The UESH 2-Wheeler (Series Hybrid)

A purpose-built 100kg Kerb-Weight Series Hybrid 2-wheeler designed for high-density, stop-and-go Indian urban environments.

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Executive Summary: Hyper-Efficient Urban Commuting

Project Goal

Eliminate charging dependency with unprecedented fuel economy.

Core Technology

50cc generator as range extender + 2 kWh battery buffer.

Efficiency Milestone

228.6 km/l ideal real-world city mileage.

Strategic Advantage

Bypasses power grid limits for a "no-compromise" solution.

Powertrain Architecture & Specifications

Component	Specification
Prime Mover	50cc Single-Cylinder (DHE)
Electrical Output	1.5 kW Nominal
Battery Buffer	2 kWh LiFePO4
Propulsion	1.2kW Nom / 2.7kW Peak BLDC
Cooling	Integrated Thermal Loop

Technical Justification

Prime Mover

Optimized for a "Fixed-Point" 38% Thermal Efficiency island.

Electrical Output

Sized to provide propulsion and recharge the 2 kWh buffer simultaneously.

Battery Buffer

High-longevity chemistry; acts as a buffer for peak loads and recovery.

Propulsion

High-torque delivery from 0 RPM; 90%+ efficiency in city speeds.

Cooling

Liquid-cooled system ensures engine stays in the 90°C–100°C efficiency window.

Performance Data & Assumptions

Efficiency targets are based on verified engineering constraints for a 160kg total system weight (100kg vehicle + 60kg passenger).

1 Steady-State Power

0.71 kW at 50 km/h (low rolling/drag coefficients).

2 Ancillary Load

Minimum 0.1 kW for electronics and thermal management.

3 Energy Conversion

1L gasoline (8.9 kWh) yields 3.38 kWh usable electricity at 38% efficiency.

4 Systemic Efficiency

Net 2.53 kWh at wheels per liter, accounting for 25% "Conversion Tax."

Range Calculation & Urban Recovery

Baseline Range

2.53 kWh / 0.81 kW (total load) × 50 km/h = **156.2 km/l**.

Urban Recovery Factor

Regenerative braking in stop-and-go traffic (15–20 km/h average) recaptures energy, boosting real-world results to **228.6 km/l**.

Market Statistics & Competitor Analysis

The UESH platform addresses the "Efficiency Gap" by providing EV-like efficiency with ICE-like convenience.

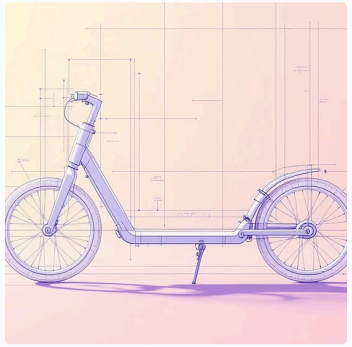
Metric	Standard 110cc Scooter	Mass-Market EV	UESH 2-Wheeler
Transmission	CVT (High Friction)	Single-Speed	Single-Speed / Direct Drive
Kerb Weight	105 kg - 115 kg	110 kg - 150 kg	100 kg
Real-World Mileage	45–55 km/l	N/A (Range Ltd)	228.6 km/l
Infrastructure	Petrol Stations	Charging Grid	Petrol Stations (No Plug-in)

Key Engineering Milestones

To industrialize this concept, the project focuses on three critical engineering pillars:

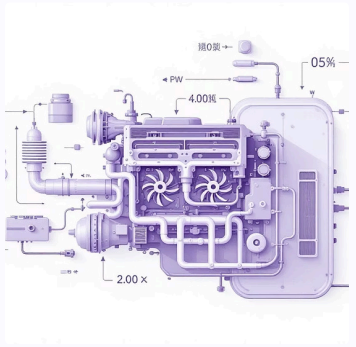
Dedicated Hybrid Engine (DHE) Tuning

50cc block tuned for fixed-point generator role to maximize thermal efficiency.



Lightweighting

Strategic use of high-tensile steel for 100kg kerb weight, minimizing rolling resistance.



Active Thermal Management

Proprietary controller ensures generator operates within peak 90°C–100°C efficiency window.

Conclusion: A Viable Urban Solution

The UESH 2-wheeler project provides a commercially viable, high-efficiency alternative for the Indian commuter.

By applying series hybrid logic to a lightweight platform, it delivers extreme fuel economy without the infrastructure hurdles of pure electric vehicles.