The BurN Book



Incinerators that Threaten the Climate, Public Health, and our Finances

GLOBAL WEEK OF ACTION TO STOP INCINERATION

gaia

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GLOSSARY

Baghouse system:

An air-pollution-control system that filters fine particles out of an incinerator's exhaust gases before they are released through the smokestack. The exhaust passes through fabric filters, or "bags," that trap particulate matter. The captured material is periodically removed from the filters and becomes part of the facility's collected pollution-control residues.[1]

Biogenic CO_2:

Carbon dioxide released when recently living biological materials—such as food, paper, wood and other plant-based materials—are burned or decomposed. It is distinguished from fossil CO_2, which comes from burning fossil-based materials such as plastics. Although biogenic CO_2 is sometimes excluded from certain greenhouse-gas inventories or carbon-accounting systems, it is still CO_2 released directly into the atmosphere and should not be understood as having zero emissions.[2] Unless otherwise stated, all total CO_2 emissions reported in this publication include both fossil and biogenic CO_2.

Incinerator ash - bottom ash, fly ash and slag:

The solid residues left behind after waste is burned. Bottom ash is the heavier material that remains at the bottom of the furnace and can contain ash, glass, metals, minerals and partially burned material. Fly ash refers to finer particles carried with the incinerator's flue gases and captured by pollution-control equipment; related air-pollution-control residues can also contain pollutants removed from the exhaust gases. Slag is melted material that cools and solidifies during or after combustion and is often considered part of the bottom-ash stream.[3]

Per- and Polyfluoroalkyl Substances (PFAS):

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals characterized by a strong bond between fluorine and carbon.[4]

Put-or-pay contracts:

A waste contract that requires a city or other waste supplier to deliver a minimum amount of waste to an incinerator, or pay for some or all of that amount even if the waste is not delivered. These contracts can discourage waste prevention and recycling because reducing the amount of waste sent for burning may trigger additional payments.[5]

Waste entrapment / waste lock-in:

A situation where a city or region becomes financially or contractually dependent on supplying an incinerator with a steady amount of waste for many years. Because incinerators are expensive to build and operate, long-term contracts, debt, and minimum-waste requirements can make it harder for governments to reduce waste, expand reuse, recycling and composting, or move away from incineration.[6]

Waste-shed:

The geographic area from which a waste facility receives its waste. A waste-shed may include a single city or county, multiple municipalities or a much larger region, depending on the facility and the contracts or waste-management system supplying it.[7]

INTRODUCTION

Around the world, governments have turned to waste incineration—often promoted as "waste-to-energy" (WtE)--to manage growing quantities of municipal waste under the guise of energy recovery. But incineration does not eliminate the waste; it converts it into greenhouse gas emissions, toxic air pollutants, and ash, while destroying materials that could otherwise be reused, composted, or recycled.

The fundamental question for governments should be not how to dispose of increasing quantities of waste, but how to redesign systems to avoid waste generation in the first place. A United Nations Environment Programme (UNEP) analysis found that a lifecycle approach centered on waste prevention, reduction, reuse, and recycling can substantially reduce projected waste growth while delivering economic, environmental, and social benefits.8 Incineration makes this transition to zero waste systems difficult because facilities require a continuous supply of combustible waste and enormous upfront investment. Once built, long-term contracts, minimum-tonnage requirements, put-or-pay provisions, public financing, subsidies, and other forms of government support lock municipalities into generating high volumes of waste for decades.

Guaranteeing incinerators a large supply of waste undermines efforts to reduce it and, when local supplies decline, creates pressure to expand a facility's waste-shed by seeking waste from other regions or countries— making the local community a "dumping ground" for other municipalities. In this way, infrastructure intended to manage today's waste can become a long-term obligation to maintain and even grow waste volume instead of reducing it. The substantial public and private resources required to build and maintain incinerators could instead support zero waste systems like source reduction, reuse and refill, repair, separate collection, recycling, and composting.

In addition, WtE should not be considered "renewable energy", as waste is not a renewable resource. Valuable resources were extracted and used to create the products that eventually turn to waste, and burning it does not make its environmental impacts disappear. Incineration releases greenhouse gases—including CO_2 from plastics and other fossil-derived materials, along with biogenic CO_2 (which has the same impacts)--and destroys the material value of products that could otherwise remain in circulation. It also generates bottom ash and fly ash, which are highly toxic and must be transported, treated, and ultimately disposed of.

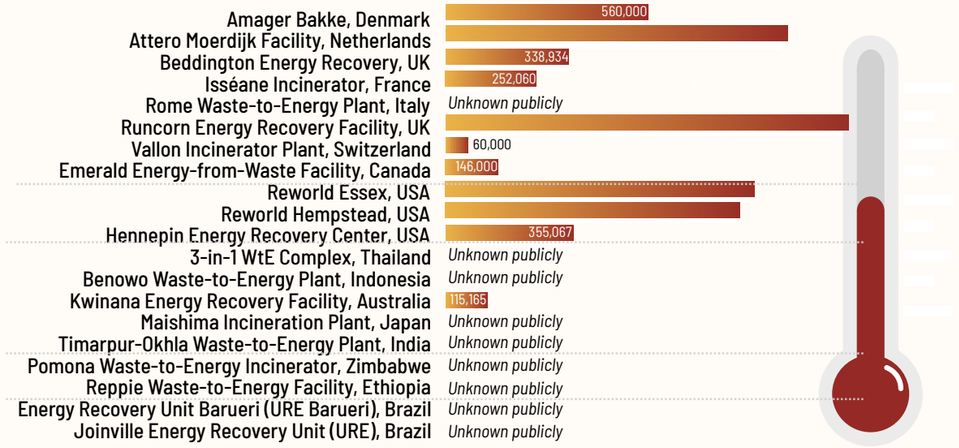
The resulting burdens can extend well beyond the incinerator itself: from the communities where the virgin resources are extracted to create products, to the communities generating the waste, to those living near waste transfer stations, to the neighborhood surrounding the facility, and ultimately to the communities near incinerator ash processing and disposal sites. In many cases, incinerators and their related infrastructure are located in neighborhoods already suffering from other kinds of industrial pollution, adding further impacts to an already overburdened community. Incineration does not make the waste problem go away; it merely turns one form of pollution into another more concentrated form - harming human health and the environment, worsening climate change, and squandering taxpayer funds in the process.

Incinerators harm people and the planet, and lock public resources into harmful infrastructure that depends on massive waste production, as this report lays out. Rather, governments should invest upstream, in: source reduction, reuse and refill, repair, recycling, and composting. These zero waste systems prevent waste, conserve resources, move communities toward a regenerative future, and must be used to frame the future of waste management.



Greenhouse gas emissions from 20 incinerators worldwide

(metric tons CO_2e/year)



Which is equivalent to:

At least

5.5 million

metric tons/year

Based on publicly available data for **11 facilities** out of **20 incinerators** studied

1.3 million
passenger cars on the road for one year

1.5
coal-fired power plants in one year

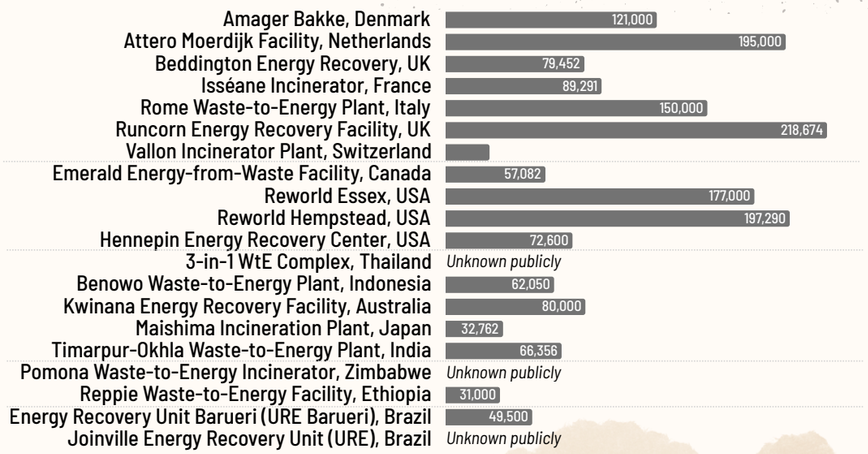
746,000
homes' energy use for one year



(c) Global Alliance for Incinerator Alternatives (GAIA)

Toxic ash generated in 20 incinerators

(metric tons/year):



Which is equivalent to (by weight)**:**

At least

1.7 million

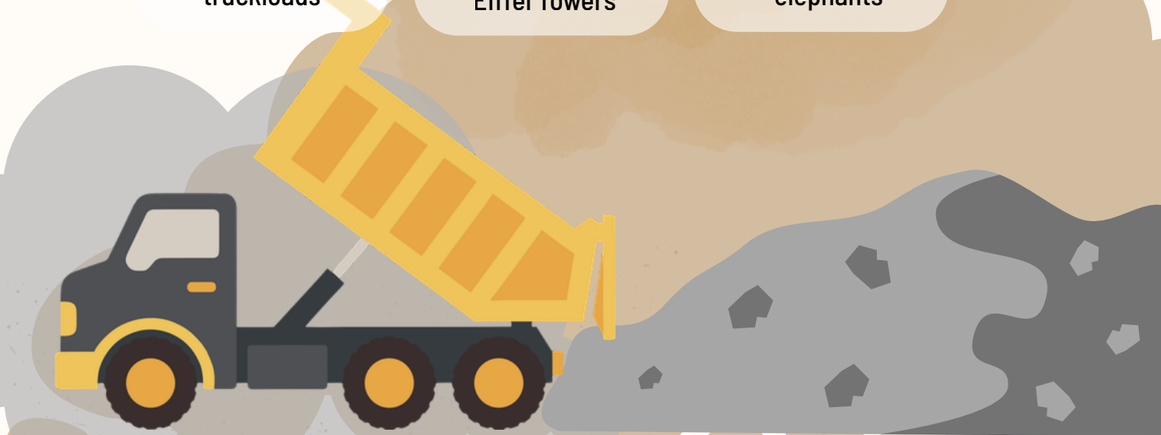
metric tons/year

Based on publicly available data for **17 facilities** out of **20 incinerators** studied

85,000
truckloads

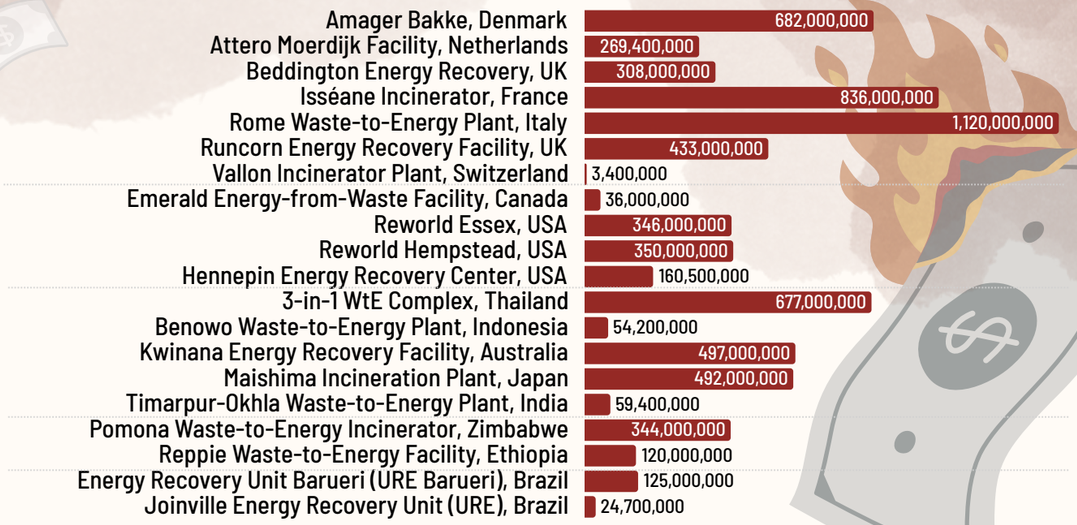
230
Eiffel Towers

280,000
elephants

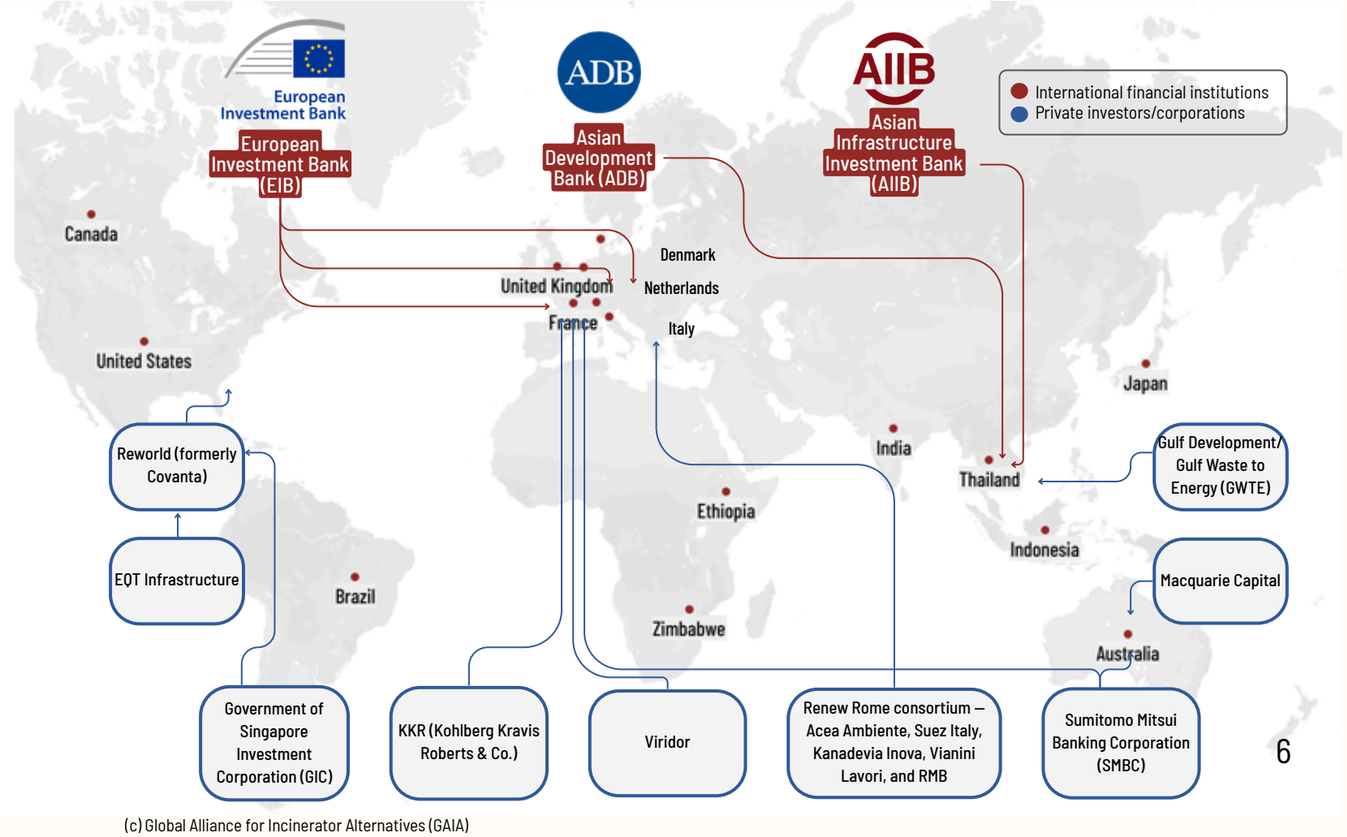


So far, nearly $7 billion USD has been wasted on 20 incinerators worldwide

(In USD, based on the exchange rate at the time of commissioning the construction)



Who's behind these investments?



(c) Global Alliance for Incinerator Alternatives (GAIA)

INCINERATOR ANALYSIS

The 20 incinerators examined in this report were not selected as a representative sample of every incinerator operating worldwide. They were chosen because each tells an important part of the story of how waste incineration is being built, financed, operated, contested, and, in one case, left behind. Many are at the center of active community fights over pollution, health, waste policy, public spending, or proposed expansions. Others are at critical moments: receiving new public or international financing, entering construction, requiring major investments to keep aging equipment operating, facing legal or regulatory challenges, or becoming part of political debates over whether communities should continue relying on incineration at all.

The facilities span different regions, income levels, regulatory systems, ownership structures, technologies, and stages of development. They range from some of the world's largest operating incinerators to smaller facilities embedded in dense urban communities, as well as projects that have yet to burn their first ton of waste. Rather than organizing them geographically, the analysis separates the facilities into three groups: incinerators currently operating, incinerators being built, and a closed incinerator, with facilities in the first two categories ordered from highest to lowest permitted waste burning capacity. This allows the analysis to examine both the impacts communities are experiencing today and decisions being made now that could shape local waste systems for decades to come.

Each profile follows the money and the waste. Where information is available, the analysis examines investment costs, public debt, subsidies and international financing; permitted burning capacity and long-term waste contracts; greenhouse gas and air-pollutant emissions; the presence of recyclable and compostable materials in the waste stream; quantities of bottom and fly ash and where those residues ultimately go; and the communities affected by the facility and its related infrastructure. The profiles also document the organizations fighting these projects and the demands communities themselves are making—from stronger pollution controls and health protections to closure, cancellation of proposed facilities, greater transparency, and investment in alternatives.

Taken together, the cases provide a snapshot of incineration at different points in its life cycle: from projects attracting hundreds of millions of dollars in new financing, to operating facilities requiring a steady supply of waste and continued capital investment, to a plant that closed decades ago but left pollution that communities and governments are still confronting. Looking across those stages makes it possible to examine costs and consequences that can be difficult to see when an incinerator is considered only as an individual waste management project.

FACILITIES CURRENTLY OPERATING



Operating since 1997, Attero's Moerdijk plant is one of the Netherlands' largest waste incinerators, with four moving-grate lines and a permitted capacity of approximately 1.2 million MT/year.9 Its history illustrates the long-term consequences of building incineration infrastructure at this scale: the plant has emitted roughly 945,000 MT of CO_2 in a single year, was supported by a $269.4 million USD (€233 million) European Investment Bank (EIP) loan, and was tied to contracts requiring 510,000 MT of waste annually—commitments that later generated financial disputes when increased waste separation reduced municipal waste deliveries.10 11 Today, Moerdijk burns approximately one million MT of waste each year, including waste imported from England and Ireland, while producing a substantial residual ash stream and continuing to burn plastics and other fossil-derived materials that contribute to its carbon footprint.12 13 Rather than eliminating waste, Moerdijk demonstrates how a large, capital-intensive incinerator can create decades-long dependence on maintaining waste throughput while generating hundreds of thousands of tons of CO_2 and ash annually.

FACILITY FACTS

Location:	North Brabant, Netherlands
Population within 5 kilometers (km):	26,029
Facility Ownership:	Ardian Infrastructure (acquired 100% of Attero in 2023)
Facility Operators (Day-to-Day):	B.V. Afvalverbranding Zuid-Nederland (AZN) - legal entity of Attero B.V.
First Year of Operation:	1997
Designed Burning Capacity:	1.2 million MT/year
Facility Type:	"Mass-burn" incineration, moving-grate combustion
Project Investment:	~$269.4 million USD (€233.2 million)
CO_2 Impacts:	945,403 MT of CO_2 MT/year
Incinerator Ash Created:	195,000 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

The original Moerdijk incinerator's construction cost approximately $485 million USD (€420 million), with about €25 million attributed specifically to the building works.14 Its development also received direct public support. The facility's innovative energy-recovery system received approximately $1.94 million USD (€1.678 million-equivalent; originally ECU 1,677,600) through the European Union's THERMIE program, while Attero later invested more than $115 million USD (€100 million) in a new steam-turbine system.[15] [16]

The project was not financed primarily through conventional municipal bonds, but it nevertheless created substantial public and quasi-public financial exposure. The European Investment Bank (EIB) provided approximately $269 million USD (€233.2 million) in financing specifically for the AZN waste-incineration project in 1993.[17] Publicly connected Dutch energy utilities Provinciale Noord-Brabantse Electriciteits-Maatschappij (PNEM), Maatschappij voor Elektriciteit en Gas Limburg (MEGA Limburg), and Delta Nutsbedrijven also guaranteed project financing of up to approximately $262 million (€227 million; NLG 500 million).[18] Revenues supporting these financing commitments were closely tied to municipal waste-delivery contracts, meaning that the project's financial stability depended in part on continued public-sector delivery of waste.[19] [20]

CLIMATE IMPACT

The Moerdijk facility is a major industrial greenhouse gas and air pollution source, with the facility reporting approximately 945,403 MT of CO2 in 2021.[21] More recent reporting, from Attero's owner Ardian, places the facility's fossil carbon emissions alone at more than 600,000 MT/year, reflecting the continuing combustion of plastics and other fossil-derived materials in the residual-waste stream.[22]

Moerdijk also releases substantial quantities of conventional air pollutants. The facility reported approximately 434.6 MT of nitrogen oxides (NOx) in 2021; Dutch Emission Registration data separately recorded 458.1 MT of NOx in 2019, placing Moerdijk among the country's 25 largest reported industrial NOx sources that year.[23] Dutch government analysis of waste-incinerator emissions also identifies AZN Moerdijk as a reporter of sulfur-oxide (SOx) emissions and found a rising SOx trend at the facility during the period examined.[24] The plant's regulated air-emission profile additionally includes carbon monoxide (CO), particulate matter/dust, hydrochloric and other acid gases, ammonia, mercury, cadmium, lead, arsenic, nickel, chromium, thallium, dioxins and furans (PCDD/F), hydrocarbons and other trace pollutants.[25]

Heavy metal and persistent toxic pollutant emissions are particularly important at Moerdijk because they have been the subject of both regulatory controls and legal challenges. Attero's current facility documentation identifies mercury, cadmium, arsenic, lead, nickel, chromium, thallium, cobalt, PFAS, PAHs and dioxins/furans among substances regulated or monitored in connection with air emissions and waste residues at the facility.26 Earlier Dutch RIVM reporting also identified AZN Moerdijk as a source of atmospheric heavy metal emissions, while environmental organizations challenged Moerdijk's permit conditions concerning mercury emissions and mercury bearing activated carbon residues before the Dutch Council of State.27 28 These emissions occur within the broader Rotterdam-Moerdijk industrial corridor, adding to an already concentrated regional pollution burden.

