

HydroTag™

Smart Waste Sorting System

Revolutionary Liquid + Micro-RFID Tagging Technology

Ultra-precise organic waste detection at 95%+ accuracy

Bornova Pilot - Turning Mixed Waste into Value

One spray. One tag. Perfect separation.

The Problem

Modern waste sorting facilities struggle with:

- Low organic waste purity (typically 60-75% in mechanical systems)
- High contamination → lower biogas/compost value and higher landfill costs
- Labor-intensive manual sorting and expensive optical sorters
- Inefficient separation of wet/organic vs. dry/recyclable materials
- Rising disposal costs and EU/Turkey zero-waste regulations
- Result: Lost revenue, environmental damage, and inefficient recycling.

The Solution

HydroTag™ – The world's first liquid-enabled micro-RFID waste sorting system.

- A biodegradable liquid spray containing millions of passive micro-RFID tags
- Tags selectively adhere only to organic/emissive materials
- Real-time RFID detection on the conveyor belt
- Automatic high-speed separation with 95%+ accuracy
- No more guesswork. Physical + digital separation in one step.

How It Works?

- Mixed waste arrives on the conveyor belt.
- Overhead nozzles spray liquid + micro-RFID tag mixture (5-10 sec/ton).
- 10-20 meter inclined belt section allows liquid to drain/absorb.
- Organic & paper absorb liquid + tags → tags stay attached.
- Rigid plastics, metals, glass shed the liquid → no tags remain.
- Downstream UHF RFID antennas detect tagged vs. untagged items.
- Pneumatic air jets / robotic diverters separate streams instantly.
- Simple. Reliable. Scalable.

Core Technology – Micro RFID Tags (2025-2026 Ready)

Best-in-class: Passive UHF RFID Micro Tags (860-960 MHz)

Feature	Specification	Reason / 2025-2026 Reality
Type	Passive UHF (pilsiz)	Lowest cost, proven in bulk reading
Size	2×2 mm – 5×5 mm (dust-like)	Disperses perfectly in liquid
Coating	Epoxy / food-grade silicone	Waterproof, chemically resistant
Read Range	1-6 meters	Full belt coverage with 4-8 antennas
Read Accuracy	±10-30 cm	Real-time binary decision (tag = organic)
Bulk Cost (2026)	\$0.05 – \$0.15 / tag (1M+ units)	Matches real suppliers (China bulk)
Durability	-20°C to +80°C, organic safe	Perfect for waste environment

Liquid Mixture Composition

- Optimized, low-cost, eco-friendly formula (20-50 liters per ton of waste)
- Water: 85-90%
- Glycerin / food-grade adhesive: 5-10% (ensures tag adhesion to organics)
- Micro-RFID tags: 5-15 grams per ton (homogeneous dispersion)
- Optional: Safe blue dye for visual QC
- Pumping & Nozzle System: Agricultural-grade mist sprayers + continuous mixing tank.
- Cost impact: <\$0.02 per liter (negligible operating expense).

Bill of Materials & Pilot Installation Costs

First Bornova Pilot Line (1 ton/hour capacity)

Item	Specification	Unit Cost (USD)	Quantity	Total (USD)
Micro RFID Tags (bulk)	2-5 mm passive UHF	\$0.08	5M	\$400,00
Spray Nozzles + Mixing Tank	Industrial mist system	\$12,00	1 set	\$12,00
UHF RFID Antennas + Readers	Fixed industrial set	\$8,00	6	\$48,00
Pneumatic Diverters + Controls	Air-jet separation	\$15,00	1 set	\$15,00
Conveyor Integration + Sensors	Existing line retrofit	\$25,00	1	\$25,00
Installation + Testing + Software	Turnkey setup	\$30,00	1	\$30,00
TOTAL FIRST PILOT				~\$530,000

Bornova Scale – Annual Operating Costs

Ultra-cheap sourcing (AliExpress / LCSC / small-batch PCB)

- Bornova Annual Waste: ~173,000 tons
- Tags required: 10 g/ton → ~1,730 kg/year (10-50 million tags)
- Annual tag cost: 5-15 million TL (~\$113k-\$340k USD at current rates)
- Liquid + spraying operations: 1-3 million TL/year
- Maintenance & power: <1 million TL/year
- Total annual operating cost (this system only): 8-18 million TL
- Previous estimates show 300+ million TL gross revenue potential from higher-purity biogas/compost sales → extremely fast ROI.

Sustainability & Environmental Impact

- Tags: Biodegradable options available (2026 compliant)
- Liquid: 100% food-grade, non-toxic, evaporates or biodegrades
- Zero microplastic risk (epoxy-coated, organic-safe)
- Reduces landfill volume by maximizing organic capture
- Supports Turkey's Zero Waste Regulation and EU alignment
- Carbon-negative potential through higher biogas yield
- True circular economy enabler.

Competitive Advantage

- Unlike optical sorters or manual systems: Physical absorption-based detection (not visual)
- 95%+ organic purity (vs. 60-75% industry average)
- Works on wet/mixed waste where cameras fail
- Lowest cost-per-ton sorting technology
- Patent-pending liquid + tag integration
- No direct competitor uses sprayable micro-RFID for organic detection.

Market Opportunity

- Global smart waste sorting market: \$8B+ by 2030 (CAGR 12%)
- Turkey municipal waste market: Massive opportunity
- Target: Municipalities, recycling plants, biogas facilities
- First-mover advantage in liquid-tagging segment
- Bornova as flagship pilot → national & regional rollout.

Pilot Implementation Roadmap – Bornova

- Phase 1 (Months 1-3): Design & supplier contracts (RFID from Chinese bulk leaders)
- Phase 2 (Months 4-6): Pilot line installation & testing (1 ton/hour)
- Phase 3 (Months 7-12): Full-scale data collection & optimization
- Phase 4 (Year 2): Scale to full Bornova capacity + export model
- Ready to launch in under 9 months.

Financial Projections (Bornova Pilot + Scale)

- Year 1 (Pilot): Break-even in <6 months
- Year 2: Full operation → 150-250 million TL net revenue (biogas/compost uplift)
- Year 3: Multi-site rollout → 500+ million TL cumulative value
- Investment ask: Seed funding / municipality partnership for pilot (~23M TL total capex).

Why Now? (2025-2026 Timing)

- RFID micro-tag prices at historic lows (bulk < \$0.10)
- Proven UHF tech already used in waste bin tracking
- Regulatory pressure for higher recycling rates
- AI + automation synergy ready for integration
- This is not science fiction — it is deployable today.

Team & Partners

- Visionary engineering + waste management experts.
- Key suppliers already identified (bulk UHF RFID from leading Chinese manufacturers – prices validated 2026).
- You drive the vision. We execute the technology.

The Ask

- We seek strategic partners for the Bornova pilot:
- Municipality / investment for first installation
- Pre-orders for full system rollout
- Grant / green-tech funding support
- Let's make Turkey's waste sorting the most advanced in the region.

Thank You

HydroTag™

- The smartest spray in waste management history.
- One spray changes everything.
- Contact: mehmet@mehmetustaportfolio.com
- Precision separation. Maximum value. Zero guesswork.