
Functional Requirements Documentation for the development and implementation of the Online Portal for EV Public Charging Stations (Category C) - Implementation under PM E-DRIVE Scheme - KSEBL

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Introduction

The Kerala State Electricity Board Limited (KSEBL) is the primary entity responsible for generating, transmitting, and distributing electricity in the State of Kerala, India. Established in 1957 under the Electricity (Supply) Act, 1948, KSEBL has played a vital role in electrification and the economic growth of Kerala. In 2013, it was restructured into a public sector company under the Companies Act, 1956.

Key Divisions

1. Generation

KSEBL operates a wide range of power generation facilities, including hydroelectric stations, thermal power plants, and renewable energy installations such as solar and wind.

2. Transmission

The transmission network spans the entire state, ensuring reliable delivery of electricity from generation plants to distribution substations. It operates at multiple voltage levels and is crucial for maintaining grid stability and efficiency.

3. Distribution

The distribution wing serves millions of domestic, commercial, industrial, and agricultural consumers through an extensive network of substations, transformers, and distribution lines.

E-Governance and Technology Initiatives

KSEBL has undertaken several e-governance initiatives to enhance operational efficiency and customer service delivery.

1. Overview

The proposed online portal will streamline application, review, and subsidy processes for Category C EV Public Charging Stations as part of PM E-DRIVE, with Kerala State Electricity Board Limited (KSEBL) serving as the State Nodal Agency. All back-end scrutiny, proposal aggregation, and fund disbursement will be managed by KSEBL, as per latest operational guidelines (September 2025).

2. Objectives

- Enable robust eligibility verification and streamlined proposal management for Category C locations.
- Ensure transparent application progress tracking and efficient subsidy flow.
- Guide CPOs(Charge Point Operators) in regulatory compliance.
- Support rapid, accurate EVPCS deployment in qualifying private locations.

3. Scope

- **Inclusions:** Category C proposals - private land/public-access sites, 80% upstream infrastructure subsidy.
- **Users:** CPOs (applicants); **KSEBL Admins - EV Accelerator Cell** (reviewers) &IT Department KSEBL.
- **Features:** Registration, eligibility checks, station proposal submission (aligned with scheme annexures), multi-stage review, project tracking, subsidy workflow, analytics, dashboard and reports.

4. System Architecture

- **Frontend:** Mobile/desktop responsive UI
- **Backend:** Node.js/Express or Django for workflow management and API.
- **Database:** PostgreSQL/MongoDB for user, document, audit storage.
- **Integrations:** Email/SMS ; GIS for site mapping.

5. Roles & Permissions

Role	Description	Permissions
CPO	Applicants	Register, submit proposals, upload docs, track status
Admin (EV Cell)	Reviewers	Scrutiny, approval, rework, batch aggregation, reports
IT KSEBL	IT/Oversight	Manage users, backend, audit logs, integrations

6. Functional Modules

a. Registration & Eligibility Verification

- CPO signup (mobile/email OTP); create org profile, add KYC, bank details.
- Upload proof for minimum **10 public charging stations** each with $\geq 30\text{kW}$ DC fast charger.
- Auto-validation + manual KSEBL review.
- SSO support (for CPOs).
- Personalized dashboard for each user showing progress.

b. Proposal Submission

- Form-based entry: station details (lat/long, segments, electrical load, costs), required document uploads.
- Integration for real-time DISCOM cost API.
- Validation of completeness, exclusion of refundable deposits, digital signature.

c. Review & Approval Workflow

- KSEBL performs backend cross-checks (evidence, location, compliance).
- Results: Approve, rework (with remarks), or reject (with codes).
- Approved stations compiled report generation matching annexure formats.

d. Progress Monitoring & Upstream Works

- CPOs upload milestones (procurement, installation photos).
- KSEBL tracks upstream work.
- Automatic notifications for delays/completions via email/SMS.