COMMUNITY POLLUTION EXPOSURE

Moerdijk is located within one of the Netherlands' most heavily industrialized areas, with the surrounding communities experiencing pollution in the context of numerous industrial, freight, port and energy facilities. Approximately 26,029 individuals live within 5 kms of the facility.[29] Concerns surrounding the facility have included air emissions, mercury and other toxic pollutants, expansion of authorized waste streams, flue-gas treatment and cumulative industrial pollution. In 2007, Mobilisation for the Environment and Stichting Natuur en Milieu formally challenged an AZN permit before the Dutch Council of State, including provisions involving mercury, pollution control technology and the types of materials authorized for incineration.[30] The principal exposure concerns include NOx, particulate matter and trace toxic pollutants such as mercury and dioxins/furans within the broader Rotterdam-Moerdijk industrial corridor, one of the country's largest concentrations of industrial pollution sources.[31]

WASTE ENTRAPMENT

The original Brabant waste agreements provide a particularly clear example of contractual waste lock-in. Under the 1993 arrangements, Noord-Brabant municipalities committed their remaining combustible household waste to the regional system, while a parallel agreement with AZN required delivery of 510,000 MT/year to the Moerdijk incinerator when the plant's original capacity was approximately 600,000 MT/year.[32] Beginning in 2011, municipalities delivered less than the contracted amount, primarily because waste separation increased and less residual waste remained available for incineration. The resulting dispute led to years of arbitration over payments for under-delivery; proceedings covering 2015 through January 2017 initially resulted in approximately $17 million USD (€14.7 million) in payments and interest being assessed against Brabant municipalities.[33]

The original agreements remained in force until February 1, 2017, after which waste-supply arrangements shifted toward individual municipal and commercial contracts rather than a single province-wide minimum-tonnage structure.[34] Attero has also supplemented Dutch waste with imported material. The company states that Moerdijk processes waste from the Netherlands, England and Ireland, and it invested in port and handling infrastructure specifically to receive refuse-derived fuel from England and Ireland as domestic residual-waste volumes declined.[35 36]

VALUABLE MATERIALS BURNED

Attero does not publish a current facility-specific sorting analysis showing exactly what percentage of the Moerdijk furnace feed consists of plastics, organics, paper/cardboard, metals or glass. However, available Dutch waste-characterization studies nevertheless show that these materials remain substantial components of the residual household waste stream supplied to incinerators. The Dutch government's national sorting analysis found residual household waste to contain approximately 34% organic material, 20% paper and cardboard, 13% plastics, and 8.1% metals and glass.[37]

However, there is some evidence that suggests recoverable materials remain in the waste delivered to Moerdijk. Attero is developing a new post-separation installation at the Moerdijk site to recover valuable materials from household residual waste before final treatment, and the Province of North Brabant has already granted an environmental permit for construction of a plastics separation installation and transfer hall at the facility.[38] [39] Attero's broader residual-waste operations recover plastics, metals and beverage cartons through post-collection separation, demonstrating that these materials remain present in mixed residual waste even after household source separation programs.[40] The planned Moerdijk investment is particularly significant, as it provides facility-specific evidence that recyclable material is currently reaching the Moerdijk residual-waste system and that additional material recovery is technically possible before incineration.[41] [42]

INCINERATOR ASH STATS

Moerdijk has no recent plant-specific operating data about the production of incinerator ash. However, older data shows the facility produced approximately 195,000 MT/year of incinerator ash (bottom and fly ash) when the facility was processing approximately 700,000 MT of waste annually.[43] This means that about 28% of the incoming waste mass remained as bottom and fly ash after combustion. The facility now processes closer to one million MT of waste annually, so current ash production is likely higher, but a more recent public facility-specific breakdown of both bottom and fly ash is not available.

For disposal and processing, Attero entered a long-term arrangement in 2017 under which bottom ash from its Moerdijk and Wijster incinerators was sent to Nauerna/Assendelft in North Holland for processing and material recovery. At the time, the two facilities together generated approximately 450,000 MT/year of bottom ash.[44] The Nauerna installation was designed to recover ferrous and non-ferrous metals and process the remaining mineral fraction into secondary construction materials. Historically, Moerdijk transported fly ash and boiler ash to former mines in Germany for use as underground fill, while other flue-gas-cleaning residues were managed separately as chemical waste.[45]

Nauerna is an already burdened waste-management community. Residents surrounding the large Nauerna landfill have pursued sustained organizing and litigation over landfill expansion, contamination, closure, health risks and plans to convert portions of the disposal site into recreational land.[46] Dutch courts and the National Institute for Public Health and the Environment (RIVM) have examined risks associated with contaminated soil, landfill gases, and polluted water; RIVM concluded that recreational use of portions of the site required additional measures to adequately protect public health.[47] [48]

FUNDERS

Moerdijk's original financing combined public-sector waste authorities, Dutch utility companies, municipal waste commitments, and European public finance. The largest clearly documented outside financier was the European Investment Bank (EIB), which provided approximately $269 million USD (€233.2 million) to the AZN waste-incineration project in 1993.[49] PNEM, MEGA Limburg, and Delta Nutsbedrijven additionally guaranteed project financing of up to approximately $262 million USD (€227 million), while municipal waste-delivery revenues underpinned part of the financing structure.[50] The project was developed through waste authorities and utilities serving North Brabant, Limburg and Zeeland, before subsequent ownership consolidated into Attero.[51]

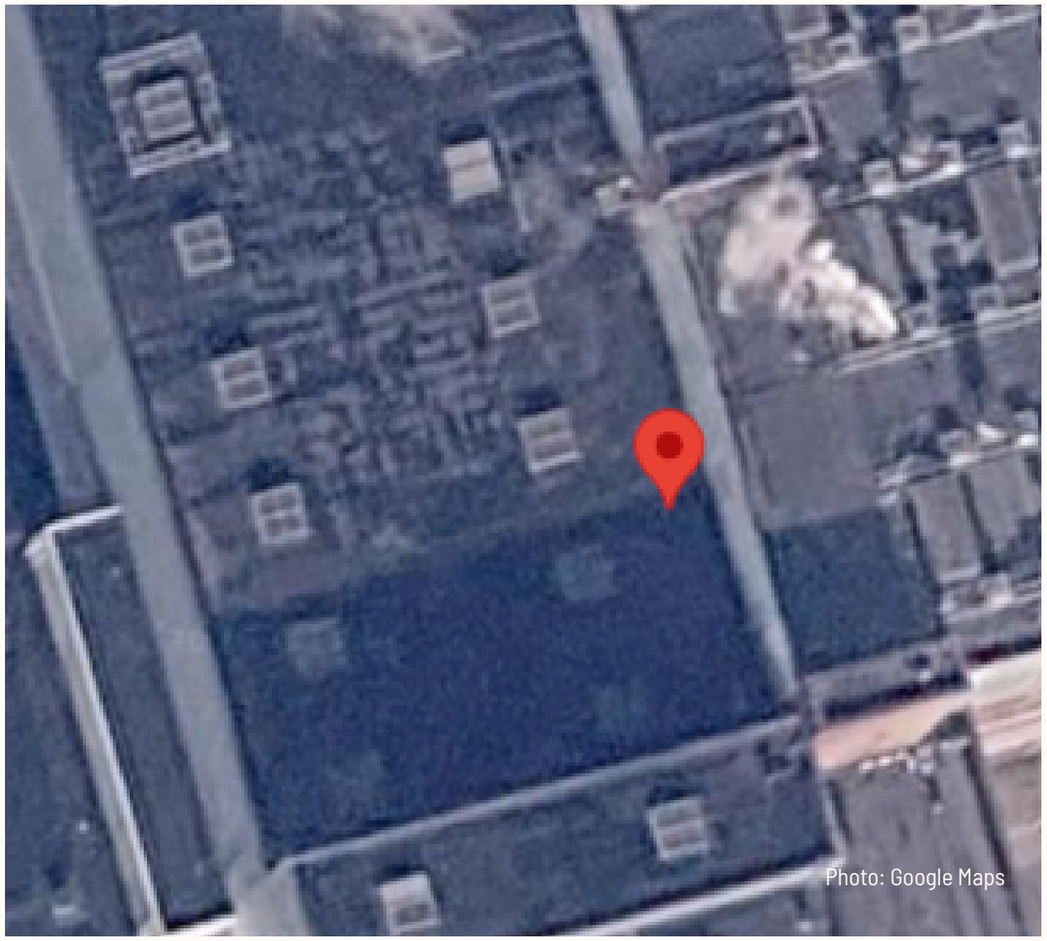


Photo: Google Maps

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Mobilisation for the Environment (MOB) and Stichting Natuur en Milieu have been the most prominent organizations challenging the Moerdijk incinerator's environmental permits. The groups brought a case before the Dutch Council of State challenging changes to the facility's fourth incineration line, focusing particularly on mercury emissions, mercury-contaminated activated carbon and other residues, flue-gas treatment, hazardous-waste handling, and whether the facility was applying Best Available Techniques (BAT).[52] Their intervention also challenged the expansion of waste streams authorized for combustion and pushed regulators to apply stronger pollution controls to the facility.[53]

KEY COMMUNITY DEMANDS

Community and environmental demands have centered on stricter controls and monitoring for mercury and other toxic emissions; stronger flue-gas treatment; application of Best Available Techniques (BAT); greater scrutiny of hazardous and contaminated materials authorized for incineration; and stronger public oversight of facility expansions and permit changes.[54] [55] There has also been a significant focus on demanding waste policies that prioritize waste prevention, separation and recycling without financially tying municipalities to continued incineration.



RUNCORN ENERGY RECOVERY FACILITY (ERF)

United Kingdom

Photo credit: Sue Bowden

Operating since 2014–2015, Runcorn is one of the UK's largest waste incinerators, permitted to burn 1.1 million MT annually in an industrial area surrounded by communities living and working nearby that have spent years reporting odors, noise, dust, vermin and other disturbances.[56] [57] The facility released approximately 1.11 million MT of CO2 in 2025 and generated more than 218,000 MT of bottom and fly ash, while its development was supported by long-term Greater Manchester waste commitments and substantial public financing, including a direct European Investment Bank (EIB) loan.[58] [59] Community opposition ultimately contributed to legal action by nearly 200 households and a reported $1.3 million USD (£1 million settlement), while residents and campaigners continue to press for stronger monitoring, enforcement, transparency and protection from the cumulative impacts of one of Britain's largest incinerators.[60] [61]

FACILITY FACTS

Location:	Cheshire, UK
Population within 5 kilometers (km):	84,408
Facility Ownership:	Viridor (KKR (Kohlberg Kravis Roberts)/ Equitix) and INEOS/INOVYN
Facility Operators (Day-to-Day):	Viridor Energy Limited
First Year of Operation:	2014
Designed Burning Capacity:	1,100,000 MT/year
Facility Type:	Moving-grate combustion technology
Project Investment:	~$433 million USD (£279 million)
CO2 Impacts:	1,114,519 MT/year
Incinerator Ash Created:	218,674 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Runcorn was developed through a combination of private equity, commercial bank debt, European Investment Bank (EIB) financing, and direct UK government lending, with Phase I tied to Greater Manchester's enormous waste private finance initiative (PFI). Records place Phase I construction at approximately $377 million USD (£235 million), while Phase II required another approximately $249 million USD (£160 million) plus roughly $53 million USD (£34 million) of advanced/shared works.[62] This puts documented Runcorn-specific capital commitments at approximately $679 million USD (£429 million).

The European Investment Bank (EIB) provided $132 million USD (£82 million) directly to INEOS Runcorn TPS for the Phase I incinerator as part of a £182 million EIB financing package for the Greater Manchester waste project.[63] Other financing included Bank of Ireland, BBVA, Lloyds and Sumitomo Mitsui Banking Corporation, while HM Treasury's Infrastructure Finance Unit entered the lending syndicate when credit-market conditions threatened financial closure.[64] The wider Greater Manchester PFI received approximately $201 million USD (£124.5 million) in government PFI credits, while HM Treasury ultimately provided a $163 million USD (£120 million) direct loan to the overall Greater Manchester waste PFI.[65] These latter amounts supported the integrated Greater Manchester infrastructure program.

The arrangement created a long-lived public payment commitment even though much of the project debt sat within private special-purpose companies rather than appearing as conventional municipal borrowing. Greater Manchester's original PFI committed the waste authority to decades of payments for the waste-treatment system and guaranteed a major waste stream for Runcorn Phase I.[66] Following termination and restructuring of much of the PFI in 2017, Greater Manchester retained a separate long-term agreement with Viridor for Runcorn, illustrating how the incinerator commitment survived even after the broader PFI structure was dismantled.[67]

CLIMATE IMPACT

Runcorn is one of the UK's largest individual sources of carbon emissions from waste incineration. Environment Agency Pollution Inventory data report 1,114,519 MT of total CO_2 emissions in 2025, up from approximately 1,081,421 MT in 2024 and 998,142 MT in 2023.[68] Of the 2025 total, roughly 51% of Runcorn's reported CO_2 was classified as biogenic and 49% as fossil, making the fossil component alone comparable to the annual emissions of a substantial industrial installation.[69]

The plant also reported large quantities of conventional and toxic air pollutants in 2025: approximately 1,021.8 MT of nitrogen oxides (NOx), 128.36 MT of sulfur oxides, 28.35 MT of particulate matter, 24.59 MT of non-methane volatile organic compounds and 3.78 MT of ammonia.[70] Trace-metal releases included approximately 0.041 MT of mercury, 0.026 MT of chromium, 0.025 MT nickel, 0.015 MT of copper, 0.008 MT of arsenic, and 0.005 MT of cadmium.[71] Dioxin/furan releases were reported as 90 milligrams I-TEQ, equivalent to 0.00000009 MT, with a separate WHO-TEQ value of 70 milligrams.[72]

The scale of the carbon problem is also reflected in Viridor's currently unfunded proposal to install carbon capture and storage (CCS) at Runcorn. The company estimates that a CCS system could capture more than 900,000 MT of CO_2 annually, roughly half biogenic.[73] The proposal itself underscores the magnitude of the plant's existing direct carbon stream.

COMMUNITY POLLUTION EXPOSURE

Approximately [84],408 people live within 5 kilometers of the facility.[74] Communities surrounding Runcorn have reported unusually persistent quality-of-life impacts associated with the facility. The five recurring complaints are (1) noise and vibration from the plant, trains and waste vehicles; (2) persistent odors and foul smells; (3) dust, steam/plume and concerns about air pollution; (4) flies, rats, birds and other vermin associated with waste handling; and (5) heavy waste traffic and the resulting disruption to nearby homes and roads.[75] Complaints became sufficiently extensive that legal proceedings were initiated on behalf of approximately 196 households in 2021, alleging nuisance from noise, dust, smells and steam. A subsequent settlement reportedly distributed over $1.3 million USD (£1 million) among approximately 180 households, with participating residents required to sign non-disclosure agreements.[76]

The effects described by residents extend beyond simple nuisance. Residents have reported sleep disturbance from continuous mechanical and transport noise, inability to open windows or use gardens because of odors and flies, stress and deterioration in wellbeing, and fears about respiratory and long-term toxic exposure from dust and stack emissions.[77] Residents and UKWIN have also raised concerns with the Environment Agency about whether pollution episodes are captured quickly enough and whether existing monitoring adequately distinguishes incinerator emissions from other local pollution.[78]

The dispute has become severe enough to reach Parliament. In July 2026, Runcorn MP Sarah Pochin told Parliament that residents continued to experience odors, rats, flies and concerns about birds moving through open waste-handling doors, and argued that residents should not bear the burden of continually documenting pollution incidents.[79] She called for faster Environment Agency intervention, stronger enforcement powers and compensation for affected residents.[80]

WASTE ENTRAPMENT

Runcorn provides a particularly clear example of contractual waste lock-in. Phase I was developed primarily to serve Greater Manchester's 25-year waste PFI, under which residual municipal waste was processed into solid recovered fuel and transported to Runcorn for incineration.[81] The original arrangement provided approximately 325,000 MT/year of Greater Manchester-derived fuel for the facility.[82] Although Greater Manchester terminated and restructured much of the wider PFI in 2017, the Runcorn disposal arrangement survived. In 2019, GMCA confirmed that its separate 25-year Viridor contract to process residual waste at Runcorn remained in force with 16 years left to run, placing its expiration around 2035, with an option for a further 15-year extension.[83]

At the same time, Runcorn was deliberately constructed with substantially more capacity than Greater Manchester alone could supply. Phase II was developed for the wider commercial waste market, and the plant now accepts residual waste and refuse derived fuel (RDF) from across north-west England and beyond.[84] Planning changes substantially increased the amount permitted to arrive by road, while the Environment Agency subsequently authorized up to 110,000 MT/year of mixed municipal waste rather than requiring all material to arrive as processed RDF.[85] This combination of a long-term municipal waste commitment and a much larger merchant-market incinerator gives Runcorn both a contractually protected base waste stream and a commercial incentive to draw additional residual waste from a broad catchment area.

VALUABLE MATERIALS BURNED

No publicly available characterization has been conducted that provides a complete material-by-material percentage breakdown specifically of Runcorn's total incoming waste stream. The strongest evidence for the municipal portion of Runcorn's feedstock is Greater Manchester's 2018/19 residual-waste characterization, which directly characterizes the household residual waste from which the Greater Manchester material sent to Runcorn is produced.
That study found approximately 28.4% food waste and 0.8% garden waste, with total putrescible material around 32%; 16.1% plastics, comprising approximately 7.8% plastic film and 8.3% dense plastics; 12.1% paper and cardboard, including 8.6% paper and 3.5% card; and approximately 5.2% metals and glass, comprising 2.9% metals and 2.3% glass.[86] The residual stream additionally contained approximately 5.4% textiles, 1% wood and 1% waste electrical and electronic equipment. Greater Manchester's own subsequent policy documents emphasize that food waste alone constituted more than 28% of the residual bin, making it the single largest identifiable material stream remaining in household residual waste.[87]

INCINERATOR ASH STATS

Runcorn generated approximately 218,674 MT of incinerator ash in 2025, consisting of roughly 190,320 MT of incinerator bottom ash (IBA) and 28,354 MT of fly ash/air-pollution-control residues.[88] The combined ash stream was equivalent to about 22.7% of the approximately 963,290 MT of waste combusted at the facility in 2025.[89]

A major destination for Runcorn's bottom ash is the Johnson's Lane Incinerator Bottom Ash (IBA) processing facility in Widnes, Cheshire, across the River Mersey from the incinerator. Halton Borough Council's planning records state that the facility was developed to receive IBA primarily from the Runcorn Energy-from-Waste facility and was authorized to process up to 250,000 MT/year.90 The ash is processed to recover ferrous and non-ferrous metals, while the remaining mineral fraction is converted into incinerator-bottom-ash aggregate for use in construction applications. This makes Johnson's Lane primarily an ash-processing and recovery site rather than simply a disposal landfill.[91]

The movement of Runcorn's ash into the surrounding Widnes/Runcorn industrial corridor also raises an environmental justice concern. National analysis of English incinerator siting found that energy-from-waste facilities are disproportionately concentrated in deprived communities; BBC analysis reported that people living in the most deprived areas were approximately 10 times more likely to have an incinerator nearby than residents of the wealthiest areas, with Runcorn highlighted as a prominent example.[92] The communities around Runcorn and Widnes also face longstanding industrial, freight and waste-management activity.

FUNDERS

Runcorn was financed through a combination of corporate investment, commercial bank lending and public finance. Phase I was developed through INEOS Runcorn (TPS), originally involving Viridor, John Laing and INEOS, while the European Investment Bank (EIB) provided approximately $128 million USD (£82 million) directly for Runcorn Phase I.[93] The wider Greater Manchester financing syndicate included Bank of Ireland, BBVA, Lloyds Banking Group and Sumitomo Mitsui Banking Corporation. Viridor also committed approximately $133 million USD (£85 million) of investment, with the possibility of up to another $63 million USD (£40 million) in mezzanine debt across the Greater Manchester/Runcorn project.[94] Phase II was financed largely through Viridor's available internal resources, with approximately $247 million USD (£160 million) of additional capital investment, plus approximately $53 million USD (£34 million) of advanced/shared works.[95]

Public finance was nevertheless critical to the system underpinning Runcorn Phase I. During the financial crisis, HM Treasury provided approximately $188 million USD (£120 million) in direct lending to the wider Greater Manchester Waste PFI, which also received approximately $195 million USD (£124.5 million) in government PFI credits.[96] These amounts should not all be treated as direct grants to Runcorn, but they helped finance the Greater Manchester infrastructure and long-term waste arrangement supplying Phase I. Runcorn therefore illustrates how a nominally private/PPP incinerator could be supported simultaneously by private investors, commercial banks, an international public financial institution, central-government finance and long-term municipal waste commitments.[97,98]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Opposition and community scrutiny have involved nearby residents, United Kingdom Without Incineration Network (UKWIN), earlier local groups including the Cheshire Anti-Incinerator Network (CHAIN) and Halton Action Group Against the Incinerator, and elected representatives.[99] Residents have filed repeated complaints with the Environment Agency, pursued legal action, participated in media investigations and documented odors, noise, dust, steam/plume, flies, rats and transport disturbance. UKWIN has also scrutinized Viridor's regulatory submissions and raised apparent errors and omissions directly with the Environment Agency.[100]

KEY COMMUNITY DEMANDS

The demands emerging from this resistance have become increasingly concrete. Residents and campaigners have sought faster investigation of odor, noise and pollution incidents; stronger Environment Agency enforcement; better independent air and noise monitoring; effective control of flies, rats, birds and waste-handling problems; greater transparency in Viridor's reporting; compensation for households whose homes and quality of life have been affected; and meaningful action where repeated complaints continue rather than requiring residents to continually prove individual incidents.[101] In Parliament in 2026, the local MP went further, calling for regulators to have the power to halt operations until serious complaints are resolved, arguing that the burden of proof should shift away from residents.[102]



HEMPSTEAD RESOURCE RECOVERY FACILITY (REWORLD HEMPSTEAD)

USA

Photo: Google Maps

Operating since 1989, the Hempstead Resource Recovery Facility (Reworld Hempstead) is a large waste incinerator located in Westbury, New York, operated by Reworld (formerly Covanta), and capable of processing approximately 944,000 MT of waste annually.[103] The facility generates substantial greenhouse-gas emissions and roughly 197,000 MT of incinerator ash per year, much of which has historically been disposed of at the Town of Brookhaven Landfill, adjacent to the predominantly Black and Latino community of North Bellport, where regulators have documented a groundwater plume contaminated with PFAS and 1,4-dioxane.[104] While the plume has not been specifically attributed to Hempstead's ash, New York State Department of Environmental Conservation (NYSDEC) fined Reworld $878,500 in penalties in 2025 for nearly a decade of historic violations in ash-management practices.[105] Hempstead is also supported by a long-term put-or-pay contract requiring payment for at least 381,000 MT of waste annually through 2034, reinforcing dependence on incineration even if municipal waste deliveries decline.[106]

FACILITY FACTS

Location:	Westbury, NY
Population within 5 kilometers (km):	205,511
Facility Ownership:	Reworld Holding Corporation (formerly Covanta)
Facility Operators (Day-to-Day):	Reworld
First Year of Operation:	1989
Designed Burning Capacity:	~943,700 MT/year
Facility Type:	Thermomechanical treatment (waste-to-energy/incineration)
Project Investment:	~$350 million USD
CO_2 Impacts:	815,681 MT/year
Incinerator Ash Created:	197,290 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

The Hempstead Resource Recovery Facility (Reworld Hempstead) was developed through a public-private financing structure, combining private investment with tax-advantaged public financing. The approximately $350 million USD facility was developed by the private Hempstead Resource Recovery Corporation under a long-term agreement with the Town of Hempstead. Financing included tax-exempt industrial development revenue bonds issued through the Town of Hempstead Industrial Development Agency (IDA), alongside private equity.[107] Tax-exempt IDA financing reduced borrowing costs for the project with reduced interest rates, longer financing terms, and lower equity requirements.[108]

Public support also extended to the facility's long-term revenue structure. Hempstead benefited from long-term electricity-sale agreements and, under the replacement municipal service agreement that took effect in 2009, the Town entered into a 25-year relationship extending through 2034, including service payments based on a minimum of 420,000 tons of waste annually, subject to the agreement's contractual provisions.[109] These arrangements provided predictable revenue streams without taking the form of recurring direct government operating grants.

