High-Efficiency Ethanol Vaporization and Secondary Combustion Cookstove

Bridging the energy gap between ethanol and LPG through advanced thermal engineering

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The Mission

Energy Parity

Match LPG cooking duration, cost, and thermal intensity using localized ethanol infrastructure

Advanced Engineering

Bridge the gap between ethanol (27 MJ/kg) and LPG (46 MJ/kg) through thermal innovation

Carbon Neutral

100% domestic, sustainable solution using India's 2026 ethanol surplus

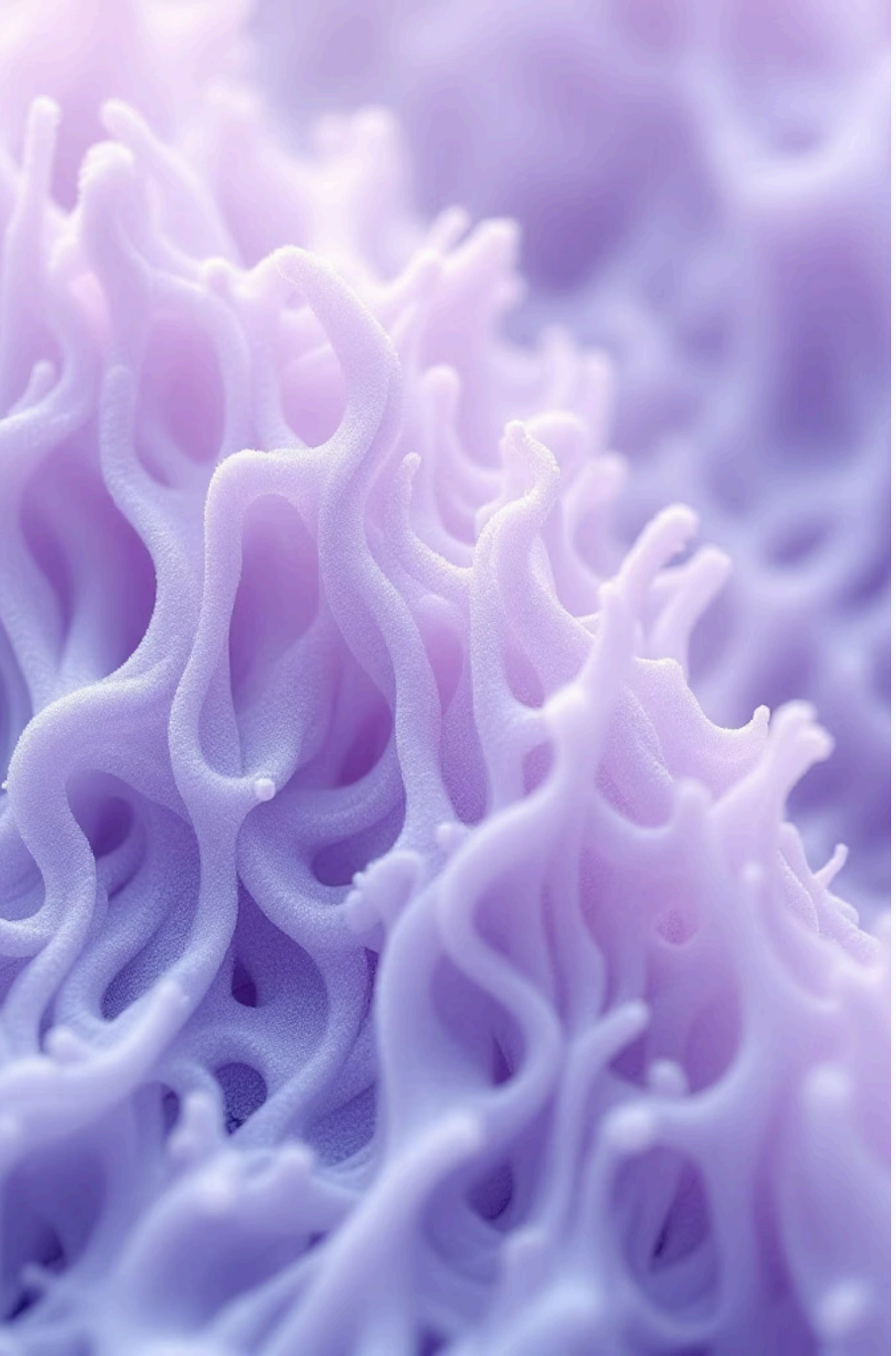
The Innovation

Traditional Wick Burning

- Atmospheric pressure operation
- ~40% thermal efficiency
- Orange flame, lower temperature
- 1.7 kg ethanol needed per 1 kg LPG

EVSC Technology

- BEV vapor combustion system
- 85% thermal efficiency target
- Blue flame, 1,600°C+ temperature
- Parity achieved with 20kg supply



Core Design: Phase-Change Wick

Material Innovation

Microporous Alumina-Silica Ceramic Fiber replaces standard cotton wick

Surface Area Increase

400% greater evaporation surface area for enhanced vapor production

Stable Performance

Maintains steady vapor pressure throughout fuel depletion, eliminating "lazy flame"

