The Urban-Efficient Series Hybrid

A 700kg Range-Extended Electric Vehicle purpose-built for high-density, stop-and-go urban environments

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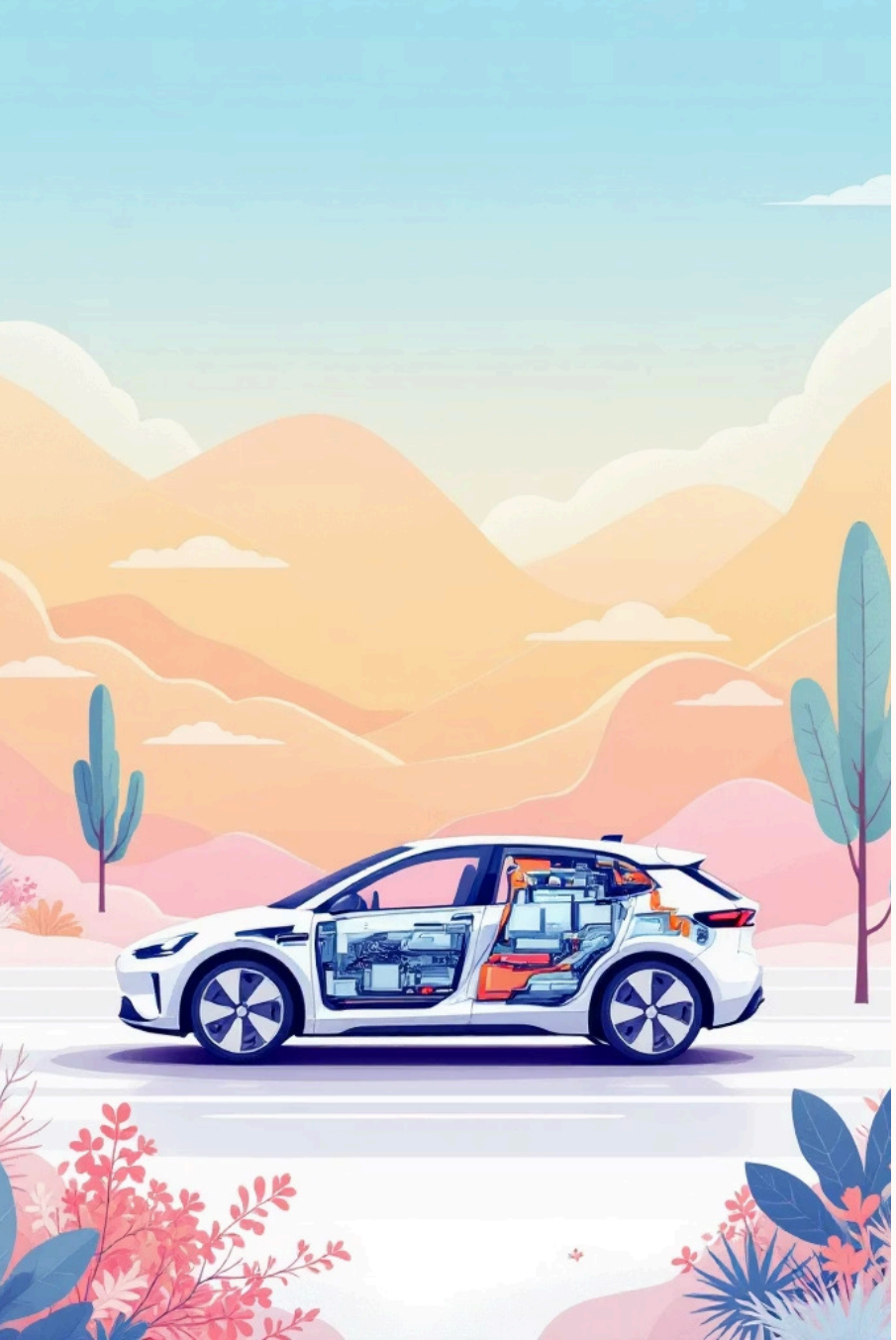


Executive Summary

Series Hybrid Powertrain

Hyper-efficient design bypassing current charging infrastructure limitations

44-46 km/l Real-World

200% improvement over standard ICE hatchbacks in city conditions

350cc Range Extender

Liquid-cooled generator optimized for fixed-point efficiency

Powertrain Architecture

Prime Mover

350cc Single-Cylinder DHE optimized for 38% Thermal Efficiency island

Electrical Output

12 kW Nominal matches 20kWh pack discharge

Battery Buffer

20 kWh LiFePO4 high-longevity chemistry

Propulsion

Electric traction motor delivering 90%+ efficiency at city speeds

Cooling

Integrated thermal loop maintains 90-100°C efficiency window

Performance Engineering

01

Steady-State Power

2.0 kW required at 40 km/h with 0.01 rolling resistance and 0.32 drag coefficient

