

Maximizing Resources



Minimizing Waste

City of Alexandria and Arlington County

Integrated Solid Waste Management Systems

For more information:

Solid Waste & Recycling Program in the City of Alexandria visit www.alexandriava.gov

Solid Waste & Recycling Program in Arlington County visit www.arlingtonva.us

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City of Alexandria & Arlington County



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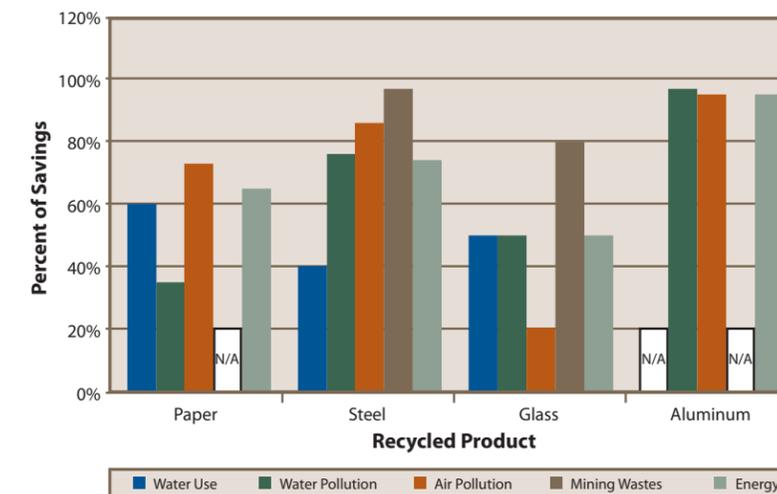
City and County Buildings Recycling: Both the City and County offer recycling programs in City and County buildings. The County expanded the recycling programs in its offices and facilities in 2007, adding over 400 recycling containers. The County recycles bottles, cans, and mixed paper in every facility, department, and office, including libraries and community centers. In 2006, the County collected 209 tons of recyclable materials in its offices and buildings.

Mulching Programs: In 2006, the Jurisdictions collected 24,332 tons of yard waste from residential curbs. In the fall, the Jurisdictions offer curbside pickup of filled bags and vacuum leaf collection. In the spring, they offer curbside collection of yard waste. The County also offers year-round brush recycling collection by request. Leaves and yard waste collected are used to create mulch which is available free of charge for residents in the County and City. Both Jurisdictions provide information on their websites for grasscycling and backyard composting.

Recycling is Good for the Environment

Using recycled material to create new products instead of mining for iron ore to make a new soup can; importing oil to make a new plastic water bottle; or cutting down more trees to make a ream of paper, not only reduces the quantity of trash, but it also helps reduce water usage, water and air pollution, and mining waste generation. The table below shows that, depending on the material, water usage savings ranges from 40 to 60%; water pollution savings ranges from 35 to 97%; air pollution savings range from 20 to 95%; and mining waste savings for steel and glass are between 80 and 100%. In addition, recycling uses much less energy than using virgin materials. Recycling 1 ton of plastic saves the equivalent of up to 2,000 gallons of gasoline.

Recycling Reduces Water Usage, Water and Air Pollution, and Mining Wastes

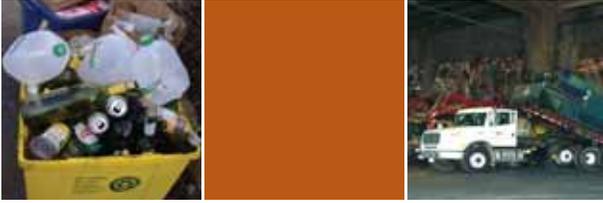


Through the aggressive recycling program described and the use of the EfW Facility, the Jurisdictions are working for a cleaner environment. The integrated waste management system allows the County and the City to maximize the use of resources while minimizing the waste for disposal. Looking into the future, the Jurisdictions will continue to maximize their recycling and composting opportunities while minimizing the air emissions and waste for disposal.



The Jurisdictions collected over 56,000 tons of paper, 13,000 tons of scrap metal and appliances, 14,000 tons of bottles and cans, and 24,000 tons of yard waste through their many recycling and yard waste collection programs.