Secondary Air Injection System

Primary Combustion

Initial burn at wick surface creates heat

Air Pre-Heating

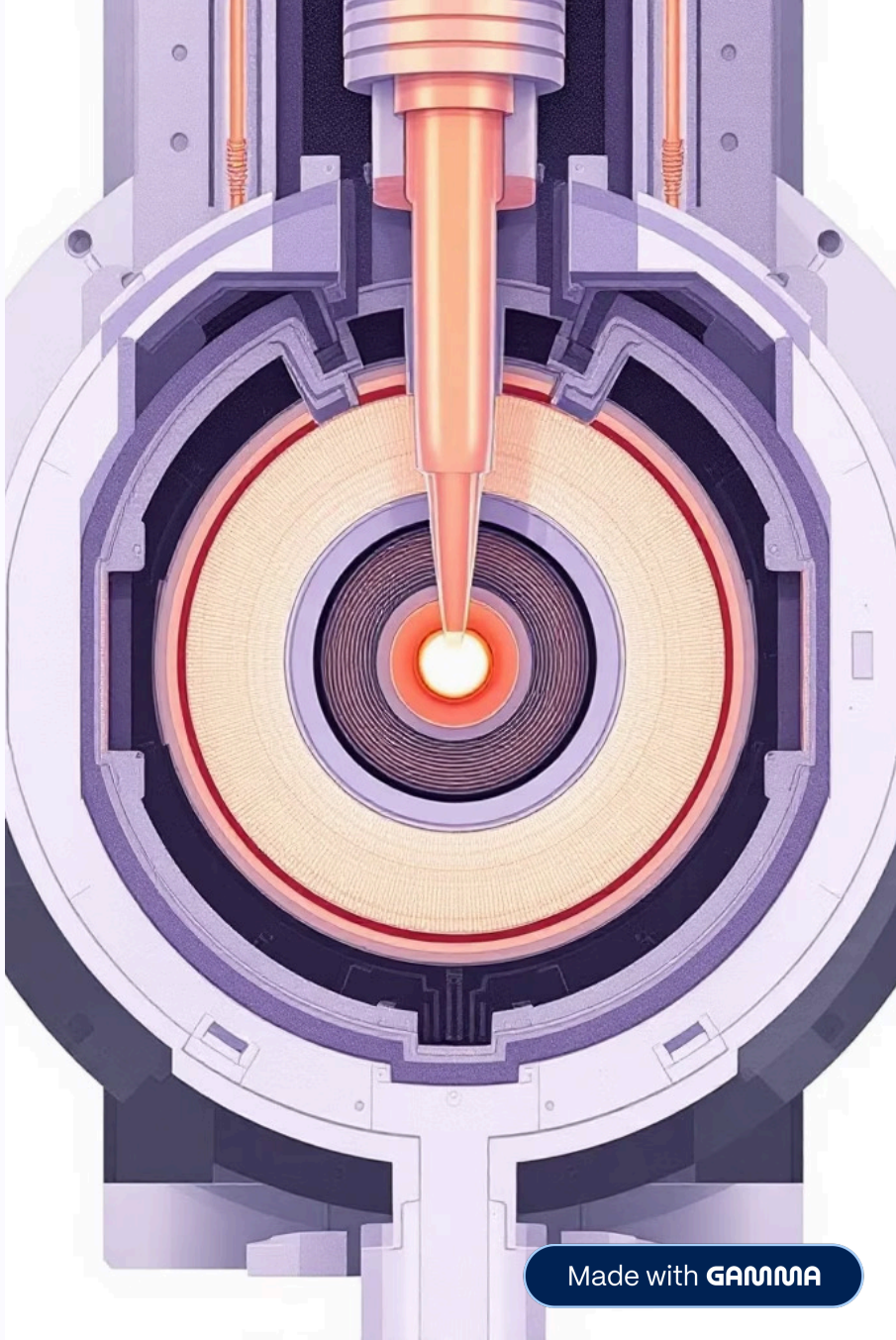
Double-wall heat exchanger warms incoming oxygen