e. Subsidy Disbursement Request/Tracking

- Upon project completion, CPOs upload certified proofs for milestone validation.
- KSEBL reviews, submits proposals in the annexure formats to **MHI** for funds (**70%/30% tranches**).
- Real-time status and timeline views for CPOs (read-only).
- KSEBL records sanction/ref/UTR, stages, document links.

f. Reporting & Analytics

- Dashboard summarizes application counts, subsidy claims, covered locations (with GIS map), compliance guidance/resources.
- GIS heatmap visualization of approved sites.
- Export functions for required formats (PDF/CSV/XLSX).

g. Contact and Support

- Support Email
- Phone number

7. Workflow Summary (with Error Paths)

1. **CPO Signup/Login:** Mobile/email OTP verification.
2. **Org Profile:** Declare eligibility, upload docs.
3. **Verification:** KSEBL examines evidence; unlocks station entry if valid.
4. **Station Proposal:** CPO submits per-station Annexure C/D, doc upload.
5. **Station Verification:** KSEBL reviews stations; batch inclusion.
6. **Proposal Compilation:** Generate proposal bundles to be submitted to MHI.
7. **Manual Decision Sync:** Update statuses post-approval/rejection.
8. **Tranche Docs & Bank Disbursement:** CPO uploads final docs, KSEBL processes funds; notifications at each stage.
9. **Rework/Reject:** Feedback loops with remarks/codes and notifications.

8. UI and Validation Requirements

- Landing authentication (buttons, notices, priority info, support contacts).
- Strong validation on all forms (required fields, formats, OTP/MFA for back-office).
- Dashboard visualizations (progress meters, checklists), error handling, **accessibility compliance (WCAG 2.1 AA)**, GIS heatmaps.
- Bulk entry/import/export up to prescribed file/row limits.

9. Data Model & Integrations

- Well-defined entities: users, organizations, stations, proposals, verification logs, batches/tranches, documents, audit logs, bank accounts.
- Email/SMS notification templates.
- Strict file upload limits, virus/MIME scanning.

Page-by-Page Layout & Field Specifications

1. Landing & Authentication

- **UI Elements:** Call-to-action buttons (Signup/Login); info banners (priority for >100 kW chargers, guideline adherence, support email: **evcell@kseb.in**); footer (Privacy Policy, Terms, Accessibility, Version).
- **Signup Form Fields:** Organization Legal Name, CIN/LLPIN, Registered Address, Contact Person, Mobile (OTP), Email (verify link), Password, Accept Terms (checkbox).
- **Action:** Create Account → Trigger email verification.
- **Login Fields:** Email/Mobile + Password; Forgot Password; OTP fallback. **MFA:** Optional TOTP/SMS (enforced for back-office).
- **Validation:** Required fields; strong passwords; valid email/mobile formats.

2. Organization Profile & Eligibility Check (Dashboard → Setup)

- **Basic Details:** Legal Name (read-only if pulled), Trade Name, PAN, GSTIN, CIN/LLPIN, Incorporation Date, Addresses, Website.
- **Primary Contacts:** Compliance/Technical/Finance (Name, Designation, Phone, Email).
- **Eligibility Declaration:** Installed/Operated EV PCS Count (≥ 10), Service Regions, Tenure (years), Uptime % (last 12 months), Evidence Uploads (PDF/JPG/PNG: commissioning letters, photos, reports).
- **Experience:** Narrative, Client List, LOAS/POs (uploads).
- **Acknowledgments:** Charging Standards, PMP Compliance, Hub Onboarding, Data Sharing Consent.
- **Buttons:** Save Draft, Submit for Verification.
- **Validation:** Required fields; file size ≤ 20 MB (PDF/JPG/PNG); count ≥ 10 .

3. KSEBL Verification Console (Back-Office)

- **Queues:** New, Under Review, Rework, Approved, Rejected.
- **Dossier View:** Summary header, documents, notes, history. **Actions:** Approve, Send Back (remarks), Reject (codes).
- **Outcome:** Approve → Unlock CPO for station entry.