Maximize. Minimize.

Managing Resources

The City of Alexandria and Arlington County (Jurisdictions) strive to efficiently and cost-effectively manage municipal solid waste generated within their borders in a way that minimizes the impact on land, air, and water. The focus of solid waste management used to be on disposal, “out of site; out of mind.”

Over the past 20 years, as concern about air and water quality, energy consumption, and diminishing open space increased the focus of solid waste management has shifted to finding the highest and best use of materials through an integrated waste management system.



According to the United States Environmental Protection Agency (EPA), an integrated waste management system is designed to function through the complementary use of a variety of practices, such as reuse, recycling, and energy-from-waste (EfW), also known as waste-to-energy (WTE), to effectively handle municipal solid waste.

Using EPA’s solid waste hierarchy, the Jurisdictions combine source reduction, recycling, EfW, and landfilling to manage their waste. Single-family homes receive curbside recycling collection and businesses and multi-family properties are required to recycle through their hauler. With these tools and programs, the Jurisdictions were able to recycle approximately 33% of the waste generated in 2007, including televisions, bottles and cans, and yard waste. For waste that is not recycled, the Jurisdictions use EfW technology to safely reduce the volume of the waste by over 90%, and to generate electricity. In 2007, almost 350,000 tons of municipal solid waste (MSW) were collected and processed at the Alexandria/Arlington EfW facility in Alexandria generating enough electricity to power over 20,000 homes. In 2007, the Jurisdictions only had to dispose of approximately 90,000 tons of ash.

Goal

To efficiently and cost effectively manage solid waste generated within the Jurisdictions in a way that minimizes environmental impacts on the land, air, and water.

