

Commerce Refuse-to-Energy Facility

WASTE DIVERSION: A CHALLENGE FOR SOUTHERN CALIFORNIA COMMUNITIES

Los Angeles County successfully diverts more than 50 percent of the solid waste generated each day from local landfills. While recycling makes up the majority of the diversion, environmentally sound refuse-to-energy facilities, which use refuse as fuel to produce power, play an important role by recovering energy from wastes that cannot be easily recycled.

Refuse-to-energy facilities can lessen our reliance on fossil fuels and prolong remaining landfill capacity for future use. Some of the benefits derived annually from the Commerce Refuse-to-Energy Facility (Commerce Facility) are: (1) it generates a net of 10 megawatts (MW) of electricity, enough to power about 13,000 homes, which saves the equivalent of more than 95,000 barrels of oil; (2) it recovers 1,925 tons of metal, equivalent to the metal in 750 cars; and (3) it saves 155,000 cubic yards of landfill space, equivalent to a football field piled 93 feet high. The City of Commerce and the Sanitation Districts of Los Angeles County jointly undertook the initiative and designed and built the first municipal refuse-to-energy facility in Southern California.

COMMERCE REFUSE-TO-ENERGY FACILITY: CONTINUED OPERATION EXCELLENCE

Planning for the Commerce Facility began in 1981. The original goal of the project was to demonstrate that refuse-to-energy is a viable alternative method of solid waste management in the South Coast Air Basin, where air pollution requirements are the toughest in the world. The Commerce Facility has achieved its goal by meeting regulatory requirements since 1987.

The Commerce Facility was the first plant in the world to use a unique state-of-the-art combination of air pollution control devices. These devices consist of ammonia and limestone injection into the furnace, followed by a dry scrubber, and finishing with a baghouse. This combination of devices has earned the Commerce Facility the reputation for being the cleanest of all the plants of this type in the world.

The Commerce Facility poses no health threat to the community. A health risk assessment prepared and reviewed by the South Coast Air Quality Management District (SCAQMD) and the California Office of Environmental Health Hazard Assessment revealed that the cancer risk for the average person living near the Commerce Facility is only 0.3 in a million. To put this into perspective, the cancer risk from eating peanut butter everyday is 560 in a million, and the risk from drinking one pint of milk per day is 140 in a million.

THE COMMERCE EXPERIENCE: A DOCUMENTED SUCCESS

The Commerce Facility has established itself as one of the best refuse-to-energy plants in the world, having produced some of the lowest emissions on record and operating an innovative ash reuse system.

The Commerce Facility has won four national awards:

- Environmental Protection Award from “Power” Magazine
- Award of Excellence from the Solid Waste Association of North America
- Grand Prize for Operation/Management from the American Academy of Environmental Engineers
- Facility Recognition Award from the American Society of Mechanical Engineers

Since the beginning of operation in 1987, the Commerce Facility has reliably generated enough electricity for about 13,000 homes. Thousands of people have toured the plant, including visitors from almost every state plus countries such as: the Philippines, Japan, Finland, Canada, Denmark, New Zealand, Taiwan, China, Sweden, Korea, Costa Rica, Mexico, Russia, Germany, England, Italy, India, Pakistan, Egypt, South Africa, Brazil, and Thailand.





WEIGH SCALES

Each truck must be weighed and pay a fee based upon the refuse weight before disposing of its load. Special meters screen all loads for radioactive materials, which, if found, will be safely handled by the Department of Public Health.



REFUSE STORAGE PIT

After weigh-in, the trucks dump their loads into the refuse storage pit. The storage pit has a 1,200-ton capacity, enough to run the Commerce Facility for three to four days. Each day, some loads are pulled aside on an unannounced basis and checked for unacceptable waste, and all employees and crane operators are trained to look for such materials. All loads are scanned for large pieces of ferrous metal, which are removed and recycled. The crane operator scoops up 3,000-pound loads of refuse and delivers them to the furnace feed chute. The entire storage pit area is enclosed, and air is continuously drawn into the refuse storage building to eliminate the escape of odors or dust. This air is then used for burning of the refuse. Odors are destroyed by the high temperature in the furnace. Four carbon filters are used for odor control when the furnace is shut down for maintenance.

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FURNACE & BOILER

After the refuse reaches the bottom of the charging chute, hydraulic rams push it into the burning area. The floor of the furnace contains moving grates that push the burning refuse through the furnace and ensure complete combustion. The ash falls from the ends of the grates and is quenched with water. The hot gases of combustion rise through the furnace as they travel to the boiler. The walls of the furnace contain steel pipes carrying water that begins to heat as the gases pass over the pipes. Ammonia is injected into the furnace to remove nitrogen oxides, which would otherwise contribute to smog. Limestone is also added to aid in acid gas removal. As the hot gases enter the boiler, the hot water contained in the boiler tubing is converted to high-pressure steam.

