SUSTAINABLE RECYCLING INDUSTRIES

Ekhorda II: the First Egyptian Incubator for E-waste Management Start-Ups

Final Incubation Report
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SRI SUSTAINABLE RECYCLING INDUSTRIES

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Turning waste into resources for development

SRI builds capacity for sustainable recycling in developing countries. The programme is funded by the Swiss State Secretariat of Economic Affairs (SECO) and is implemented by the Institute for Materials Science & Technology (Empa) and the World Resources Forum (WRF). It builds on the success of implementing e-waste recycling systems together with various developing countries since more than ten years.

Acronyms

CEDARE:	Center for Environment and Development for the Arab Region and Europe
ERI:	Electronics Research Institute
MVP:	Minimum value proposition
SME:	Small and Micro Enterprise
STPERI:	Science & Technology Park for Electronics Research & Industry

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1 Introduction

The Egyptian state attaches utmost importance to supporting innovation and entrepreneurship, creating technological job opportunities, empowering youth, and developing the capabilities of researchers. Boosting entrepreneurship and innovation are key principles of the Ministry of Communications and Information Technology's Executive Plan for the Strategy for Science, Technology and Innovation 2030, as well as the National Strategy for Higher Education and Scientific research.

Figure 1. Ministry of Communications and Information Technology, ERI, CEDARE, and dss+ sign an official cooperation agreement, establishing E-Khorda II

At the end of 2022, the **Green Electrobekia Incubator (E-Khorda II)** was established at the Electronics Research Institute (ERI) in Nozha, with funding from the Center for Environment and Development for the Arab Region and Europe (CEDARE) and with oversight by the Ministry.

E-Khorda II is the first Egyptian governmental incubator focusing on electronic waste (e-waste) management. Offering a year-long incubation program for both technical and entrepreneurship skills, it supports innovators start-up small and micro enterprises (SMEs). Once incorporated, these SMEs are based in the Science & Technology Park for Electronics Research & Industry (STPERI), where they receive additional administrative, logistical, technical and financial support for their further development. This aligns with STREPI's core goals: to become Egypt's first electronics industry science park, uniquely specialized for Africa and the MENA region, targeting the local and regional markets in the growing electronics, communication, and IT industries.

This report summarizes the first incubation program (2023-2024) under E-Khorda II.

2 Key Figures about Ekhorda II

- Number of Egyptian incubators focusing on e- waste recycling: only **1 (Ekhorda II)**
- First incubation batch: **2023-2024**
- Innovator teams who participated in the first incubation batch: **9**
- Innovators trained through the first incubation program: **45**
- Start-up SMEs established after the incubation who will sit in STPERI: **3**
- Training sessions on entrepreneurship: **10**
- Training sessions on prototyping, product development, and demos: **13 (149hrs)**
- Training sessions on e-waste management: **16**
- Lab sessions: 1 (full day)
- Networking sessions with the industrial community: **7 (86hrs)**
- Trainers who delivered training to the innovators: **8**
- Jury members: **5**

3 About Ekhodra II's incubation program

E-Khorda II's first incubation program (2023-2024) aimed to address the technical, business, and legal developmental needs of potential Egyptian e-waste management startups. It focused on building innovators' technical and entrepreneurship skills and supporting them in officially establishing startup SMEs through a "multi-track services" approach:

- **Core training on entrepreneurship**. The program provided over 110 hours of core training on entrepreneurship, covering essential startup topics like business models, product/market fit, marketing and sales, and product management. To apply the lessons from the lectures, each innovator team had to interview 100 customers to validate their ideas.
- **Technical training on e-waste management**. The program included a 6 day theoretical and practical training on e-waste management. It covered key topics such as e-waste management in Egypt, the health, safety, and environmental impacts of e-waste, and e-waste policy, management, and technology. Additionally, it taught innovators practical skills and how to use lab equipment for dismantling and testing e-waste.
- **Prototyping support**. The program dedicated over 102 hours to prototyping and product development, assisting teams in working on their product designs and production proposals. This helped them develop and validate a minimum value proposition (MVP) with real customers.
- **Networking with the industrial community.** The program enabled the innovators to pitch their ideas to the local industrial community. It trained them in core presentation skills (incl. investor deck preparation) and organized 2 day-long pitching and demo sessions for selected industry guests. Additionally, it facilitated broader industrial support by organizing 2 day-long networking and matchmaking events.
- **Mentorship**. A pool of mentors provided dedicated feedback, advice, and coaching to the innovators at each stage of the process.

The program was structured into several phases, each spanning a couple of months (see Figure 3 below). Following a selection process, over 20 innovators were accepted in the program, forming expanding teams to work throughout its duration. At the close of each stage, a judging committee composed of senior ERI and CEDARE staff selected the teams to progress to the next stage. Ultimately, 3 innovator teams where chosen to receive further support, including the opportunity to incorporate specialized start-up SMEs eligible to reside in STREPi and accessing additional administrative, logistical, technical and financial support for their further development.

