Scraps In, Sauce Out: Transforming Food Waste into Valuable Soil



With food waste accounting for nearly a tenth of the world's greenhouse gas emissions, **Ecotone Renewables** was launched in 2019 with a clear mission to make sustainability both practical and profitable. The company's roots trace back to a collaborative aquaponics project between Carnegie Mellon University, the University of Pittsburgh, and the University of Michigan, where early research reimagined food waste as a scalable, circular resource rather than a landfill liability.

Led by co-founder and CEO **Dylan Lew**, Ecotone Renewables set out to eliminate the biggest barriers to food-waste solutions—unreliability, odor, and cost. Its Zero-waste Ecological Upcycling System (ZEUS) reimagines anaerobic digestion for real-world settings, using a right-sized, automated, and fully enclosed design to process even contaminated food waste cleanly, with minimal odor and nominal operator effort. Inside ZEUS, microbes quietly break down organics, while converting scraps into renewable energy and Soil Sauce, a nutrient-rich liquid fertilizer. Leased to organizations, ZEUS often offsets its own cost through averted waste hauling fees, while the commercially sold Soil Sauce completes the loop by allowing partners to share in a new revenue stream generated directly from their digester.

ZEUS goes beyond waste processing by turning food scraps into actionable intelligence. Its integrated camera-based sensors power a real-time analytics dashboard that reveals exactly what's being wasted by type and volume surfacing daily, weekly, and monthly patterns. Deployed across hospitals, universities, restaurants, and corporate campuses, ZEUS pairs these insights with an automated, containerized biodigester that cuts hauling costs and CO_2 emissions, proving waste-free operations can deliver positive results in a myriad of settings.

Challenge

The earliest ZEUS systems ran on ingenuity. The initial hopper, the front end of the system where operators dump food, was improvised in true Pittsburgh fashion from an old sink and a repurposed baby-changing table sourced from prominent salvage superstore Construction Junction in Point Breeze. That scrappy setup proved the concept and functioned as an initial grinding station, but it was never designed for automation, durability, or repeatability at scale.

As deployments grew, the sink-and-grinder assembly—now contract-manufactured—became a bottleneck, hampered by long lead times, uneven quality, and no clear path to iteration. Ecotone's engineers lacked formal 3D models, drawings, or specifications, making it impossible to source competitive bids or bring fabrication in-house. To move from prototype to product, Ecotone needed to redesign the hopper from the ground up as a purpose-built, automated subsystem.

Project Details

Company: **Ecotone Renewables**

Year Founded: **2019**

Founders: **Dylan Lew, Elliot Bennett, and Kyle Wyche**

Programs Participated In (Year): **Robotics Factory Scale Program (2023)**



Solution

In 2023, Ecotone turned to the Robotics Factory through its Scale Program to redesign the digester front end. Robotics Factory engineers and technicians began by reverse-engineering the existing hopper to define its functional requirements, constraints, and failure points. Robotics Factory engineers produced a full 3D model and manufacturing-ready drawings for a new sink assembly, paired with detailed recommendations on materials, standards, and off-the-shelf component alternatives. The Robotics Factory team also connected Ecotone with vetted local manufacturers to support competitive quoting and early production runs.

Just as importantly, the Robotics Factory team focused on capability-building. Three Ecotone engineers were trained in sheet metal fabrication and welding, which enabled rapid in-house prototyping and modifications. Robotics Factory technician **Luca DeGroot** tested multiple welding approaches and fabrication techniques, helping the team iterate faster and smarter.

The result was a step-change in performance. Ecotone is now on version four of the ZEUS digester, with improved uptime, faster operator workflows, and a front-end system built for real-world use. By removing a critical manufacturing bottleneck, the partnership helped turn an improvised component into a scalable, production-ready solution, unlocking the next phase of growth for ZEUS and the resilient economy it enables.

The founders of Ecotone Renewables, recently named to the Forbes 30 Under 30, are accelerating their innovation roadmap with the launch of the company's first fully mobile ZEUS pilot program. With its most advanced biogas system yet, the ZEUS-on-wheels reduces deployment costs and unlocks short-term trials, events, and mobile deployments, bringing ZEUS's impact beyond fixed locations and into entirely new use cases.



"Being a two-minute walk from the Robotics Factory means expert assistance is just around the corner."

--Dylan Lew
Founder and CEO,
Ecotone Renewables

From day one, Ecotone Renewables has been deeply intertwined with the University of Pittsburgh, leveraging a partnership that fueled its earliest experiments and growth. That alliance paid dividends in 2023 with a Pitt Sustainability Challenge win and multiple on-campus ZEUS deployments. At Pitt, an informal experiment sharing "digest-ate" evolved into Soil Sauce, now sold at retailers across the region. As the company scaled, it paired Pitt's institutional backing with Western Pennsylvania's manufacturing strength and close collaboration with Carnegie Mellon University. Early support from the Richard King Mellon Foundation and pre-seed and seed investment from Innovation Works moved Ecotone from pilot to commercial systems. Public-sector funding—including a $2.2 million award from the U.S. Department of Agriculture and a grant from the Pennsylvania Department of Agriculture—accelerated fertilizer production. Together, this tightly knit ecosystem propelled a campus-born idea into a fast-scaling public benefit company, firmly rooted in Pittsburgh but designed for broad impact.

Innovation Works and the Robotics Factory

Innovation Works is one of the most active early-stage investors in the country and the most active in Pennsylvania. Since its inception of the seed fund in 1999, Innovation Works has invested in over 780 companies that have gone on to raise $3.4 billion in follow-on funding. Innovation Works is part of the Ben Franklin Technology Partners network, which has catalyzed economic growth over the last 30 years by providing access to capital and networks that help foster innovation and technology-based economic development in Pennsylvania. The Robotics Factory is an array of robotics programs led by Innovation Works and the Pittsburgh Robotics Network. Learn more at **innovationworks.org** and **roboticsfactory.org**.