The facility's project bonds were structured as limited obligations rather than general-obligation municipal debt, meaning repayment was tied to project revenues rather than the Town's general taxing authority.[110] The original project bonds were ultimately redeemed in 2009. Consequently, Hempstead's financing created publicly issued, tax-advantaged project debt but not conventional general-obligation debt for the Town of Hempstead. This distinction is central to the facility's financing model: public institutions facilitated access to lower-cost capital and long-term municipal revenues while much of the underlying project and ownership risk remained within the private project structure.

CLIMATE IMPACT

In 2023, Reworld Hempstead emitted approximately 815,691 MT/year of CO2, with nearly 63% of that representing biogenic CO_2 emissions.[111] The facility also emitted 299.09 metric tons of methane (CH_4) and 39.265 metric tons of nitrous oxide (N_2O), contributing approximately 19,178 MT CO_2e in total facility emissions.[112]

COMMUNITY POLLUTION EXPOSURE

Approximately 205,511 people live within 5 kilometers of the Reworld Hempstead facility.[113] Community concerns associated with the facility center on air pollution and respiratory health, incinerator-ash management, groundwater contamination at the ash-disposal site, and the cumulative burden placed on environmental-justice communities.

Hempstead burns roughly 943,000 metric tons of waste annually, releasing nitrogen oxides, particulate matter, sulfur dioxide, metals, and other pollutants. Community concerns about incinerator ash intensified after the NYSDEC investigation found that between 2007 and 2013, the facility violated requirements governing the handling and mixing of bottom ash and fly ash.[114]

In 2025, Reworld agreed to pay $378,500 in penalties and fund a $500,000 environmental-benefit project to resolve the historical violations; NYSDEC reported that the facility's current ash-management practices were in compliance.[115] These concerns extend approximately 40 miles east to the Town of Brookhaven Landfill, a major disposal destination for Hempstead's incinerator ash. Hempstead reported sending 192,649 metric tons of ash to Brookhaven in 2021, while Brookhaven records describe an arrangement allowing the landfill to receive roughly 208,652 metric tons annually from the facility.[116] NYSDEC has separately documented a groundwater contamination plume beneath the landfill containing PFOA, PFOS and 1,4-dioxane at concentrations above state groundwater guidance values, and extending approximately 8,000 feet southeast of the landfill, beneath residential areas and toward Beaver Dam Creek.[117] Available investigations have not established Hempstead's incinerator ash as the specific cause of the plume; the landfill contains older waste cells that predate modern liner requirements and have long been associated with groundwater contamination.

Residents surrounding Brookhaven have also reported persistent odors, dust, and suspected ash migration, alongside symptoms including headaches, nausea, eye irritation, and aggravated asthma. NYSDEC has documented off-site hydrogen sulfide odors and required corrective measures, although investigations have not established that landfill emissions caused the illnesses reported by residents.[118] The groundwater contaminants raise additional long-term health concerns: New York health authorities associate PFAS exposure with potential effects on the immune system, liver, fetal growth and development, while 1,4-dioxane is considered a likely human carcinogen based largely on animal evidence.[119] Public-water connections have been extended to some nearby residents to reduce potential exposure to contaminated groundwater, and available investigations have not found the identified plume contaminating public drinking-water supplies.[120]

The combined waste-management system has also raised environmental-justice concerns. NYSDEC has determined that the Brookhaven landfill is located in or potentially affects a state-designated disadvantaged community, requiring consideration of disproportionate environmental burdens.[121] The continued disposal of large quantities of Hempstead incinerator ash therefore adds to an area already confronting landfill emissions, truck traffic, and documented groundwater contamination. While available evidence does not demonstrate that Hempstead ash caused the groundwater plume or specific illnesses reported by residents, the facility's ash contributes to the cumulative waste and pollution burden borne by communities surrounding the Brookhaven disposal site.

WASTE ENTRAPMENT

Reworld Hempstead is supported by a network of long-term municipal waste contracts that provide substantial and predictable waste flows. The most significant is the Town of Hempstead's service agreement, which extends through August 19, 2034. Under the agreement, the Town is obligated to pay processing fees on a minimum of 381,017 metric tons of waste annually, whether or not the full quantity is actually delivered; shortfall payments may be reduced through contractual mitigation provisions.122 This effectively creates a put-or-pay structure, protecting facility revenues if municipal waste deliveries fall below the contractual threshold.

Other Long Island municipalities provide additional contracted waste streams. The Town of Brookhaven's "trash-for-ash" agreement historically provided for approximately 154,221 metric tons of Brookhaven municipal solid waste to be processed at Hempstead in exchange for Brookhaven accepting approximately 208,652 metric tons of incinerator ash at its landfill, with both waste and ash charges assessed on a per-ton basis.[123] More recent Brookhaven financial disclosures describe approximately 199,580 metric tons of waste and 190,508 metric tons of Hempstead ash annually and identify December 31, 2024 as the expiration of that version of the agreement.[124] The Town of North Hempstead separately entered into an agreement beginning in 2021 for approximately 127,005 metric tons of waste annually, initially for five years with options for an additional ten years.[125] With this in mind, the facility receives substantial quantities of waste from municipalities beyond the Town of Hempstead, including Brookhaven, North Hempstead, and Garden City.

VALUABLE MATERIALS BURNED

Available waste composition estimates indicate that a substantial portion of the municipal waste burned at Reworld Hempstead consists of organic materials, paper and cardboard, and plastics. The estimated incoming waste stream is approximately 34% organic material (including food scraps and yard waste), 26% paper and cardboard, 18% plastics, and 12% metals and glass, with the remaining roughly 10% consisting of other materials.[126] Town of Hempstead waste-management records separately identify paper, cardboard, plastics, glass, metals, and yard waste as materials targeted for source separation or recycling, underscoring that materials with reuse, recycling, or composting potential can remain in the residual waste stream ultimately sent for disposal or combustion.[127]

INCINERATOR ASH STATS

Reworld Hempstead generates approximately 197,290 metric tons of incinerator ash per year, based on New York State Department of Environmental Conservation (NYSDEC) data.[128] Much of this residual ash has historically been transported approximately 40 miles east for disposal at the Town of Brookhaven Landfill in Suffolk County. In addition to accepting ash from Hempstead, the landfill accepts ash from other Long Island waste-combustion facilities.[129]

The Brookhaven Landfill is adjacent to and has significant impacts on North Bellport, a community with longstanding environmental-justice concerns. New York State's North Bellport Strategic Investment Plan identifies the entire North Bellport project area as a potential environmental justice area and specifically identifies the landfill as a longstanding source of community concern over air pollution, water contamination, quality of life, and health.[130] More recently, NYSDEC determined that the landfill itself is located within a state-designated Disadvantaged Community and found that its operations are in, or potentially affect, a disadvantaged community, requiring analysis of disproportionate environmental burdens.[131] Community organizations and secondary reporting have consequently characterized continued disposal of incinerator ash at Brookhaven as part of a broader environmental-justice burden borne by the predominantly Black and Latino community surrounding the landfill.[132]

FUNDERS

The Hempstead Resource Recovery Facility's financing has evolved from project-specific public-private financing to ownership within a major global infrastructure investment portfolio. The original facility was developed by Hempstead Resource Recovery Corporation using a combination of private equity and tax-exempt industrial development revenue bonds issued through the Town of Hempstead Industrial Development Agency.[133] The Town of Hempstead supported the project's economics through its long-term waste service relationship, while electricity sales provided another major source of facility revenue. The IDA acted as the public financing conduit rather than the ultimate bearer of the project debt, which was structured as a limited obligation payable through the project financing structure.[134]

The facility later became part of Covanta's waste-to-energy portfolio, which was acquired by EQT Infrastructure V, a fund managed by global investment organization EQT, in November 2021. EQT paid approximately $5.3 billion, including the assumption of Covanta's net debt, to take the publicly traded company private.[135] The acquisition transferred Hempstead, along with Covanta's broader portfolio of waste facilities, into an infrastructure fund backed by institutional investors. Covanta was subsequently renamed Reworld. In 2024, Singapore's sovereign wealth fund GIC acquired a 25% minority interest in Reworld through a combination of primary and secondary capital, while EQT Infrastructure remained the company's largest shareholder.[136] The primary-capital component provided new investment directly into Reworld, rather than consisting solely of a transfer of existing ownership interests.

Hempstead therefore sits within a financing chain extending well beyond the Town of Hempstead. EQT Infrastructure V is the controlling investment fund behind Reworld, while GIC holds a substantial minority interest and provides additional institutional capital. EQT's $5.3 billion acquisition was a corporate-level investment in Covanta's entire business rather than direct financing for construction of the Hempstead facility; similarly, GIC's investment represents capital at the Reworld corporate level rather than project-specific financing for Hempstead.[137,138] The distinction illustrates the facility's transition from a locally structured waste-to-energy project financed with tax-advantaged public bonds and private equity into an asset held within a global infrastructure investment platform.

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Several local and regional organizations have been organizing against both the Reworld Hempstead facility and its ash-disposal relationship with the Brookhaven Landfill. These groups include, but are not limited to: The Brookhaven Landfill Action & Remediation Group (BLARG) and the Long Island Progressive Coalition (LIPC).

KEY COMMUNITY DEMANDS

The key community demands are as follows:

(1) End Hempstead ash disposal at Brookhaven and fully close the landfill;

(2) Investigate Hempstead's historical ash-handling practices and hold responsible parties accountable;

(3) Clean up the landfill and remediate contaminated groundwater, rather than relying primarily on monitoring systems; and

(4) Reduce the community's cumulative waste burden and transition toward zero waste alternatives, and away from the incinerator.



ESSEX COUNTY RESOURCE RECOVERY FACILITY (REWORLD ESSEX)

USA

Operating since 1990, the Essex County Resource Recovery Facility (Reworld Essex) is a large waste incinerator located in Newark's heavily industrialized Ironbound neighborhood, where it is operated by Reworld and permitted to burn approximately 894,000 MT of waste annually.[139] The facility released roughly 854,000 MT of direct fossil and biogenic CO_2 in 2023, alongside hundreds of metric tons of nitrogen oxides (NOx) and other air pollutants, adding to the cumulative pollution burden facing the surrounding environmental-justice community.[140] Long-term waste arrangements—including a 20-year New York City contract and Essex County's mandatory waste-flow controls—provide the incinerator with large, predictable waste streams, while the facility generates roughly 177,000 MT of incinerator ash annually that must be transported elsewhere for processing or disposal.[141] [142] For decades, the Ironbound Community Corporation and allied environmental-justice organizations have challenged the facility's pollution and called for its closure, stronger enforcement, and an end to Newark's dependence on waste incineration.[143]

FACILITY FACTS

Location:	Newark, NJ
Population within 5 kilometers (km):	247,983
Facility Ownership:	Reworld Holding Corporation (formerly Covanta) is the facility owner; The Port Authority of New York and New Jersey is the landowner
Facility Operators (Day-to-Day):	Reworld Essex Company
First Year of Operation:	1990
Designed Burning Capacity:	894,000 MT/year
Facility Type:	Thermomechanical treatment (waste-to-energy/incineration)
Project Investment:	~$346 million USD
CO_2 Impacts:	853,647 MT/year
Incinerator Ash Created:	177,000 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Construction of Reworld Essex required approximately $346 million USD in capital investment, including roughly $252 million USD in investment by the Port Authority of New York and New Jersey.[144] New Jersey legislative records later reported that approximately $190 million USD of the Port Authority's initial investment remained outstanding.[145] Federal court records further document that approximately $205 million USD in Port Authority Consolidated Revenue Bonds were issued to finance construction of the facility.[146] Together, these records demonstrate that development of the incinerator relied heavily on public-authority financing and created substantial long-term public debt.

The facility has also benefited from public policies subsidizing waste incineration as an energy source. A joint analysis by the New Jersey Environmental Justice Alliance (NJEJA), Ironbound Community Corporation (ICC), and Earthjustice found that New Jersey's waste incinerators collectively received nearly $30 million in "clean energy" subsidies from utilities and ratepayers since 2004, despite repeated air-permit violations.[147] These subsidies supplemented the substantial public financing and long-term government waste arrangements supporting the facility.

CLIMATE IMPACT

The Reworld Essex facility releases substantial quantities of greenhouse gases and conventional and toxic air pollutants. In 2023, the incinerator released approximately 853,647 MT of direct CO_2 emissions, 55% of which came from biogenic sources.[148] Methane contributed another 7,083 MT CO_2e and nitrous oxide approximately 11,084 MT CO_2e.[149]

GAIA and the New Jersey Environmental Justice Alliance (NJEJA) reported that the Essex incinerator emitted approximately 692 MT of Nitrogen Oxides (NOx) in 2020, as well as 32.1 MT of particulate matter (PM2.5), 17.3 MT of total hazardous air pollutants, 0.0088 MT of lead, and 0.0051 MT of mercury.[150] Earlier data compiled by GAIA with the Ironbound Community Corporation (ICC) show that the facility's emissions have varied substantially from year to year: in 2017 it released approximately 999 MT of NOx, 24.7 MT of PM2.5, 0.112 MT of lead and 0.013 MT of mercury.[151] These emissions are particularly significant in Newark's Ironbound neighborhood, where ICC has documented a longstanding cumulative pollution burden from the incinerator alongside highways, truck traffic, industrial facilities, and other major pollution sources.[152]

COMMUNITY POLLUTION EXPOSURE

Approximately 247,983 people live within 5 kilometers of the Reworld Essex facility, as it operates in one of New Jersey's most heavily industrialized environmental-justice communities.[153] New Jersey Department of Environmental Protection's (NJDEP) environmental justice review identified numerous environmental and public-health stressors affecting the overburdened communities surrounding the facility, including air pollution, contaminated sites, heavy transportation infrastructure, and elevated health vulnerabilities.[154]

Residents have repeatedly complained about odors, truck traffic, air pollution, toxic emissions and visible smokestack plumes. In 2019, residents documented unusual pink and purple emissions from the facility's smokestack, prompting Ironbound Community Corporation, Earthjustice and other advocates to demand a state investigation and stronger enforcement.[155] Community health concerns include asthma and other respiratory illnesses, cardiovascular disease, cancer risk and exposure to lead, mercury and other toxic pollutants. Ironbound Community Corporation has reported that approximately one in four Newark children has asthma, illustrating the broader health vulnerability of the population exposed to the area's cumulative pollution burden.[156]

WASTE ENTRAPMENT

The Reworld Essex facility is supported by long-term government agreements that secure large, predictable waste streams from both New York City and Essex County. Under a 20-year agreement between the New York City Department of Sanitation (DSNY) and the Port Authority of New York and New Jersey, the Newark incinerator can receive up to 1,633 MT of Manhattan waste per operating day.[157] Service began in October 2012, and DSNY reported average deliveries of 1,088 MT per day in 2023. [158] Port Authority disclosures indicate that the New York City contract accounts for approximately 40% of the facility's disposable capability.[159] Earlier DSNY records show 359,060 MT of New York City waste delivered to Essex in 2019 alone.[160]

A second major waste stream is secured through the Essex County Utilities Authority (ECUA) and New Jersey's regulatory waste-flow-control system. Essex County's Fourth Supplemental Agreement with the Port Authority extends the waste-disposal arrangement for five years, from January 1, 2026 through December 31, 2030, covering approximately 385,550 MT of processible municipal and commercial waste annually.[161] NJDEP's current flow-control rules direct processible municipal solid waste generated within Essex County to the Newark incinerator.[162] The agreement does not function as a conventional put-or-pay contract requiring municipalities to deliver a fixed minimum tonnage or pay a shortfall penalty; instead, regulatory flow control directs eligible local waste to the facility, while the New York City contract supplies a substantial additional stream from outside New Jersey. Together, the two arrangements can direct roughly three-quarters of a million metric tons of waste per year toward the facility, reinforcing a long-term institutional dependence on incineration.[163] [164]

VALUABLE MATERIALS BURNED

New Jersey's most recent physical waste-characterization study found that significant quantities of potentially recoverable or compostable materials remain in the state's disposed waste stream. Statewide, disposed municipal waste averaged approximately 22.1% paper, 18.9% food scraps, and 4.6% yard waste, meaning food and yard organics alone represented approximately 23.5% of disposed waste.[165] For the study's urban Passaic County residential sample, which provides a useful urban New Jersey comparison for Newark, food waste alone represented 19.3%, while compostable paper accounted for another 9.2%, corrugated cardboard 5.8%, plastic film 10.3%, and rigid plastics 2.6%.[166] These figures are a New Jersey waste-stream proxy rather than a direct physical characterization of material entering the Essex incinerator.

Facility-specific records nevertheless demonstrate that recyclable material is reaching the Essex facility. Between 2015 and 2019, the facility recovered an average of approximately 19,625 MT of ferrous metal and 3,134 MT of non-ferrous metal annually from incinerator ash—approximately 22,760 MT of metal per year combined.[167] This means substantial quantities of metal passed through combustion before being recovered from the residual ash. Taken together, the NJDEP composition study and Essex's own post-combustion metal recovery data show that the waste stream burned at the facility includes food waste and compostable paper that could be organically managed, paper and cardboard with recycling potential, plastics, and thousands of metric tons of metals that are recovered only after incineration.

INCINERATOR ASH STATS

The Essex Facility generates approximately 177,000 MT of incinerator ash per year, based on actual facility records for 2015–2019. During this period, annual ash generation ranged from 170,458 to 183,284 MT, averaging approximately 176,747 MT/year.[168] The ash represented about 20% of the incoming waste by weight. Earlier environmental-impact projections anticipated substantially more—up to approximately 685 MT of wet ash per day, or roughly 28% of processed waste—which likely explains higher estimates approaching 246,000–250,000 MT/year.[169] The residue consists of bottom ash combined with fly ash captured by the facility's air-pollution-control system; NJDEP requires routine toxicity-characteristic leaching (TCLP) testing for metals and annual testing for dioxins and furans.[170]

Disposal destinations have changed over the facility's operating life. NJDEP's 2006 statewide solid waste plan reported that Essex ash was being directly hauled out of New Jersey, while historical court records document contracts for transporting and disposing of Essex ash at out-of-state landfills.[171] More recent facility permit records identify the Gloucester County Solid Waste Complex Landfill, 503 Monroeville Road, Swedesboro, New Jersey, as the facility's contracted ash-disposal landfill beginning in 2020. [172] The same permit authorized shipments to Covanta Metals Marketing at the Keystone Industrial Port Complex, 500 Middle Drive, Fairless Hills, Pennsylvania, where ash could be processed through a Total Ash Processing System to recover additional metals. [173] Reworld states that residual ash may ultimately be used as daily cover at landfills, but this does not eliminate the residual waste: after combustion and metals recovery, a substantial quantity of ash still requires processing, reuse, or landfill management. [174]

FUNDERS

The Essex facility was originally developed through a partnership involving Essex County, the Port Authority of New York and New Jersey, and American Ref-Fuel Company of Essex County, combining public infrastructure financing with private investment and operation.[175] Covanta subsequently acquired American Ref-Fuel and operated the Newark facility for nearly two decades before adopting the Reworld name in 2024.

At the corporate level, Reworld is principally owned through EQT Infrastructure V, which acquired Covanta in 2021 in a transaction valued at approximately $5.3 billion, including the assumption of net debt.[176] In 2024, Singapore sovereign wealth fund GIC acquired a 25% minority stake in Reworld through a combination of primary and secondary capital, while EQT remained the company's largest shareholder.[177] EQT and GIC therefore represent current corporate investors in Reworld rather than the original financiers of the Newark incinerator.

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

The Ironbound Community Corporation (ICC) has led local opposition to the Essex Facility for decades, organizing Newark residents, challenging permits and pollution violations, and advocating for closure of the incinerator. ICC works closely with the New Jersey Environmental Justice Alliance (NJEJA), which provides statewide environmental-justice advocacy, and GAIA, which supports the campaign through research, technical assistance, and its Failing Incinerators Project. Earthjustice has provided legal and regulatory support, including efforts to secure enforcement over air-pollution violations, while GreenFaith has historically partnered with ICC on challenges to the facility's air permits. Together, these organizations have focused on reducing the cumulative pollution burden facing Newark's Ironbound community and ultimately ending waste incineration at the facility.

KEY COMMUNITY DEMANDS

The key community demands center on closing the incinerator and reducing the pollution burden imposed on Newark's Ironbound neighborhood. ICC has called for the facility's closure and remediation, while advocating for a zero-waste plan to replace dependence on waste burning. ICC, NJEJA, and allied organizations have also demanded that New Jersey end renewable-energy subsidies for incineration, prohibit new or expanded incinerators, and redirect investment toward community-supported waste-management alternatives.

In the near term, residents have demanded stronger enforcement of air and waste permits, greater transparency and emissions monitoring, and accountability for repeated violations. Following the facility's pink and purple plume incidents, ICC specifically called for an independent state investigation, enforcement action, and suspension of operations until the plant complied with environmental laws. Community advocacy has already resulted in requirements for improved waste-management practices, employee training, monitoring cameras, a health-impact assessment, and penalties for violations.