Manage Integrated Solid Waste Management System

Minimizing Environmental Impacts

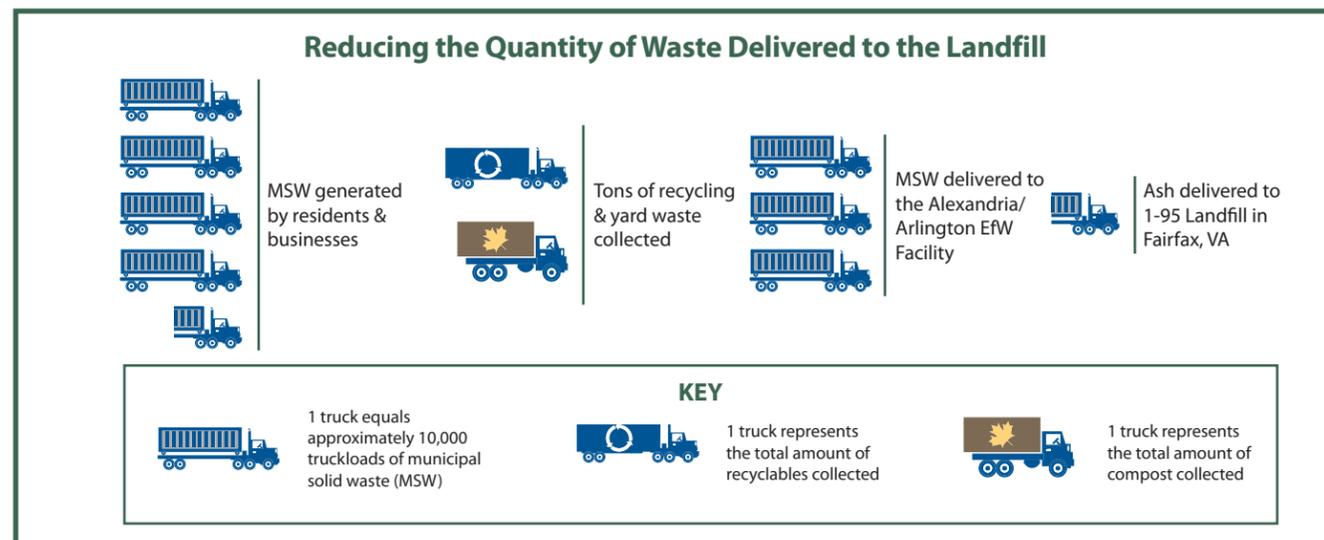
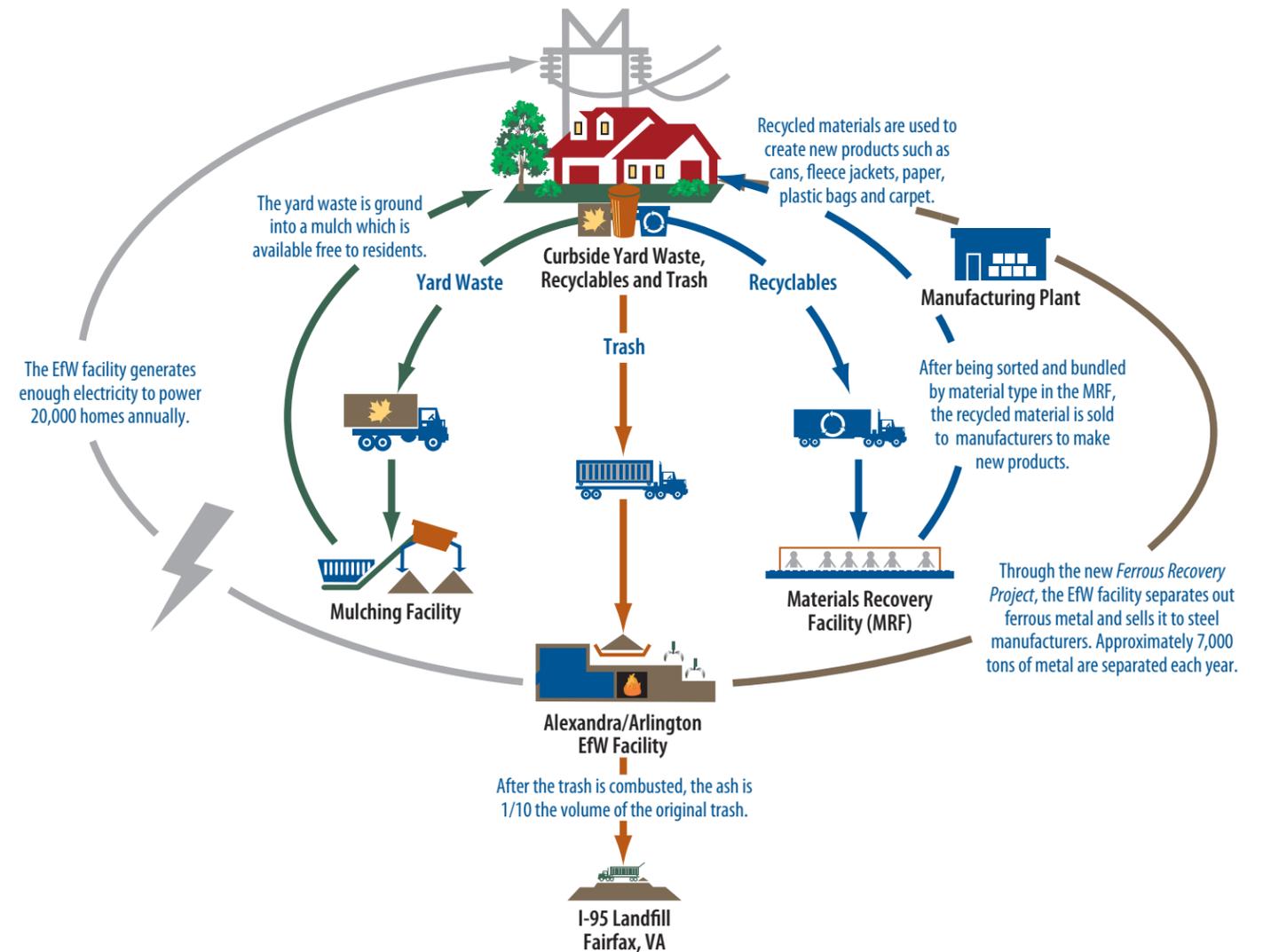
- Recycling, composting, and EfW avoid greenhouse gases (GHG) generated by landfilling, manufacturing virgin materials, and burning of fossil fuels.
- Minimizing the use of landfills helps reduce the risk of groundwater contamination and methane production, while saving open space.