02

Ancillary Load

1.5 kW AC for real-world Indian conditions, total continuous demand 3.5 kW

03

Energy Conversion

8.9 kWh per liter at 38% efficiency yields 3.38 kWh usable electricity

04

System Efficiency

25% conversion tax results in 2.53 kWh net energy available at wheels

05

Urban Recovery

Regenerative braking in stop-and-go traffic pushes real-world results to 44-46 km/l

Efficiency Breakdown

38%

Thermal Efficiency

Fixed-point engine optimization

2.53

kWh per Liter

Net energy available at wheels

29

Baseline Range

km/l before regenerative braking

44-46

Real-World Range

km/l with urban recovery factor

Market Positioning

The UESH platform targets the efficiency gap between traditional ICE vehicles and full Battery Electric Vehicles

ICE Hatchback

950+ kg | 12-14 km/l | Gearbox/CVT transmission

Mass-Market Hybrid

1200+ kg | 22-26 km/l | Complex power-split

UESH Project

700 kg | 44-46 km/l | Single-speed direct drive

Competitive Advantages

Ultra-Lightweight

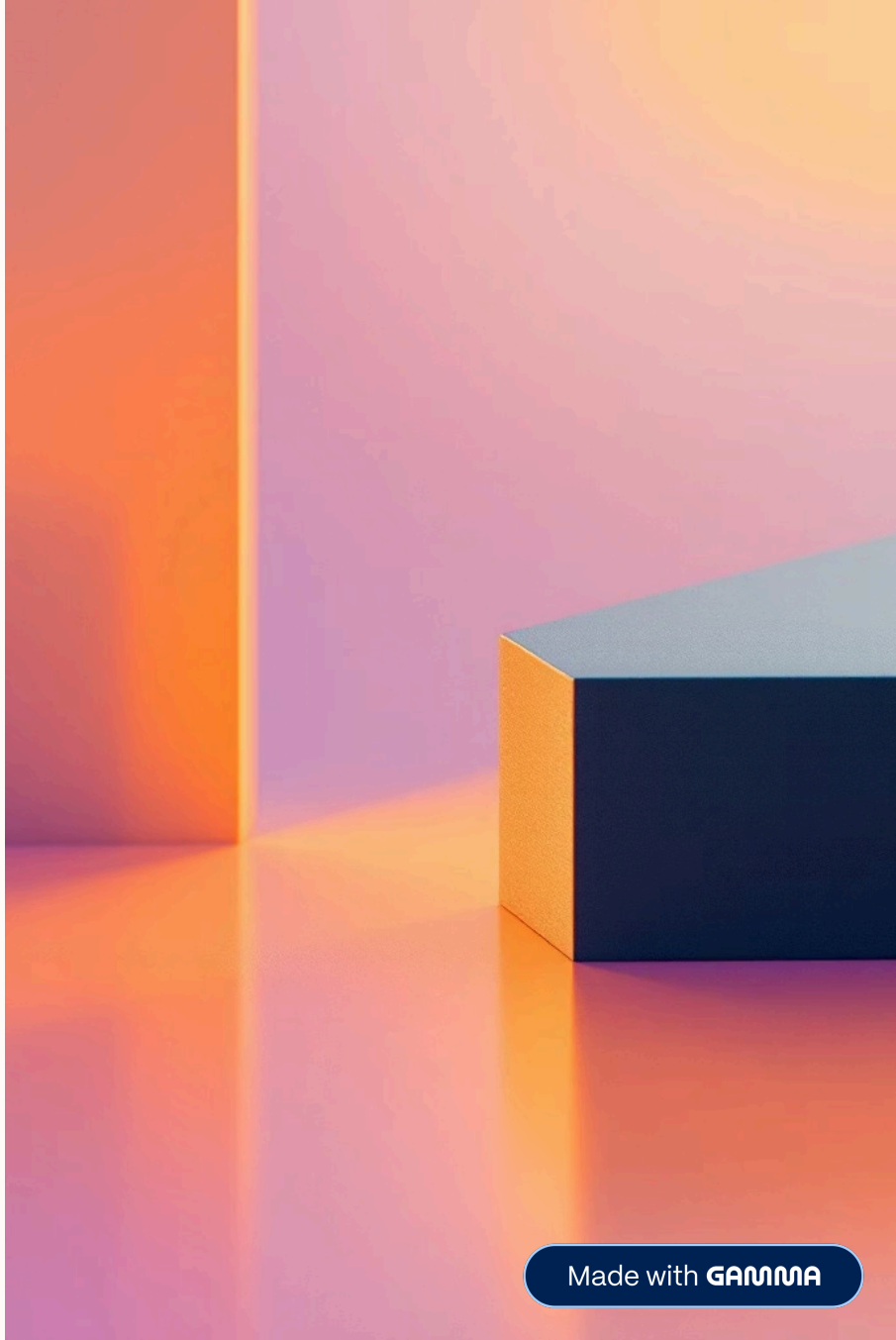
700kg kerb weight vs 950-1200kg competitors, reducing energy requirements

