the facility in the Industrial Park.

R&D Facility

EV-Industrial Park will provide R&D facilities for various companies and Start-ups involved in the quality check of Next Generation Motors for EV Cars, EV Bus, EV Motorcycle, EV Scooter, EV Bicycle and EV Truck.

EV Car motors can be checked for Four-Quadrant Operation/Braking, Drive Load Simulation with User-Defined Sequence, “Hardware in Loop” communicates via CANBUS, High Speed & High Torque EV testing.

EV Motor Testing requirements

- Complete load performance testing: Torque, Speed, Current, Efficiency, Power Input, Power Output.
- Standard electrical parameters testing: HV, Vibration, Noise, and others.
- Additional testing: Cogging, Back EMF, Friction, Friction Spectrum, Ripple Torque.
- Automatic temperature rise test: Thermocouple device with 4 to 16 channels, Current, Voltage, Speed, Torque, Input Power, Output Power, all synchronized to each temperature.
- Electric Motorcycle Motor Drive Cycle Load Simulation: Real-time simulation of scooter/driver, with acceleration, brake, change of vehicle states.
- Additional EM Tests: Performance Generating Mode & Performance Motoring Mode, Stall Torque, Cogging Torque, Back EMF RMS, Open Circuit Back EMF, Back EMF Constant K_E , No Load Coupled & Uncoupled, Torque Ripple Measurements at Low RPM & at High RPM, Electromechanical Time Constant, Voltage and Current Harmonics, Load from Excel File, Speed Torque Scope Viewer, Deceleration Test (MOI Calculation), Servo Bandwidth (Speed Loop & Current Loop), Dynamic Testing during acceleration and deceleration, Friction vs. Speed & Friction Drag Torque, Torque Speed FFT, Performance at Variable Voltage, Inductance Test 3 Phases, Vibration.

Infrastructure Facility

EV-Industrial Park can provide infrastructure for the operation of companies /Startups in the field of quality testing of EV Motors.

Manpower/Skill set

Motor manufacturing industry requires manpower with skill sets of ITI, Diploma, Graduate and Post Graduate in Electrical Engineering. Also, it requires Production Managers, Operators, Helpers in any discipline.

IV. Service of Motor

EV-Industrial Park focuses on providing infrastructure facilities for the servicing of Electric motors. With the increment of Electric vehicles, a new opportunity of servicing/repairing the electric motors will be in huge volume. Industrial Park can provide the infrastructure facility for the servicing of electric motors.

R&D Facility

EV-Industrial Park will provide R&D facilities for various companies and Start-ups involved in the servicing of various EV motors.

Infrastructure Facility

EV-Industrial Park can provide infrastructure for the operation of companies /Startups in the field of servicing/repairing of EV Motors.

Manpower/Skill set

Motor manufacturing industry requires manpower with skill sets of ITI, Diploma and Graduate in Electrical Engineering/Mechanical Engineering Also, it requires Production Managers, Operators, Helpers in any discipline.

3. Drive controller development

Electric Drive Component Manufacturing Facilities

Presently most of the electric drives are imported based on the cost and availability. The below are the few constraints and approaches to overcome by facilitating the R&D infrastructure for the indigenous designs.

Constraints

- Component manufacturing costs are driven largely by production quantity, and to achieve high production volumes, low-cost components are required
- Without high volume commitment from OEMs, component manufacturers are unwilling to invest in the equipment, tooling, and other supply chain costs to bring propulsion system prices down
- Without low-cost propulsion systems, OEMs are unable to price vehicles at a level that will create consumer demand

Approach

- Apply manufacturing and assembly design principles to existing products to create low-cost electric propulsion systems that can be manufactured in volume, following Advanced Product Quality Planning (APQP) and Control Plans, creating quality products that meet SAE Standards
- Create a manufacturing facility that supports high volume component manufacturing
- Set up production lines and systems to support a large volume unit a year on a single shift
- Establish multiple suppliers for key components to minimize timing and volume delivery risks
- Design manufacturing systems that are flexible enough to adapt to evolving technologies and product variants

PE requirements in E-mobility

The rise of electric vehicles is inevitable around the world and India alike. The building blocks for Electric Vehicles are Batteries, Traction Motor and Power Electronic Converters. Technologies for these building blocks must improve to provide vehicle range, safety, reliability, life, and flawless operation.

a. Advanced R&D and manufacturing facility requirements

Advanced level of R&D is vital to build a strong technology to bring all collective subsystems of EV under one roof. Advanced technologies in all areas of EV power electronics viz. converters with advanced power semiconductor switches, new ferromagnetic materials, improved embedded electronics hardware and several other new technologies are propelling the increased performance of electrical power train systems in electric vehicles. While safety, reliability, and efficiency are mandatory requirements, the cost is the primary business driver for these products. Intelligent design to strike a suitable balance between performance and cost is key to business success. Above all, design decisions are driven by cost.