Finding the Highest and Best Use

- Recycled materials collected through the Jurisdiction's curbside and drop-off programs support recycling through the creation of new products such as fleece jackets from recycled plastic and soda cans from recycled aluminum.
- Leaves and holiday trees collected in both communities become mulch that is available for use by residents.
- The EfW facility recently installed a new electromagnet, which pulls out ferrous metal from the ash for recycling through local scrap markets.

Taking Responsibility

- Most waste collected is processed within the two Jurisdictions, thereby taking responsibility for their waste in a sustainable manner. This eco-sustainable approach reduces the need for rural communities to build landfills, and associated long-haul truck traffic and emissions are reduced.



Convert Energy-from-Waste (EfW)



The Jurisdictions have been using the Alexandria/Arlington EfW Facility to convert municipal solid waste into energy since 1988. The Facility can generate up to 23 megawatts (MW) of electricity, which is sold to Dominion Virginia Power Company. The ash generated by this process is disposed of at the I-95 Landfill in Fairfax County. Utilizing EfW technology results in a number of environmental and community benefits, such as the following:

EfW Reduces the Carbon Footprint of Solid Waste Management

Avoids Landfill GHG Emissions

Landfills generate methane, which is a greenhouse gas (GHG) with a greenhouse effect 25 times greater than carbon dioxide, according to the Intergovernmental Panel on Climate Change (IPCC). Landfills are one of the largest sources of man-made methane in the United States. By using EfW technology, the Jurisdictions are avoiding the GHG emissions that would be released if the trash were sent directly to a landfill. It is estimated that for every ton of waste processed at the EfW facility, approximately one ton of GHG of carbon dioxide is prevented from entering the atmosphere. The EfW facility reduces the weight of trash by over 70% and the volume by over 90%.

Avoids Fossil Fuel GHG Emissions

The generation of electricity is one of the largest contributors of GHG emissions in the United States because it is primarily generated through burning coal and natural gas. EfW generates cleaner electricity and reduces the amount of electricity generated from fossil fuels. Burning coal releases significantly more GHGs, than EfW. One ton of MSW generates approximately 2/3 megawatt hour (MWh) of electricity. The average American household uses approximately 10.7 MWh of electricity per year. The Alexandria/Arlington EfW Facility generates enough electricity each year to power over 20,000 homes.

Avoids Raw Material Mining GHG Emissions

With the installation of a new electromagnet, the EfW facility now recovers steel from the waste stream, reducing the quantity of fossil fuels and energy used for mining and manufacturing raw materials. These metals are sold to steel mills to create new steel products such as cans and beams for construction. In addition, recycling this metal prevents it from being disposed of at the I-95 Landfill. The ferrous recovery system is anticipated to recover over 7,000 tons of metal annually. Recycling one ton of steel saves the energy equivalent of 3.6 barrels of oil and 1.49 tons of iron ore that would be used to produce new steel. Through the ferrous recovery system, the Jurisdictions will save approximately 25,200 barrels of oil and 10,430 tons of iron ore that would have been required to produce new steel. The Ferrous Recovery Project was one of four finalists for the Alexandria Technology Achievement Award, co-sponsored by the City of Alexandria, the Alexandria Economic Partnership, and the Alexandria Chamber of Commerce.