4. Annexure C Data Entry (Cities) & D (Highways)

- **Entry Model:** Per-station form + "Add Station" table; **bulk import** (CSV/XLSX template); geo-pin map integration.
- **Common Fields:** State, City/Highway Details, Locality/Address, Lat/Long (mandatory), Implementation Mode (CPO default), Category (C preset).
- **Config Segments:** e-2W/3W (Connector, kW, #); e-4W (same); e-buses/trucks (same).
- **Electricals:** Total Load (kW), **Upstream Cost (Lakh ex-GST)**, EVSE Cost (captured but disabled for subsidy calculation).
- **Totals:** Project Cost, Subsidy Requested (**80% upstream**).
- **Ownership:** Upload NOC/Lease/Ownership (PDF/JPG/PNG), Validity Dates, Issuer, Ref #.
Flag: Auto-flag if > 100 kW.
- **Table Columns:** Station ID, Location, Lat/Long, Segments/Counts, Load, Upstream Cost, Subsidy, Doc (✓), Status, Flags.
- **Actions:** Save, Validate, Submit for Review, Bulk Upload/Download Template/Export.
- **Validation:** Positive numbers; lat $-90/90$, long $-180/180$; ex-GST costs; mandatory documents; standards compliance.

5. KSEBL Station Verification (Back-Office)

- **Review:** Cross-check documents, lat/long, category, DISCOM note, standards.
- **Outcomes:** Approve/Send Back/Reject. **Batch Actions:** Approve multiple, lock on batch inclusion.

6. Proposal Compilation (Annexure B Summary + C/D Details)

- **Builder:** Select verified stations → Auto-generate B (totals by segment/subsidy), attach C/D grids.
- **Export:** Secure bundle (PDFs + CSV + cover letter); manual submission by Admin.
- **Audit:** Timestamp, signer, hash, batch ID. **Notifications:** Email to Admin/CPOs on submission.

7. MHI Decision Sync & Post-Approval Hub

- **Sync:** Manual entry of per-station status (Approved/Partial/Rejected + remarks).
- **CPO View:** "Approved Locations" widget; next steps guidance.

8. Tranche Documentation Modules

- **First Tranche (70%):** CPO Uploads: DISCOM receipts, PMP certificates, standards declaration, deposits exclusion proof. System generates Annexure E undertaking (e-sign/countersign).
- **Second Tranche:** Uploads: Energization certificates, PMP, Hub proof, UCs (H/I), G/J undertakings.
- **Features:** Per-station linkage, checklist progress meter, bulk mapping. Store as PDFs.

9. Bank Details & Disbursement

- **CPO Profile:** Beneficiary, Account #, IFSC, Bank/Branch, Cancelled Cheque, PAN, GSTIN, Udyam (optional). **KYC:** Address proof, signatory authorization (resolution/POA).
- **Tracking (KSEBL):** Sanction #, Amount, Tranche, Date, UTR/Ref, Notes, Doc links.
- **CPO View:** Read-only timeline per station/batch.

10. Help & Notices

- **Static Blocks:** Support queries to@kseb.in; priority for >100 kW applications;
- **Disclaimer** ("Adhere to MHI guidelines. KSEBL not responsible for rejections due to incomplete/inaccurate/non-compliant CPO submissions").
- **Links:** Scheme guidelines, charging standards, PMP resources.

II. Non-Functional Requirements

1. Performance

- Support at least **500 concurrent users**.
- **Throughput:** 1,000 pass transactions per hour.

