Long Term Disposal Options for Regional Solid Waste

REGIONAL POLICY COMMITTEE

SOLID WASTE DIVISION

King County Solid Waste System Overview

Operate 8 transfer stations, 2 drop boxes and 1 landfill

- Over **400** employees
- Serve **37** Cities (excluding Seattle and Milton)
- Cedar Hills Estimated Closure: ~2040
- Disposed of **865,000** tons of waste in 2022
- Recycling rate of **53%** (2021), including recycling over **973,000** tons system-wide
- ~70% of what gets thrown away could have been recycled instead

SWD Comp Plan Update
Long-Term Disposal Study

Considering 5 options

- Waste Export
- Waste to Energy – Incineration/Mass Burn
- Gasification
- Pyrolysis
- Refuse Derived Fuel

Against 6 criteria

- Environmental Impacts
- Social Impacts
- Logistics
- Capacity
- Economic Impacts
- Operating History

Comp Plan Update Overview

Comp Plan Activity	Date
Begin chapter updates	August 2023
Long Term Disposal Decision made	2024 Q2-Q3
Draft Comp Plan complete	2024 Q4
Public and Ecology Review	2025 Q1-Q2
Executive Approval	2025 Q3-Q4
Council Approval	2025 Q4 – 2026 Q2
City Approval	2026 Q2-Q3
Ecology Approval	2026 Q3-Q4

Waste to Energy Overview

Waste to Energy (WTE) turns typical mixed garbage into energy, and harnesses that energy for productive uses. Different technologies include:

- **Incineration**: garbage is burned to create steam and electricity.
- **Gasification**: using high heat, high pressure, and *limited* oxygen, garbage is transformed into fuels and chemicals.
- **Pyrolysis**: using high heat, high pressure, and *no* oxygen, garbage is transformed into chemicals and fuels.
- **Refuse Derived Fuel**: garbage is sorted, shredded, and dried into a stable uniform fuel source – used for a variety of industrial and energy needs.

All WTE technologies produce ash that typically requires disposal in specially designed landfill cells.

Waste Incineration

Facilities are proven, common, accepted world-wide, and can handle King County's projected municipal solid waste (MSW) volumes.

When permitted, some ash can be used for construction purposes.

- Currently, in WA state, per RCW this is not allowed.

Capital cost depends on size. The 2019 Arcadis study estimated >$1 billion for a facility to handle >1 million tons of waste.

- Revenue from energy sales helps offset capital and operating costs.

Siting, permitting, construction timeline is lengthy.

Waste Incineration – U.S. Facilities

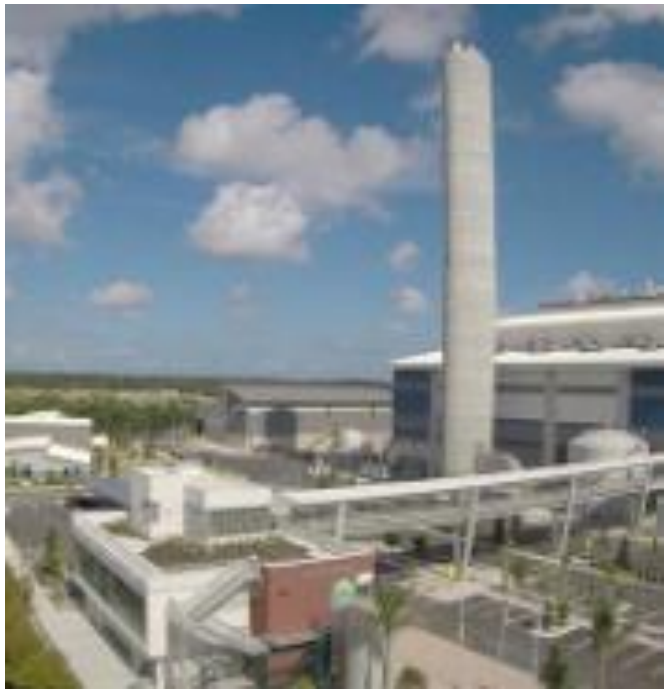
The number of incineration facilities in the U.S. has dropped by about 10% in the last 20 years.

The only new facility built in the last 20 years is West Palm Beach Florida, built in 2015.