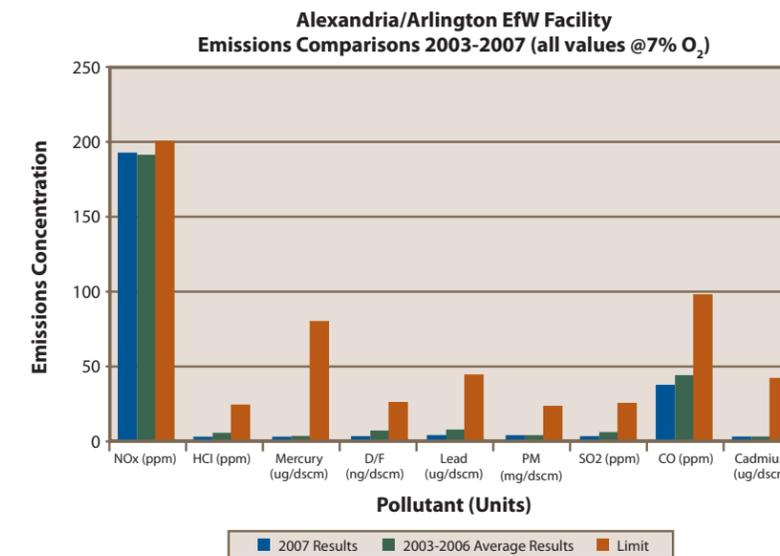
In 2000, the Facility was retrofitted with advanced air pollution control equipment to comply with new, stricter EPA air emission standards. Today, air emissions for

Alexandria/Arlington EfW Facility Outperforms EPA Air Emissions Standards

dioxins, particulate matter, and sulfur dioxide are all at least 90 percent below the State permit limits for these emissions. In addition, emissions of mercury and lead are approximately 99% lower than the State limits.

Even though the Nitrogen Oxide (NOx) emissions of the Facility are below the State standards, the Jurisdictions and Covanta have been working together to lower the emissions even more. NOx emissions are a concern to the Jurisdictions because Arlington County and the City of Alexandria are located in an EPA non-attainment area for ozone; and NOx emissions can contribute to ozone pollution. A non-attainment area designation means that air quality in the Jurisdictions does not meet one or more of the National Ambient Air Quality Standards for the ozone designated in the Clean Air Act. The Jurisdictions pro-actively sought to reduce NOx emissions by approximately 10 percent through a NOx Optimization Program.

Air Emissions Fall Far Below Permit Limits



Covanta and the Jurisdictions Value Health and Safety

In 2004, Covanta Alexandria/Arlington was inducted into the US Occupational Safety and Health Administration (OSHA) VPP STAR worksite, the highest honor given to all facilities with outstanding health and safety practices.

In 2005, Covanta Alexandria/Arlington was admitted into Virginia's Environmental Excellence Program sponsored by the Virginia Department of Environmental Quality (VDEQ). Covanta Alexandria/Arlington was inducted as an Exemplary Environmental Enterprise, which means they have fully-implemented Environmental Management Systems (EMS), pollution prevention program, and demonstrated environmental performance.

Covanta Takes Active Role in the Community

In addition, Covanta Alexandria/Arlington is a contributing member of the Alexandria/Arlington community. In 2007 and 2008, they sponsored:

- The INOVA Alexandria - Walk to Fight Breast Cancer,
- Virginia Recycling Organization,
- Earth Day 2007,
- Alexandria Volunteer Bureau,
- The Scholarship Fund of Alexandria, and
- Alexandria's Eco-City Summit.



ECO-CITY ALEXANDRIA

In June of 2008, the City of Alexandria adopted the Eco-City Charter, and commits the City to dispose of solid waste in an environmentally sustainable manner, following the hierarchy of "Reduce, Reuse, Recycle, and Resource Recovery (recover energy) prior to disposal."

The EfW Facility generates enough electricity each year to power over 20,000 homes.

Energy-from-Waste Process (typical layout)



Scale-House
The first stop for trucks after entering the Facility is the scale-house. Haulers are charged a fee based on the weight of their load and the type of waste they are transporting.



Tipping Hall
Trucks dump their loads. Operators screen incoming material to keep inappropriate wastes out of the combustion process.



Waste Is Moved to Combustion
Overhead cranes move the waste from the pit to the charging hoppers, nearly 3 to 5 tons at a time, for introduction into the combustion chambers.



Combustion Chamber
Waste is burned on the patented Martin Grates, at furnace temperatures exceeding 1,800°F, where finger-like devices are constantly exposing the unburned waste to fire, ensuring the most efficient combustion.



Control Room
Highly trained personnel monitor operating conditions in the entire facility, including the state-of-the-art continuous emissions monitoring system.