- **Average Response Time:** Less than 2 seconds.
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2. Scalability

- Modular design with **horizontal scaling options** for future power stations.
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3. Security

- **Two-factor authentication** for all roles except Data Entry Operators.
 - **Compliance** with **CERT-In** and **NCIIPC** guidelines.
 - **Vulnerability Assessment and Penetration Testing (VAPT)** to be performed by **CERT-In empaneled agencies**.
 - **Automatic session lock** and **inactivity timeouts** to be implemented.
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4. Availability and Reliability

- Minimum **99.5% uptime SLA**.
 - **Failover clustering** for critical modules.
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5. Usability

- **Responsive User Interface (UI)** across desktop, tablet, and mobile platforms.
 - **Multilingual support** (English and Malayalam).
 - **Simple navigation** with **contextual help**.
 - Availability of **step-by-step user manuals** and **embedded tutorial videos**.
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6. Maintainability

- **Version control** through KSEBL's Git repository.
- **Modular code** with well-documented **APIs**.
- **Minor enhancements/customizations** (≤ 2 person-days) to be provided **without additional cost**.

7. Technology

- **Platform-independent design** (OS/browser agnostic).
 - **Application to be developed using PHP, Java, or similar open-source technologies, along with an open-source database.**
 - Fully **mobile-responsive** and **web-accessible** application.
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8. Training

- Vendor shall conduct **“Train-the-Trainer” sessions** for KSEBL trainers and end users.
 - Trainers shall conduct **end-user sessions** for individuals and groups.
 - Training shall cover **interface navigation, task execution, and system utilization.**
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9. Application Knowledge Transfer

- Vendor shall provide **knowledge transfer sessions** for KSEBL’s Core IT Team (minimum 10 staff) at **Thiruvananthapuram.**
 - Sessions shall cover **architecture, documentation, deployment, configuration, database schema, APIs, security, debugging, and error handling.**
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10. Project Inception

- Vendor shall prepare a **comprehensive project plan** detailing:
 - Tasks and activities
 - Responsible personnel
 - Allocated resources
 - Timelines, milestones, and deliverables
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11. Requirement Study

- Vendor shall **review and finalize the Software Requirements Specification (SRS)** in consultation with KSEBL.

- The **final SRS** shall be submitted for approval **before initiating development**.
 - The functional requirements in this document are **indicative** and may be subject to change.
 - Any **additional or revised requirements** identified during the Requirement Study Phase shall be incorporated **prior to SRS finalization**.
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12. User Acceptance Testing (UAT)

- Vendor shall **conduct and manage UAT** in coordination with KSEBL.
 - UAT shall **validate compliance** with all functional requirements.
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13. Source Code, Documentation, and IPR

- Vendor shall hand over **complete source code and documentation** to KSEBL.
 - Documentation shall include **architecture, design, deployment, and configuration details**.
 - **All Intellectual Property Rights (IPR)** shall rest exclusively with KSEBL.
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14. Project Timeline

- The **development, testing, and commissioning** shall be completed within **six (6) months** from the **Letter of Award (LoA)**.
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III. Integration Points

- **KSEBL Single Sign-On (SSO)**
 - **SMS Gateway**
 - **SMTP Email Server**
 - **RESTful APIs** for HRIS, attendance, and maintenance systems
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IV. Assumptions and Constraints

- **Hardware, network, and OS environments** will be provisioned by KSEBL.

- **Regulatory approvals** will be managed by KSEBL.
 - **All data** shall reside within **KSEBL servers**, as per **CERT-In guidelines**.
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VI. Application Security Audit

Responsibility:

- The selected firm shall be **fully responsible** for conducting a comprehensive **Application Security Audit** before go-live.

Cost:

- The **entire cost** of the security audit shall be borne by the **development firm**.

Audit Agency:

- The audit shall be carried out **only by a CERT-In empaneled agency** approved for application security assessments.

Certification Requirement:

- The development firm shall ensure that a **“Safe to Host” certificate** is obtained from the audit agency and submitted to KSEBL **prior to production deployment**.

Compliance:

- The application **shall not be accepted for go-live** unless the required certification has been submitted.
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