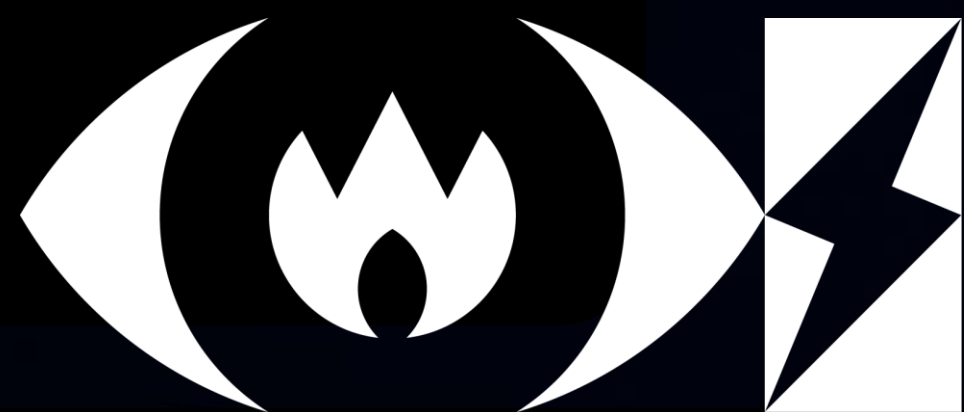




GRINNER

A New Standard for Battery Detection in Waste Recycling

One Year of Industrial Deployment at **GreenWEEE** Romania

 **Green|WEEE**

DUAL-ENERGY X-RAY
AI DETECTION



X-RAY
SCAN





Romania's leading WEEE recycler and industrial deployment site of **GRINNER**



3 recycling plants



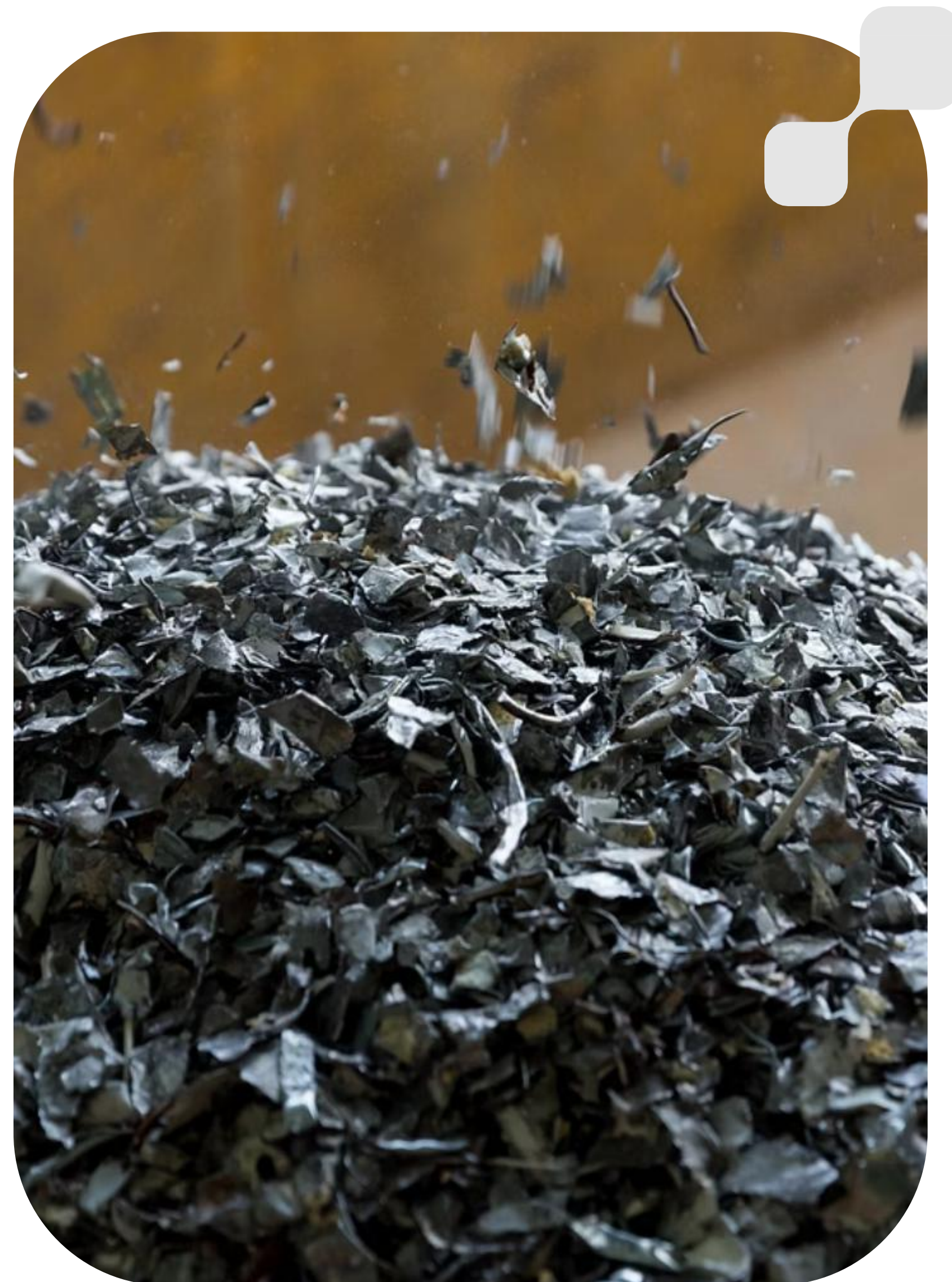
>40 million EUR investment



