Re+ Fast Start Action Overview

Mixed Waste Processing of Municipal Solid Waste

Description

Intended as a final screen of materials, Mixed Waste Processing (MWP) uses various types of sorting and processing equipment to remove valuable resources from the waste stream. Waste is fed into the MWP facility where the resources, such as recyclable or organic material, are separated from residual garbage. Once separated, these resources are sorted and prepared for sale and reuse, just as a material recovery facility (MRF) sorts a community's recycling stream. MWP plants are sometimes called "dirty MRFs" or "advanced MRFs" because they have similar equipment, processes, and end products.

MWP operations can divert up to 75 percent of municipal waste, thereby significantly reducing the amount that goes to the landfill. While some communities use MWP as the only recycling separation method, most use MWP as a final screen prior to disposal, and only after effective curbside recycling programs. Recyclables separated at the curb have higher values and higher demand than recyclables pulled from waste.

There are many types of MWP systems available. Different MWP systems can be customized to prioritize certain materials. Priority materials for recovery may include fiber for paper production, organics for anaerobic digestion and/or composting, metals and high-quality plastics for recycling, and various low-value materials for energy production. Most MWP facilities use similar tools to pull resources from the waste stream as MRFs, such as screens, magnets, blowers and vacuums, optical sorters, and robotic pick-stations. Modern MWP design frequently uses artificial intelligence pick stations for their speed and accuracy.

MWP facilities work best in communities with effective curbside recycling programs. Communities with widely used curbside organics diversion programs will produce drier municipal waste with less messy food waste. An MWP facility handling drier municipal waste can generally achieve higher diversion rates because there is less contamination of the recovered resources.

Background

Based on King County's 2019 Waste Characterization Study, approximately 70 percent of the county's municipal waste, over 600,000 tons, has value. King County's Solid Waste Division (SWD) and regional partners are implementing a range of waste reduction and waste prevention programs, under the Re+ umbrella, to keep many of those resources out of the garbage. MWP is another step before final disposal to get those resources out of the landfill and back into the circular economy.

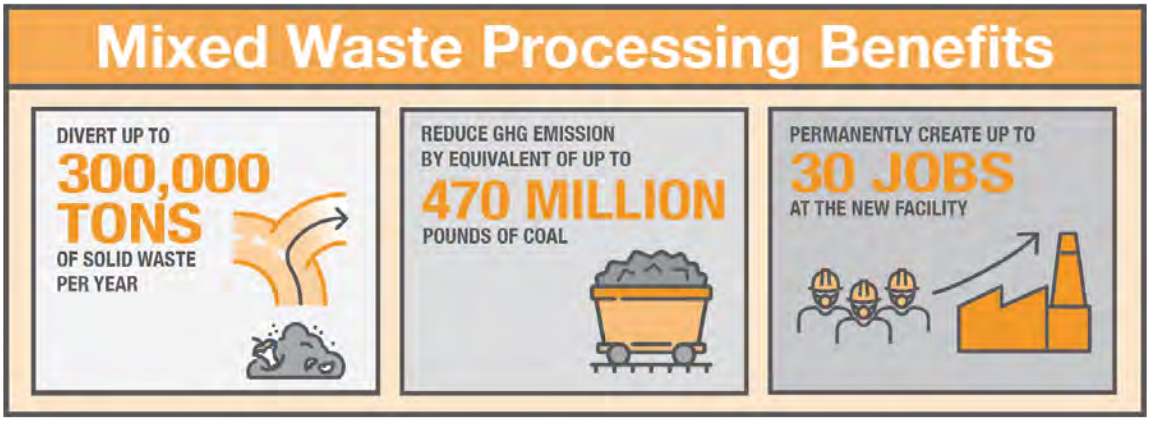
Diversion potential varies greatly, depending on the type of MWP chosen, as well as the size and tonnage capacity of the facility. MWP diversion may also change as the region implements other Re+ programs that prevent resources from getting into the trash in the first place. If other Re+ programs are successful, a MWP facility will have fewer resources to capture.

MWP is not widespread in waste management systems but is becoming more common as other waste prevention and reduction programs reach their limits. MWP may be customized for our

region's quantity and type of waste. Effective MWP can contribute to the circular economy by diverting resources back to the marketplace, using recovered materials for beneficial purposes.

