Telefónica Tech

Aquatic drones for waste collection

5G and IoT connectivity to keep seas and rivers clean

The environmental challenge

Ensuring water quality along our coastlines is an increasingly urgent need.

Various factors such as waste pollution, climate change and habitat degradation are placing unprecedented pressure on Europe's lakes, rivers, coastal and underground waters:

Millions of tonnes of plastic and other waste.

The discharge of organic waste causes eutrophication*, altering water quality.

**Eutrophication: The excessive enrichment of water with nutrients mainly nitrogen and phosphorus causing rampant growth of aquatic plants and algae. This can reduce dissolved oxygen and negatively affect aquatic life.*

Moreover, traditional cleaning methods such as conventional boats and manual labour are often costly, slow, inefficient, and highly dependent on weather and logistical conditions. Manual waste management involves high operational costs and poses safety risks in contaminated areas.

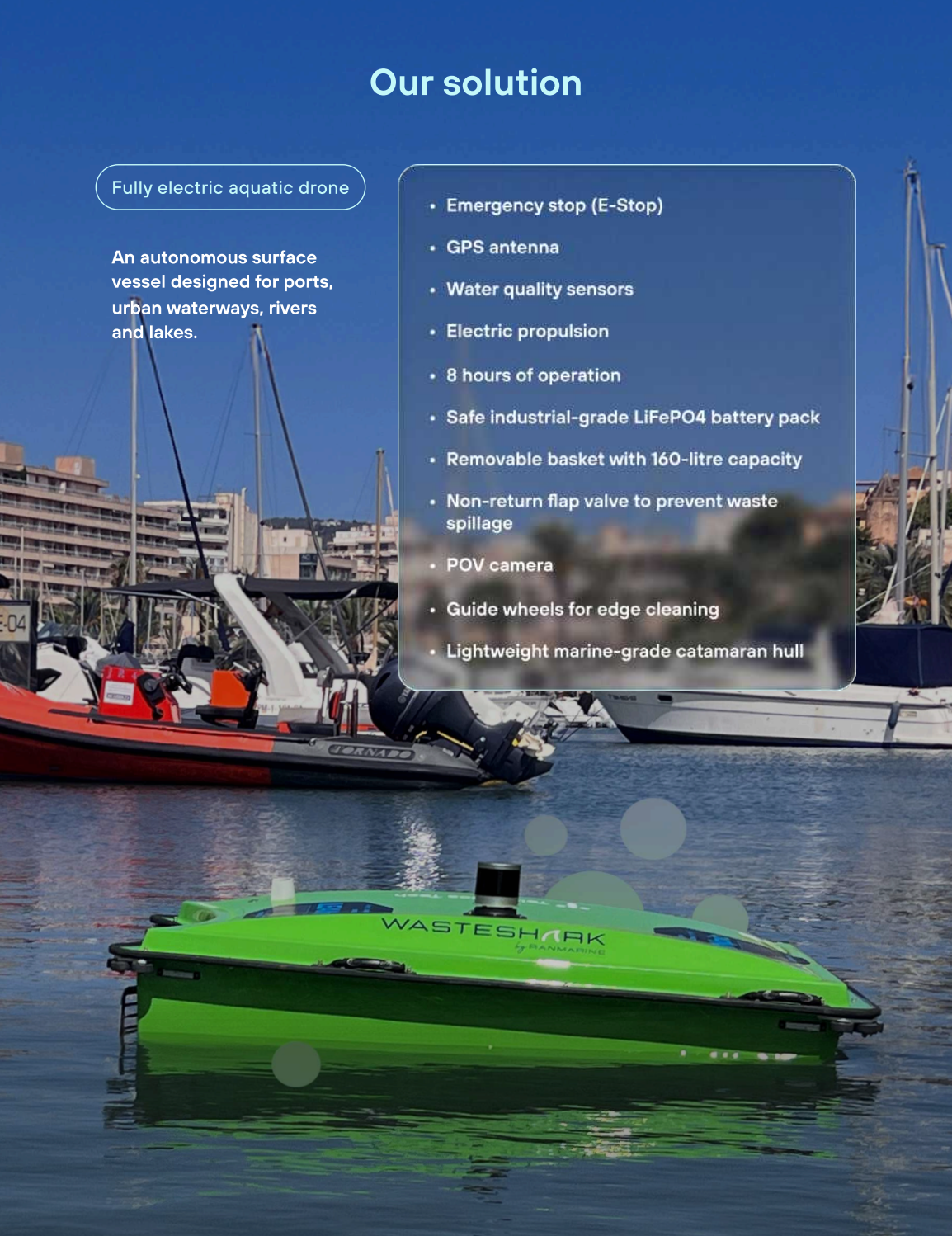
Ensuring water quality with 24/7 monitoring and real-time data is key to protecting human health, biodiversity, and the economic and tourism value of affected areas.

Our solution

Fully electric aquatic drone

An autonomous surface vessel designed for ports, urban waterways, rivers and lakes.

- Emergency stop (E-Stop)
- GPS antenna
- Water quality sensors
- Electric propulsion
- 8 hours of operation
- Safe industrial-grade LiFePO4 battery pack
- Removable basket with 160-litre capacity
- Non-return flap valve to prevent waste spillage
- POV camera
- Guide wheels for edge cleaning
- Lightweight marine-grade catamaran hull



Waste collection system

Removable 160L basket (60 kg); up to 500 kg of waste per day, (with 8 h autonomy).**

Water quality sensors

Temperature, oxygen, pH, turbidity, chlorophyll, depth... with real-time 5G data transmission.

5G & LiDAR connectivity

Autonomous or remote operation, programmable routes, and obstacle detection.

Autonomy & range

3 km/h speed, up to 8 hours of operation and 24 km of range per full charge.

*** Daily capacity depends on waste density and operating conditions.*

Data flow and integration

Dron ▶ 5G antenna ▶ Cloud ▶ Dashboard / API

Collection

The drone collects both data and physical waste.

Dashboard and alerts

Environmental KPIs, routes, drone status and SLAs.

Real-time data sent via 5G

To a cloud platform (FIWARE-ready API) or custom integration.

Seamless connection

With ESG or SCADA tools via secure APIs.

Benefits

Direct impact

Up to 500 kg of waste removed daily without interrupting port traffic.

Data-driven decisions

Collection of water quality data during operation, for sustainable decision-making.

Safety & compliance

Zero crew required in risk zones, aligned with the EU Water Framework Directive.

Cost efficiency

Lower OPEX compared to conventional boats and manual labour.

Brand value

Strengthens sustainability objectives and appeals to responsible tourism.

Reduction of environmental impact:

Minimises plastic pollution and enables real-time water quality monitoring.

Use cases

- Harbour waste cleaning.
- Removal of cyanobacteria (blue-green algae).
- River waste and plastic cleaning.
- Pollution prevention in bathing and recreational areas.
- Environmental maintenance in industrial port areas.
- Monitoring and cleaning in aquaculture areas.

Deployment

1. Environment assessment.
2. Drone delivery, configuration, and team training.
3. 24/7 operations & support from Telefónica Tech NOC.
4. Scalable to fleet or multi-site rollouts based on results.

Why Telefónica Tech?

- Own 5G and IoT network in **190+ countries** and **750+ roaming agreements.**
- End-to-end integration of **IoT, AI, Data, Cloud and Cybersecurity.**
- **Recognised by Gartner** for leadership in private 5G networks and services.