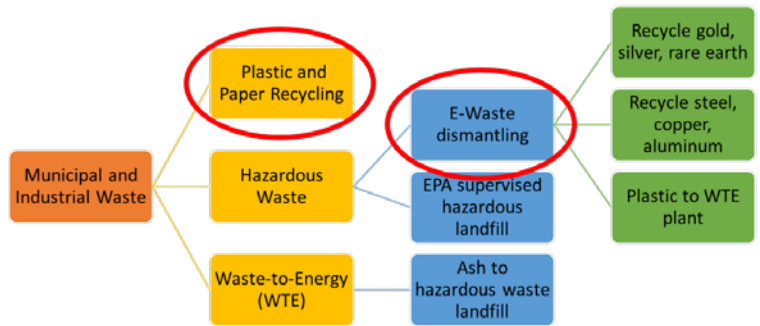


# DE-MANUFACTURING – REVERSE SUPPLY CHAIN

JUNE 2018 TECH BRIEF FOR ADVANCED MANUFACTURING TALENT NETWORK

USE OF NEW HIGH TECH CIRCLED IN RED



## Reverse Supply Chain Has Gone High Tech

Electronic waste (e-waste) consists of laptops, servers, cell phones, photocopiers, etc. Electronic discard is one of the fastest growing segments of our nation's waste, already constituting ~5% of the total waste volume. The hazardous materials within electronic waste are required by law to have proper disposal. Fortunately, e-waste also has a variety of valuable metals and minerals to be recovered.

Depending on commodity prices, the value of precious and rare-earth metals in electronic components can make recycling e-waste very profitable. No surprise then that e-waste processing equipment has been developed (in CA) such as the one from [CP Manufacturing](#). Discard is loaded into a grinder and the grind is sorted. A state-of-the-art, high-resolution, wide-spectrum color camera provides accurate separation of small particles.

Plastic material type (ABS, HIPS, PC, PMMA, PCABS) can be separated by the spectra in the near infrared region of each chip – this is part of mixed stream recycling separation as well. Color separation is used to separate the green fiberglass circuit board particles. Shape is used to distinguish copper wire. Metal fines can be separated magnetically. Providing separation capability at high speed is very high-tech; so is operating it with optimized settings as the mix in the waste stream varies.

In the figure above, Waste-to-Energy (WTE) or incineration technology deserves to be circled in red. Incineration technology has grown in sophistication. The pollution controls preventing mercury, other heavy metals and toxins getting into the airstream is second to none. However, power generation is CUTN territory.

## Labor Force Takeaway

TAN recommends that Reverse Supply Chain technology + social responsibility issues are included in apprenticeship programs. Technology is displacing (miserable) waste sorting manual work with sophisticated materials science technologies for identifying materials and conveyor belt techniques for sorting. As a result, companies in the Reverse Supply Chain sector need *skilled* employees. It goes without saying that waste management is a growing field.

The work of dismantling valuable e-waste is a complex social issue. It is perfectly suited for those with moderate-to-severe autism. So should government preserve a role for them? As minimum wage rises to \$15/hour, the payroll for the paraprofessionals who train, supervise and manage the e-waste dismantling, will close facilities with autistic dismantlers, such as Green Vision, Inc. unless the State (DDD) is willing to put more money into increasing their support.

# People, Planet, Profit – The triple bottom line.

Competing with high tech in the e-waste recycling business is NJ's own Green Vision Inc. [GVI](#) teaches adolescent students and adults on the autistic spectrum how to properly dismantle and recycle unwanted electronics. Once training is complete, these clients are offered long-term, supported jobs - plus a springboard to mainstream employment. The back of their work-shirts reads, "Dismantling the Stigma of Developmental Disability."

GVI's business plan depends on day-program funds from New Jersey's Division of Developmental Disabilities (DDD) for ~60% of its budget. The rest comes from sales of scrap materials, licensing income, charitable donations and services – including data destruction. Headquarters and franchise training locations are listed here by county:



- Morris: Green Vision Inc., Headquarters 8 Emery Ave, Randolph, NJ 07860; (973) 998-7955
- Morris: [Celebrate The Children](#); 230 Diamond Spring Rd.; Denville, 07834; (973) 989-4033
- Bergen: The Forum School, 107 Wycoff Ave., Waldwick, NJ 07463; (201) 444-5882
- Somerset: Bonnie Brae School; 3415 Valley Rd; Liberty Corner, NJ 07938;(908) 647-4703
- Essex: New Beginnings, 28 Dwight Place, Fairfield, NJ 07004; (973) 882-8822
- Essex: [Deron School](#) II, 130 Grove St Montclair, NJ 07042; (973) 509-2777
- Union: Deron School, 1140 Commerce Ave, Union, NJ 07083; (908) 206-0444
- Camden: [Y.A.L.E. School](#), 11 Connecticut Ave., Cherry Hill, NJ 08002; (609) 677-9960
- Camden: Y.A.L.E. School, 2127 Church Rd., Cherry Hill, NJ 08002; (609) 677-9960
- Camden: [Y.A.L.E. School](#), 350 Edgewood Ave., Audubon, NJ 08106; (609) 677-9960
- Atlantic: [Y.A.L.E. School](#), 1000 Burton Ave., Northfield, NJ 08225; (609) 677-9960
- Gloucester: Y.A.L.E. School, 575 Fox Run Rd., Deptford Township, NJ 08096; (609) 677-9960

The State's most reputable recyclers, including GVI, are registered to R2:2013 Standard. [Responsible Recycling \("R2"\) Standard](#) for Electronics Recyclers is the leading certification in the field. ISO 14001, and OSHA's 18001 are also important standards for any recycling facility. While training on these [standards is available](#), it will be more important for apprentices to know these sorts of standards exist for health and safety.

Data destruction is an important aspect of the reverse supply chain. As data becomes more and more valuable, so will the need/price of ensuring it is not left in the trash.

Hard drive data destruction can be done by immediate shredding (mechanical) or better, by degaussing followed by dismantling. Certification of data destruction is typically provided for a client. The fees are modest, but important for a non-profit organization like Green Vision.

New Jersey appears to have ceded all precious metal extraction to Rhode Island. We do however have a [steel plant in Sayreville](#). It recycles steel as well as destroys illegal weapons seized by law enforcement. The plant produces rebar to reinforce concrete; a handy local source as the State rebuilds infrastructure.

In terms of WTE technology, [Covanta](#), headquartered in Morristown, is committed to innovation on behalf of the environment. Through their employees, Covanta commits to "demonstrating absolute dedication to sustainability goals." All aspects of the reverse supply chain touch on social/environmental responsibility in some way.