Operating since 2012 in one of the most densely populated parts of New Delhi, the Timarpur-Okhla Waste-to-Energy Plant burns up to 711,750 MT of municipal waste per year beside residential communities, hospitals and schools.[178] The facility has received substantial government support—including publicly supplied waste, nominal cost land, an approximately $1 million USD (₹10 crore) central government subsidy, public sector financing and carbon credits—while residents have spent more than a decade challenging its pollution and expansion.[179] [180] [181] Regulatory monitoring has repeatedly documented pollution problems: government testing found violations for particulate matter and dioxins/furans as early as 2013, while 2021 monitoring measured dioxins/furans at nearly ten times the legal limit and hydrogen chloride at nearly four times the limit.[182] [183] Despite this history of violations and community opposition, the facility has pursued a major expansion that would increase waste processing capacity by another 1,000–1,200 MT/day.[184]

FACILITY FACTS

Location:	Okhla, New Delhi, India
Population within 5 kilometers (km):	1,463,687
Facility Ownership:	Jindal Urban Infrastructure Ltd.
Facility Operators (Day-to-Day):	Timarpur-Okhla Waste Management Company Ltd. (TOWMCL)
First Year of Operation:	2012
Designed Burning Capacity:	711,750 MT/year
Facility Type:	High-temperature combustion using reverse-acting grate technology
Project Investment:	~$59.4 million USD (₹570 crore)
CO_2 Impacts:	Publicly unknown
Incinerator Ash Created:	66,356.38 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Timarpur–Okhla was developed through a public-private partnership that combined private ownership with substantial public support. Government records place the original project cost at approximately $19.6 million USD (₹188.28 crore), while the later expansion Environmental Impact Assessment (EIA) lists the existing project cost at approximately $28.1 million USD (₹270 crore) and another $31.3 million USD (₹300 crore) for the proposed expansion.[185] [186]

The facility also benefited from multiple forms of government support. The project received central-government financial assistance through the Ministry of New and Renewable Energy (MNRE) municipal waste-to-energy program, including approximately $1 million USD (₹10 crore) in financial support.[187] Delhi's municipal authorities also supported the project by supplying its essential feedstock and land: the New Delhi Municipal Council (NDMC) committed municipal solid waste and provided project land at a nominal lease rate, while the Municipal Corporation of Delhi (MCD) supplied additional waste needed to support the facility's operating scale.[188] The project also benefited from registration under the United Nations Clean Development Mechanism (CDM), allowing it to generate Certified Emission Reductions (CERs).[189] The United Nations Framework Convention on Climate Change records multiple issuances, including 246,180 CERs for September 2012–March 2015, 64,889 CERs for 2016–17, 36,541 CERs for 2017–18, 96,732 CERs for 2018–19, and 165,965 CERs for part of 2020.[190]

In addition, there was heavy reliance on public-sector financing from the Power Finance Corporation (PFC), a Government of India-owned public financial institution.[191] Timarpur-Okhla Waste Management Company Limited (TOWMCL) secured an approximately $14.1 million USD (₹135 crore) term loan from the Power Finance Corporation.[192] As of March 31, 2025, approximately $6.1 million USD (₹58.76 crore) of that loan remained outstanding, carrying interest rates of approximately 9.25–9.45%.[193] The financing represents public-sector lending to the privately controlled project company rather than debt carried directly by Delhi's municipal government.

CLIMATE IMPACT

Timarpur–Okhla burns hundreds of thousands of metric tons of mixed municipal waste annually, including fossil-derived plastics. However, no official annual facility-specific CO2 emissions total is publicly reported.

The plant does have a documented history of exceeding air pollution standards. The facility's 2022 Environmental Impact Assessment reports combined stack emission rates of approximately 6.63 grams/second of nitrogen oxides, 2.69 grams/second of sulfur dioxide, and 1.44 grams/second of particulate matter from its two existing stacks.[194]

If operated continuously at those reported rates, these would correspond to approximately 209 MT/year of nitrogen oxides, 85 MT/year of sulfur dioxide, and 45 MT/year of particulate matter.[195] The same assessment found mercury below the detectable limit in ambient-air monitoring around the facility.[196] Separately, Central Pollution Control Board testing found that dioxins and furans reached 0.99 ng TEQ/Nm^3 in 2021—9.9 times the 0.1 ng TEQ/Nm^3 limit—while hydrogen chloride reached 198 mg/Nm^3, nearly four times the 50 mg/Nm^3 limit.[197]

COMMUNITY POLLUTION EXPOSURE

Timarpur–Okhla is located exceptionally close to established residential communities. The facility's environmental assessment places Haji Colony approximately 330 meters away, Sukhdev Vihar 470 meters, Shyam Nagar 800 meters, Jasola-Okhla 960 meters, Zakir Nagar 1.25 kilometers and New Friends Colony 1.42 kilometers from the plant.[198] There's roughly 1,463,687 people in total within 5 kilometers of the site.[199] Residents have challenged the plant's proximity to homes, schools and hospitals and raised concerns about smoke, particulate pollution, odors, dust and ash, dioxins and other toxic emissions, inadequate pollution monitoring and enforcement, and continued expansion of incineration capacity.[200] [201]

Residents have also reported respiratory problems, breathlessness, eye irritation, headaches, sleep disturbance and stress, alongside concerns about cancer and the potential long-term effects of exposure to dioxins, heavy metals and other combustion pollutants.[202] 203 These concerns have persisted alongside documented regulatory exceedances for particulate matter, hydrogen chloride and dioxins/furans.[204] [205]

WASTE ENTRAPMENT

Timarpur–Okhla's concession arrangements explicitly tie municipal authorities to continued waste delivery. The New Delhi Municipal Council (NDMC) committed to supply a minimum of 200 MT of municipal solid waste per day and provide approximately 15 acres of land at Okhla for the duration of the concession.[206] Under the concession agreement, failure by the New Delhi Municipal Council to meet its contracted waste quantity for six consecutive days can trigger a predetermined Daily Municipal Solid Waste Deficiency Amount for subsequent shortfalls.[207] The Municipal Corporation of Delhi (MCD) separately contracted to supply 1,550 MT/day, bringing the facility's contracted waste supply to approximately 1,950 MT/day.[208] The project has a 25-year concession period; Jindal Urban Infrastructure Limited was awarded the project in January 2008, placing the scheduled end of the concession in 2033, after which the project structures, equipment, machinery and other assets are to be handed over to the New Delhi Municipal Council.[209]

The facility does not rely on international waste imports, but it does depend on waste collected across multiple municipal areas of Delhi. Recent government records continue to identify Timarpur–Okhla's processing capacity as approximately 1,950 MT/day, with approximately 1,550 MT/day supplied by the Municipal Corporation of Delhi.[210]

VALUABLE MATERIALS BURNED

Facility-specific waste characterization shows that much of the material entering Timarpur–Okhla consists of compostable or potentially recyclable material. Approximately 55.7% is organic material, including vegetable and fruit residues, leaves and other plant matter; approximately 3.8% is plastics, 2.2% paper and cardboard, and 0.7% metals and glass.[211] The characterization also identifies approximately 15.8% textiles, cotton and jute.[212] These figures show that a substantial share of the residual waste directed toward combustion consists of materials with potential for composting, recycling or other forms of material recovery.

INCINERATOR ASH STATS

In 2025, Timarpur–Okhla processed 628,133 MT of municipal solid waste and generated 66,356.38 MT of incinerator ash, consisting of 49,954.55 MT of bottom ash and 16,401.83 MT of fly ash.[213] Approximately 10.6% of the incoming waste mass therefore remained as bottom or fly ash after combustion. The facility has installed an ash-brick manufacturing plant capable of producing approximately 20,000 bricks per day and consuming about 45 MT/day of fly ash, while bottom ash has also been directed toward highway and other construction applications.[214]

Despite these reuse programs, significant quantities of ash continue to require disposal. In 2026, the Municipal Corporation of Delhi reported that only approximately 20–40% of ash from the Okhla facility was being utilized, with remaining ash and inert material being sent to the Tehkhand Engineered Sanitary Landfill in Okhla, southeast Delhi.[215] [216] The landfill was commissioned in March 2024 on approximately 32 acres and was specifically developed to receive ash, inert material and rejects from the Okhla and Tehkhand waste-to-energy plants.[217]

This part of Southeast Delhi already hosts a concentrated cluster of waste infrastructure, including the older Okhla dumpsite, the Timarpur–Okhla incinerator, the Tehkhand waste-to-energy plant and the new engineered landfill.[218] Government records have acknowledged longstanding dust and odor impacts from the older landfill, which had exceeded its intended capacity, while proceedings before the National Green Tribunal have documented that previous dumping of incinerator ash caused problems for local residents.[219] The continued disposal of incinerator residues at Tehkhand therefore adds another waste burden to a community already surrounded by major waste management infrastructure.[220] [221]

FUNDERS

Timarpur–Okhla was developed through a public-private partnership led by Timarpur-Okhla Waste Management Company Limited, which was acquired by Jindal Urban Infrastructure Limited, with extensive participation by Delhi public authorities.[222] Government support included municipal land, guaranteed waste supplies and central-government waste-to-energy assistance, while the project also received AN approximately $14.1 million USD (₹135 crore) term loan from the Government of India-owned Power Finance Corporation.[223]

The facility also received international climate finance support through registration as United Nations Framework Convention on Climate Change Clean Development Mechanism Project 1254.224 The project generated Certified Emission Reductions, including 246,180 credits for September 2012–March 2015, 64,889 for 2016–17, 36,541 for 2017–18, 96,732 for 2018–19 and 165,965 for part of 2020.[225]



COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Opposition to Timarpur–Okhla has continued for more than a decade. The Sukhdev Vihar Residents Welfare Association, residents and associations from Jasola Vihar and Ishwar Nagar, and the Anti-Incinerator Committee of Sukhdev Vihar have challenged the facility's location, pollution, technology and expansion.[226] [227] Residents pursued legal action through the Delhi High Court and the National Green Tribunal, seeking intervention over pollution and the siting of the facility near densely populated residential areas.[228] Environmental and waste justice organizations including Toxics Link have also documented pollution concerns and alternatives to waste incineration in Delhi.[229]

KEY COMMUNITY DEMANDS

Residents and environmental groups have called for relocation or closure of the incinerator away from densely populated neighborhoods; stronger controls on dioxins/furans, particulate matter, hydrogen chloride and other toxic pollutants; independent and transparent emissions monitoring; safe management of bottom and fly ash; stronger enforcement of environmental requirements; and rejection of further expansion at the Okhla site.[230] [231] They have also pushed for Delhi to prioritize source separation, composting, recycling and protection of waste picker livelihoods rather than increasing the amount of mixed municipal waste committed to incineration.[232]



AMAGER BAKKE (COPENHILL)

Denmark

Operating since 2017, Amager Bakke—also known as CopenHill—is a municipally owned mass-burn waste incinerator in Copenhagen operated by Amager Resource Center (ARC). Although promoted internationally for its architecture, ski slope, energy efficiency and advanced pollution controls, the facility has also become a prominent example of the financial and climate risks associated with oversized incineration infrastructure. Amager Bakke was financed through approximately $682 million USD (DKK 3.95 billion) in publicly backed borrowing, while its owner municipalities later loosened restrictions on imported waste after lower than expected local waste volumes weakened the project's finances.[233] [234] ARC currently reports stack emissions of approximately 560,000 MT of CO2 per year, while local and regional advocates have argued that the plant's scale and long-lived debt create pressure to maintain high waste throughput even as Copenhagen seeks to increase recycling and reduce residual waste.[235] [236]

FACILITY FACTS

Location:	Copenhagen, Denmark
Population within 5 kilometers (km):	420,423
Facility Ownership:	Amager Resource Centre (ARC) - Jointly owned by 5 municipalities (Copenhagen, Frederiksberg, Hvidovre, Tårnby, and Dragør)
Facility Operators (Day-to-Day):	Amager Resource Center (ARC)
First Year of Operation:	2017
Designed Burning Capacity:	600,000 MT/year
Facility Type:	"Mass-burn", grate-fired w/combined heat and power (CHP)
Project Investment:	~$682 million USD (DKK 3.95 billion)
CO_2 Impacts:	560,000 MT/year
Incinerator Ash Created:	~112,000–130,000 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Amager Bakke was financed primarily through public-sector borrowing backed by ARC's five municipal owners. In 2012, the owner municipalities approved a borrowing framework of approximately $682 million USD (DKK 3.95 billion) for the new facility.[237] Copenhagen bore the largest share of the guarantee exposure, approximately $432-437 million USD (about DKK 2.5-2.53 billion).[238]

The plant's debt remained substantial after operation began. ARC reported approximately $505 million USD (DKK 3.306 billion) in remaining loan debt at the end of 2020.[239] Copenhagen municipal documents later reported approximately $588 million USD (DKK 3.7 billion) of ARC debt at the end of 2021.[240] A 2022 financial analysis found that the five municipalities could, under a worst-case scenario, have been required to contribute as much as approximately $103 million USD (DKK 731 million) in additional capital, of which Copenhagen's potential share was approximately $69 million usd (DKK 490 million).[241] [242]

CLIMATE IMPACT

Amager Bakke currently emits approximately 560,000 MT of direct CO2 annually, including both fossil and biogenic CO2.[243] ARC's 2020 data provide a more detailed breakdown: approximately 167,000 MT of fossil CO2 and 333,000 MT of biogenic CO2, for 500,000 MT of total direct CO2 that year.[244]

Based on Amager Bakke's reported 2020 emissions factors and approximately 599,000 MT of waste burned, annual air emissions were approximately 94.6 MT nitrogen oxides (NOx), 6.0 MT sulfur dioxide (SO_2), 4.2 MT particulate matter, 1.8 MT hydrogen chloride (HCl), 0.60 MT ammonia (NH_3), and 0.018 MT carbon monoxide (CO).[245] Trace emissions included approximately 0.0048 MT mercury, 0.0048 MT arsenic, 0.00060 MT cadmium, 0.00036 MT lead, and 0.0054 grams of dioxins.[246]

COMMUNITY POLLUTION EXPOSURE

Approximately 420,423 people live within 5 kilometers of the Amager Bakke facility.[247] Amager Bakke is located in an industrial harbor district of Copenhagen rather than in the center of a densely residential neighborhood. IEA Bioenergy reports that the nearest residential building is approximately 200 meters from the facility, although the broader Copenhagen urban area lies close to the site.[248]

Unlike facilities such as Vallon or Newark's Essex incinerator, Amager Bakke has not generated a well-documented pattern of neighborhood health complaints directly tied to facility emissions. Concerns surrounding the project have instead centered primarily on financial risk, overcapacity, continued incineration, imports of foreign waste, climate emissions and competition with recycling.

Municipal records do document odor complaints in the wider Prøvestenen/northeastern Amager industrial area, but Copenhagen has identified multiple possible industrial sources and has not attributed those complaints specifically to Amager Bakke.[249]
In addition, no facility-specific epidemiological study has been identified demonstrating increased disease rates attributable to Amager Bakke itself. The relevant potential health concerns are therefore those associated generally with exposure to NOx, particulate matter, heavy metals and other combustion-related pollutants, rather than documented Amager Bakke-specific health outcomes.

WASTE ENTRAPMENT

Amager Bakke is a strong example of financial and infrastructure-based waste lock-in, even with no conventional fixed tonnage put-or-pay agreement. Before final approval, Copenhagen officials raised concerns that the planned facility was too large relative to anticipated future residual-waste volumes and could interfere with recycling objectives. The completed plant nevertheless had a capacity of approximately 560,000 MT/year, while subsequent estimates of locally available waste fell toward approximately 350,000 MT/year.[250] ARC records identify a 30-year non-cancellable lease beginning when Amager Bakke entered operation in 2017.[251]
The original ownership agreement restricted imported waste, but those restrictions became increasingly difficult to maintain as waste volumes declined and the plant faced substantial debt service obligations. In 2016, the five owner municipalities changed their agreement to permit imported waste and biomass under specified circumstances.[252]

By 2022, Copenhagen explicitly acknowledged that waste deliveries from the owner municipalities were declining because more waste was being separated for recycling, while ARC remained highly indebted. Municipalities therefore approved additional flexibility for imported waste as part of efforts to stabilize the company's finances.[253] Zero Waste Europe reports that approximately 30,000 MT of imported waste was burned in 2018, primarily from the British Isles.[254] ARC now openly states that it imports residual waste when additional material is needed to utilize available incineration capacity.[255]

VALUABLE MATERIALS BURNED

Available waste composition estimates indicate that a substantial portion of the waste burned at Amager Bakke consists of organic materials, plastics, and paper and cardboard. A peer-reviewed facility-specific assessment estimates the incoming waste stream at approximately 38% organic material (including 34% kitchen waste and 4% garden waste), 18% plastics, 13% paper and cardboard, and 7% metals and glass, with the remaining roughly 24% consisting of other materials.256 Zero Waste Europe separately reports that imported waste burned at Amager Bakke has contained recyclable materials including paper, cardboard, and plastics, with inspections finding plastics comprising approximately 15–40% of some imported waste loads.257

INCINERATOR ASH STATS

Amager Bakke generates approximately 104,000–123,000 MT of bottom and fly ash annually when operating at its 560,000 MT/year design capacity.[258] ARC reports that approximately 17–20% of incoming waste remains as bottom ash/slag, equivalent to roughly 95,000–112,000 MT/year, while IEA Bioenergy reports approximately 15–20 kg of fly ash for every tonne of waste burned, equivalent to another 8,400–11,200 MT/year.[259]

Bottom ash is transported for maturation and processing, including at Prøvestenen in Copenhagen, where ferrous and non-ferrous metals are recovered before the remaining mineral material can be used as aggregate or fill in construction.[260] ARC reports that approximately 5–7.5% of the bottom-ash mass can be recovered as metals.[261] Fly ash and other concentrated flue-gas residues are exported to NOAH's Langøya hazardous waste facility near Holmestrand, Norway, where the material is chemically treated and stabilized before being placed within former limestone quarry areas as part of the site's rehabilitation.[262] [263]

FUNDERS

Amager Bakke was financed predominantly through public-sector borrowing rather than private project finance or an international financial institution. The principal lender was KommuneKredit, Denmark's specialized municipal credit institution, which provided ARC with six loans totaling approximately $682 million USD (DKK 3.95 billion) for construction of the facility.[264] [265] Because ARC is jointly owned by the municipalities of Copenhagen, Frederiksberg, Hvidovre, Tårnby and Dragør, the borrowing was backed by guarantees from these five municipal owners. Copenhagen carried the largest share of the exposure, guaranteeing approximately $432–437 million USD (DKK 2.5–2.53 billion) of the original financing.[266] KommuneKredit's role is important because it raises its own capital primarily by issuing bonds to investors and then lends to Danish municipalities and other eligible publicly backed entities; Amager Bakke was therefore ultimately financed through the municipal credit system and capital markets rather than through a commercial project finance structure.[267]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Amager Bakke has not faced the same type of long-running neighborhood pollution campaign documented at some older incinerators. Opposition has centered more heavily on incineration capacity, climate impacts, public debt and conflict with recycling policy.

Zero Waste Europe has been the most prominent civil society organization documenting these problems. Its dedicated Amager Bakke analysis argues that the facility was built too large for Copenhagen's future residual-waste needs and that the resulting overcapacity contributed to pressure to permit imported waste.[268]

Resistance also emerged within Copenhagen's municipal political process. Before the final financing arrangement was approved, Copenhagen sought changes because of concern that the planned facility would be too large and could undermine future recycling objectives.[269]



KEY COMMUNITY DEMANDS

The principal demands surrounding Amager Bakke have focused on reducing dependence on incineration and preventing the plant's oversized capacity from undermining waste reduction, reuse, and recycling. Before construction, Copenhagen sought a smaller incinerator with greater emphasis on recycling and reuse, while opponents argued that residual waste sent for combustion should be minimized.[270] Danish environmental organization NOAH (Friends of the Earth Denmark) similarly opposed the plant's reliance on waste combustion and emphasized preventing waste generation before incineration.[271] These concerns remain relevant as Copenhagen residents separate and recycle more material: the City acknowledged in 2022 that increased recycling was reducing the amount of residual waste available for Amager Bakke, contributing to the facility's financial difficulties.[272]

A second major demand has been to limit reliance on imported waste and prevent recyclable materials from being burned simply to maintain plant throughput. Earlier operating agreements placed restrictions on both the amount of waste Amager Bakke could burn and its ability to import waste, reflecting concern about the facility's approximately 560,000 MT/year capacity.[273] Zero Waste Europe has subsequently called attention to the plant's dependence on imported waste and argued for policies that prioritize waste prevention, reuse, and recycling rather than maintaining high incineration volumes.[274] When the owner municipalities temporarily relaxed import restrictions in 2022, they required ARC to prioritize waste from its five owner municipalities, then other Danish waste, before European imports, while also requiring annual reporting on imported quantities, origins, transportation, and associated CO2 emissions.[275]



ISSÉANE INCINERATOR

France

photo : Wikimedia Commons, Greenski

Operating since 2007–2008, Isséane is a large publicly owned waste incinerator embedded in the densely populated Paris metropolitan area, with over one million people living within 5 km of the facility.[276] In 2024, the plant burned 536,000 MT of waste and released 252,060 MT of fossil CO2, alongside NOx, particulate matter, mercury, heavy metals and dioxins; it also generated approximately 89,300 MT of bottom and hazardous fly ash, with fly ash transported to hazardous-waste facilities outside Paris.[277] Built at a cost of approximately $836 million USD (€600 million) largely through public financing, Isséane has faced sustained criticism over its short stacks, cumulative pollution in an already heavily urbanized area, health monitoring, and the financial and infrastructural dependence created by large-scale incineration.[278] [279]

FACILITY FACTS

Location:	Issy-les-Moulineaux, France
Population within 5 kilometers (km):	1,109,065
Facility Ownership:	SYCTOM (Paris metropolitan waste authority)
Facility Operators (Day-to-Day):	Issy Urbaser Environment
First Year of Operation:	2007
Designed Burning Capacity:	536,000 MT/year
Facility Type:	Twin-stream moving grate incineration
Project Investment:	~$836 million USD (€600 million, excluding VAT)
CO_2 Impacts:	252,060 MT/year (only fossil CO2)
Incinerator Ash Created:	89,291 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Isséane was one of Syctom's largest capital investments of the 2000s. Syctom's 2009 accounts place the completed investment at approximately $836 million USD (€600 million, excluding VAT), while an earlier regional audit had projected the project at approximately $736 million USD (€528 million) before completion.[280] [281] The plant received comparatively little grant support: Syctom later reported that public subsidies covered only about 2% of the roughly $836 million USD (€600 million) project cost, equivalent to approximately $16.7 million USD (€12 million).[282]

The remaining capital requirement was financed primarily through Syctom's own funds and public borrowing. Syctom's outstanding debt reached approximately $813 million USD (€592.85 million) by the end of 2007, compared with approximately $745 million USD (€543.91 million) one year earlier, and Syctom explicitly stated that the debt level resulted principally from the Isséane project, which had received little subsidy support.[283] This does not mean the entire $813 million USD (€592.85 million) was Isséane-specific debt, but it confirms that the project was a major driver of the authority's borrowing and long-term financial costs. Current debt numbers (2026) sit at the public intermunicipal authority level; thus away from public access.