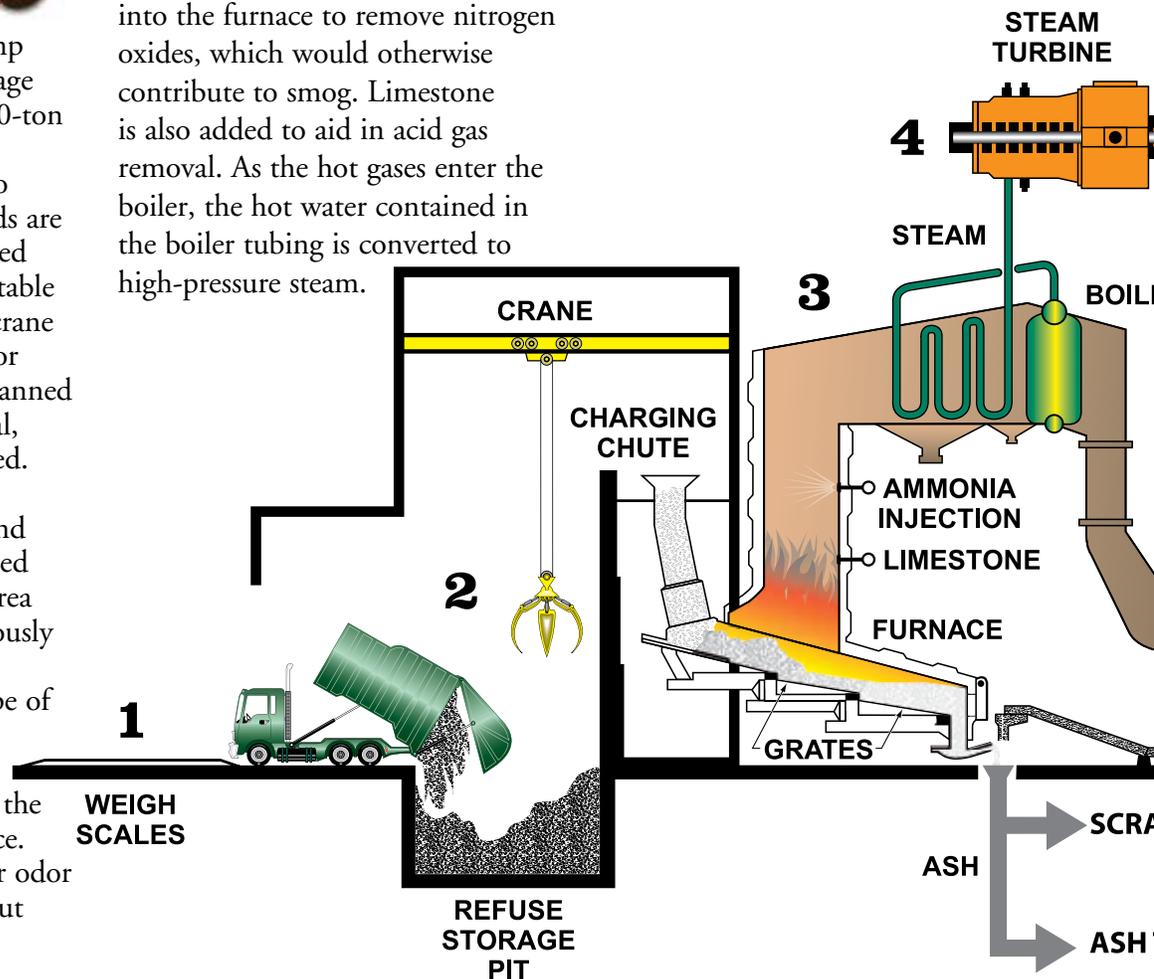
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TURBINE-GENERATOR

The steam leaving the boiler enters a steam turbine. The high-pressure steam causes the turbine blades to turn at high speed. The turbine is coupled to a generator that produces 11.5 megawatts of power. One and one-half megawatts of this power is used to run the Commerce Facility, leaving 10 megawatts to be sold to Southern California Edison. The revenue from the sale of power helps to retire the bonds that were sold to build the Commerce Facility.