While a lot of research is going on improving battery technology to enable their fast-charging capability, standardization of drive across various segments of vehicles is still at a primitive level of technology development in India. Most vehicle manufacturers (OEMs) are finalizing about 400V for passenger cars and about 800V for commercial vehicles. While two-wheeler and three-wheeler manufacturers are staying with 48V, 60V, and 72V batteries. So correspondingly there is

a need for a wide range of power capability requirements on drive aspects to cater these dc bus voltage ranges.

Few critical demands from all Power Electronic products in an electric vehicle are Efficiency (Output power as a percentage of Input Power drawn), Size, and Weight. The efficiency of all power electronic products, in turn, influences the size and weight of the products. Lower efficiency means higher power loss which results in increased heating. To dissipate the extra heat, the size and weight of the products get increased. Higher efficiency helps better thermal management and better “Range” (miles per charge). Thus, one of the most important factors that the engineers are trying to improve in these products is “efficiency.” The next important area of attention is “power density” (Power delivered per unit of volume of the product)

Power Semiconductor Switches are at the heart of any power electronic device. Power Semiconductor Switch technology is going through a rapid transition driven by the increased demand for power converters in Electric Transportation systems, be it Electric vehicles, Electric Rail engines, or More Electric Aircraft. Silicon-based IGBTs and MOSFETs are coming with better switching characteristics that enable higher power conversion efficiency.

Semiconductor manufacturers are constantly working on bringing superior silicon technologies to the market. They are revamping the silicon die packaging technologies to address various automotive applications, thermal management being the most important and improving the semiconductor packages for challenging power densities in EV applications. IGBT and MOSFET solutions are constantly evolving to address the growing demands of the automotive market. Dual-Side Cooled compact 750V IGBT modules with Integrated chip-level temperature & current sensors are specially made for 400V traction inverter application. MOSFET packages evolved from through-hole packages to surface-mount devices (SMD) like the DPAK or D2PAK, and finally to the latest leadless packages with significantly improved silicon technologies inside. Innovative surface-mount packaging with top-side cooling MOSFETs is becoming available for compact converter packaging. In the traditional approach of bottom-side colling, the surface mount MOSFETs dissipate the heat through PCB to the heatsink. With top-side cooling, the hot-spot of MOSFET is exposed at the surface of the package, which allows 95% of the heat to be dissipated directly to the heatsink. These packages are specifically targeted for high thermal performance in EV applications.

There are three major Power Electronic elements in the electric vehicle drive system: Electronic Control Unit, Traction Inverter, DC-DC Converters, Traction Motor and Transmission

Electronic Control Unit

Microcontroller unit is responsible for power management, Electronic Control Unit (ECU) communication and Unified Diagnostic Services (UDS) based diagnostics. Modern Control Algorithms like Field-oriented control, regenerative braking, field-weakening etc. are installed in the MCU platform which generates PWM signals after processing feedback signals from various sensors. Advanced DSP/FPGA controllers are used for the overall control action. With the advanced digital processor having internal 32-bit math processor architectures, it enables concurrent operation of complex control algorithms thereby the total execution time can be significantly reduced. It also enables faster system response for serving higher MHz control loops. Modern digital controller cards consist of many peripherals like PWM modulators for device control, ADC, DAC, resolver to digital converters, various protections and feedback circuits, sensing circuits etc. It may also have additional features like battery management system, motor diagnostic system, fault protection system etc for advanced monitoring.

Traction Inverter

The inverter is an AC to DC converter that converts the Battery voltage to supply an alternating voltage to the traction motor. The typical power rating of the Inverter ranges from 2kW to 5kW for two and three wheelers, 50kW to 250kW for a passenger car and 100kW to 400kW for buses and trucks. Inverter controls the rotational speed of the traction motor and provides the required torque to propel the motor. Another significant feature the inverter brings to the vehicle is its ability to provide precise “Electric Braking.” Regenerative Electric braking helps reduce the usage of mechanical braking and hence improves the life of the mechanical brake system by reducing mechanical wear and tear. The electric braking feature also transfers the motor kinetic energy to the battery every time the vehicle is braked. This, in turn, improves the vehicle range.