CLIMATE IMPACT

In 2024, Isséane emitted 252,060 MT of fossil CO2 while incinerating 536,000 MT of waste.[284] Syctom's official carbon accounting excludes biogenic CO2, even though both fossil and biogenic CO2 are physically released from the stack.[285] A carbon-14 measurement campaign conducted specifically at Isséane found that approximately 60% of the carbon in the waste was biogenic, rather than the 50% assumption traditionally used in French incinerator accounting.[286]

Isséane also reported substantial annual releases of regulated air pollutants in 2024: 82.19 MT of nitrogen oxides (NOx), 32.76 MT of carbon monoxide (CO), 9.49 MT of sulfur dioxide (SO_2), 7.96 MT of hydrogen chloride (HCl), 3.33 MT of ammonia (NH_3), 1.37 MT of total organic carbon (TOC), 0.795 MT of particulate matter/dust, and 0.078 MT of hydrogen fluoride (HF).[287] Trace pollutants included approximately 0.011 MT (11 kg) of nine regulated heavy metals—antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium—along with 0.003 MT (3 kg) of mercury and approximately 0.00008 MT (0.08 kg) of cadmium plus thallium. Isséane also emitted 23.1 mg I-TEQ of dioxins and furans during 2024, equivalent to 0.0000000231 MT I-TEQ.[288] Syctom reported the annual flows below their applicable annual limits, although the facility recorded several shorter duration exceedance events during 2024, including mercury exceedances associated with mercury-containing waste.[289]

COMMUNITY POLLUTION EXPOSURE

Isséane operates in one of the most densely populated parts of metropolitan Paris, with approximately 1,109,065 within 5 km of the facility.[290] Community complaints have centered on five recurring concerns: (1) odors and fumes from the facility; (2) air pollution from nitrogen oxides (NOx), particulate matter, heavy metals and other stack emissions; (3) the plant's unusually short stacks and whether they adequately disperse pollution away from nearby residents; (4) cumulative exposure from the incinerator together with major roads, traffic and other urban pollution sources; and (5) insufficient independent health monitoring and transparency regarding long-term exposure.

During the plant's commissioning in 2007, nearby residents reported strong and persistent odors, prompting complaints to local authorities.[291] In 2011, Écologie Sans Frontière and CNIID (now Zero Waste France) challenged Isséane's operating authorization, arguing that its approximately 25-meter stacks did not provide sufficient dispersion of pollutants and that the environmental assessment had inadequately accounted for cumulative pollution in the surrounding urban environment.[292] The groups specifically raised concerns over nitrogen-oxide emissions and called for an epidemiological study of populations living around the facility.

The principal health concerns associated with these exposures include respiratory and cardiovascular effects from NOx and particulate pollution, cancer risk and other chronic effects associated with long-term dioxin exposure, and neurological, developmental and other systemic effects associated with mercury, lead and other heavy metals.

WASTE ENTRAPMENT

Isséane does not operate under a conventional minimum-tonnage or put-or-pay waste-supply contract. Its waste supply instead comes through Syctom's public metropolitan waste management system, which directs residual municipal waste from member municipalities to Syctom treatment infrastructure. The current operating contract awarded to Urbaser in 2019 runs for 99 months—8 years and 3 months—and is worth approximately $246 million USD (€220 million).[293] This is an operations-and-maintenance contract, not a guaranteed minimum-waste supply contract.

Urbaser reported a contractual processing capacity of 510,000 MT/year when the 2019 contract was awarded, while Syctom now lists an authorized capacity of 536,000 MT/year. Waste delivered to Isséane comes primarily from municipalities within Syctom's service area, with there being no evidence that the plant relies on regular international waste imports. In 2024 the facility burned waste from Syctom's metropolitan collection system and transferred roughly 6,110 MT to other incinerators when necessary.[294] [295]

VALUABLE MATERIALS BURNED

Isséane receives residual household waste from 22 municipalities within the Syctom service area, but no publicly available facility-specific characterization exists to identify the waste entering the facility. Syctom's 2024 waste characterization program provides the most current estimate of the composition of the residual municipal waste (ordures ménagères résiduelles, or OMR) that supplies its incineration system, including Isséane. The residual waste stream contained approximately 24.9% organic waste, 36.2% paper and packaging, and 6.5% glass, while another 6.2% consisted of materials covered by dedicated collection or recovery systems, including textiles, electrical and electronic equipment, and special wastes.[296] Syctom concluded that 73.8% of the residual-waste bin could potentially be diverted from incineration to an appropriate alternative recovery or treatment stream, specifically identifying plastic and metal packaging, biowaste, paper/cardboard and glass among the materials still present.[297]

INCINERATOR ASH STATS

Isséane generated 89,291 MT of bottom and fly ash in 2024. This consisted of 76,588 MT of bottom ash (mâchefers) and 12,703 MT of fly ash, equivalent to approximately 14.3% and 2.4% of the waste burned, respectively.[298] Syctom also recorded an additional 2,932 MT of residual sodium products, bringing total thermal-treatment by-products—including metals and other residues—to 102,610 MT in 2024.[299]

Bottom ash is sent for maturation and processing, with metals recovered before the mineral fraction is used in public works applications. Fly ash is handled as a hazardous residue: Syctom states that it is transported to hazardous-waste facilities in Villeparisis, Seine-et-Marne, and Guitrancourt, Yvelines; the Guitrancourt facility uses a stabilization process before final management. Wastewater treatment sludge is also sent to the Villeparisis hazardous waste facility.[300]

FUNDERS

Isséane was financed primarily by Syctom itself, using a combination of public borrowing, its own capital resources and a relatively small amount of public subsidy. The completed investment was approximately $836 million USD (€600 million), while public grants covered only around 2%—approximately $16.7 million USD (€12 million).[301] [302] Syctom's financial records indicate that the bulk of the capital burden therefore remained with the public metropolitan waste authority and its borrowing program.

No evidence has been identified that the World Bank, European Investment Bank (EIB), or another international financial institution financed the original project. Syctom's 2007 accounts instead identify the project's financing pressure directly within its own balance sheet, with outstanding authority-wide debt reaching approximately $813 million USD (€592.85 million) and Isséane cited as the principal reason for that level of indebtedness.[303]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

The strongest organized opposition has come from Écologie Sans Frontière, Zero Waste France (formerly CNIID), and the local environmental association Val de Seine Vert. In 2011, Écologie Sans Frontière and Zero Waste France filed an administrative challenge seeking cancellation of Isséane's operating authorization, arguing that its stack height and pollution modeling did not adequately protect surrounding residents and workers.[304] Val de Seine Vert, which participates in the facility's local monitoring process, has continued to scrutinize annual operations and emissions.[305]



KEY COMMUNITY DEMANDS

Community and environmental organizations have called for stronger controls on Isséane's air pollution and greater protection for people living and working around the facility. In their legal challenge to Isséane's operating authorization, Écologie Sans Frontière and Zero Waste France (formerly CNIID) specifically demanded that the plant's two approximately 26-meter stacks be brought into compliance with what they considered necessary dispersion requirements, including raising the stacks, and that the facility's permitted pollutant-emission limits be reassessed using its health-risk evaluation.[306] [307]

The organizations argued that the existing stacks could concentrate pollutant deposition near the facility and that the original assessment inadequately accounted for the area's existing pollution from major roads, traffic and industry.[308] They also called for a dedicated health study of populations surrounding Isséane and for stronger scrutiny of NOx and other stack emissions.[309] Local organization Val de Seine Vert, which participates in the facility's official monitoring process, has likewise emphasized public access to reliable emissions data and continued independent scrutiny of the plant's environmental performance.[310]

Opposition has also focused on reducing the amount of waste sent to Isséane rather than maintaining incineration throughput. Val de Seine Vert has explicitly called for waste generation to be reduced “as much as possible” and for materials that cannot be avoided to be recovered rather than burned.[311] Écologie Sans Frontière similarly argued that the scale and cost of Isséane create an incentive to maintain waste generation in order to keep the facility economically utilized, and called instead for stronger waste prevention, source reduction, sorting and recycling policies.[312]



KWINANA ENERGY RECOVERY FACILITY

Australia

Photo: Jane Bremmer

Australia's first large-scale operational municipal waste incinerator, Kwinana Energy Recovery was developed at a cost of approximately $474 million USD (A$668 million) and is permitted to burn up to 460,000 MT of waste annually in the heavily industrialized Kwinana area south of Perth.[313] [314] The project received $16.3 million USD (A$23 million) in direct federal grant funding and up to $63.8 million USD (A$90 million) in debt financing from the Australian Government-owned Clean Energy Finance Corporation, while participating councils entered 20-year waste-supply agreements committing residual municipal waste to the facility.[315] [316] The plant's own pre-construction lifecycle assessment estimated 115,165 MT CO2e/year in gross greenhouse gas emissions, while residents and environmental groups have raised concerns about air pollution, cumulative industrial exposure, long-term waste contracts and the potential diversion of materials from recycling and composting.[317] [318] Since waste burning began, residents of nearby Medina have reported recurring burning-plastic/rubbish odors, and Western Australian authorities have acknowledged increasing odor complaints.[319]

FACILITY FACTS

Location:	Kwinana Beach WA, Australia
Population within 5 kilometers (km):	7,630
Facility Ownership:	Acciona (acquired in March 2024 from Macquarie Capital and Dutch Infrastructure Fund)
Facility Operators (Day-to-Day):	Acciona
First Year of Operation:	2025
Designed Burning Capacity:	460,000 MT/year
Facility Type:	High-temperature moving-grate “mass-burn” incineration
Project Investment:	~$497 million USD (A$700 million)
CO_2 Impacts:	115,165 MT CO2e/year (gross project greenhouse gas emissions)
Incinerator Ash Created:	80,000 MT/year (bottom ash only)

FACILITY IMPACTS

FINANCIAL BURDEN

Kwinana was initially developed as an approximately $474 million USD (A$668 million) project, with later reporting placing the construction value at approximately $497 million USD (A$700 million).[320] [321] Macquarie Capital and Dutch Infrastructure Fund initially provided approximately $195 million USD (A$275 million) in equity, while a senior debt syndicate supplied approximately $284 million USD (A$400 million).[322] The debt syndicate included Sumitomo Mitsui Banking Corporation, Investec, Siemens, IFM Investors, Metrics Credit Partners and the Australian Government-owned Clean Energy Finance Corporation.[323] The Clean Energy Finance Corporation committed up to approximately $63.8 million USD (A$90 million) in public-sector debt financing.[324]

The project also received an approximately $16.3 million USD (A$23 million) non-repayable grant from the Australian Renewable Energy Agency.[325] The Clean Energy Finance Corporation's financing was fully repaid in March 2024, when ACCIONA acquired the facility, meaning the approximately $63.8 million USD (A$90 million) represented temporary public financial exposure rather than permanent government debt.[326] The approximately $16.3 million USD (A$23 million) Australian Renewable Energy Agency grant represents direct non-repayable public support.[327] The facility was also structured to generate Large-scale Generation Certificates for eligible renewable portions of its waste derived electricity.[328]

CLIMATE IMPACT

Western Australia’s Department of Water and Environmental Regulation received the facility’s environmental commissioning report in December 2025, but the government has stated that the report is not publicly released, limiting access to the plant’s initial operating emissions data.[329]

The strongest facility-specific estimate comes from the lifecycle assessment commissioned to satisfy Australian Renewable Energy Agency funding requirements. It estimated 115,165 MT CO2e/year in gross greenhouse-gas emissions while processing 400,000 MT/year of waste.[330] However, the assessment was completed before the facility's permitted capacity increased to 460,000 MT/year.[331]

COMMUNITY POLLUTION EXPOSURE

Kwinana sits within one of Western Australia's largest heavy-industrial areas, while residential communities including Medina, Calista, Orelia, Leda and Hope Valley are nearby.[332] Approximately 7,630 people are living within 5 kilometers of the facility.[333] During the project's environmental review, community submissions specifically raised concerns about air quality, cumulative industrial pollution, potential health risks, waste incineration's position in the waste hierarchy and the safety of ash reuse.[334] The Western Australian environmental regulator received 32 public submissions, including concerns that another major combustion facility would add pollution to an airshed already affected by numerous industrial sources.335

Those concerns have continued into operation. Residents of nearby Medina reported recurring burning-plastic or rubbish odors after waste combustion began, sometimes lasting several consecutive days.336 The Western Australian Government confirmed in 2026 that it was aware of increasing odor complaints associated with the area.[337] Residents and environmental organizations have also raised concerns about exposure to particulates, nitrogen oxides, dioxins/furans, mercury and other heavy metals, particularly given the cumulative industrial burden already carried by Kwinana and Rockingham communities.[338] [339]

WASTE ENTRAPMENT

Kwinana relies on long-term municipal waste-supply contracts. The Rivers Regional Council and City of Kwinana entered 20-year agreements to provide residual municipal waste to the facility.[340] [341] The City of Kwinana's contract requires between 6,000 and 20,000 MT/year for 20 years following commissioning.[342] The Clean Energy Finance Corporation states that long-term council contracts secure the majority of the facility's waste requirements.[343] The City itself has acknowledged that changing its curbside collection system—including introducing a third Food Organics and Garden Organics bin—would reduce the amount of waste delivered for energy recovery.[344]

The facility draws waste from across metropolitan Perth rather than relying solely on Kwinana.[345] It is approved to receive municipal residual waste as well as certain commercial and industrial waste and pre-sorted construction and demolition waste.[346] [347] There is no evidence that the plant depends on international waste imports; its feedstock is principally Western Australian waste transported from participating councils and commercial sources.

VALUABLE MATERIALS BURNED

The facility's environmental review included a waste audit covering the participating Rivers Regional Council municipalities. The consolidated general-waste stream contained approximately 58.2% organic material, consisting of 16.5% food/kitchen waste, 28.6% garden/vegetation and 13.1% other organic material such as nappies, wood and other putrescibles.[348] It also contained approximately 8.8% plastics, including 1.8% recyclable plastic containers and 7.0% other plastics; 12.8% paper and cardboard; and 7.7% combined metals and glass, consisting of 5.2% glass and 2.5% recyclable metals.[349]

Even in the environmental review's hypothetical scenario removing all garden waste, the residual stream was estimated to contain 23.1% food/kitchen material, 18.4% other organics, 12.3% plastics, 17.9% paper/cardboard and 10.8% metals and glass.[350] The City of Kwinana has subsequently expanded separate organics collection, while its own waste planning documents acknowledge that improved organics separation can reduce the tonnage available for energy recovery.[351]

INCINERATOR ASH STATS

At full operation, Kwinana is expected to generate approximately 80,000 MT/year of incinerator bottom ash.[352] ACCIONA expects to recover more than 10,000 MT of metals annually from the bottom ash.[353] The remaining bottom ash is transported to the Blue Phoenix Western Australia processing facility in Hope Valley, where metals are recovered and the mineral fraction is processed into incinerator-bottom-ash aggregate for potential use in roads, blocks and other construction applications.[354] [355] WA Limestone participates in the distribution and marketing of these products.[356]

Bottom ash is not the facility's only solid residue. Kwinana also generates air pollution control residue, containing fly ash and materials captured by the plant's pollution control system.[357] The Western Australian Government confirmed in 2026 that the facility's commissioning-report requirements did not require publication of trial and compliance data for either air-pollution-control residue or bottom ash.[358]

The Hope Valley ash processing site sits within the wider Kwinana industrial area, an area already carrying a high concentration of heavy industry and waste infrastructure.[359] Community submissions have raised concerns about cumulative industrial pollution in Kwinana and Rockingham, supporting environmental justice concerns.[360]

FUNDERS

The original project was co-developed by Macquarie Capital and Phoenix Energy, with ownership subsequently held by Macquarie Capital and Dutch Infrastructure Fund.[361] [362] Macquarie Capital and Dutch Infrastructure Fund supplied approximately $195 million USD (A$275 million) in equity.[363] The senior debt syndicate– Sumitomo Mitsui Banking Corporation, Investec, Siemens, IFM Investors, Metrics Credit Partners and the Australian Government-owned Clean Energy Finance Corporation— supplied approximately $284 million USD (A$400 million).[364] Public financing included up to approximately $63.8 million USD (A$90 million) from the Australian Government-owned Clean Energy Finance Corporation.[365] The project also received approximately $16.3 million USD (A$23 million) in grant funding from the Australian Renewable Energy Agency.[366]

Kwinana received explicit Australian government climate and clean-energy finance despite being a municipal waste incinerator. The approximately $16.3 million USD (A$23 million) Australian Renewable Energy Agency grant was provided through the agency's renewable-energy funding program.[367] The Clean Energy Finance Corporation classified its approximately $63.8 million USD (A$90 million) commitment as clean-energy finance intended to reduce waste-related greenhouse-gas emissions.[368] That public-sector financing was fully repaid in March 2024.[369]



Photo: Jane Bremmer

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

The Alliance for a Clean Environment and National Toxics Network, including longtime Western Australian environmental-health campaigner Jane Bremmer, have been prominent opponents of the Kwinana project and waste incineration in Western Australia.[370] At the project's 2019 sod-turning, Alliance for a Clean Environment protesters called on the Western Australian Government to, “ditch the incinerator and switch to sustainable, zero waste policy.”[371] Community opposition has focused on toxic air emissions, cumulative pollution in Kwinana and Rockingham, climate impacts, ash management, long-term municipal waste contracts and the risk that guaranteed incinerator feedstock will compete with waste prevention, composting and recycling.[372] [373]

KEY COMMUNITY DEMANDS

Community and environmental organizations have called for Western Australia to prioritize waste prevention, reuse, recycling, source separation and composting instead of long-term dependence on waste incineration.[374] [375] Opponents have also demanded greater public access to emissions and compliance information, stronger assessment of dioxins, mercury and other toxic pollutants, scrutiny of cumulative pollution from multiple industrial facilities in Kwinana and Rockingham, and protection of communities from additional industrial pollution burdens.[376] [377] More recently, campaigners have challenged the lack of publicly available commissioning emissions data and called for greater disclosure and scrutiny of waste-incineration infrastructure.[378] [379]



REPPIE WASTE-TO-ENERGY FACILITY

Reppie was inaugurated in 2018 as Africa's first large-scale municipal waste incinerator, after the Ethiopian government spent approximately $120 million USD developing the facility beside Addis Ababa's longstanding Koshe landfill.[380] [381] Designed to burn 1,400 MT/day—approximately 511,000 MT/year—the plant now processes only about 396–650 MT/day, while roughly 3,000 MT of waste can still arrive at the adjoining landfill each day.[382] [383] The facility's underperformance has created continuing public costs: its annual operating cost is approximately $6.09 million USD (800 million Ethiopian birr), while Addis Ababa faces more than $1.83 million USD (240 million Ethiopian birr) annually in compensation to Ethiopian Electric Power associated with power-generation shortfalls.[384] [385] Residents and waste pickers living around Reppie and Koshe report smoke, odors, respiratory and skin problems, continued landfill expansion and loss of livelihoods, while interviewed waste pickers reported an average 50% decline in income following introduction of the incinerator.[386]

FACILITY FACTS

Location:	Addis Ababa, Ethiopia
Population within 5 kilometers (km):	1,862,931
Facility Ownership:	Ethiopian Electric Power (Ethiopian Govt)
Facility Operators (Day-to-Day):	Ethiopian Electric Power (Ethiopian Govt)
First Year of Operation:	2018
Designed Burning Capacity:	511,000 MT/year
Facility Type:	"Mass-burn" incineration, w/reverse-acting moving grates
Project Investment:	~$120 million USD
CO_2 Impacts:	Publicly unknown
Incinerator Ash Created:	31,000 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Reppie cost approximately $120 million USD to construct and was fully financed by the Ethiopian government, making the project's capital cost a direct public expenditure rather than private investment.[387] [388] Ethiopian Electric Power contracted Cambridge Industries Limited and China National Electric Engineering Company to develop and construct the project, while Danish engineering company Ramboll served as the owner's engineer/technical consultant.[389] [390]

The financial burden has continued after construction. The plant's current annual operating cost is approximately $6.09 million USD (800 million Ethiopian birr) while electricity production has fallen to roughly 92.8 gigawatt-hours/year, about half the originally projected 185.6 gigawatt-hours.[391] Addis Ababa officials reported in 2025 that the City Administration must additionally pay more than $1.83 million USD (240 million Ethiopian birr) each year to Ethiopian Electric Power to compensate for the facility's failure to meet its power-generation obligations.[392] Combined with the initial $120 million USD publicly financed construction cost, these continuing expenses mean that Reppie's financial burden remains concentrated within Ethiopia's public sector.[393] [394] [395]

CLIMATE IMPACT

No verified annual facility-specific measurement of Reppie's direct carbon dioxide, methane or nitrous oxide emissions has been made publicly available.[396] The plant was promoted as a climate project because incineration would supposedly avoid landfill methane while generating electricity, and the government linked Reppie to Ethiopia's Climate-Resilient Green Economy strategy.[397] However, Reppie's municipal waste contains a substantial organic fraction and plastics, and the plant uses auxiliary diesel when starting combustion and when the waste has insufficient calorific value.[398]

COMMUNITY POLLUTION EXPOSURE

Reppie and the Koshe landfill are embedded within residential communities that have lived with waste related pollution for decades.[399] Approximately 1,862,931 people live within 5 kilometers of the site.[400] Residents interviewed for the 2025 Reppie case study described incinerator smoke, deteriorating air quality, persistent odors and noise, while others complained that the landfill continued expanding despite promises that the incinerator would reduce the city's dependence on Koshe.[401] City officials reported that roughly 3,000 MT/day of waste still reaches the site, while only about 600–700 MT/day is accepted by the incinerator,

leaving surrounding communities exposed simultaneously to the landfill and the incinerator.[402] Residents also raised concerns about accumulating ash, lack of understandable emissions information and inadequate participation in decisions affecting the community.[403]

Residents and waste pickers reported respiratory problems, headaches, gastrointestinal illness, skin irritation and general malaise, while uncertainty surrounding long-term pollution exposure has contributed to stress, anxiety and distrust.[404] A 2026 public-health study of communities around the Reppie dumpsite similarly documented reported breathing problems, asthma, eye and skin irritation, diarrhea, psychological stress and injuries among waste pickers, demonstrating the broader cumulative health burden surrounding the combined waste complex.[405] The economic impacts are also substantial: interviews with 18 informal waste pickers found an average 50% decline in earnings after the incinerator reduced access to recyclable materials, with some respondents reporting that they had resorted to begging.[406]