Miami-Dade County Florida is currently planning a new incinerator to replace one that was damaged by fire in 2023.

Detroit Michigan demolished their incinerator in 2023 – and are now landfilling MSW.

Spokane, WA and Marion County (Salem, OR) incinerators are nearby.



Solid Waste as a Renewable Energy Source

- The US has over 70 waste-to-energy facilities processing ~34,310,000 tons of MSW per year.
- The federal government and over 30 states recognize waste-to-energy as renewable energy (e.g. Florida).
- To count as renewable in WA, state law would have to change the definition of “renewable energy” which specifically excludes MSW.

* per the EPA

Gasification

Gasification transforms solid materials into fuels and chemicals using high heat, high pressure, and *limited* oxygen.

- Generally produces more fuel (gas) than chemicals.

Gasification of single/homogeneous materials is used world-wide:

- Coal; forestry residue; crops; etc.

Gasification of MSW is an emerging, unproven technology.

- Not capable of handling King County's waste quantities.
- Facility price estimates are difficult to obtain or estimate.

Enerkem: operating since 2017 using some portions of MSW.

Fulcrum: operating since 2022 using pre-processed MSW (RDF).

Pyrolysis

Pyrolysis transforms solid materials into fuels and chemicals using high heat, high pressure, and *no* oxygen.

- Generally produces more chemicals than fuel.

Pyrolysis of MSW is an emerging but unproven technology.

- Not capable of handling King County's waste quantities.
- Facility price estimates are difficult to obtain or estimate.

Advocates call it "Chemical Recycling" – a way to turn waste plastic into new plastic building blocks.

- Brightmark Energy, Indiana: In start-up as of 2023.

Refuse Derived Fuel (RDF)

Refuse Derived Fuel is a stable uniform non-putrescible fuel source made from garbage.

RDF contains paper, plastic, textiles, wood debris, etc.

MSW is sorted, shredded, dried, and sometimes pelletized.

Non-combustible materials like metal, glass, and bricks are removed.

RDF is an interim step in processing waste and is used to produce energy for a variety of needs.

- RDF-style waste incinerators
- Gasification and Pyrolysis
- Cement and steel plants

Impacts from Re+ program

About 70% of what gets thrown away is useful – it could have been recycled, reused, repaired or composted to regenerate the earth

Reducing annual disposal tons from 850k+ to 300k+ does several things:

- Less waste = less disposal costs
- Less waste = smaller facility to process the waste
- Less waste = more viable options to process the waste
- Less waste = more “re-plusing” = better for the environment
- Less waste = more green jobs created

Re+ Actions

Underway

- Implement Organics Management Law requirements
- Created new grant programs and supported a statewide business incubator program
- Piloted use of a mixed waste processing technology
- 24 cities signed the Re+ Pledge

Future Actions

- Seek passage of statewide extended producer responsibility (EPR) bill
- Update collection standards to increase diversion of organics from single family homes
- Explore technologies to process commercial food waste (e.g. codigestion)
- Increase use of salvaged lumber
- Plan for and build a mixed waste processing plant

Mission

Reducing single use
Reusing everything that can be
Recycling what's left
Renewing communities
Rethinking what's possible

Vision

Healthy, safe, and thriving communities in a waste-free King County

Regional Rail Capacity

According to the 2019 Arcadis WTE and Waste Export by Rail Feasibility Study, there is adequate capacity to handle KC's waste.

- Projected 2045 rail capacity =260 million tons of cargo
- KC's Projected waste in 2045 ranges between 400,000 and 1.1 million tons

Our long-term disposal study consultant recently confirmed that they believe there is adequate capacity beyond 2040 to accommodate our low, medium and high tonnage scenarios – though Washington rail capacity for waste has become more challenging.

SWD's Harbor Island Property could serve as a location for exporting waste should that be the decision.

WTE Impact on Landfill Life

The next long-term disposal option is intended to be implemented once Cedar Hills closes so the next option will not have an impact on the life of the landfill.

Operating two disposal options at the same time would be expensive

- Relatively fixed costs for both options drives up unit cost:
  - Minimum staffing levels and equipment needed for both options
  - Requires environmental controls and regulations for both options

Thank you!