The power conversion efficiency of Traction Inverter drive directly influences the vehicle range (miles/charge). The typical efficiency of the inverter drive is more than 95%, which is expected to improve in the coming years further with the advanced power devices, efficient gate driving mechanism, modified torque control algorithm etc. The typical power density of the inverters is 20kW/Lit. In the coming years’ power density is expected to improve to 40kW/Lit, which means double the power in the same size.

DC-DC Converter

DC-DC converter acts as a DC level changer from the battery unit to the drive input unit. When there is a low voltage battery unit used as the storage power source and when the traction drive

input requires a higher level of DC bus input, this DC-DC converter does the purpose. DC-DC Converter also acts as a DC transformer that converts the high voltage from traction battery to low voltage to supply all low voltage electronics like power steering, power window, wiper control, dashboard multifunction display, and all other electronic control functions, including very critical “Vehicle Control Unit” (VCU). The typical efficiency of a DC-DC Converter is more than 96%. Typical power rating of a DC-DC Converter ranges from 1kW to 6kW for a passenger car.

An onboard charger (OBC) is a Battery Charger that is operational only when the vehicle is stationary. OBC converts the AC voltage of the utility power source to DC voltage to charge the battery. OBC has its in-built control function to charge the battery at constant current, constant power, and constant voltage. Most of the current Onboard Chargers support unidirectional power flow, namely AC grid to the battery. However, many OEMs are planning to install Bi-directional Onboard chargers. Bi-directional onboard chargers are now coming as an emerging technology which allows fully charged EV batteries to supply power to the utility grid. Discharging the EV batteries whenever available helps improve their life while the burden on the grid reduces. It is expected that bi-directional onboard chargers will gain higher popularity, supporting Vehicle to Grid (V2G) and Vehicle to Home (V2H) power flow.

b. Testing facility requirements for EV traction drive

The test facility for all the EV subsystems can be properly integrated and optimized. These vital systems are not only limited to the vehicle, but also include the power grid and available EV-charging infrastructures. Valuable testing and validation tools like programmable power supplies and programmable electronic loads is also a vital part in this phase. Regenerative load arrangement is an essential load test setup to test the motor under test by coupling it with another motor. The coupled motor will act like a generator to supply the power back to the grid. Thus, in the process, only the major loss impact will be the friction and windage losses pertained to the motor.

A dynamometer kind of load arrangement is also beneficial when the exact torque and speed profile has to be correctly estimated. For chassis or engine applications, a dynamometer is designed to create a load to duplicate various speed (RPM) and torque (Nm or lb-ft) requirements. In addition, options are available with test benches to test integrated electric axle drives that feature proprietary drive technology, including measurement of wheel torque.

The drive proto unit is required to undergo various type tests before ensuring the unit evaluation. The power /energy test benches, communication test setup, environmental chambers, Anechoic

chamber, Oscilloscopes, Spectrum analysers, Precision DMMs, etc. should be some of the unique testing facilities available at the lab. The various electrical system testing viz. component testing, equipment system testing, environmental testing, safety testing, EMI/EMC testing, reliability testing and analysis etc are some of the required test certifications to be followed up.

4. Battery management and communications

As EVs are evolving fast, the batteries need to improve and adapt to its stringent functional and operational requirements. The Battery Management System (BMS), is a critical part of EVs, which guarantees the battery to operate safely and last longer. The electrical power systems of EV are managed by BMS, which monitors the battery parameters like voltage, current, temperature, discharge status, depth of discharge and avoids overcharge, over-discharge and voltage imbalance. Even when the battery pack is manufactured with cells having similar characteristics, the imbalances develop over time. Since EV batteries are frequently charged and discharged, the imbalances among the cells may develop faster. So, the accurate measurement of the voltage of each cell, in every charge-discharge cycle, is essential. By constantly monitoring every cell in the battery pack BMS calculate exact current which can safely go in and out of the battery pack without damaging it. These calculated current limits are then sent to the source (typically a battery charger) and load (motor controller, power inverter, etc), which are responsible for respecting these limits.