WASTE ENTRAPMENT

Reppie's original operating model was built around a continuous supply of approximately 1,400 MT of municipal waste per day from Addis Ababa to support electricity generation.[407] [408] In practice, the plant has been processing only about 396–650 MT/day, because of equipment failures, spare-parts shortages, maintenance problems and the high-moisture, low-calorific characteristics of Addis Ababa's waste.[409] [410] The resulting electricity shortfall has created a financial obligation for the City Administration: officials reported in March 2025 that Ethiopian Electric Power was seeking more than $1.83 million USD (240 million Ethiopian birr) annually in compensation because the plant was failing to meet its expected power output.[411]

VALUABLE MATERIALS BURNED

A 2020 household-waste characterization study for Addis Ababa's Akaki sub-city found approximately 63.17% food and yard organics, consisting of 52.84% food waste and 10.33% leaves and grass; 9.61% plastics; 4.99% paper; and 2.57% combined glass and metals, consisting of 1.32% glass and 1.25% metal.[412] The same waste stream contained another 2.21% textiles and 7.07% diapers and sanitary products.[413]

The high organic content is particularly important at Reppie because food and vegetation waste contain substantial moisture and relatively little combustion energy.[414] Studies of Reppie's operational problems identify Addis Ababa's 60–70% organic waste fraction and associated high moisture content as a significant obstacle to efficient combustion and electricity generation.[415]

INCINERATOR ASH STATS

At its current operating rate, Reppie generates approximately 85 MT of incinerator ash each day, equivalent to about 31,000 MT/year.[416] Japan International Cooperation Agency research found that this ash is buried at the adjoining Reppie/Koshe landfill or partially used as road material.[417] Addis Ababa's Cleansing Management Agency likewise states that its Landfill Administration Directorate is responsible for removing and disposing of both fly ash and bottom ash from the Reppie plant.[418]

The landfill was the site of the 2017 waste landslide that killed 116 people, remained active despite the construction of Reppie, and continues to expose nearby communities to odors, leachate, landfill gases, waste traffic and other hazards alongside the incinerator's emissions and ash.[419] The 2025 community study reports that Reppie's ash is frequently openly dumped or buried in Addis Ababa, while residents described seeing ash accumulate and dust being carried by wind.[420]

FUNDERS

The Ethiopian government was the principal and sole capital funder of Reppie's original construction, providing the approximately $120 million USD required for the project through the state-owned power sector.[421] [422] The project was framed by the Ethiopian government as part of the country's Climate-Resilient Green Economy strategy and promoted internationally as a renewable-energy and methane-reduction project.[423]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

The strongest opposition has come from affected residents, informal waste pickers, the Global Alliance for Incinerator Alternatives Africa, and Ethiopian environmental-justice advocates examining the social and environmental effects of Reppie.[424] Ecojustice Ethiopia has separately documented the precarious conditions faced by women waste pickers in Addis Ababa and reports that introduction of the Reppie incinerator increased competition for recyclable materials on which their livelihoods depend.[425] The 2025 Reppie investigation was built around interviews with nearby residents, 18 waste pickers, government officials and environmental organizations, giving affected communities a direct role in documenting the plant's impacts.[426]

KEY COMMUNITY DEMANDS

The community and environmental justice groups have demanded continuous and publicly accessible air-quality and emissions monitoring, independent monitoring of incinerator ash, stronger pollution controls, buffer zones between waste infrastructure and residential communities, and meaningful community participation and grievance mechanisms.[427] The Reppie case study also calls for waste pickers to be formally integrated into recycling systems with fair compensation and occupational protections, rather than losing recyclable materials and income to incineration.[428]

The proposed alternative is to redirect waste policy and financing toward waste prevention, source separation, recycling, decentralized composting, community biogas and other systems capable of managing Addis Ababa's large organic waste stream without burning it.[429] The recommendations also call for adoption of Extended Producer Responsibility (EPR), implementation of Ethiopia's circular economy planning and a shift in climate finance away from incineration toward upstream waste reduction and organic waste management.[430]



Photo credit: Nick Mattey

BEDDINGTON ENERGY RECOVERY FACILITY

United Kingdom

Beddington Energy Recovery Facility is a mass-burn municipal waste incinerator in south London built for approximately $308 million USD (£205 million) and operating under a 25-year residual waste contract between Viridor and the four councils of the South London Waste Partnership.[431] [432] The facility burned 330,484 MT of waste in 2025 and released 338,934 MT of carbon dioxide, while its environmental permit now allows it to receive up to 382,286 MT/year following a controversial capacity increase approved by the Environment Agency in June 2026.[433] [434] The facility has faced sustained community opposition over air pollution, waste imports, traffic and regulatory oversight. Concerns intensified after investigators determined that Beddington had exceeded its daily nitrogen oxide emissions limit 916 times between 2022 and 2024 without those exceedances being correctly reported at the time.[435] [436]

FACILITY FACTS

Location:	Sutton/Croydon, London, UK
Population within 5 kilometers (km):	620,597
Facility Ownership:	Viridor / KKR (Kohlberg Kravis Roberts)
Facility Operators (Day-to-Day):	Viridor South London Limited
First Year of Operation:	2019
Designed Burning Capacity:	382,286 MT/year
Facility Type:	Two-line "mass-burn" moving-grate incinerator
Project Investment:	~$308 million USD (£205 million)
CO_2 Impacts:	338,934 MT/year
Incinerator Ash Created:	79,452 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Construction of Beddington was reported at approximately $308 million USD (£205 million) when building work formally began in December 2015.[437] The project was developed and financed by Viridor, then part of Pennon Group, as the infrastructure required to fulfill its long-term south London residual waste contract.[438] Viridor's original contract announcement described the arrangement as a Public Private Partnership covering the financing, construction and operation of the new facility, rather than a council-financed construction project.[439]

The original agreement was a 25-year waste treatment contract, and was signed in November 2012 by the London boroughs of Croydon, Kingston, Merton and Sutton.[440] It called for the treatment of roughly 200,000 MT/year of residual municipal waste, providing the facility with a long-term publicly funded revenue stream while allowing Viridor to sell spare capacity to commercial and third-party waste customers.[441] The service term ends 3 March 2044, with the potential extension to 5 November 2047.

CLIMATE IMPACT

Environment Agency Pollution Inventory data show that Beddington released 338,934.2 MT of carbon dioxide in 2025, down from 350,068.3 MT in 2024.[442] Approximately 193,214 MT of the 2025 CO2 total was reported as biogenic, leaving a substantial fossil-derived component associated primarily with materials such as plastics.[443] Beddington also emitted 16.52 MT of nitrous oxide (N_2O) in 2025.[444]

Measured 2025 releases included approximately 370.25 MT of nitrogen oxides (NOx), 15.28 MT of hydrogen chloride (HCl), 8.39 MT of ammonia, 0.0137 MT of chromium, 0.0124 MT of nickel and 0.00306 MT of mercury.[445]

The reliability of emissions monitoring became a major issue after Viridor discovered in March 2024 that incorrect functions had been entered into Beddington's continuous emissions monitoring system.[446] Subsequent recalculation showed 916 previously unreported daily NOx-limit exceedances, and the Environment Agency recorded permit non-compliance associated with the monitoring failures.[447] [448] The UK Health Security Agency advised the regulator that nitrogen oxides are non-threshold pollutants for which reducing population exposure can provide public health benefits even below regulatory air-quality standards.[449]

COMMUNITY POLLUTION EXPOSURE

Beddington operates in a densely populated part of south London already affected by major roads, industrial activity and waste infrastructure, with approximately 620,597 people.[450] [451] Both Beddington Lane and nearby Croydon residential receptors lie within designated Air Quality Management Areas, reflecting existing concerns about local nitrogen dioxide and particulate pollution.[452] Community concerns surrounding the incinerator have included NOx and particulate emissions, odors, heavy goods vehicle traffic, fires and operational failures, the reliability of emissions monitoring and proposals to increase the quantity of waste burned at the site.[453] [454]

Local community health concerns have been particularly focused on exposure to nitrogen dioxide and particulate matter, pollutants associated with respiratory and cardiovascular harm, alongside concern about persistent or toxic pollutants released in much smaller quantities, including mercury and dioxins/furans.[455] [456] The discovery of hundreds of previously unreported NOx exceedances intensified those concerns because residents and local authorities had relied on monitoring data that were later found to be incorrect.[457] Sutton Council and the other South London Waste Partnership boroughs subsequently opposed Viridor's capacity increase, citing historic permit compliance problems and concerns about whether higher throughput could be managed without worsening operational impacts.[458]

WASTE ENTRAPMENT

Beddington is anchored by the 25-year South London Waste Partnership residual waste treatment contract signed on November 5, 2012 between Viridor and Croydon, Kingston, Merton and Sutton.[459] The contract was designed around approximately 200,000 MT/year of residual municipal waste from the four boroughs, while additional plant capacity was deliberately available for commercial and other third-party waste.[460] The contract documentation establishes a long-term obligation to make residual municipal waste available for treatment, creating a guaranteed public-sector waste stream while leaving Viridor able to monetize unused capacity.[461] [462]

Beddington consequently burns substantial quantities of waste originating outside the four partner boroughs.[463] The South London Waste Partnership acknowledged when opposing Viridor's capacity expansion that additional waste would come through merchant contracts and be delivered by commercial heavy goods vehicles, rather than being generated by the partnership's households.[464] Environment Agency waste transfer records likewise show waste arriving from multiple local authority areas beyond Sutton, Croydon, Kingston and Merton.[465]

VALUABLE MATERIALS BURNED

The original planning stage waste composition estimates projected a residual feedstock containing approximately 31.5% food and garden organics, 17.6% plastics, 20.8% paper and cardboard, and 6.6% metals and glass, alongside approximately 3.6% textiles, 2.6% wood and 0.3% waste electrical and electronic equipment.[466] More recent figures have yet to be released to the public.

However, a recent South London Waste Partnership composition analysis found that recyclable and compostable materials remain in the residual waste stream sent for disposal.[467] A 2022 Resource Futures analysis of waste from 1,469 houses and 785 flats across the four partnership boroughs found that half of the material in a typical rubbish bin could have been recycled through existing council collection services.[468] This means the residual stream supplying Beddington continues to contain materials for which upstream recycling or organics management routes are available. [469]

INCINERATOR ASH STATS

Environmental Agency waste transfer records show that Beddington produced a total of 73,219 MT of bottom ash, representing roughly 23% of waste entering the furnace.[470] [471] Beddington sent the bottom ash for recovery to destinations in Derbyshire and Cambridgeshire, including 18,760 MT to Erewash, 17,842 MT elsewhere in Derbyshire, 17,646 MT to Cambridgeshire, 12,531 MT to Cambridge and 6,439 MT to Derby.[472] Johnsons Aggregates operates its principal incinerator bottom ash processing facility in Ilkeston, Derbyshire, and also operates ash treatment activities at Saxon Pit near Whittlesey, Cambridgeshire, where metals are recovered and the remaining mineral fraction is converted into aggregate.[473] [474]

Regarding Beddington's fly ash, Environmental Agency records show 6,233 MT of solid gas treatment waste leaving Beddington for recovery in 2024, with 2023 records showing material moving to facilities in Erewash, Stockton-on-Tees and West Yorkshire. [475]

FUNDERS

Beddington was developed by Viridor while it was owned by Pennon Group, with Viridor responsible under the South London Waste Partnership contract for financing, constructing and operating the facility.[476] The contract itself describes the arrangement as a design-build-finance-operate Public Private Partnership, tying the private infrastructure investment to a long-term municipal waste treatment revenue stream.[477]

KKR (Kohlberg Kravis Roberts) acquired Viridor from Pennon in 2020, after Beddington had already been financed and constructed.[478] Equitix later acquired a 35% interest in Viridor's Energy division and in December 2025 agreed to acquire an additional substantial minority stake in Viridor Group from KKR, with a path to ownership of as much as 50%.[479]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Beddington opposition has involved local residents, community campaigners, councillors and the United Kingdom Without Incineration Network (UKWIN), with campaigns focusing increasingly on emissions compliance, regulatory transparency and Viridor's effort to increase permitted throughput.[480] [481] Residents staged protests in 2022 over the facility's operations and proposed infrastructure changes, while later campaigns organized public meetings and petitions around health and emissions concerns.[482] The discovery of the 916 NOx exceedances in 2025 intensified pressure on the Environment Agency and Viridor and led Sutton Council to call for enforcement action.[483]





Opposition to expansion also came directly from the four councils that supply Beddington with contracted waste.[484] The South London Waste Partnership argued that increasing throughput would bring more third party waste and heavy goods vehicle movements into Beddington and raised concerns about the facility's operational record and historic permit compliance.[485] [486] Despite those objections and two rounds of public consultation, the Environment Agency approved the higher 382,286 MT/year permitted capacity on June 3, 2026.[487] The local Member of Parliament, Bobby Dean, described the approval as "disgraceful" and called on the Government to urgently review the decision.[488]

KEY COMMUNITY DEMANDS

Community campaigns have called for stronger Environment Agency enforcement, transparent and reliable emissions monitoring, timely disclosure of permit breaches, greater accountability from Viridor and meaningful consideration of cumulative local air-pollution and health impacts.[489] [490]

Opposition to the capacity increase has also focused on preventing additional third party waste and associated heavy truck traffic from being brought into Beddington simply to increase incinerator throughput.[491] [492] Campaigners have additionally argued for greater emphasis on waste prevention, reuse, recycling and separate collection of recyclable and compostable material rather than expansion of incineration capacity.[493]



HENNEPIN ENERGY RECOVERY CENTER (HERC)

USA

Photo: Zero Burn Coalition

Operating since 1989, the Hennepin Energy Recovery Center (HERC) is located next to the historically black and working-class neighborhoods of North Minneapolis, Minnesota, and is owned by Hennepin County and operated by Great River Energy (GRE HERC Services LLC). Minnesota has the third-highest number of Municipal Solid Waste (MSW) incinerators in the country, with six of the seven located in an environmental justice community.[494] Over the past 37 years, the HERC facility has become the top polluting facility in Hennepin County, contributing roughly $16 million in health damages, and at least 1-2 premature deaths annually from particulate matter alone, according to a PSE Healthy Energy study.[495] [496] In October 2024, the Minneapolis City Council passed a resolution pushing to end waste incineration at the HERC by December 31, 2027, and fully decommission the facility by 2033.[497] However, this timeline is a recommendation to the county, with county officials not committing to an enforceable closure timeline.

FACILITY FACTS

Location:	Minneapolis, MN
Population within 5 kilometers (km):	243,145
Facility Ownership:	Hennepin County
Facility Operators (Day-to-Day):	GRE HERC Services LLC (Great River Energy) since 2018; previously Covanta (now Reworld), 1989-2018
First Year of Operation:	1989
Designed Burning Capacity:	331,122 MT/year
Facility Type:	"Mass-burn" waste incineration technology
Project Investment:	~$160.5 million USD
CO_2 Impacts:	~355,067 MT/year
Incinerator Ash Created:	~72,600 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

The HERC facility was developed through a financing structure that relied substantially on public-sector debt and government-issued financing.[498] Hennepin County reports that the facility cost approximately $160.5 million USD to construct and was funded primarily through $134.5 million in Hennepin County debt.[499] Construction began in 1987 under Blount Corporation, which sold the facility to General Electric in 1988, shortly before HERC began operating in 1989.[500]

The project's financing was subsequently restructured through tax-exempt revenue bonds. In October 1986, Hennepin County issued $129.25 million USD in Solid Waste Resource Recovery Revenue Bonds and loaned the proceeds to Hennepin Energy Resource Company Limited Partnership, the private entity responsible for construction and operating HERC.[501] The bonds were offered to investors through a trustee and secured through a letter of credit provided by two French international banks (Crédit Lyonnais and Banque Indosuez), which allowed the privately developed project to access county-issued, tax-exempt revenue bond financing rather than relying exclusively on conventional private corporate borrowing.[502]
Hennepin County ultimately assumed direct ownership of HERC in 2003, purchasing the facility from General Electric (GE) for $37 million USD.[503] The County reports that the debt associated with this acquisition was fully repaid by 2012.[504] Hennepin County had contracted with Reworld (formerly Covanta) to operate HERC, but that agreement was not renewed in 2018 following allegations by Reworld that the County had breached its Service Agreement in the handling of negotiations.[505]
However, retiring HERC's original debt did not end the County's debt obligations associated with the facility. Hennepin County subsequently used general obligation bonds with 20-year maturities to finance capital projects at HERC, including facility repairs and investments needed to maintain its pollution control systems and comply with air-emission requirements.[506] As of December 31, 2022, the County reported $37.7 million USD in outstanding HERC capital project debt, which was scheduled to be fully repaid by 2042 if no additional debt were added.[507] HERC-generated revenues were being used to service this debt, but the County acknowledged that if the incinerator were decommissioned before the bonds were repaid, other County revenue sources would be needed to meet the remaining debt obligations.[508]

The debt also sits alongside substantial continuing capital expenditures required to maintain the aging facility. In 2023, Hennepin County estimated that HERC would require approximately $5–6 million USD in capital improvements annually.[509] The County's 2021–2025 HERC maintenance program ultimately carried a $29 million USD budget, including $5 million financed through general obligation enterprise bonds.[510] For 2026–2030, the County has approved another $29 million USD for HERC maintenance and repairs—approximately $5–6 million annually—although these newer projects are currently budgeted from Solid Waste Enterprise Fund income rather than additional general obligation borrowing.[511]

The planned work includes boiler and turbine-generator repairs, cooling-system upgrades, baghouse work and other system replacements required to maintain operations while the County pursues its plan to phase out HERC.[512]

CLIMATE IMPACT

HERC is one of Hennepin County's significant stationary sources of air pollution. As of 2023, the HERC emitted over 355,067 MT of CO2 per year (3rd largest emitter in Hennepin County), with roughly 55% characterized as biogenic.[513] Based on Minnesota Pollution Control Agency (MPCA) point-source emissions data, HERC has ranked among the county's largest permitted emitters of several pollutants, including: #1 for nitrogen oxides (NOx), #2 for sulfur dioxide (SO2), #2 for PM2+5, #3 for lead, #4 for PM10, and #6 for carbon monoxide (CO).[514] Other analyses of MPCA emissions data have estimated that HERC was responsible for approximately 25% of Hennepin County's permitted point-source NOx emissions, 14% of SO2 emissions, and 7% of particulate emissions during the period analyzed.[515]

HERC also emits dioxins and furans, with historical reporting stating that in 2002, HERC's self-reported emissions of 2,3,7,8-TCDD accounted for approximately 51.89% of the 2,,3,7,8-TCDD emissions reported in Minnesota that year.[516] A Barr Engineering study for the Minnesota Resource Recovery Association, an industry trade group, measured PFAS in emissions from three Minnesota incinerators, including HERC, and concluded the emissions were likely safe. An independent analysis by Doug Gurian-Sherman argues that this conclusion understates the risk, calculating that HERC's PFOA emissions could exceed more protective proposed EPA standards by up to 2.6 times. Former DuPont PFAS scientist Denise Trabbic-Pointer told the Guardian the study lacked enough data to support the industry's claim that Minnesota incinerators cut PFAS emissions by 99.6%.[517][518]

COMMUNITY POLLUTION EXPOSURE

Approximately 243,145 people live within 5 kilometers of the HERC facility.[519] Community opposition to HERC centers on several interconnected concerns: air pollution and respiratory health; cumulative pollution burdens on North Minneapolis and other nearby environmental-justice communities; exposure to toxic pollutants such as lead, dioxins, mercury and fine particulate matter; additional diesel pollution from hundreds of garbage truck trips; and the continued operation of an incinerator in communities already experiencing significant health disparities.

Hennepin County's official review of public comments on its Zero Waste Plan found that many residents specifically raised elevated asthma rates and cumulative health impacts in North Minneapolis, arguing that continued HERC operation perpetuates existing racial and environmental-health disparities.[520] Also, in June 2020, the Hennepin County Board adopted Resolution 20-0242, formally declaring racism a public health crisis and committing the County to address racial disparities through its policies, programs, and services.[521] The County acknowledged significant racial and ethnic disparities in health and other areas and committed to building more equitable systems, supporting efforts to dismantle systemic racism, and engaging with communities of color.[522]

Minneapolis's own racial equity analysis similarly identifies HERC as a significant permitted source of NO_x, hydrogen chloride, dioxins, lead, sulfur dioxide and particulate matter and notes that more than 200 garbage trucks travel to and from HERC each weekday, with nearly another 100 over the weekend, adding diesel exhaust and tire pollution to the area's cumulative burden.[523]

These concerns are especially significant because they occur against a background of documented health disparities rather than in isolation. The City of Minneapolis reports that communities within three miles of HERC have higher concentrations of low-income residents than 89% of Minnesota and higher concentrations of people of color than 90% of the state; nearby ZIP codes (55411 & 55415) have the second- and third-highest asthma rates in the Minneapolis metropolitan area.[524] Residents have therefore connected HERC's particulate matter, NO_x, lead and other emissions with concerns about asthma and other respiratory disease, cardiovascular impacts, cancer risk and neurological/developmental harm from lead exposure, particularly for children.[525]

WASTE ENTRAPMENT

Instead of operating under a conventional minimum-tonnage or put-or-pay contract, HERC's waste supply has been supported by waste delivery agreements, municipal collection contracts, and Minnesota waste-flow requirements.[526] Hennepin County's standard Waste Delivery Agreement establishes per-ton tipping fees and maximum allowable tonnage, but does not impose a minimum annual delivery requirement; its "minimum charge" refers only to a one-ton minimum charge for an individual transaction.[527] Minneapolis separately contracted with Hennepin County to send municipal garbage to HERC, and the City delivered more than 80,500 tons in 2023, representing nearly 23% of HERC's total waste intake.[528] Some suburban municipal collection contracts have gone further—for example, St. Louis Park required all garbage collected under its contract to be delivered to HERC, except when the facility was unavailable.[529] Minnesota law also supports waste flow to processing facilities by requiring available processing capacity to be utilized before unprocessed waste is landfilled and by authorizing waste-designation systems that can require designated waste to be delivered to specified facilities.[530]

VALUABLE MATERIALS BURNED

Hennepin County's waste-composition studies indicate that a substantial portion of material sent to HERC consists of potentially recoverable organic materials, paper, and plastics. The County has characterized HERC's incoming waste as approximately 32% organics (food scraps, yard trimmings, and non-recyclable & food-soiled papers), 16% paper, 15% plastics, 5% metals, and 2% glass, with the remainder consisting of other materials.[531]

INCINERATOR ASH STATS

Hennepin County contracts with SKB Environmental to transport the combined ash to the SKB Rosemount Industrial Waste Facility (MPCA Permit SW-383) in Rosemount, Dakota County, Minnesota.[534]

The landfill has been permitted to accept municipal solid-waste incinerator ash since 1998 and had approximately 1.3 million cubic yards of permitted MSW-incinerator-ash capacity in 2022.[535] SKB also processes HERC's ash to recover additional ferrous and non-ferrous metals before final disposal. Dakota County reports that the associated Gem-Ash/SKB operation recovered approximately 2,688 tons of ferrous metals and 3,913 tons of non-ferrous metals in 2023 from the incinerator ash it processed.[536] The Rosemount disposal site is located within a heavily industrialized portion of the city, and is close to existing rural residential boundaries, public open lands, and is less than a mile from the Mississippi River. [537]

HERC's ash-management practices are now the subject of an active lawsuit. In July 2026, the Minnesota Center for Environmental Advocacy (MCEA) sued Hennepin County, alleging that its solid waste planning fails to comply with Minnesota statutory requirements to address reductions in both the quantity and toxicity of incinerator ash.[538] MCEA argues that the County's current plan does not adequately explain how it will reduce HERC's ash or address contaminants concentrated in the ash, including lead, cadmium, mercury, arsenic, dioxins and furans, and PFAS.[539] [540] The lawsuit asks the court to require Hennepin County to develop a legally compliant ash-management plan; Hennepin County disputes MCEA's allegations, maintaining that its existing plan complies with state law, has been approved by the Minnesota Pollution Control Agency, and includes measures to reduce hazardous materials entering HERC and recover metals from ash after combustion.[541] [542]

FUNDERS

HERC was developed through a public-private financing structure, with Blount serving as the private developer and Hennepin County playing the central public-financing role. Hennepin Energy Resource Company Limited Partnership—whose general partner was Blount Energy Resource Corporation—contracted with Hennepin County to construct, own, and operate the facility. In 1986, Hennepin County issued $129.25 million in tax-exempt Solid Waste Resource Recovery Revenue Bonds and loaned the proceeds to the private HERC partnership to finance construction.[543] Private bond investors supplied the underlying capital, while Crédit Lyonnais and Banque Indosuez (two French international banks) provided a letter of credit supporting the bonds.[544]

Hennepin County later reported HERC's total original project cost at approximately $160.5 million, of which $134.5 million was financed through county debt.[545] The project's financing was subsequently restructured, including the refunding of earlier solid waste resource recovery debt through industrial revenue bonds.[546] This structure allowed the privately developed facility to access government-issued, tax-exempt financing backed by private capital markets and international-bank credit support, making public financing a central component of HERC's development.