Figure 2. The innovators participating in stage 1 of the incubation program

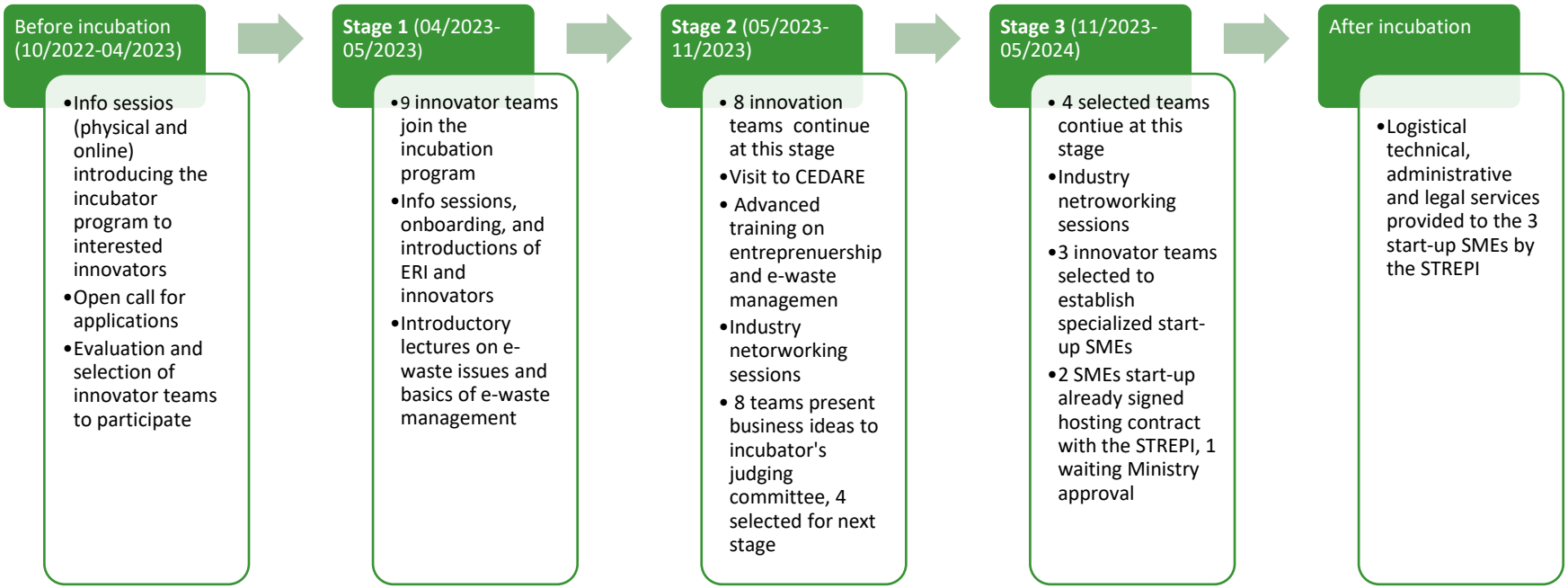

Figure 3. Flow of activities within the incubation program (2022-2024)

4 More about the Innovation Teams, their Ideas, and the Winners

A diverse set of innovators participated in the first incubation program under E-Khorda II. They came from various technical and engineering backgrounds such as mechatronics, renewable energy, and mechanical engineering, as well as from business disciplines. Participants included both individuals with extensive industry experience and current students. Additionally, some innovators were researchers at ERI, eager to apply their research and ideas to practice.

The ideas developed in the incubator were equally diverse. Some focused specifically on certain waste streams like batteries or plastics, while others addressed e-waste more broadly. Some ideas centered on providing collection, pre- and end-treatment operations as a service, while others integrated digital services as well. (see Table 1 below)

Table 1. Information about all innovation teams participating in the incubation program

#	Innovator team	E-waste management sub-sector	Key innovation	Participated in which phase	Status and support needed to enable next steps for the team
1	**Battarity**	Collection, sorting, disassembly, shredding, separation	• Local solution for end-of-life lithium-ion batteries • Separation and sales of final metals at local market • Extraction, export and sales of black mass to China	All (winner)	An SME is already established, next support to be provided by STREPI
2	**Battery Cycle**	Collection, recycling, advisory	• Local solution for end-of-life lithium-ion batteries • Battery recycling for damaged and expired lithium-ion batteries • Environmental training and consultation services, preparation of environmental compliance and sanitation plans	All (winner)	An SME is already established, next support to be provided by STREPI
3	**Electronic Components Company**	Refurbishment	• Metal extraction and reuse • Component extraction and reuse • Refurbishment and resale of usable components	All (winner)	Waiting for approval from Ministry to establish the SME - as the startup team are researchers at the research center ERI
4	**EGY Green Recycling**	Recycling	• Producing fertilizers (e.g. copper sulfate, copper nitrate, and copper oxide) from e-waste recycling outputs (wastewater)	1-3	