BMS estimates the State of Charge (the amount of energy remaining in the battery) by tracking how much energy goes in and out of the battery pack and by monitoring cell voltages. This value can be thought of as a fuel gauge indicating how much battery power is left in the pack.

BMS monitors the health and safety of the battery pack by constantly checking for shorts, loose connections, breakdowns in wire insulation, and weak or defective battery cells that need to be replaced.

Balances all the cells in the battery pack by intelligently bleeding off excess energy from cells that are charged more than others.

Monitors the temperature of the battery pack and controls a battery fan to regulate the temperature of the pack.

Provides real-time information and values to other devices such as motor controllers, chargers, displays and data loggers using several different methods (CANBUS, analog and digital outputs).

Stores error codes and comprehensive diagnostic information to be used in fixing problems with the battery pack

BMS includes electronic circuits, instrumentation and control circuits and communication systems. The subsystems and interfacing circuits involved in BMS Development are

1. Monitoring and control circuits
2. Cell balancing circuits
3. Diagnostics
4. Communication Interfaces
5. System Controller

A generic BMS architecture with electronics, instrumentation, protection circuits is shown in figure given below.

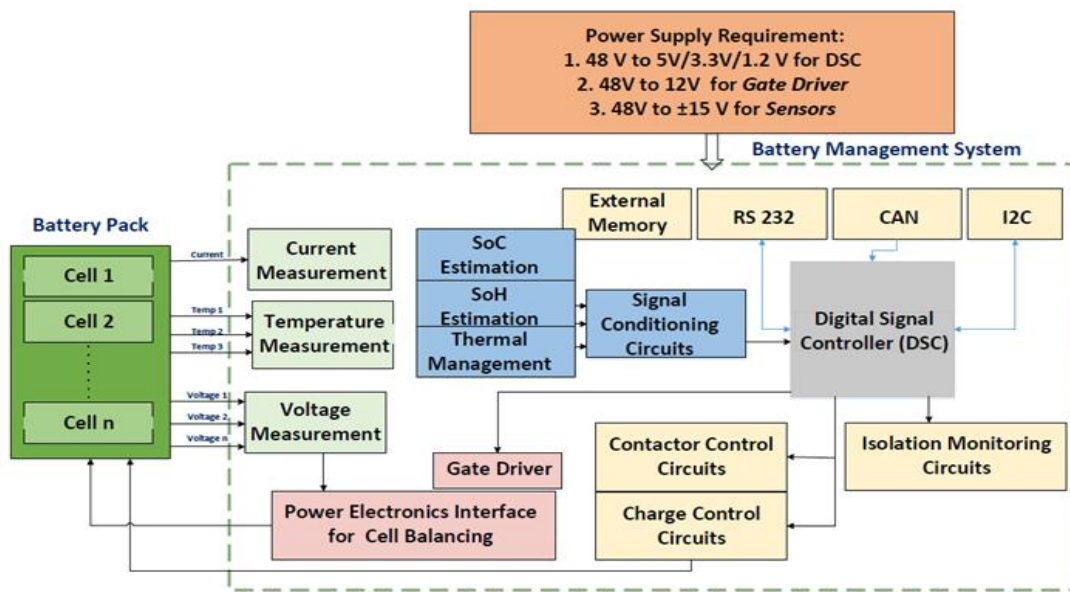


Figure 2. Generic BMS Architecture

R&D Activities in development of BMS

The activities shall include:

- Safety system design and component selection/ pack design, thermal management of EV 2W/3W/4W
- Benchmarking of existing BMS & developed BMS Architecture

- BMS for different battery cell chemistries
- Modeling & simulation for various battery chemistry
- Component testing & specification – fuse, wire, connectors
- Battery Pack design and thermal management

Technical know-how generation under BMS development activities

- Domain knowledge for battery management systems
- Integration with BMS
- Testing methods of BMS as per standards
- Stack level Test jigs and requirements of validation and testing platforms
- Integrated testing with motor testing test beds
- Development of energy storage systems for EV applications

5. Emulation of EV systems and its Realtime simulations

Emulation techniques for electric vehicle subsystems testing involve simulating the behavior of certain components or subsystems in a controlled environment to test and validate the performance of the overall system.

Techniques used in electric vehicle subsystem testing:

Battery emulation: Battery emulation involves creating a simulated battery pack that mimics the behaviour of a real battery. This is done using a power supply and a battery emulator, which can replicate the voltage, current, and temperature characteristics of a real battery pack.