The recycling marketplace generally prefers source-separated materials over MWP-sourced materials. Contamination lowers the demand and the value of resources after they're mixed with wet or sticky garbage. Paper is especially harder to sell with visible or smell contamination, unless working closely with a paper mill.

Benefits



- Diversion Potential: 50,000-300,000 tons per year (depends on chosen technology and future waste tonnage).
- Organics capture reduces odors from landfilling residual waste.
- Organics may be used for anaerobic digestion and/or composting.
- Captured metal, plastics, and paper/fiber can be a revenue source.
- MWP diversion means less resources going to landfill.
- Greenhouse gas emissions reduction: 70,000 to 425,000 metric tons of carbon dioxide equivalent.
    - This is equivalent to the emissions from 77 million to 470 million pounds of coal burned.[1]
- Jobs generated: Typically, 20-30 permanent jobs to operate a facility plus dozens of jobs during construction.[2]

Considerations

- Costs
    - MWP facility costs range depending on size and capabilities. Information on existing facilities below:

Location	Tonnage capacity	Cost
San Leandro, CA[3]	150,000 tons per year(tpy)	$120 million (2017)

Santa Barbara, CA[4]	180,000 tpy	$130 million (2021, inc. MRF and anaerobic digestion)
San Jose, CA[5]	180,000 tpy	Facility cost not shared
Toledo, OR (Juno)	120,000 tpy	Facility cost not shared

    - Annual operations and maintenance costs vary depending on MWP approach. Consultants with MWP experience can help clarify costs.
    - Ownership and operations can be either public or private or a mix. Capital costs, operating costs, and revenues vary depending on public versus private ownership and operations.
    - Hauler routes may change to adjust to the location of the MWP facility – if it is different from an existing transfer station.
- Behavior change
    - MWP requires no behavior change from residents or workers.
    - MWP is considered by some to undercut other waste prevention and recycling messaging by telling consumers that all resources will be sorted automatically, therefore they don't need to consume less or sort carefully.
- City Coordination
    - For MWP to achieve its intended goal collaboration and coordination with King County cities will be a critical component of success.

Equity and Social Justice Considerations

MWP typically captures and removes organic waste from the landfill. This means reduced odors and less methane released from handling and landfilling food waste. Methane is a powerful greenhouse gas that contributes to climate change, which disproportionately impacts historically disadvantaged communities. Reducing landfill methane emissions in King County helps both in and out of the County.

If sited strategically, MWP can decrease waste trucking volumes and reduce transportation impacts on communities.

Employees in a MWP facility are sorting mixed waste, so they are exposed to typical dangers associated with working around municipal solid waste. For waste sorters, waste handlers, and maintenance technicians, industry safety standards must be followed. Automation is making MWP and MRF operations safer over time.

Next Steps

SWD will continue researching and evaluating multiple MWP options as they come online and show diversion and performance records. In 2022 and 2023, SWD will be seeking MWP advice from a consultant with innovative solid waste expertise. The consultant will assist SWD in evaluating and possibly implementing a MWP strategy for King County. SWD is also negotiating with Georgia-

Pacific for a test of the Juno MWP facility, their proprietary technology. This will be a six-week test to process 1,000 tons of King County waste through the Juno facility and measure diversion. The Juno facility is currently achieving about a 60% diversion rate.

MWP project components include:

- Juno MWP test to occur in Q1 and Q2 of 2023
- Develop plan for long-term MWP-related needs
- On-going: monitor and evaluate relevant MWP projects by other agencies and jurisdictions.

Questions?

Email

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[1] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
[2] GreenWaste MRF, San Jose CA
[3] https://resource-recycling.com/recycling/2017/04/18/rr-exclusive-waste-management-builds-trash-sorting-mrf-near-oakland/
[4] https://santamariatimes.com/news/local/state-of-the-art-recycling-center-near-tajiguas-landfill-will-cut-emissions-generate-power/article_88d60f3d-2e5d-58a9-a5f9-69f7b1eebef6.html
[5] https://resource-recycling.com/recycling/2017/04/18/rr-exclusive-waste-management-builds-trash-sorting-mrf-near-oakland/