5	**EcoCycle Solutions**	Collection, disassembly, refurbishment, shredding, separation	• Refurbishment and resale of usable components • Use of advanced technology	1-2	Investment of $**130,000 to $150,000** to establish operations, purchase equipment, hire and train staff, develop partnerships, acquire customers, and expand operations.
6	**RE-TECH**	Collection, refurbishment	• Online platform and a user-friendly mobile application for collection • Refurbishment of collected items for resale.	1-2	Financial support, technical support and consultancy, logistical support and an office to host our startup, a workspace to serve as our headquarters.
7	**International Waste Recycling Technology Company**	Recycling (mechanical)	• Egyptian manufactured technology, increasing the purity of extracted materials, to be offered to local recyclers	1-2	Proof of concept at small-scale / in lab conditions.
8	**Global System Company**	Recycling, refurbishment	• Extending the services of an excising company trading IT and other equipment to recycling and refurbishment.	1-2	Investment of $**130,000-$150,000** to purchase equipment, start operations, hire and train staff, acquire customers Waiting for approval from trade register to be able to deal with recycling as an activity.
9	**Innovation team #9**	Recycling	• Recycling of plastic bottles to produce 3D printer filaments	1	Financial support, technical support and consultancy, logistical support and an office to host our startup, a workspace to serve as our headquarters.

In the beginning of 2024, the jury selected as top three teams **Batterity, Battery Cyle,** and **the Electronic Components Company**.

- **Battarity**, which was considered unanimously by the jury as the best team, was first incorporated, and first signed a contract to be hosted by STREPI. Eng. Youssef Maher, founder of the company, praised the STPERI in facilitating all procedures for establishing the company and providing him with technical, administrative and legal advice.
- **BatteryCycle** also got incorporated and signed its contract with STREPI in June 2024.
- **the Electronic Components Company**, which comprises of ERI researchers, as of 2024 is still waiting for Ministry approval.

Table 2. More about the 3 winning teams and ideas

	Innovator team	More about the winning idea
1	**Battarity**	Lithium-ion batteries are widely used in portable electronic devices, electric vehicles, and energy storage systems. Over time, they lose their ability to efficiently store energy, necessitating replacement with new batteries. Recycling lithium-ion batteries is an essential step in preserving the environment and ensuring resource sustainability. The main idea of **Batterity** is to collect these batteries from waste collectors and companies, sorting and discharging them. Then, manually disassemble them before grinding them into a powdered state. The resulting powder is subjected to density-based separation, leaving with final materials such as plastic, iron, aluminum, lithium, and other metals for direct sale in the local market. As for the black mass material containing lithium, it is exported to China due to its lithium content.
2	**Battery Cycle**	**BatteryCycle** aims to provide recycling services for damaged and expired lithium-ion batteries. A wide range of customers can benefit from this service - individuals, large and small companies, governmental and non-governmental agencies, those who wish to preserve the environment and those who maintain the performance of their social responsibility. **BatteryCycle** will provide collection services for damaged and expired batteries as well as technical and logistical support and support for recycling operations. The company operates in accordance with the highest standards of Egyptian and international environmental laws and legislation, using the latest technology methods and techniques. It is proud to be first in Egypt to recycle lithium ion batteries. **BatteryCycle** also will provide environmental training and consultation services and prepare the environmental compliance and sanitation plans for electronic waste recyclers, industrial and tourism facilities and other economic activities.
3	**Electronic Components Company**	**The Electronic Components Company** focuses on reducing environmental loads/impact through repurposing and recycling e-waste for a variety of purposes. For example, recovering valuable parts from devices and providing manufacturers with recycled metal that can be used to make new products

5 Conclusion

The establishment of a start-up incubator dedicated to electronic waste management solutions in Egypt represents a vital step towards fostering innovation in this critical sector. By providing targeted resources, mentorship, and funding, the E-Khorda II incubator empowered start-ups to develop scalable and sustainable solutions to address the growing challenge of electronic waste.

This initiative not only supports local entrepreneurs but also aligns with Egypt's broader goals of promoting environmental sustainability, reducing waste, and creating green jobs. By cultivating a community of innovators, the incubator can drive technological advancements, enhance public awareness, and contribute to a circular economy.

E-Khorda II incubator offers a promising opportunity to turn electronic waste from a pressing challenge into an economic and environmental asset, ultimately contributing to a more sustainable future for Egypt and the region. A catalyst for innovation and environmental stewardship, it positions Egypt as a regional leader in the fight against electronic waste.