Vortex Injection

Pre-heated air meets unburnt vapors at burner head

Blue Flame

High-velocity kinetic flame exceeds 1,600°C



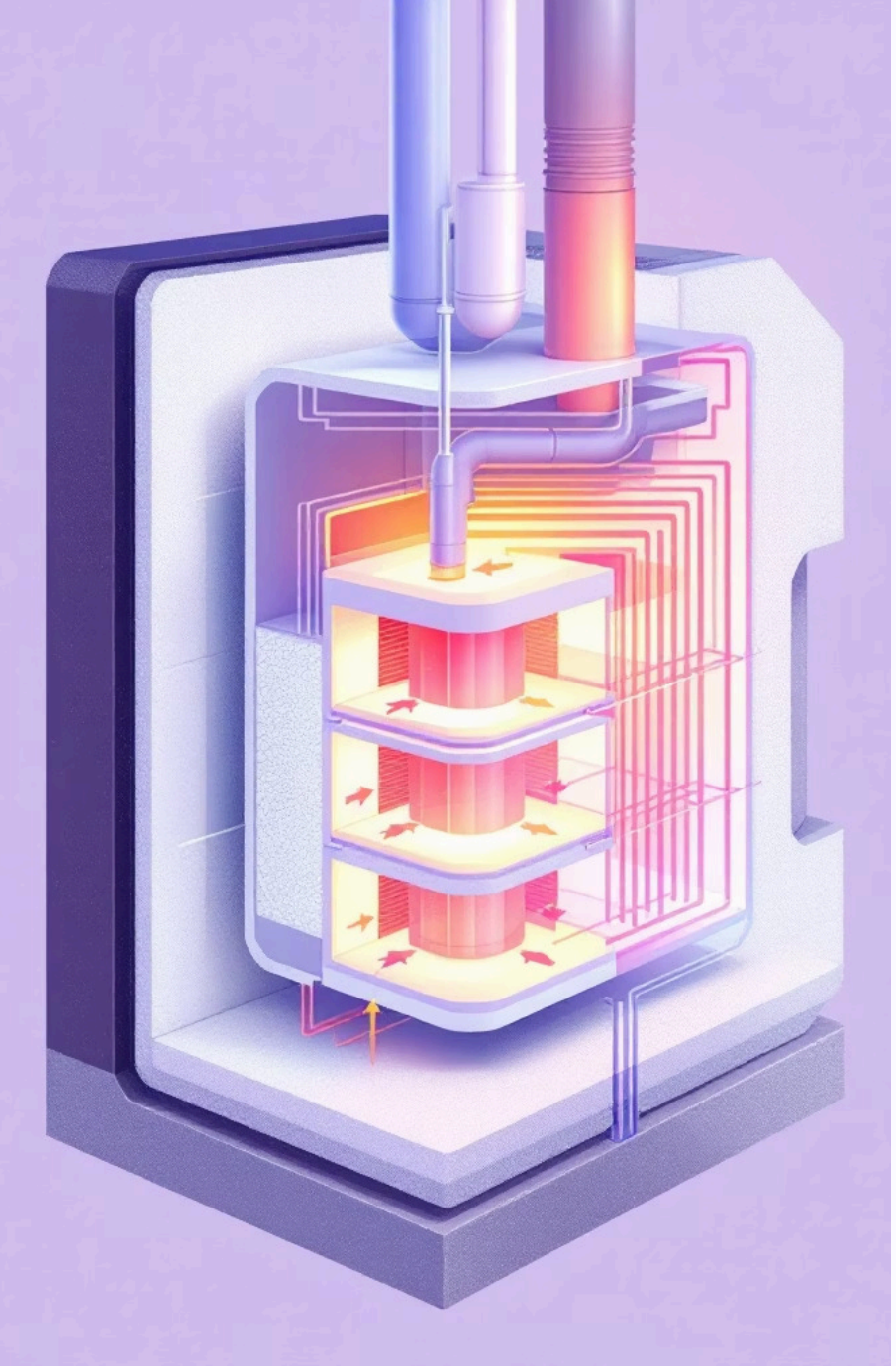
BEV Technology

Gas Phase Combustion

A pre-heating loop uses burner heat to vaporize liquid ethanol in sealed internal pipes before nozzle exit.

Transformation: Device shifts from "Liquid Burner" to "Gas Burner"

Result: Gaseous ethanol mixes perfectly with air, achieving 85% thermal efficiency



Thermal Containment

Vacuum Insulation

Jacket encases combustion zone, minimizing heat loss to environment

Polished Surface

Internal reflective coating directs 100% infrared energy upward to cooking vessel

Refractory Design

Eliminates "Side-Radiation Loss" common in conventional burners

Performance Comparison (20kg)

Metric	Commercial LPG	EVSC Ethanol
Energy Content	920 MJ	540 MJ
System Efficiency	55%	85%
Effective Heat	506 MJ	459 MJ
Cooking Duration	~65 Hours	~62 Hours
Operating Cost	Rs. 1,950	Rs. 1,400

28% cost reduction while matching LPG duration within 3%

Safety & Infrastructure Advantages

Non-Explosive Storage

Atmospheric pressure eliminates pressurized gas cloud risks from leaks

Modular Fueling

Pay-as-you-go model: buy 1-litre increments, lowering household barriers

Local Production

Domestic bio-fuel reduces import dependency, supports rural economy

Path Forward

Parity Achieved

85% efficiency offsets lower ethanol energy density, matching LPG duration

Economic Viability

Rs. 70/kg projected price beats commercial LPG operating costs

Operational Safety

Eliminates high-pressure hazards, replaces heavy steel cylinders

Scalability

Ideal for Indian market: decentralized production, pay-as-you-use models

> *"The EVSC model represents a shift from backup fuel to primary, high-performance cooking technology for residential and commercial use."*