

eFuel — Visual User Manual & Operations Guide

Welcome to the **eFuel** Operations Guide. eFuel is an enterprise-grade, multi-tenant petrol station management platform. It automates inventory control, wetstock auditing, shifts billing, and double-entry accounting—operating seamlessly even when your connection is offline.

1. System Architecture

eFuel utilizes a progressive hybrid model. Data is stored in a secure cloud database, while operations can be performed in the browser using localized state.

```
graph TD
    User[User Device / Browser] -->|Read/Write Operations| UI[React / Next.js PWA Interface]
    UI -->|Online| SA[Next.js Server Actions]
    UI -->|Offline| LocalSync[LocalStorage Queue]
    LocalSync -->|On Internet Reconnect| SA
    SA -->|Query Execution| DB[(Cloud PostgreSQL Database)]
```

Key Components:

- **PWA Interface:** A mobile-friendly interface designed for phone, tablet, and desktop screens. It runs a service worker (`sw.js`) that caches static files so it loads without internet.
- **Offline Sync Queue:** Transactions like nozzle readings, collections, and expenses are queued inside browser storage (`localStorage`) if the network is down. When internet connectivity is restored, the queue will sync with a click.
- **Cloud Database:** A PostgreSQL database storing tenant information, staff, configurations, journal records, and stock receipts.

2. Daily Operations Pipeline

A petrol pump manager or operator follows a step-by-step pipeline every day to log transactions, balance cash, and verify reports.

```
flowchart TD
    A[Start of Day] --> B[Configure Rates / Nozzles if Changed]
    B --> C[Staff Assignment & Nozzle Start Readings]
    C --> D[Shift Handover / Shift Close]
    D --> E[Record Nozzle End Readings]
    E --> F[Reconcile Collections from Salesmen]
    F --> G[Log Daily Expenses & Payments]
    G --> H[Bank Deposit of Collected Cash]
    H --> I[Review Financial Statements]
    I --> J[End of Day]

    style B fill:#0c2d48,stroke:#005cff,stroke-width:2px,color:#fff
    style E fill:#003322,stroke:#10b981,stroke-width:2px,color:#fff
    style F fill:#3b1e04,stroke:#f59e0b,stroke-width:2px,color:#fff
    style I fill:#23012c,stroke:#8b5cf6,stroke-width:2px,color:#fff
```

Steps Explained:

- 1. **Rates Configuration:** Fuel rates fluctuate daily. Ensure that the correct rate is entered in the configurations panel before closing nozzle logs.
- 2. **Shift Start:** Note down start readings for nozzles.
- 3. **Shift Close / Readings:** As salesmen end their shifts, enter the final readings. Liters sold are calculated as:
$$\text{Liters Sold} = \text{End Reading} - \text{Start Reading}$$
- 4. **Collections Reconciliation:** Match the expected cash collections against actual salesman handovers (Cash, UPI, Card, or Credit to customer accounts).
- 5. **Log Expenses:** Input any cash or bank payments made during the day (e.g., generator fuel, staff meals, utilities).
- 6. **Bank Deposit:** Record deposits of cash in hand to the pump bank accounts.
- 7. **Verify Ledger / P&L:** Check that the trial balance is zero-balanced and the Profit & Loss statement reflects correct sales margins.

3. Double-Entry Bookkeeping Ledger Flow

Every action taken in eFuel automatically posts balanced journal vouchers under the hood. The system establishes a set of default ledgers:

- **Fuel Sales** (Revenue)
- **Product Sales** (Revenue)
- **Cash in Hand** (Asset)
- **GST Receivable** (Asset)
- **Transport Charges** (Expense)
- **Fuel Purchases** (Expense)

Here is how common operations map to debit/credit lines:

Operation	Debit Account (Dr.)	Credit Account (Cr.)	Economic Impact
Record Shift Sales	Salesman Ledger	Fuel Sales (Revenue)	Increases Salesman Liability & Revenue
Salesman Handover	Cash / UPI Bank / Customer Ledger	Salesman Ledger	Clears Salesman Liability, Increases Cash/Receivables
Refill Tank Stock	Fuel Purchases (Base) + GST Receivable	Supplier Ledger	Increases Inventory & Accounts Payable
Daily Expense	Expense Ledger	Cash / Bank Ledger	Records operational cost, decreases cash
Bank Deposit	Selected Bank Account	Cash in Hand	Moves liquid funds into banking
Supplier Payment	Supplier Ledger	Bank Account	Decreases Accounts Payable & Bank Balance

4. Maker-Checker Authorization Model

To ensure financial integrity and prevent data tampering, eFuel employs a secure **Maker-Checker Workflow** for settings and configurations.

```
sequenceDiagram
    actor Operator as Operator (Maker)
    actor Admin as Admin (Checker)
    participant Sys as System Database

    Operator->>Sys: Proposes Change (e.g., Update Fuel Rate to ₹98.50)
    Note over Sys: Change Request Created (Pending)
    Sys-->>Admin: Alerts pending verification
    Admin->>Sys: Reviews and Approves
    Note over Sys: Request Executed & Applied
    Sys-->>Operator: Rates updated on Dashboard
```

- **Makers (Operators)** can edit details but their modifications do not go live immediately. A **Change Request** is generated.
- **Checkers (Administrators)** see these requests in a list and must review them. Once approved, the change takes effect.
- **Auto-Approval:** If an Administrator performs the edit directly, the system automatically checks and executes it instantly.

5. Offline Capabilities & PWA Syncing

In areas with low network connectivity (e.g., highway petrol pumps), eFuel switches to **Offline Mode** automatically.

Sync Lifecycle:

1. **Network Disruption:** When internet goes down, a yellow banner alert appears at the top:

 You are currently Offline. Transactions are caching locally. Queue size: X

2. **Operations Continuation:** Nozzle readings, collections, and daily expenses can still be saved. They are cached securely in the browser's `localStorage` queue.
3. **Reconnection:** Once connection returns, a cyan banner appears:

 Pending offline transactions: X [Sync Now]

4. **Manual Sync:** Click **Sync Now** to transmit the queue to the PostgreSQL database sequentially. If a record contains invalid readings (e.g., end reading < start reading), the system keeps it in the queue for you to correct.

6. Troubleshooting & FAQs

Q1: The offline sync button is throwing errors.

Check if another device logged in under the same salesman has already entered conflicting nozzle readings. Ensure start readings match the previous end readings.

Q2: How can we change the reserve capacity warning of a tank?

Go to **Station Configuration** -> **Tanks**. Click **Edit**, modify the reserve capacity threshold, and submit. If you are an operator, an admin must approve it before it takes effect.

Q3: A salesman collection shows a discrepancy.

Verify the salesman ledger balance under **Reports**. The ledger balance tracks exactly how much cash is owed by the salesman. Re-check daily shift collection receipts to find cash or UPI mismatches.