Ownership subsequently shifted from Blount to General Electric, before Hennepin County purchased HERC from GE for $37 million in 2003, bringing the facility into direct public ownership.[547] The acquisition was financed separately from the original construction financing, and Hennepin County reports that the debt associated with the purchase was fully repaid by 2012.548

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

A variety of local and regional organizations have been organizing against the HERC facility since before the burner was constructed. In 2020, the Minnesota Environmental Justice Table took on the fight against the facility and then helped launch the Zero Burn Coalition (ZBC) in 2023. The ZBC is a multi-faith, muilti-racial, cross generation and background movement of more than 70 organizations, spanning labor, environmental justice, public health, civil rights, faith, neighborhood and community organizations, advocacy nonprofits, frontline organizations, and political and grassroots movements.

KEY COMMUNITY DEMANDS

The Zero Burn Coalition's key positions against the HERC facility include, but are not limited to: (1) The County Board must deliver on its promise to close HERC under the 2023 Board Action Resolution (File No. 23-0384 R1), which requires a Board vote to begin decommissioning of the burner (as detailed on page 35 of the County closure plan). Advocates are asking commissioners to cast the binding vote required before the end of 2026 and fully decommission the facility by 2028; (2) Hennepin County must install continuous emissions monitoring equipment at the HERC trash burner covering for at least 21 additional pollutants, including dioxins/furans, PFAS, lead, mercury, arsenic, cadmium, hydrochloric acid and hexavalent chromium, instead of relying on once-a-year stack tests; and, (3) Hennepin County must lower the burner's emission limits to the limits the U.S. Environmental Protection Agency (EPA) proposed in 2024 for new incinerators no later than December 31, 2026.



BENOWO WASTE-TO-ENERGY PLANT

Indonesia

Photo: WALHI Jawa Timur

The Benowo Waste-to-Energy Plant in Surabaya is Indonesia's first commercially operating large-scale municipal waste gasification facility, developed through a 20-year Build-Operate-Transfer agreement between the Surabaya City Government and PT Sumber Organik.[549] [550] Its thermal gasification unit, formally inaugurated in 2021 after an approximately $54.2 million USD (Rp704.4 billion) investment, is designed to process 1,000 MT of waste per day, or 365,000 MT/year, and generate up to 12 megawatts of electricity.[551] The public-private arrangement guarantees PT Sumber Organik payment for at least 1,000 MT/day even when the city delivers less waste, while the national electricity utility purchases the plant's electricity at a preferential $0.1335 USD/kWh tariff.[552] [553] Communities around Benowo have raised concerns about odors, respiratory illness, ash and the absence of transparent toxic-emissions data, while community air monitoring found daily-average PM2.5 concentrations exceeding the World Health Organization guideline on all 31 monitoring days, with maximum concentrations reaching roughly eight times the guideline.[554]

FACILITY FACTS

Location:	Surabaya, Indonesia
Population within 5 kilometers (km):	197,756
Facility Ownership:	The Surabaya City Government owns the land and underlying public infrastructure
Facility Operators (Day-to-Day):	PT Sumber Organik
First Year of Operation:	2021 (20-year concession began in 2012)
Designed Burning Capacity:	365,000 MT/year
Facility Type:	Thermal gasification with a separate landfill-gas recovery system
Project Investment:	~$54.2 million USD
CO_2 Impacts:	Publicly unknown
Incinerator Ash Created:	62,050 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Construction of Benowo's gasification facility required approximately $54.2 million in investment, according to the Indonesian government's later accounting of the completed project.[555] The full investment was borne by PT Sumber Organik, the private partner responsible for financing, constructing and operating the facility under a Build-Operate-Transfer public-private partnership.[556] The Surabaya City Government nevertheless provided significant public support by supplying the 37.4-hectare Benowo landfill site and associated landfill infrastructure, which will ultimately return to full municipal ownership when the concession ends.[557] [558]

Public financial support also continues through long-term waste treatment and electricity purchase payments. Surabaya's waste-treatment fee rose from approximately $11.66 USD/MT (Rp191,000/MT) at the beginning of the arrangement to approximately $14.17 USD/MT (Rp232,000/MT) in 2025, with the city contractually required to pay for a minimum of 1,000 MT/day.[559] [560] The central government has also supported the waste-treatment payment framework, with Surabaya reporting that national-government assistance was expected to cover approximately 30% of the tipping fee.[561] In addition, state-owned electricity utility PLN purchases electricity from the gasification plant at a preferential tariff of $0.1335 USD/kWh, while electricity from the landfill-gas system was contracted at approximately $0.076 USD/kWh (Rp1,250/kWh).[562]

CLIMATE IMPACT

No publicly accessible annual inventory provides measured Benowo-specific releases of carbon dioxide, methane, nitrous oxide, nitrogen oxides, sulfur dioxide, hydrogen chloride, carbon monoxide, particulate matter, mercury, lead or dioxins/furans.563 564 This is an important data limitation because Benowo thermally processes a mixed municipal waste stream containing plastics and other fossil carbon materials, while gasification and secondary combustion can generate conventional combustion pollutants and trace toxic contaminants requiring flue-gas treatment.[565]

The lack of publicly accessible toxic emissions monitoring has become a central concern for environmental organizations.[566] Wahana Lingkungan Hidup Indonesia (WALHI) East Java reported difficulty obtaining Benowo's Environmental Impact Assessment and has argued that residents lack sufficient information to independently evaluate releases of dioxins, mercury and other heavy metals.[567] Community monitoring conducted with support from GAIA found daily-average PM2.5 above the World Health Organization guideline during all 31 monitored days, with the highest daily average approximately eight times the guideline.[568] That monitoring demonstrates elevated ambient particulate pollution around the facility but does not by itself establish that Benowo was the sole source, because measurements capture cumulative pollution from sources in the surrounding area.[569]

COMMUNITY POLLUTION EXPOSURE

Approximately 197,756 people live within 5 kilometers of the facility.[570] Residents around Benowo have lived alongside a major landfill for years and now experience the combined burden of the landfill, waste transport and thermal waste treatment.[571] A community survey conducted around the Benowo landfill before the gasification plant entered full commercial operation found that residents already recognized air and water pollution associated with the waste complex, illustrating the cumulative environmental burden into which the thermal facility was introduced.[572] More recent residents of Benowo and Romokalisari have reported strong odors, fine dust and respiratory problems, particularly during morning and evening periods.[573]

Public health concerns have centered on particulate exposure and respiratory illness.[574] WALHI East Java has pointed to Benowo Community Health Center records showing an increase in acute respiratory infections, particularly among children, between 2020 and 2021, coinciding with the period when the gasification facility entered operation.[575] That temporal association does not by itself demonstrate that the plant caused the illnesses, but it has intensified demands for transparent emissions data and independent health monitoring.[576] Community organizations have also raised concerns about possible long-term exposure to dioxins and heavy metals because detailed facility-specific monitoring results have not been readily available to the public.[577] [578]

WASTE ENTRAPMENT

Benowo's 2012 cooperation agreement contains a particularly explicit minimum-waste provision. The Surabaya City Government must deliver at least 1,000 MT/day of waste, and if actual deliveries fall below that threshold, the city must still pay PT Sumber Organik the waste-treatment fee as though 1,000 MT had been delivered each day.[579] Waste delivered above the minimum is charged according to the additional tonnage received.[580] This effectively creates a 365,000-MT/year minimum payment obligation, linking municipal expenditure to continued delivery of a large residual-waste stream.[581] Surabaya remains responsible for the minimum treatment payment even if deliveries fall below the contractual threshold.[582]

The Build-Operate-Transfer concession runs for 20 years from 2012 to 2032, after which the infrastructure is scheduled to transfer to the Surabaya City Government.[583] [584] The facility primarily receives waste generated within Surabaya with no evidence of relying on international waste imports.[585]

VALUABLE MATERIALS BURNED

Waste arriving at Benowo contains substantial quantities of organic material, plastics, paper, metals and glass, although the proportions vary considerably between waste characterization studies. A 2023 study sampled freshly unloaded waste at the Benowo landfill over eight days using Indonesia's national SNI 19-3964-1994 waste characterization methodology.[586] The samples contained 32.9% food waste and leaves, 20.1% plastics, 7.0% paper, 0.7% metals and 3.8% glass.[587]

While the remaining waste included 14.8% wood, 13.2% textiles, 3.7% leather/rubber and 3.8% other material.[588] An earlier Benowo-specific inventory provides a useful comparison and demonstrates how significantly the waste stream can vary over time. The 2021 Benowo waste composition was reported as 52.92% organic material, 19.02% plastics, 12.37% paper, 1.94% metals and 1.46% glass, with smaller shares of wood, textiles, leather, rubber, ceramics and other materials.[589]

The high organic share is consistent with broader research on Surabaya's waste stream. A United Nations supported case study estimated that approximately 57% of Surabaya's municipal waste was organic, 16% plastic and 14% paper, with metals and glass together accounting for less than 2%.[590] More recent analysis by WALHI and the GAIA, drawing on Indonesia's national waste management database, found that food waste alone represented 55.48% of Surabaya's waste stream, with approximately 57.73% of the city's domestic waste potentially manageable through composting and another 25.31% through recycling.[591]

These data are significant for Benowo because much of the material entering the waste system has potential management routes other than thermal treatment. More specifically, the large wet organic fraction creates a technical challenge for thermal treatment: research on Surabaya has specifically identified the city's moisture-rich organic waste as poorly suited to thermal processing because its high water content reduces its usefulness as a combustion fuel.[592]

INCINERATOR ASH STATS

Public information on measured annual ash generation from Benowo is unknown. However, a recent Indonesian government report estimates that Benowo's gasification process leaves approximately 15% bottom ash and 2% fly ash.[593] Applied to the plant's full 1,000-MT/day thermal design capacity, this corresponds to approximately 54,750 MT/year of bottom ash plus 7,300 MT/year of fly ash, or approximately 62,050 MT/year combined.[594]

Public information about final ash management is also quite weak. Government and operator descriptions state that bottom ash and fly ash are collected separately and have been investigated for reuse in construction materials, including fill, bricks and paving products.[595] [596] However, a 2026 technical review of Benowo concluded that management of bottom ash, fly ash and unreacted char had not been adequately documented publicly, including a lack of available evidence demonstrating secure final disposal of fly ash or systematic leachate monitoring around ash storage.[597]

In addition, recent government planning for Surabaya's next waste-to-energy facility includes dedicated land for a fly-ash landfill, underscoring the continuing need for secure management of these residues.[598] [599] Because the existing ash remains associated with the Benowo waste complex, the surrounding Sumberejo/Romokalisari communities bear the cumulative burden of landfill operations, thermal processing, ash handling and waste traffic highlighting serious environmental justice concerns.[600] [601]

FUNDERS

Benowo was developed as a privately financed public-private partnership between the Surabaya City Government and PT Sumber Organik, which holds the concession to manage the Benowo waste complex.[602] The Indonesian Ministry of Public Works identifies the project as a Build-Operate-Transfer (BOT) arrangement with an investment value of approximately $54.2 million USD (Rp704.4 billion) for the gasification facility, while PT Sumber Organik describes Benowo as the first waste-to-energy project in Surabaya and East Java to involve private investment.[603] [604] Under this structure, the private developer financed and constructed the waste-to-energy infrastructure, while the Surabaya City Government provided the publicly owned 37.4-hectare landfill site and supporting landfill infrastructure.505 The concession gives PT Sumber Organik control of the facility during the contractual period, after which the infrastructure is transferred to the city under the BOT arrangement.[606]

The project's private investment is supported by two long-term public revenue streams. Surabaya pays PT Sumber Organik a waste-treatment or tipping fee under the municipal concession, including the contractual minimum-payment arrangement for 1,000 MT/day, while state-owned electricity utility PLN purchases electricity from the gasification plant under a Power Purchase Agreement at $0.1335 USD/kWh.[607] [608] Indonesia's waste-to-energy policy established this fixed electricity tariff for facilities below 20 megawatts, providing Benowo with a guaranteed electricity purchaser in addition to its municipal waste-treatment revenue.[609] These arrangements significantly reduce revenue risk for the private operator even though the project's capital investment was privately financed.

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

The most prominent environmental organizations challenging Benowo is WALHI East Java (Wahana Lingkungan Hidup Indonesia/Jawa Timur), working alongside GAIA Asia Pacific and affected residents.[610] WALHI has challenged the lack of publicly accessible emissions and Environmental Impact Assessment information, investigated community health and pollution concerns and participated in ambient-air monitoring around the facility.[611] [612] The monitoring campaign found elevated PM2.5 throughout the 31-day measurement period and has been used by campaigners to call for greater scrutiny of Benowo's environmental performance.[613]



Community concerns also extend beyond air pollution to the broader direction of Surabaya's waste policy.[614] Advocates argue that investment in thermal treatment risks directing public resources toward downstream waste destruction rather than source reduction, reuse, recycling and organic-waste management, particularly in a city where the waste stream contains a very large organic fraction.[615] WALHI has similarly called attention to the burden borne by communities living around waste infrastructure and the need for residents to have access to environmental information affecting their health.[616]

KEY COMMUNITY DEMANDS

Key community demands include full public disclosure of Benowo's Environmental Impact Assessment and emissions-monitoring results; independent and continuous air-quality monitoring; transparent testing for dioxins, mercury and other toxic pollutants; clear documentation of bottom-ash and fly-ash handling and final disposal; and meaningful health monitoring for surrounding communities.[617] [618] [619] These demands are closely connected to residents' reported experiences of odors, dust and respiratory concerns and to the absence of easily accessible facility-specific emissions data.[620] [621]

Environmental groups have also called for greater investment in waste prevention, source separation, reuse, recycling, composting and other upstream systems rather than increasing dependence on thermal waste treatment.[622] With approximately 57–60% of Benowo's incoming waste described as organic, source-separated composting and other biological treatment could address a large share of the waste stream before it reaches a thermal facility.[623] [624]



MAISHIMA INCINERATION PLANT

Japan

Photo Credit: Chris Guy

Osaka's Maishima Incineration Plant is a publicly owned mass-burn waste incinerator that began operating in 2001, with two 450-MT/day furnaces capable of burning up to 900 MT/day.[625] Designed by Austrian artist and architect Friedensreich Hundertwasser, the highly decorated facility cost approximately $492.0 million USD (¥60.9 billion) to construct and became controversial over its unusually high public cost; Osaka records show that a similarly sized incinerator built shortly afterward cost roughly $400.7 million USD (¥49.6 billion).[626] [627] Maishima burned approximately 198,240 MT of waste in FY2023, producing 29,413 MT of combustion residue, while more recent FY2024 records show 32,762 MT of Maishima ash and other incineration residues sent to landfill.[628] [629] The plant also became the center of a major environmental controversy in 2013–14 when Osaka burned approximately 15,300 MT of disaster debris transported more than 700 kilometers from Iwate Prefecture following the Fukushima disaster, despite opposition from residents concerned about possible radioactive contamination.[630] Residents sought an ordinance establishing Osaka's financial responsibility if health damage occurred, but the Osaka Municipal Assembly rejected the proposal in February 2013.[631] Osaka authorities maintained that monitoring showed the material could be processed safely.[632]

FACILITY FACTS

Location:	Osaka City, Osaka, Japan
Population within 5 kilometers (km):	184,786
Facility Ownership:	Osaka Wide Area Environmental Facilities Association (an intermunicipal organization involving Osaka City, Yao City, Matsubara City and Moriguchi City)
Facility Operators (Day-to-Day):	Osaka Wide Area Environmental Facilities Association
First Year of Operation:	2001
Designed Burning Capacity:	267,000 MT/year
Facility Type:	"Mass-burn" stoker incinerator
Project Investment:	~$492 million USD (¥60.9 billion)
CO_2 Impacts:	Publicly unknown
Incinerator Ash Created:	32,762 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

Osaka government records place Maishima's original construction cost at approximately $492 million USD (¥60.9 billion), including $67.9 million USD (¥8.4 billion) associated with the adjoining bulky-waste crushing equipment.[633] [634] The plant was financed and constructed as municipal infrastructure by Osaka City before responsibility for the city's incinerators was transferred to the intermunicipal environmental facilities authority.[635] The distinctive Hundertwasser architectural design itself accounted for approximately $630,000 USD (¥66 million) of the project cost.[636]

The facility's overall construction cost was substantially higher than comparable Osaka incinerators. The nearby Hirano Plant, which has the same 900-MT/day nominal incineration capacity, was recorded at approximately $400.7 million USD (¥49.6 billion), compared with Maishima's $492.0 million USD (¥60.9 billion).[637] The difference in price contributed to criticism that Maishima represented excessive municipal spending, particularly because the facility was constructed during Osaka's unsuccessful campaign to host the 2008 Olympic Games.[638] Maishima's unusual architecture has since become a tourist attraction and environmental-education site, but debate over the original capital expenditure remains part of the facility's history.[639]

CLIMATE IMPACT

Maishima's public operating records provide measurements for regulated conventional pollutants but do not provide a complete annual facility-specific greenhouse gas inventory for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The plant nevertheless releases fossil carbon through combustion of plastics and other fossil-derived materials contained in the municipal waste stream. Recent Osaka waste-characterization data continue to show substantial quantities of plastics among household discards, alongside large quantities of paper and food waste, which release biogenic carbon.[640]

COMMUNITY POLLUTION EXPOSURE

Approximately 84,786 people live within 5 kilometers of the facility.[641] Maishima differs from many urban incinerators because it is located on an artificial island dominated by industrial, recreational and waste management uses.[642] However, emissions, waste transportation, and ash disposal remain part of the broader environmental burden concentrated along Osaka's reclaimed waterfront.

The most significant community conflict occurred over Osaka's decision to accept disaster debris from Iwate Prefecture following the 2011 earthquake and tsunami.

Residents and activists raised concerns about potential radioactive contamination, exposure from incineration and disposal of the resulting ash at Yumeshima.[643] Osaka nevertheless proceeded with the program and ultimately burned 15,299 MT at Maishima, including the trial-processing material.[644]

Osaka reported that radioactive cesium in the incoming waste ranged from non-detect to 8 Bq/kg, against an acceptance criterion of 100 Bq/kg, while fly ash ranged from non-detect to 21 Bq/kg, against a criterion of 2,000 Bq/kg.[645] Radiation measurements at the Osaka port, transfer facility, Maishima plant and North Port disposal site were reported to show almost no change from conditions before the program.[646] However, residents are still skeptical and concerned about the potential long-term impacts of this disposal.

WASTE ENTRAPMENT

Rather than operating under a private minimum-tonnage or put-or-pay contract, Maishima forms part of a publicly administered regional waste system in which combustible municipal waste is allocated among incinerators according to collection areas, available capacity and operational requirements. There is consequently no private concession period or contractual minimum-waste guarantee requiring Osaka to supply Maishima with a fixed annual tonnage.

Maishima does, however, process waste originating outside Osaka City. The Osaka Wide Area Environmental Facilities Association now serves Osaka City, Yao City, Matsubara City and Moriguchi City, meaning that intermunicipal waste transfers are built into the regional system.[647]

VALUABLE MATERIALS BURNED

No Maishima-specific measurements regarding waste composition are publicly available. However, the City of Osaka's waste characterization studies show that significant quantities of paper, plastics, food waste, and other potentially recoverable materials remain within the municipal waste stream. Osaka's City's FY2023 household waste analysis found that approximately 35% of household waste was paper, 27% was food waste and 17% was plastic by weight, accounting for a large portion of the household waste stream.[648] The presence of paper, food waste and plastics within the residual stream therefore indicates that potentially recyclable, preventable or biologically manageable material continues to reach a waste management system that relies heavily on incineration.