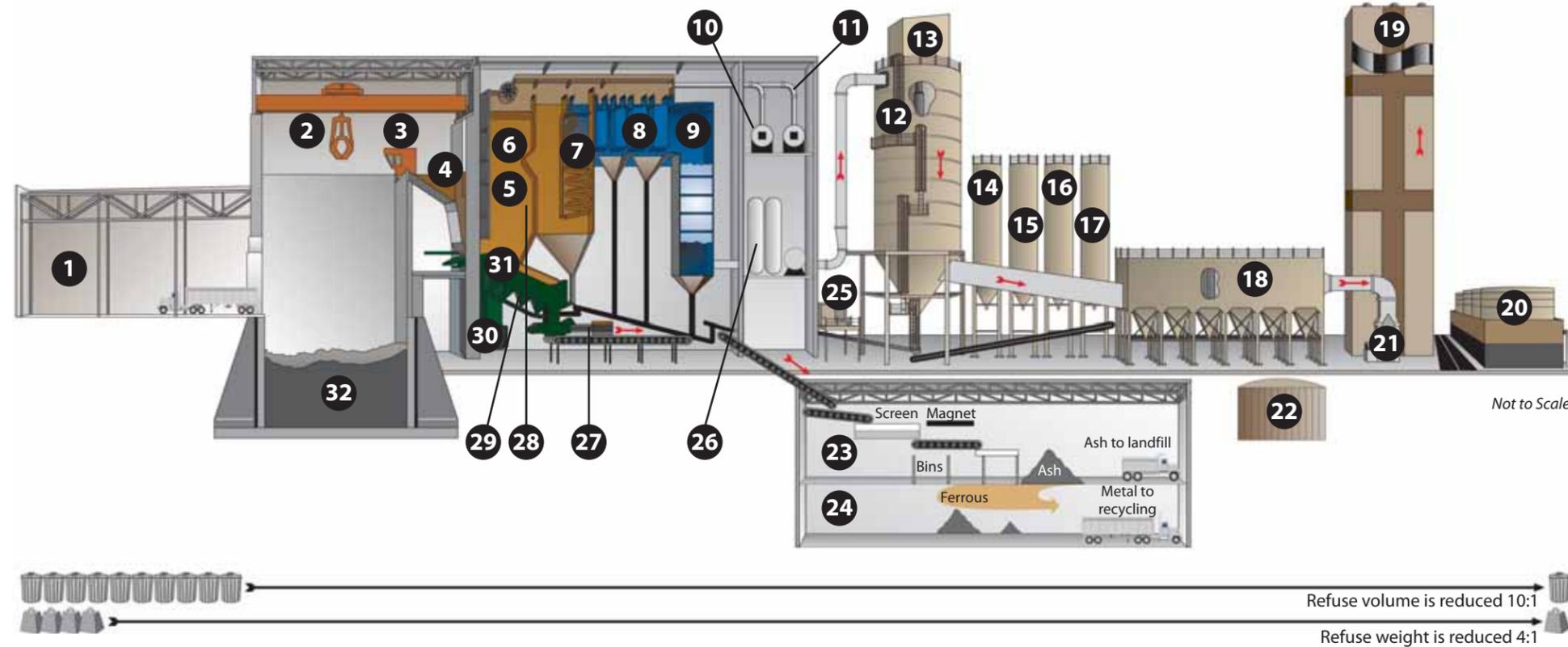
Air Pollution Control
The Facility's new emissions control system can process emissions to exceed 1990 federal Clean Air Act requirements. The first of four stages is where anhydrous ammonia injection turns smog-causing nitrogen oxides into nitrogen and water.



Scrubbers & Fabric Filter Baghouse
Hot gases, after passing through the boiler, are washed with lime slurry to stabilize acid gases. Next, activated carbon scrubs out mercury, dioxin, furan and other pollutants. In the final stage, tiny particles, not visible to the human eye, are filtered out by some 2,000 cylindrical bags.



Electricity Generation
Electricity, enough to power some 23,000 homes, is distributed to the power grid via Dominion Virginia Power's transformer.