No Plug-In Required

Uses existing petrol infrastructure without nationwide charging grid

20 kWh Battery

LiFePO4 chemistry provides buffer for peak loads and regenerative braking



Key Engineering Milestones

Dedicated Hybrid Engine

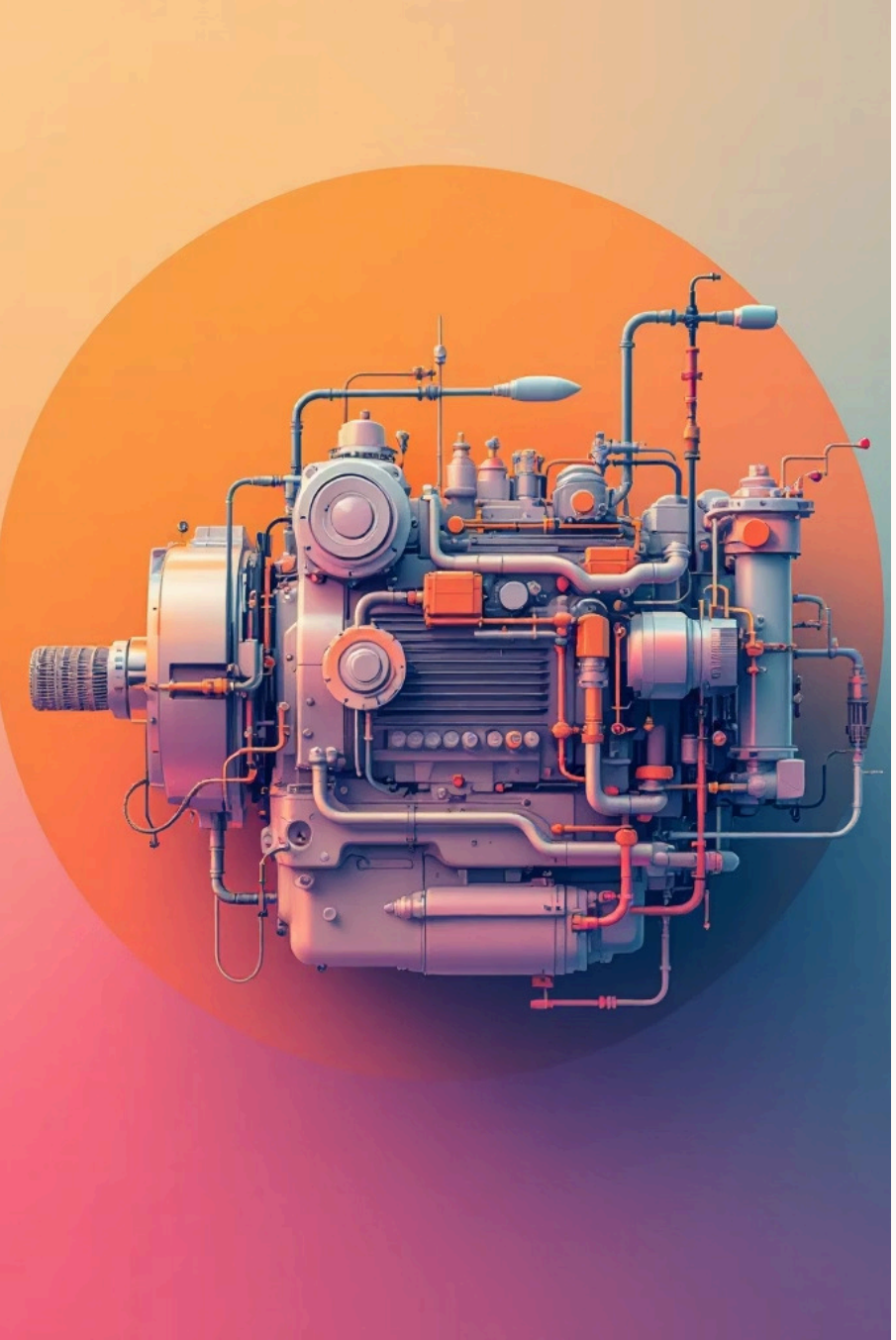
Converting 350cc block to generator with lean-burn Atkinson cycle

Lightweighting

High-tensile steel and composites maintain 700kg while meeting safety standards

Active Thermal Management

Proprietary controller ensures generator never runs cold, maximizing efficiency



Technical Specifications

Core Components

- 350cc single-cylinder DHE
- 12 kW nominal electrical output
- 20 kWh LiFePO4 battery
- Electric traction motor
- Liquid-cooled thermal loop

Performance Metrics

- 700 kg kerb weight
- 44-46 km/l city mileage
- 38% thermal efficiency
- 90%+ motor efficiency
- No plug-in infrastructure

Conclusion

> The UESH project offers a commercially viable path to low-emission mobility without requiring a nationwide charging grid

No-Compromise Solution

For urban Indian commuters seeking efficiency without infrastructure dependency

Weight Reduction

700kg platform delivering 200% improvement over standard ICE vehicles

Fixed-Point Efficiency

350cc generator optimized for maximum thermal efficiency island