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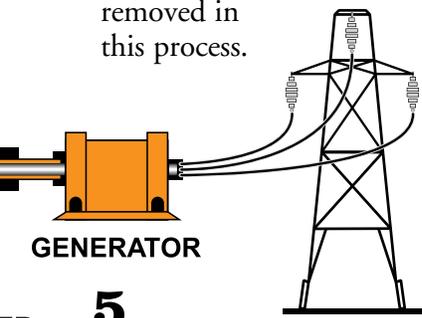




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DRY SCRUBBER

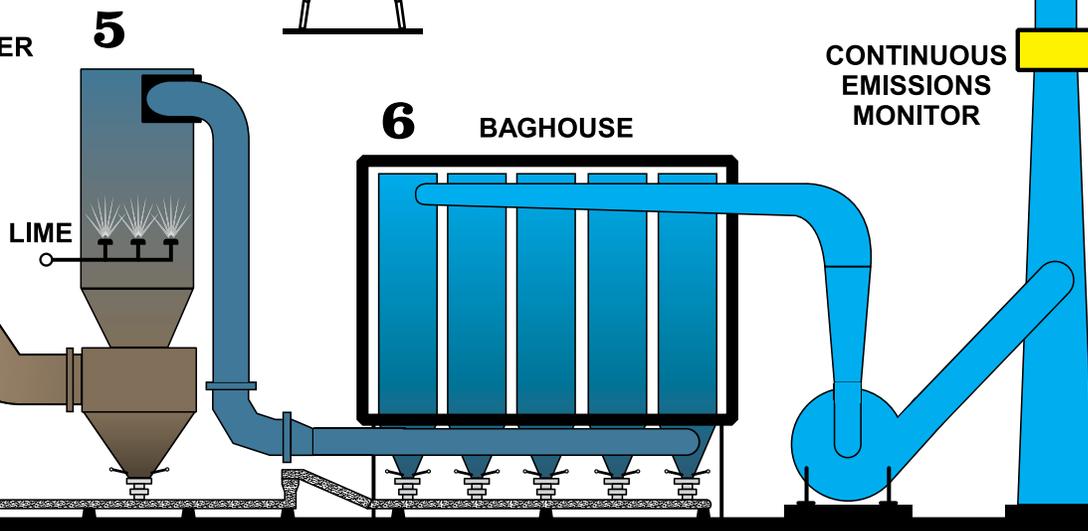
After leaving the boiler, the hot combustion gases continue through sophisticated air pollution control systems. The dry scrubber sprays wet lime into the flue gas, which converts acid gases such as sulfur dioxide and hydrochloric acid into a solid that is collected in the baghouse. Any unreacted lime exiting the scrubber is collected in the baghouse, which can then capture additional acid gases. In excess of 95 percent of the sulfur dioxide and hydrochloric acid are removed in this process.



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BAGHOUSE

The baghouse operates like a gigantic vacuum cleaner. As the air is drawn through the baghouse, particulate matter and fly ash are left on the inside of the bags, and the air is allowed to travel through. The baghouse contains eight modules with bags made of fiberglass. The modules are cleaned by blowing air, in the reverse direction, through the bags. The particulate matter and fly ash are removed through the bottom. This process removes 99.5 percent of the particulate matter in the airstream down to sub-microscopic levels, eliminating any visible plume. After leaving the baghouse, the cleaned exhaust gases exit through a 150-foot stack. Monitoring devices incorporated into the stack continuously monitor the air for nitrogen oxides, sulfur oxides, and carbon monoxide.



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ASH RECYCLING

The ash exiting the Commerce Facility makes up approximately 30 percent of the total weight of the incoming refuse. Metals are recovered from the bottom ash and recycled. The remaining ash is reused at landfills for road base. Alternative uses of some of the ash as construction materials may become a possibility in the future.

The Commerce Facility produces power seven days a week, 24 hours per day. An average of 50 trucks per day deliver loads Monday through Friday during normal working hours. The Commerce Facility burns an average of 350 tons of trash per day and generates a net 10 megawatts of electricity for sale to Southern California Edison. This is enough for about 13,000 Southern California homes. Sophisticated air pollution control equipment approved by the SCAQMD consistently maintains low emissions. Testing of the emissions is performed continuously with in-stack monitors. After metals are recovered, the screened bottom ash and fly ash are transported to a landfill for reuse.

AP METAL TO RECYCLER

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TO LANDFILL





LOOKING TOWARD A REGIONAL SOLUTION TO DISPOSAL PROBLEMS

Society cannot completely eliminate the generation of wastes. As long as there are people and industry, wastes will be created and require management.

While we can't make the waste disappear, we can create an environmentally safe and cost-effective integrated solid waste management system incorporating refuse-to-energy, recycling, composting, materials recovery, and state-of-the-art sanitary landfilling. State law requires cities and counties to divert 50 percent of the waste stream from landfills. Refuse-to-energy facilities can create electrical power and help to fulfill the diversion requirement.

Green Waste Recycling



Recycling Center



Landfilling





SANITATION DISTRICTS OF LOS ANGELES COUNTY



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