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|---------------------------|-----------------------------------|-------------------------|----------------------------|--|------------------------|
| 1. Tipping Hall | 8. Superheater | 14. Ammonia Tank | 20. Cooling Towers | 25. Continuous Emissions Monitoring System | 30. Combustion Air Fan |
| 2. Grapple Crane | 9. Economizer | 15. Carbon Silo | 21. Induced Draft Air Fan | 26. Boiler Water Treatment | 31. Grate Surface |
| 3. Crane Operator | 10. Electrical/Turbine Generators | 16. Lime Silo | 22. Water Tank | 27. Dolomitic Lime Added | 32. Refuse Holding Pit |
| 4. Refuse Feed Chute | 11. Steam Feed Lines | 17. Dolomitic Lime Silo | 23. Metal Removal from Ash | 28. Ammonia Injection | |
| 5. Combustion Chamber | 12. Dry Gas Scrubber | 18. Baghouse | 24. Ferrous Metal | 29. Stoker Grate | |
| 6. Radiant Zone (furnace) | 13. Lime & Carbon Added | 19. Stack | | | |
| 7. Evaporator | | | | | |



Ferrous Recovery
A large electromagnet removes ferrous metals from the ash, recycling approximately 2% of the incoming waste.



Ash Management
Ash is collected from the combustion chamber, scrubbers and baghouse to be disposed of at an approved landfill.



Steam Condensing & Water Reuse
Large fans, used in conjunction with a water spray system, cool and condense the steam produced for electricity generation. The condensed steam, reconverted to water, is then pumped to the boilers to generate additional steam, completing the cycle.



Recycle Recycling



Recycling Reduces the Quantity of Materials for Final Disposal

In 2006, the City of Alexandria recycled over 24% and Arlington County recycled over 42% of the waste generated by residents and commercial entities. The Jurisdictions achieved these high recycling rates through a comprehensive recycling program that targets homes, apartments, and businesses through recycling mandates, curbside collection, and drop-off facilities. Both communities have developed proactive education campaigns to ensure that all community members know how to recycle materials from paper to socks and from bleach to computer monitors.

The Jurisdictions Offer Many Ways to Recycle

Curbside Recycling Collection: The City recently changed to single stream collection. Residents in Alexandria may combine all recyclable material in one bin and place it on their curb. Single stream collection can be more convenient to residents and has the goal of increasing the diversion rate. Residents in the County must separate paper from the bottles and cans. Both Jurisdictions offer weekly curbside collection of large metal items and appliances and unbundled brush by request.

Drop-off Recycling Programs: The City provides four recycling drop-off locations and the County provides 2 locations. Residents can bring the same recyclable materials to these centers that are picked up curbside. The City also accepts alkaline batteries at these centers.

Household Hazardous Waste Drop-off Program: Both Jurisdictions provide a household hazardous waste (HHW) drop-off center. Residents can bring most common HHW products such as paint thinner, batteries, and lawn care products; and electronics such as computers and televisions. In 2006, the Jurisdictions collected over 450 tons of HHW including cleaners and paint thinner. The Jurisdictions also collected over 500 tons of electronics.

Business/multi-family Recycling: Business and multi-family recycling is legally required in both the City and County. Multifamily properties, homeowner's associations not receiving City solid waste collection services, and businesses are responsible for 77% percent of the City's solid waste and 70-75% of the County's solid waste. Business and multi-family building owners and homeowner associations (HOA), that contract directly with haulers, must maintain an advertised recycling program, which is separate from the refuse collection. In the County, business building owners must recycle the two materials it generates annually in the greatest quantities. Multi-family building owners must recycle newspapers, glass bottles and jars, and metal food and beverage containers. Multi-family properties are encouraged to include additional recyclable materials such as plastic bottles and jugs, magazines, mixed paper, and corrugated cardboard.

Recycling at School: The Arlington Public Schools operates a recycling program. All 44 schools and administration buildings recycle bottles, cans, and mixed paper. The larger facilities recycle cardboard as well. Many schools in the City of Alexandria Public Schools also collect paper, cans, and bottles for recycling.

Special Events Recycling: Both the City and the County promote event recycling through information and provision of event recycling bins. Since 2005, the County has coordinated recycling at approximately 100 events, ranging from the County Fair, to large street festivals, and the Marine Corps Marathon.