

# Project partners



**Technosind srl** is an R&D Italian company specialized in the field of treatments and recovery of raw and innovative materials and in the field of renewable energy. The main activities on LIFE DRONE project are: project management, monitoring the application of green procurement and preparation of after LIFE plan.



**Eco Recycling srl** is an Italian spin-off aiming at technology transfer in the field of innovative processes for treatment and recycling of e-wastes. The main activities on LIFE DRONE project are: request of authorization, construction of the prototypes (hydrometallurgical and synthesis section), demonstration activity on the prototype for NMC cathode oxides production, process optimization, monitoring and environmental and socio economic impact actions and dissemination actions.



**Theory of Development of Chemical Processes** is a research group of the Chemistry Dept. (Sapienza) developing innovative processes for waste valorization. The main activities on LIFE DRONE project are: support for the process optimization and replicability and transferability analysis.



**SEVal srl** is the biggest Italian company involved in collection, treatment, and disposal of WEEE including batteries. The main activities on LIFE DRONE project are: supply and mechanical pretreatment of Li-ion batteries.



**FAAM Research Center** is the R&D company of Seri Industrial S.p.A. dealing with the development of lead-acid and lithium-ion technologies. The main activities on LIFE DRONE project are: testing of the new electrodic material produced in the process and its commercial validation.

## Contact

**Technosind srl**

Email: [emanuela.moscardini@technosind.it](mailto:emanuela.moscardini@technosind.it)

**Eco Recycling srl**

Email: [ludovica.baldassari@ecorecycling.eu](mailto:ludovica.baldassari@ecorecycling.eu)

**Sapienza Chemical Department: Theory of Development of Chemical Processes**

Email: [francesca.pagnanelli@uniroma1.it](mailto:francesca.pagnanelli@uniroma1.it)

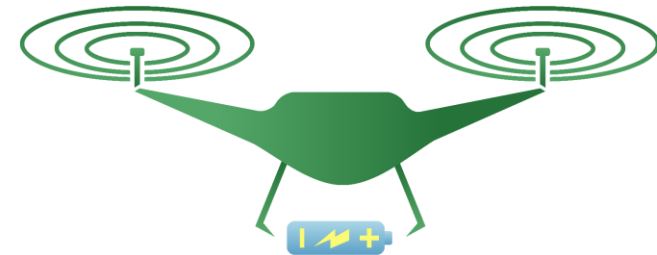
**SEVal srl**

Email: [roberto.ardenghi@seval.net](mailto:roberto.ardenghi@seval.net)

**FAAM Research Center**

Email: [federico.vitali@faam.com](mailto:federico.vitali@faam.com)

# Life DRONE



**LIFE19 ENV/IT/000520**

**Direct pROduction of New Electrode materials from battery recycling**

**Start date: 30/11/2020**

**End date: 31/12/2023**

**EU co-funded project LIFE+ 2019 Environment and Resource Efficiency**

**Total budget: € 1.752,705**

**EU Contribution: € 946,111**

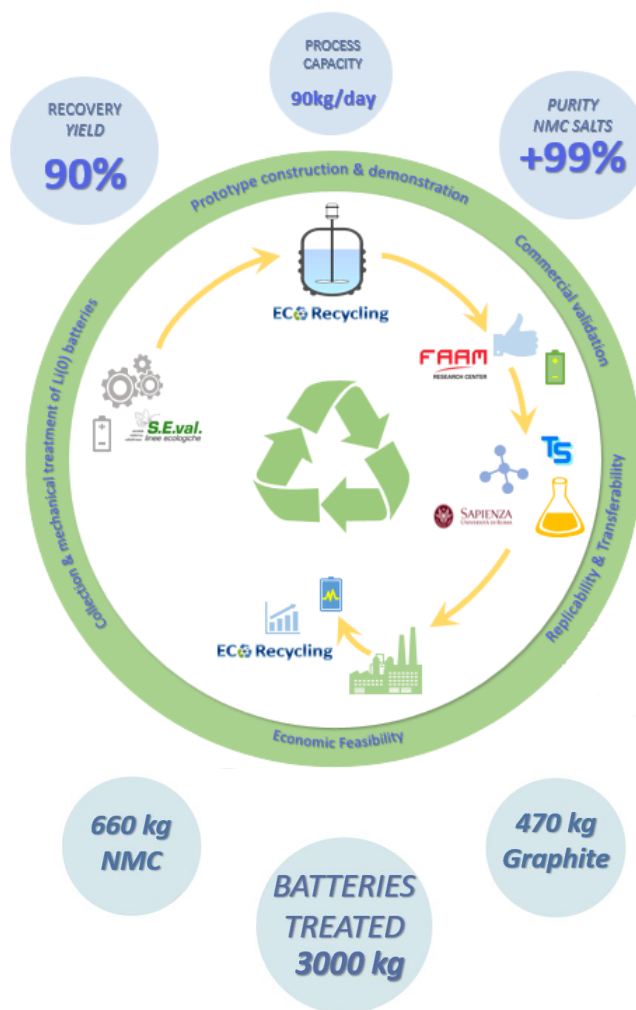
**[www.lifedrone.eu](http://www.lifedrone.eu)**

# Environmental problem targeted

The application of batteries has been steadily increasing over the past two decades driven by the growing market of consumer electronics. Electrodes materials including strategic or critical raw materials such as graphite, cobalt, nickel and manganese, which account for more than 50% of the battery cost, need to be recovered from EU resources and recycled into the batteries manufacturing chain to reduce the environmental impact and prevent the dispersion of hazardous elements into the environment. A major bottleneck hindering the recovery of batteries materials at large scale today is the elevated cost of implemented recycling processes, such as pyro and hydrometallurgical recycling.



# Project architecture



# Project objectives

Demonstration of a novel recycling route for different EoL lithium-ion battery types showing significantly lower processing cost and better environmental impact as compared to the alternative state of the art processes.

## Actions

- ❖ Design and construction of a mobile plant to perform the synthesis of the Nickel, Manganese and Cobalt (NMC) oxide
- ❖ Process demonstration
- ❖ Validation of produced materials by preparation of 10 Li-ion cells (capacity 10-20 Ah)
- ❖ Evaluation of the process economic feasibility
- ❖ Life cycle assessment of the proposed recycling route
- ❖ Elaboration of a replicability plan in a different EU member state
- ❖ Elaboration of a business plan large scale industrial application