EV charger emulation: Electric vehicle charger emulation refers to the process of creating a simulation of an electric vehicle charging system at the charger or vehicle side to test and validate the performance of the charging system. Charger emulation also allows researchers and engineers to experiment with different charging algorithms and protocols to optimize charging speed, efficiency, and reliability.

Motor emulation: Motor emulation involves simulating the behaviour of an electric motor using a motor emulator. This can be useful for testing motor control algorithms and other subsystems that rely on accurate motor performance.

Vehicle dynamics emulation: Vehicle dynamics emulation involves simulating the behaviour of the vehicle itself, including the suspension, steering, and braking systems. This can be useful for testing the performance of the entire vehicle in different driving scenarios.

R and D requirements:

Development, configuration and verification of emulation platforms by integrating Real-time simulators, offline simulators, HMI/GUIs, power amplifiers etc.

Infrastructure requirements:

Real-time simulators and workstations, Logic analysers, protocol emulators, Bi-directional power supplies and dynamometers.

Ratings:

Battery/Motor/EV charger emulator: Power 1kW to 200kW; Voltage 48V, 72V, 300-700V bus systems.

Manpower and Skillset (For each emulation facility):

One Engineer and one Technician with knowledge of EV subsystems, Real-time simulators (dSPACE, Opal-Rt, vector etc) Simulation packages (MATLAB, Altair), EV standards (IEC, IS, AIS), protocols etc.

6. Auxiliary EV subsystems development and validations

The auxiliary test solutions that are required for the development of a total EV eco system are as mentioned below.

E-Mobility Testing Solutions

- Validation of EV Charging Station
- Validation of EVs (2W, 3W and 4W)
- Electric Vehicle Battery Pack Testing
- Electric Vehicle Battery Cell Testing
- Validation of Battery Management Systems
- Electric Vehicle Motor Validations using Dynamometers
- Electric Vehicle Validations using Chassis Dynamometers

Development of EB Subsystems for EVs

- Indigenous Development of VCU for Electric Vehicles
- Design and Development of motor drives for Air-Conditioning Systems
- Design and Development of pump drives for Water Circulation Systems
- Development of PE converters for Auxiliary supplies
- Development of LED drivers for Headlights and other EV lighting systems

Grid Requirements for EV PARK

- An uninterrupted 11kV Feeder Capable of Supplying 500 kVA power
- 2 x 130 kVA Diesel Generators for backup
- Dedicated UPS for PCs and other Critical systems

Rooftop Solar generation of >300 kWp for reduction of carbon footprint.

Safety and General Requirements

The EV Park shall have the following Safety Requirements

Multiple Exits from the park to the nearest safe location

Fire Brigades for handling Electric related fires

Hospital / Clinic for First Aid

Frequent safety drills and training for employees

24x7 security with restricted access for visitors

The EV Park shall have the following General Requirements

A customer care cell for allotting a managing slot for customers

A guest house to accommodate customers

24/7 pantry at respective labs during continuous tests

Ample parking area at multiple locations for customers and employees

Infrastructure Requirements for Power Electronics for the EV industrial park

The minimum infrastructure required for the setting up of a test and development center for the EV sub systems are listed below. The facility covers the requirements of the low power segment of E2Ws, E3Ws to the maximum and a few subsystems of E4Ws.

Sl	Description of Items
1	Electrical substation requirements for the operation Without Cabling
2	Electrical equipments like Programmable Source and loads with regenerative operations
3	Electronics equipments for test and measurements
4	Infrastructure for the above test beds
5	Low power Lab for the Electrical, Mechanical and Electronics simulations
6	Manpower skill set to maintain the above facility
7	Standards for evaluations and validations
8	Pre compliance and Environmental test requirements Vibrational dynamometers
9	Battery Emulators, BMS testing center, Battery component manufacturing and testing
10	EV Subsystem Validation centers 1. Chargers 2. Drive train 3. Battery packs 4. EV interfaces

Battery Materials and different types of Batteries – Trial Manufacture Facility

In addition to the above facilities, the following facilities are required for the battery manufacturing technologies.

- a laboratory facility for the development of battery materials
- a pilot facility to trial manufacture the developed material
- a pilot facility to trial manufacture different type of batteries.