Certified according to CENELEC and ISO standards



EERA Member
(European Electronics Recyclers Association)





24 years of recycling expertise and
circular economy leadership

180

million euro
turnover

11

Companies

Active across various
waste segments:
plastics (PET,
polyolefin), WEEE, glass
packaging, IWM.

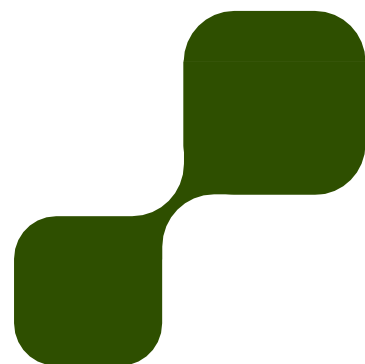
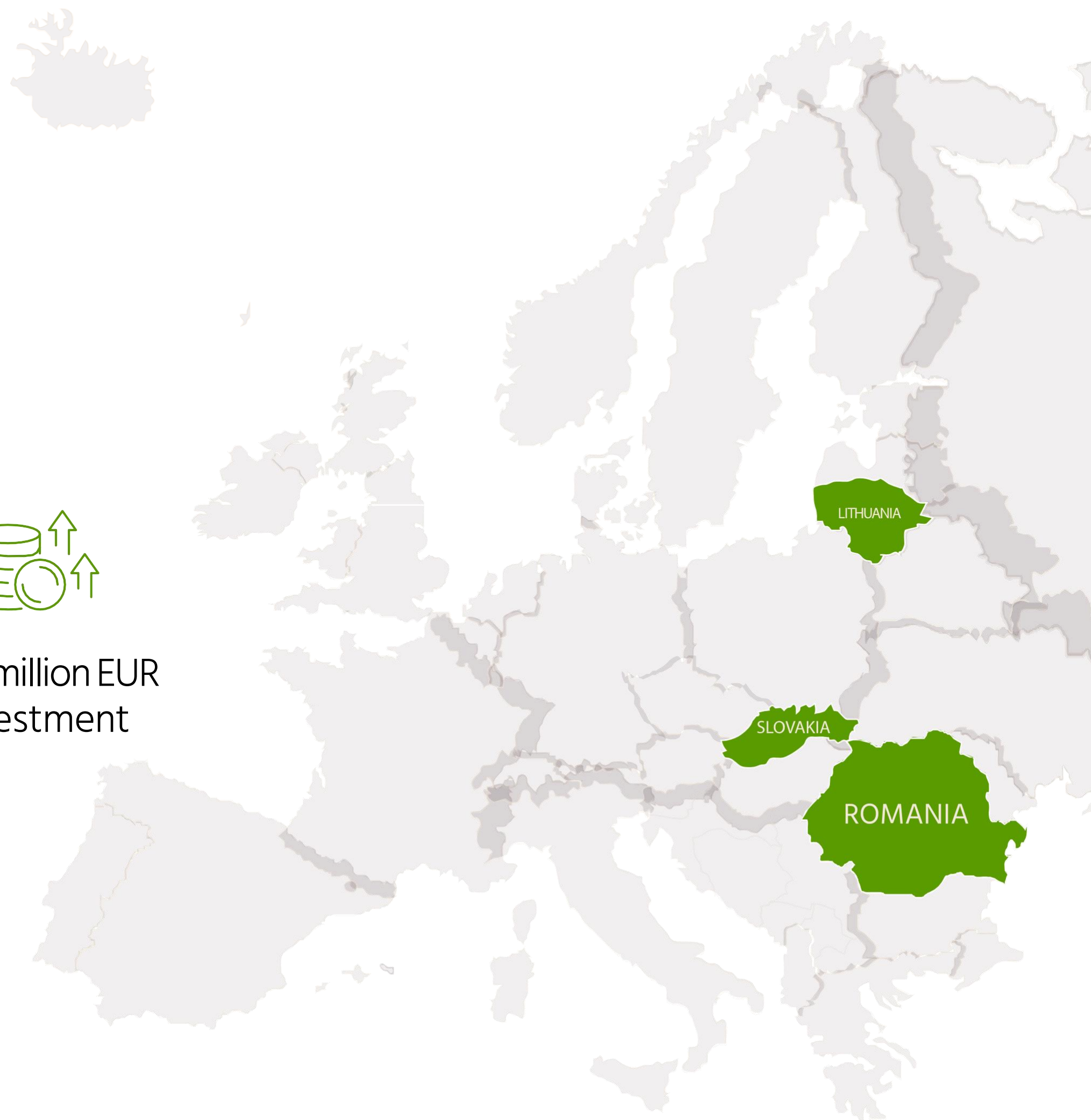
2500

