The original pricing information was gathered directly from public energy provider websites (e.g., SureCharge, Believe, Ubitricity, BP Pulse) [1,2,3,4].

A screenshot of a computer

AI-generated content may be incorrect.

Figure 1: SureCharge – Raw Tariff Information (Website Extract)

A screenshot of a computer

AI-generated content may be incorrect.

Figure 2: Believ – Raw Tariff Information (Website Extract)

A close-up of a message

AI-generated content may be incorrect.

Figure 3: Ubitricity – Raw Tariff Information (Website Extract)

A screenshot of a website

AI-generated content may be incorrect.

Figure 4: Bppulse – Raw Tariff Information (Website Extract)

The raw pricing data included inconsistent formats, varying currencies (pence/kWh vs £/kWh), and heterogeneous fee structures (energy rates, idle fees, connection fees). To ensure comparability, we standardised units, harmonised VAT inclusion, and separated the data into three structured datasets: pricing\_core (base tariffs), pricing\_conditions (time-of-use, idle rules), and pricing\_by\_charger\_type (connector/power-based overrides). These structured datasets were integrated into the charging cost estimation module, enabling the reinforcement learning environment to compute realistic, provider-specific charging session costs.

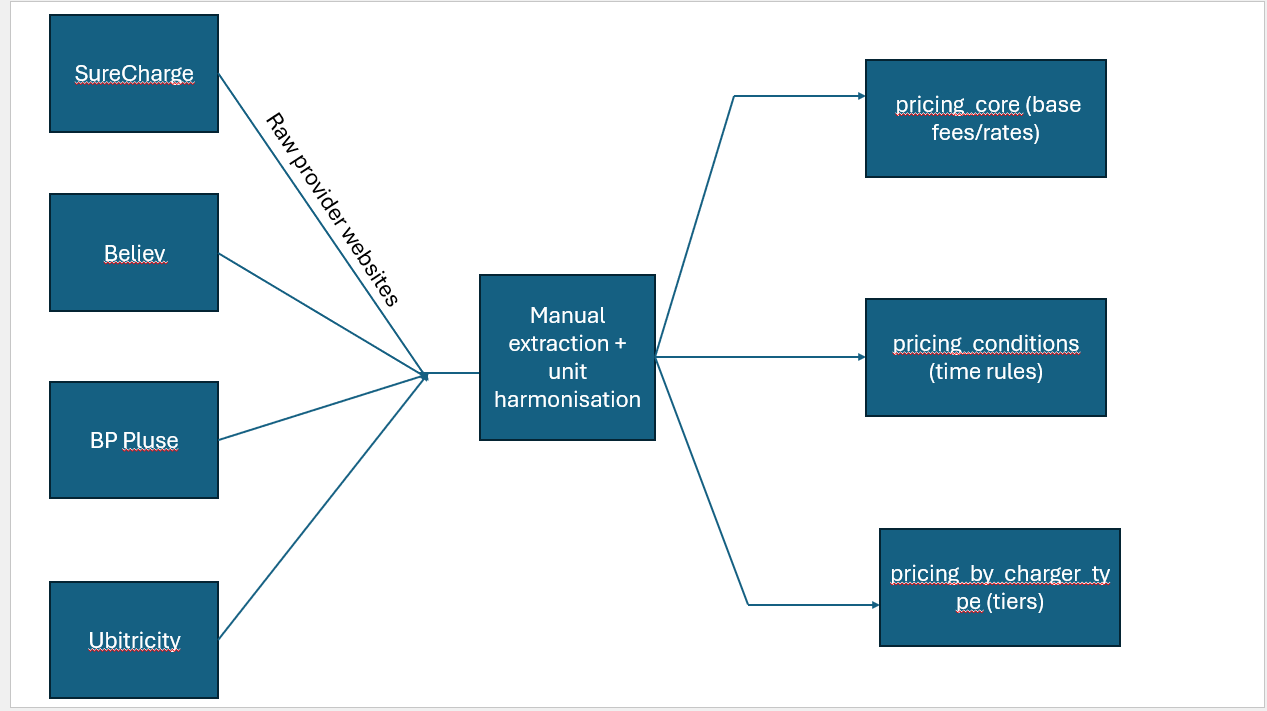


Figure 5: Pricing Data Collection and Processing Pipeline

The original charging station dataset was obtained from the National Chargepoint Registry (NCR), archived by the UK Department for Transport [5]. We cleaned duplicates, standardised geolocations, and separated connector details from station metadata, producing two datasets: *charging\_station\_connectors* and *charging\_station\_metadata*. These cleaned datasets support station feature generation and action feasibility within the RL environment.

A diagram of a system

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Figure 6: Charging Station Data Cleaning and Splitting Process

EV specifications and charging curves were sourced from Open EV Data v2 [6]. We parsed JSON shards to extract usable\_battery\_size, AC/DC ports/power, energy\_consumption and charging\_curve points. Cleaning: standardised plug names, converted consumption to kWh/km, interpolated 0–100% curves, capped powers. Used to build EV\_Metadata and EV\_Charging\_Curve\_Data powering SOC and charging-time.

A diagram of a diagram

AI-generated content may be incorrect.

Figure 7: EV Data Extraction and Normalisation Pipeline

References

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