Common Facility

Cylindrical cell Line, 100 cells per day

Prismatic cell line, 3.6V,25Ah,200 cells/day

Pouch cell line,30Ah, 50 cells/day

Packing of cells and battery assembly line

The Man Power Requirement for EV Park also needs to be specified.

7. Key Considerations in the design of the EV Industrial Park

1. Inclusion of Startups; Incubation:

- Relevance of innovation.

Mechanism for innovators and startups to be included in the EV consortium space needs to be in place as the competitiveness of the EV space will critically depend on innovators and startups.

- Entities like Space park could be brought in for this purpose.
- Incubation mechanism could be the critical component of the EV park design and it was proposed to have a governing body with the IT secretary and KSUM.
- Incubation mechanism – Focus on the Micro factory model

2. Synergies in EV Battery Technology:

Synergies between battery technology and fuel cells should be investigated, especially since graphene and carbon nanotubes are critical components in both fuel cells and ultra- and supercapacitors.

3. Drain on the Power Grid; Distributed Energy Storage System:

- There is a need for a mechanism to mitigate the strain on the power grid with more EVs coming in.
- Thus, as a part of the ecosystem, a distributed energy storage system must be considered.

4. Autonomous EV:

It has been projected that by 2030–35, at least 47 – 50% EV will be autonomous vehicles. Additional gadgets and technologies in the field of control and power electronics will be required for this, and it could be part of C-DAC’s mandate.

5. Power Electronic Systems; Controllers:

The power electronics, control and related systems are an extremely critical component for the park design as it covers the proposed 5 domains (EV charger, electric motor development, drive control development, battery development, BMS and communications, Auxiliary EV subsystems development). These areas come in the expertise of C-DAC and TrEST Research Park.

6. EV charging: In the context of Kerala, 2 way charging, Grid management

Flash charging shall be given importance.

7. In terms of futureproofing,

- WBG – Gallium Nitride (GaN) and Silicon Carbide (SiC) based controllers will be a critical component for consideration.

- AI-based accelerators and controllers apart from cloud-based systems are very critical in terms of BMS and new technologies in the EV space.

8. EV Motors: Recovery of Neodymium and Dysprosium shall be looked at as it is becoming a critical component with 84% of the motor market being permanent Magnet Synchronous Motors (PMSM). This could be an area of interest for IISER and TTPL.

9. EV Battery Manufacturing: Mechanisms framework for electrode production, cell production, cell conditioning, electrical system, adhesive bonding and related technology should be considered while moving from cell to a full-fledged battery module (package).

10. Optimized Engineering and Quick Mass Manufacturing:

- Focus should be on weight-optimised engineering and quick mass manufacturing which are very critical components for startups as well as for 2W and 4W manufacturing.

- Composites in place of metal structures in EV shall be looked into. Could be an area of interest for VSSC and IISER as they have a high level of expertise.

- Alternatives to metal jigs like plastic-based chassis and plastic based bodies were critical for micro-manufacturing especially for startups in the EV space.

8. Certification and other Facilities

A. Certifications

Regulatory certification

Self-Certification for quality

Global Certification for safety

NABL lab for aux components

B. Small test tracks

For gradients

For road conditions.

C. Facility for development & testing of automotive auxiliary systems to support the ancillary industries.

Self-certification for quality.

Internationally renowned labs should be invited to take up space in the EV park and provide their services to the industries. Since EV Park and Space Park are in close proximity, there will be demand for their services. We can think of an arrangement with these companies to provide subsidized services to the industries in the park.

The following labs may be invited.

1.UL

2.TUV SUD

3.TUV

4.Interleh

5.SGS etc

➤ Global Certification for safety.

We have a functional safety standard called IEC61508 and from this standard, functional safety standards are made for each industry. The relevant standards by each industry are as follows.

A. Certification

➤ Regulatory certifications (India)

Today, ARAI & ICAT are the only two agencies in India for automotive certifications, Labs in VRDE(DRDO) also support testing of large vehicles with good test tracks .We should aspire to be a certification facility for EV since the existing facilities are crowded and the waiting time for a slot is very high. Tamil Nadu and Karnataka are also trying to set up a certification facility. We can even try to be a satellite facility of ARAI in case we do not get the permission to be completely independent.

In comparison to the other certification options, regulatory certification is a low tech, process-oriented activity. The commercial value of this is also low. If this does not workout we should try setting up the other options.