employees

Romania, Slovakia,
Lithuania



> 270 million EUR
investment



Battery risks are escalating



3x



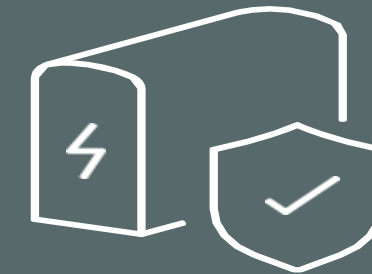
Growth in lithium-ion consumer devices since 2015

85%



Of portable batteries are already embedded in electronic devices*

~40%



Of small electronics items contain embedded batteries*



As batteries become structurally integrated into products, manual removal is becoming unrealistic.

Sources: Bebat (Belgian battery EPR); Publishing industry data on small WEEE battery prevalence.

Today's reality



A lithium-ion battery ignited within the waste stream in **GreenWEEE** causing damages estimated at several hundred thousand euros.

IMPACT



500+ tons
of e-waste destroyed



Production shutdown
and operational disruption



Safety risks
for employees and facility



Signifiant
financial losses



This was not a theoritical risk – it has already happened, **and it will happen again without prevention built into the process.**

Today's solutions

The challenge is not only battery detection — it is detecting batteries before mechanical damage occurs.

Manual sorting

Human dependent

- ✗ Difficult to identify batteries in overlapped or mixed waste
- ✗ Operator performance varies between shifts and conditions
- ✗ Not scalable for high-speed industrial WEEE processing

Visual & IR detection

Sees only the surface

- ✗ Embedded batteries remain hidden
- ✗ Heat signals appear too late
- ✗ Inconsistent at industrial scale

X-RAY scanning

Detection after shredding

- ✗ Existing systems are installed after pre-shredding
- ✗ Batteries may be damaged
- ✗ Detection comes too late for prevention



All existing approaches fail because batteries are detected too late in the process.

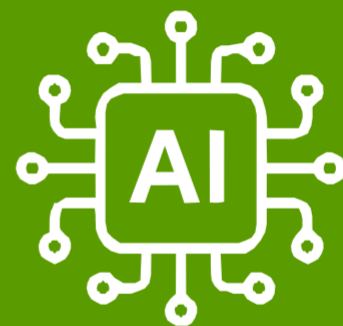
The GRINNER solution

AI + dual-energy X-ray technology for detecting embedded batteries **before** mechanical processing.



Dual-Energy X-Ray

- 4K–8K scanning on every item
- Detects battery cells from 2.5 to 200 mm
- Reveals embedded and concealed batteries



AI Detection Engine

- Real-time analysis at 1 m/s belt speed
- Classifies batteries by type (cylindrical, button cell, pouch)
- Determines the battery location within the device



AI-Light Guiding System

- Visually highlights items containing batteries
- Guides rapid operator intervention



Performance Reporting

- Tracks detection trends and system performance
- Monitors throughput and belt speed
- Generates operational reports and analytics

GRINNER was developed by a European consortium bringing together expertise in recycling, AI & robotics technologies.

From pilot to industrial reality



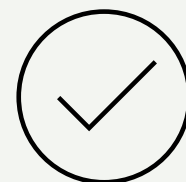
Stable operation
in live WEEE streams



Reliable detection
before mechanical processing



Scalable performance
for industrial
recycling lines



Proven in industrial operation. Ready for deployment
across the recycling industry.

GRINNER in Operation

Live industrial deployment at GreenWEEE Buzau

**AI-powered
battery detection
for e-waste recycling**





7% of all SDA & IT&C entering GreenWEEE's recycling process **contained batteries**

June 2025 - June 2026

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INCIDENTS

SINCE INDUSTRIAL DEPLOYMENT



99%

Detection Accuracy



24/7

Continuous
Industrial Operation



4.5 - 5 t/h

Processing Throughput



2.5 mm

Smallest Battery Detected

A new standard for **battery detection**

From innovation to **industrial reality**.



Marius Costache
CEO GreenWEEE