-ISO 26262 –Automotive

-IEC 62279-Railways

-IEC 60730-Household appliances

-DO -254/DO-178B/C (Aerospace)

Now for automotive applications the ISO 26262 and ASIL standards have become mandatory. It is to be noted that even in India, batteries to be used in EV have to be ASIL B rated. There is no qualification /certification facility anywhere in India in the Government sector. Today the said certification is done by private labs. There are 3 aspects for ISO 26262.

-System level certification

-Hardware level certification

-Software certification.

All 3 must be completed to have the product certified. Today this is a very big entry barrier for any Indian company waiting to enter into the automotive space.

The value of this activity in commercial terms is very high. It also enables our software sector .It will enable Indian companies to launch products for Indian and the global market.

Labs available

- TUV

- Burea Veritas

- Exider

- Vector

➤ NABL labs for our components

Today with electrification of vehicles, lot of aux components have changed from mechanical to electrical.

- Water pump

- Radiation fan
- Brake resistor fan
- HVAC systems.

Additional equipment.

- DC DC connector
- On board charger
- Power distribution system (PDU) etc

All these systems have to be developed and tested. It is not a very complicated /difficult process, but we need NABL accredited labs with the required infrastructure.

- NABL accredited labs of CUSAT, CET etc.

The necessary infrastructure upgrade is required for this. This can be done on a collaboration basis.

B. Small test tracks

We have a good land area and the natural terrain in the unused space can be used for small test tracks, gradient tests and road conditions. These are very small test tracks which are typically 10-20m long and do not require a large area. This should be done in accordance with AIS standards and use only the space area and the natural terrain .

C. Facility for development & testing of aux equipment in EV

- BMS
- On board charger
- DC DC converter
- PDU
- HVAC Controller
- AC compressor motor
- HVAC System
- Oil Pump
- Water Pump
- Radiator cooling fan

- Break resistor cooling fan
- etc

There are a lot of aux systems that need to be developed to make the EV completely indigenous. Today most of these systems are imported. We should provide a platform for the development of these kind of systems as well.

9. Research Centres

The research centres are expected to cater to the demands of both the academia and industry.

The Research Park, when fully constructed, will have about 500,000 sq ft of state-of-the-art buildings. The campus will have a fully developed road, power, water, communications, sanitation and fire protection network. Each block of the building will have backup power and air conditioning. It will also have required employee amenities. There will be a residential area specifically for researchers, since the research facilities are open and available 24x7 basis. An auditorium for seminars, conference facilities, training facilities, meeting rooms etc will be available in the campus for the benefit of member companies. Member companies are free to build their signature interiors and specific facilities inside the space taken by them. Maintenance of the park facilities will be done by a team of professionals in the Park management.

Facilities need to be arranged for having the major laboratories set up in the park space for 100 new technology companies, and the provision to provide projects for at least 8000 engineering students (at least 5% of the engineering students in the state).

10. Incubation Units and Innovation Space

A dedicated space for promoting innovation and managing innovation in EV and related future technologies would be established under the management of Kerala Development and Innovation Strategic Council. This shall involve collaborative work spaces, maker spaces, meeting and event spaces, prototyping labs for testing and refining ideas and space for Governance and Faculty.

Technical and management professionals will be part of the Park management team, who will provide necessary guidance to prospect members and members in formulating R&D projects, facilitating tie-ups with faculty, support for start ups, IP services, etc. The Park will have an innovation space and incubation centre for new ventures. Park management can also facilitate approvals, registrations, Government projects, funding etc.

It is expected that once the EV Park is in full swing, the target will be to bring at least 100 innovators and 100 Electric Vehicle Startups / Companies to the Park. This will require a built-in space of at least 500,000 sq. feet. A separate building needs to be constructed for the incubation unit with the required amenities.

11. Hostels and Residential Facilities

There will be the provision to provide projects for at least 8000 engineering students (at least 5% of the engineering students in the state) including innovators and a significant number of faculty members, in addition to employees of the startups and innovation space. Hostel and Residential Facilities needs to be provided for the researchers and innovators, innovation managers who are planning the research on innovation activities.

APPENDIX II

Earnest Money Deposit (EMD): An EMD of Rs. 1,00,000/- shall be remitted through the online payment mechanism for e-Procurement system of Government of Kerala. The EMD of all unsuccessful bidders would be refunded within 30 days of finalization of the selection process (bidder selection).

1. **SUBMISSION PROCESS:** For submission of bids, all interested bidders must register online as explained above in this document. After registration, bidders shall submit their bid online on www.etenders.kerala.gov.in along with online payment of fees. They are also required to fill the form available in the TrEST Park website.

For page-by-page instructions on bid submission process, please visit www.etenders.kerala.gov.in and click “Bidders Manual Kit” link on the home page.

It is necessary to click on “Freeze bid” link/ icon to complete the process of bid submission otherwise the bid will not get submitted online and the same shall not be available for viewing/ opening during bid opening process.

2. **DEVIATIONS:** The offers with Deviations in Commercial terms and Technical Terms of the RFP Document are liable for rejection.
3. **BLACK LIST:** All the intending bidders shall agree that in the event of the documents furnished with the offer being found to be bogus or the documents contain false particulars, they shall be blacklisted for future RFPs/ association with TrEST Park.
4. **BIDDER’S LOCATION**

The bidders are requested to furnish the exact location of their registered office with detailed postal address and pin code, telephone, and fax numbers etc. in their proposal to this RFP to arrange inspection by TrEST Park, if considered necessary.

5. All communication shall be made to the registered email of the bidder in the e- tender systems and TrEST Park shall not be responsible for non-receipt or delay of any such communication.
6. **CORRUPT AND FRAUDULENT PRACTICES**

TrEST Park requires compliance with its policy regarding corrupt and fraudulent/prohibited practices as set forth in this proposal. In further pursuance of this policy, the selected service Provider(s) shall permit TrEST Park or its representatives to inspect the accounts, records

and other documents relating to the submission of the Proposal and execution of the contract, in case of award, and to have the records inspected by TrEST Park.

7. CONFLICT OF INTEREST

The service Provider(s) is required to provide professional, objective, and impartial services, at all times holding TrEST Park's interest's paramount, strictly avoiding conflicts with other assignments or its own corporate interests, and acting without any consideration for future work. The consultant has an obligation to disclose to TrEST Park any situation of actual or potential conflict that impacts its capacity to serve the best interests of TrEST Park. Failure to disclose such situations may lead to the disqualification of the supplier or the termination of its Contract and/or sanctions by the Government.

8. CONFIDENTIALITY

- i. From the time the Proposals are opened to the time the Contract is awarded, the agency (ies) should not contact any of the officials of TrEST Park on any matter related to its Technical Proposal. Information relating to the evaluation of Proposals and award recommendations shall not be disclosed to the agency (ies) who submitted the Proposals or to any other party not officially concerned with the process, until the publication of the Contract award information.
- ii. Any attempt by the agency (ies) or anyone on behalf of the bidders to improperly influence TrEST Park in the evaluation of the Proposals or Contract award decisions may result in the rejection of its Proposal and may be subject to the application of prevailing Government sanctions procedures.
- iii. Notwithstanding the above provisions, from the time of the Proposal's opening to the time of Contract award publication, if any agency (ies) intends to contact TrEST Park on any matter related to the selection process, it should do so only in writing.
- iv. The Bids should be submitted only through the portal www.etenders.kerala.gov.in. Agency (ies) shall upload all the necessary documents in the portal before the last date & time for online submission. Proposals received after the submission deadline will be treated as non-responsive and will be excluded from further evaluation process.
- v. Proposals must be direct, concise, and complete. TrEST Park will evaluate the bidder's proposal based on its clarity and the directness of its response to the requirements of the project as outlined in this RFP document. Bidders shall furnish the required information on their technical and financial proposals in the enclosed formats only. Any deviations in

format or if the proper information is not provided properly, the RFP will be liable for rejection. The Evaluation committee may seek clarification, if required, while evaluating the proposal.

vi. The technical bid opening date, time and the address are as stated in the RFP document.

9. GOVERNMENT OF KERALA – CORRUPT AND FRAUDULENT PRACTICES

TrEST Park follows the policy of the Government of Kerala for anti-corruption and fraudulent practices to maintain sound procurement principles of open competition, economy and efficiency, transparency, and fairness. TrEST Park requires the agency (ies) to observe the following Government manuals (amended from time-to-time) during the selection process and in execution of such contracts, The Kerala Financial Code (KFC), 2008 (7th Edition, 1st Edition was in 1963), and The Stores Purchase Manual (SPM), 2013.