INCINERATOR ASH STATS

Maishima produces approximately 30,000–33,000 MT of incineration residue annually in recent operating years, with the total varying according to waste throughput. The most recent facility-specific figure identified during this review was approximately 32,762 MT in FY2024.[649] The Osaka Wide Area Environmental Facilities Association disposes of incineration residues from its six plants at two principal landfill systems: the North Port Disposal Site on Yumeshima and the Osaka Bay Phoenix regional landfill system.[650]

The published FY2024 summary does not provide a facility-specific split showing exactly how much of that Maishima material went to each destination.651

FUNDERS

Maishima was developed as public municipal infrastructure by Osaka City, rather than through a private project-finance or Build-Operate-Transfer arrangement. The original capital investment was approximately $492.0 million USD (¥60.9 billion), including approximately $67.9 million USD (¥8.4 billion) for the associated crushing facility.652 Private engineering and construction companies participated as contractors, but the underlying project was a municipal capital investment rather than a privately owned concession. Responsibility for Maishima subsequently transferred into the Osaka Wide Area Environmental Facilities Association, which now administers the regional incineration system for Osaka City, Yao City, Matsubara City and Moriguchi City.653

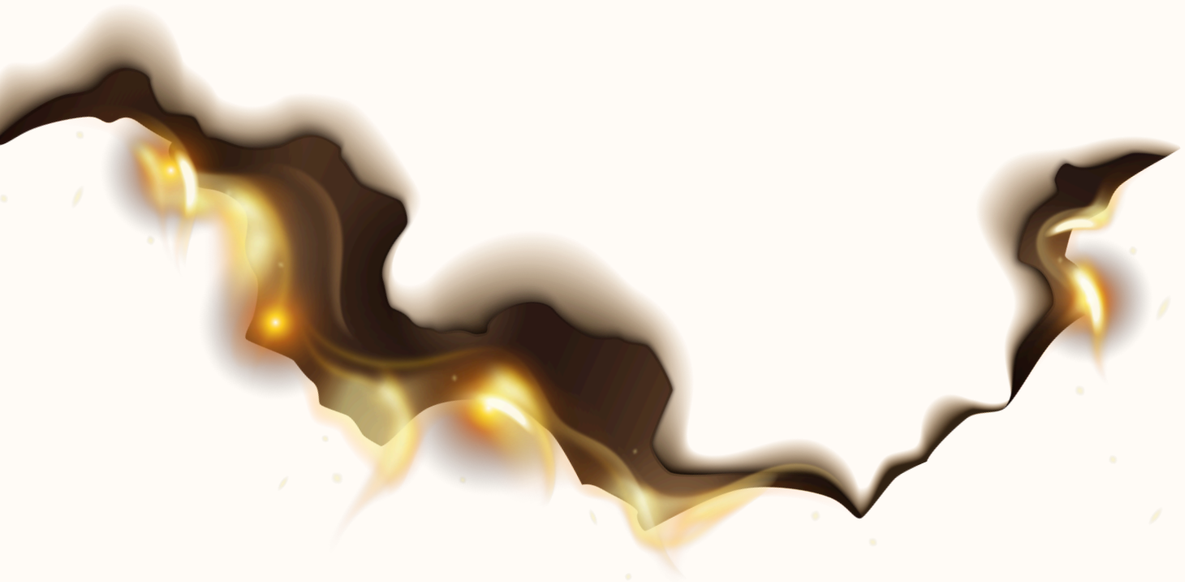


Photo Credit: Chris Guy

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Zero Waste Japan has challenged Osaka's continued reliance on incineration and called for public policy and financing to shift toward waste prevention and resource circulation. The organization has pointed to recent disruptions in Osaka's incinerator network as evidence of the vulnerability of a waste system heavily dependent on maintaining large combustion facilities. Osaka has already reduced its incinerator network substantially as waste generation declined, while aging facilities, reconstruction and maintenance periodically reduce available capacity. In 2026, Osaka City acknowledged that reduced incineration capacity was creating pressure on waste processing and causing delays in waste collection.[654]

Zero Waste Japan has argued that the response should not be renewed dependence on incineration, but policies that further reduce the amount of waste requiring disposal. The organization has specifically called for changing public funding systems that favor incineration and redirecting resources toward waste reduction and material circulation.[655] This position increasingly overlaps with Osaka City's own recognition that further waste reduction is necessary: the city's current waste policy prioritizes waste prevention and reuse and sets a goal of reducing annual waste treatment to 840,000 MT.[656]



KEY COMMUNITY DEMANDS

Zero Waste Japan has called for shifting public funding away from systems that favor incineration and toward waste prevention, reuse, recycling and resource circulation. Rather than responding to reduced incinerator availability by maintaining or expanding combustion capacity, the organization argues that Osaka should reduce the volume of material requiring incineration in the first place.[657]

Recent disruptions within Osaka's incinerator network give that demand added significance. With facilities periodically unavailable because of maintenance, reconstruction and operational problems, the remaining plants can face increased pressure to absorb the region's waste. Zero Waste Japan argues for treating waste reduction and resource circulation as core infrastructure investments—not secondary programs operating alongside an incineration-centered system.



EMERALD ENERGY-FROM-WASTE FACILITY

Canada

Operating since 1992, the Emerald Energy-from-Waste Facility is located in Brampton, Ontario, Canada. The company is beginning construction on a phased expansion in 2027 (approved in 2025) to increase capacity from approximately 182,000 to 912,000 MT/year, processing non-hazardous municipal and commercial waste— generating electricity, steam, with plans to eventually produce hydrogen. A recent report from the region's Medical Officer of Health and Commissioner of Health Services warns that additional emissions from the expanded facility would increase cumulative exposure to air pollutants – posing serious health risks to nearby residents, many of whom are considered to be vulnerable.[658]

FACILITY FACTS

Location:	Brampton, ON, Canada
Population within 5 kilometers (km):	111,641
Facility Ownership:	Emerald Energy Waste Inc. (affiliate of U-Pak Group of Companies)
Facility Operators (Day-to-Day):	Emerald Energy Waste Inc. (affiliate of U-Pak Group of Companies)
First Year of Operation:	1992
Designed Burning Capacity:	182,000 MT/year (current); 912,000 MT/year (proposed expansion)
Facility Type:	Thermal recycling system featuring a hybrid gasification-combustion technology (current); Moving grate "mass-burn" incineration (proposed expansion)
Project Investment:	~$36 million USD ($50 million CAD)
CO_2 Impacts:	~146,000 MT/year (as of 2022); 904,000 MT/year (proposed expansion)
Incinerator Ash Created:	57,082 MT/year (current)

FACILITY IMPACTS

FINANCIAL BURDEN

Initial construction and setup costs for the 1992 facility totaled roughly $36 million USD ($50 mil CAD), which included the building construction and site services, equipment procurement, and engineering & financing contingencies.[659] Emerald also secured a grant worth $2.16 million USD ($2.99 million CAD) from the Ontario government to add hydrogen production to the expanded incinerator.[660] The estimated costs for the recently approved facility expansion have not been publicly disclosed. As a private facility, the official amount of public debt is unclear; however, there has been substantial public spending through municipal put-or-pay contracts (more information in waste entrapment section).

CLIMATE IMPACT

As of 2022, the Emerald facility emitted over 146,000 MT of CO2 per year.661 According to Emerald's own environmental assessment, the fully expanded facility will directly emit more than 904,000 MT CO2 per year, with roughly 40% characterized as biogenic.662
Emerald's official Air Quality Impact Assessment (AQIA) confirms that the existing facility emits– and the proposed expansion would continue to emit– a range of pollutants, including nitrogen oxides (NOx), sulfur dioxide (SO2), hydrochloric acid (HCl), carbon monoxide (CO), particulate matter, mercury, cadmium, lead, and dioxins/furans.[663] For the proposed expansion, Emerald modeled emissions using maximum in-stack concentrations of 121 mg/Rm^3 for NO_x, 35 mg/Rm^3 for SO_2, 9 mg/Rm^3 for HCl, 40 mg/Rm^3 for CO, 15 $\mu g/Rm^3$ for mercury, 7 $\mu g/Rm^3$ for cadmium, and 50 $\mu g/Rm^3$ for lead.[664]

The greatest concern in the assessment involves pollutants that are persistent or already elevated in the surrounding areas. Dioxins and furans are particularly important: the initial assessment found background concentrations around 84% of Ontario's ambient criterion, and under its original emissions assumptions the expanded facility was projected to contribute to an exceedance of the criterion.[665] [666] Emerald subsequently revised its assumptions using historical stack-test results, substantially lowering the modeled dioxin/furan emissions and eliminating that predicted exceedance; community reviewers have challenged whether those revised assumptions adequately represent normal variability and startup, shutdown, and upset conditions.[667]

COMMUNITY POLLUTION EXPOSURE

Approximately 111,641 people live within 5 kilometers of the Brampton facility.[668] These numbers are expected to increase substantially in the next decade. Brampton is Canada's fastest growing city, and on the border of Toronto and Mississauga - the densest part of

Canada (Greater Toronto Area).[669] Land near the incinerator is zoned for more mixed-used and residential development.

Members of the community have a variety of complaints, including but not limited to: 1) Environmental Racism: Brampton's population is over 80% people of color, targeting a working-class, diverse neighborhood. (2) Existing Pollution Burden: The surrounding community is already heavily impacted by industry, including a gas-fired power plant, an airport, traffic emissions from Highway 407, and logistics corridors, among other industrial facilities. (3) Lack of Genuine Public Consultation: Many local families have reported being entirely unaware of the facility's expansion plans and open houses until provincial approvals were already underway. Technical notices in local print media failed to meaningfully reach the local population where many residents faced language barriers or a lack of time to follow dense regulatory notices.

Peel Public Health data highlights that nearby residents in this overburdened community suffer from higher baseline rates of chronic illnesses like diabetes, heart disease, and Chronic Obstructive Pulmonary Disease (COPD).[670] The approved expansion is projected to cause a sixfold increase in greenhouse gas emissions.[671] Concerns include benzo(a)pyeardene, nitrogen dioxide, dioxins and furans, mercury, cadmium, and sulfur dioxide - all byproducts of combustion known for decades to harm human health. Families express high levels of daily stress and fear that an additional multi-decade spike in toxic emissions will severely worsen respiratory conditions in their children.

WASTE ENTRAPMENT

The Brampton facility relies on various municipal put-or-pay contracts for revenue, which typically run on 20-year cycles. They include the following: (*1) Simcoe County (approximately 100 km away):* Simcoe County had been exporting 25,000 MT of waste annually, and recently signed a new 20-year anchor municipal contract focused on diverting household and municipal residual waste away from local landfills and truck it directly to Brampton starting in late 2026.[672] *(2) Region of Peel (approximately 5 km away):* The Region of Peel sends up to 20,000 tonnes per year of waste on an as-needed basis. An update is expected for the 2026 expansion.[673] (*3) York Region (approximately 45 km away):* The York Region has historically held agreements with Emerald featuring a 12,400-tonne annual minimum (and options to scale up to 33,000 tonnes).[674] Actual deliveries have sometimes been considerably higher, reaching 45,750 tonnes in 2023.[675] An update is expected for the 2026 expansion. *(4) U-Pak Commercial Network:* A substantial portion of the new capacity is designated for U-Pak's extensive internal network of Industrial, Commercial, and Institutional (ICI) clients like the Loblaw Grocery chain and the Toronto International Airport.[676] These commercial agreements are structured to redirect Ontario-generated corporate waste that would otherwise be exported to landfills in the United States. There are growing concerns that these agreements provide another way for commercial waste to grow unchecked, without any requirements for source separation or diversion to recycling and composting.
In addition to the contracts listed above, the facility imports waste from across the Province of Ontario. The facility is permitted and certified to accept non-hazardous waste originating from commercial and industrial sources, plus international flights.[677] These imports are expected to increase with the expansion of the facility.

VALUABLE MATERIALS BURNED

According to Emerald, in 2024 the waste composition breakdown was as follows: 45% organics (food, diapers, pet waste, wood, leaf & yard waste), 20% mixed debris (composite materials, soil, ash), 15% Paper & Packaging, 15% Plastics, and 5% other combustibles (textiles, leather, rubber).[678] The data underpins the fact that nearly half of the waste received (organics) could be diverted from the incinerator through upstream measures, likely reducing many of the associated economic, environmental, and social impacts from the facility.

INCINERATOR ASH STATS

In 2023, approximately 38% (by weight) of the waste received had been turned into ash.679 This amounts to roughly 57,082 MT/year, made up of the following residuals: air pollution control residue (from the baghouse system), fly ash, slag, unacceptable waste, and metal.[680] The bottom ash is shipped to the Niagara Road 12 Waste Management Facility and used as landfill cover.[681] This facility is approximately 88km away from the Emerald Incinerator, and is located in an environmental justice community. The fly ash is also shipped, but to an unknown hazardous waste facility. Emerald is also exploring options to sell both bottom and fly ash from the new facility expansion as concrete additives.

FUNDERS

The Emerald Energy From Waste facility originated as Peel Resource Recovery Inc., which began operating the Brampton incinerator in 1992 with municipal waste supplied by the Region of Peel.[682] The original project received provincial financial assistance through Ontario's Energy-from-Waste Capital Assistance Program; Ontario's 1991–92 Public Accounts record a $1.5 million USD (C$2.1 million) payment to Peel Resource Recovery Inc.[683] The facility was subsequently acquired by KMS in 1998, Algonquin Power Income Fund in 2002, and Emerald Energy From Waste in 2014.[684]

Today, Emerald forms part of the privately held U-Pak Group of Companies, whose affiliated operations span waste collection and transfer (U-Pak Disposals), waste incineration/energy recovery (Emerald), food-waste recovery for animal feed (Kerry Cavan Feeds), industrial environmental services (MCC Industrial Services), and rail/transloading services (Traxxside Transloading).[685] This integrated network allows waste collected or transferred through U-Pak's operations to be routed to Emerald's Brampton incinerator, recycling/recovery operations, or landfill.

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

A variety of local and regional organizations have been organizing against the Emerald facility in recent years. They include, but are not limited to: The Canada Zero Waste Coalition (40+ orgs), Toronto Environment Alliance (TEA), Environmental Defence Canada, Ontario Zero Waste Coalition, Brampton Environmental Alliance (BEA), Sierra Club Peel, Sierra Club Ontario, The Canadian Coalition for Environmental & Climate Justice, and SCAN (Seniors for Climate Action Now).

KEY COMMUNITY DEMANDS

The main goal for advocates is to put a STOP to the 2027 facility expansion, and plan the shutdown of the existing aging facility. In the meantime, advocates are also pushing for the provincial government to support and invest in waste reduction initiatives to eliminate the need for a waste disposal facility, and to impose much stronger facility requirements for: pre-sorting waste, pollution control, and monitoring emissions.



JOINVILLE ENERGY RECOVERY UNIT (URE)



The Joinville Energy Recovery Unit (URE), which began operating in October 2025, is a new waste-to-energy facility constructed inside the city's Parque de Educação Ambiental Bororós and designed to process 110 MT of municipal waste per day, or approximately 40,150 MT/year.[686] Rather than directly feeding untreated waste into a conventional moving-grate furnace, the facility mechanically processes municipal waste into a dry fuel marketed as Composto Biossintético Industrial (CBSI), which is subsequently burned in a steam boiler to generate electricity.[687] The approximately $24 million USD (roughly R$127 million) facility was financed by private concessionaire Ambiental Limpeza Urbana e Saneamento Ltda. as part of its extended municipal waste management concession, which runs through November 2032.[688] The project has nevertheless faced significant local opposition: environmental advocates, recycling organizations and academics have argued that burning CBSI still constitutes waste incineration, questioned its potential air emissions and challenged whether Joinville should invest more heavily in recycling, environmental education, and composting instead.[689]

FACILITY FACTS

Location:	Santa Catarina, Brazil
Population within 5 kilometers (km):	67,517
Facility Ownership:	Municipality of Joinville
Facility Operators (Day-to-Day):	Ambiental Limpeza Urbana e Saneamento Ltda.
First Year of Operation:	2025
Designed Burning Capacity:	40,150 MT/year
Facility Type:	Waste-to-Industrial Biosynthetic (eco-fuel) Compound (CBSI)
Project Investment:	~$24.7 million USD (R$127 million)
CO_2 Impacts:	Publicly unknown
Incinerator Ash Created:	Publicly unknown

FACILITY IMPACTS

FINANCIAL BURDEN

The Joinville URE cost approximately $24.7 million USD (R$127 million) to build, financed by private concessionaire Ambiental Limpeza Urbana e Saneamento Ltda.[690] The plant was incorporated into Ambiental's existing municipal waste concession, through the 8th Amendment to Contract No. 378/2002, which was extended for another ten years beginning November 29, 2022; municipal records identify the URE as one of the investments negotiated as part of that extension.[691]

Although Joinville did not take on the plant's construction cost as direct municipal debt, the concession is supported by the city's Tarifa de Limpeza Urbana (TLU), or Urban Cleaning Tariff, which charges residents and other users for municipal solid waste collection and related waste management services.[692] The tariff provides a recurring source of revenue for the municipal waste system and helps compensate Ambiental for services performed under the concession.[693] This means the URE was privately financed upfront, but operates within a long-term public service system ultimately supported in part by charges levied on local waste service users.[694]

CLIMATE IMPACT

No full year facility-specific totals have been publicly reported for CO2, methane (CH4), nitrous oxide (N2O), nitrogen oxides (NOx), sulfur dioxide (SO2), hydrochloric acid (HCl), particulate matter, carbon monoxide, mercury, lead, dioxins or furans. The facility began operating in October 2025 under IMA Operating License No. 3160/2025, with atmospheric emissions and air quality subject to environmental monitoring.[695]

COMMUNITY POLLUTION EXPOSURE

The URE is located inside the Parque de Educação Ambiental Bororós, a roughly 460,000-m^2 waste management complex that includes Joinville's sanitary landfill, effluent-treatment facilities, composting operations and other waste infrastructure.[696] Approximately 67,517 people live within 5 kilometers of the area.[697] Opposition emerged before the facility began operating, with Coletivo Joinville Lixo Zero, academics, recycling organizations and other community representatives raising concerns about air pollution, the burning of recyclable and compostable materials, impacts on recycling, and alternatives such as composting and improved material recovery.[698] [699]

At a December 2023 City Council hearing, Federal University of Santa Catarina chemistry professor Sônia Corina Hess argued that burning the waste-derived fuel at temperatures

above 800°C constitutes incineration under Brazil's thermal-treatment regulations and raised concerns about chlorine, mercury, arsenic, cadmium, lead and other substances found in the waste stream.[700] Because the URE only began operating in October 2025, no epidemiological study has yet documented health impacts attributable specifically to the facility.[701]

WASTE ENTRAPMENT

There are no plant-specific minimum-tonnage or put-or-pay requirements associated with the Joinville facility. Instead, the facility is embedded within Ambiental's long-term municipal waste concession, which was extended for ten years beginning in November 2022, with the URE included among the investments associated with the renewed concession.[702] [703] The $24.7 million USD (R$127 million) plant was built to process up to 110 MT/day—approximately one-quarter of Joinville's municipal waste stream—creating a long-term economic interest in maintaining sufficient residual waste for the facility.[704]

VALUABLE MATERIALS BURNED

Joinville's municipal waste planning estimates that the city's waste stream consists of approximately 46.45% organic material, 35.51% recyclable material and 18.04% rejects.[705] These figures represent the broader municipal waste stream rather than the composition of the final CBSI burned at the URE, which undergoes processing, separation, shredding and drying before combustion.[706]

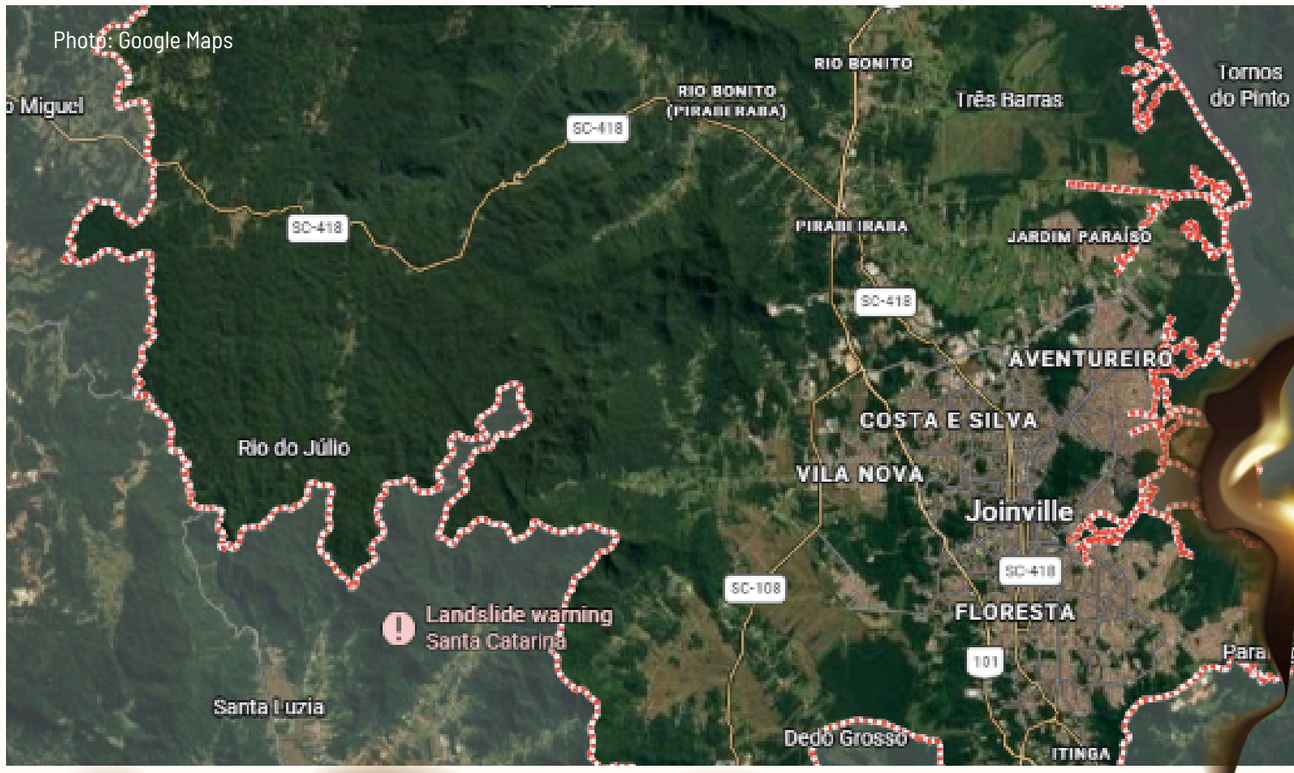
Joinville separately collects recyclable materials including paper, plastics, metals and glass and promotes composting of food and garden waste.[707] Local zero waste advocates have argued that expanding recycling and composting could divert more material before thermal treatment, particularly given the large share of organic and recyclable material in the city's waste stream.[708] [709]

INCINERATOR ASH STATS

Joinville has not yet published an annual total for bottom ash, fly ash or air-pollution-control residues generated by the URE. The facility's final energy production stage burns CBSI in a boiler to generate high-pressure steam and electricity, while public reporting to date has focused primarily on waste throughput, electricity generation, landfill diversion and claimed greenhouse-gas reductions.[710] [711]

FUNDERS

Ambiental Limpeza Urbana e Saneamento Ltda. financed the approximately $24.7 million USD (R$127 million) investment required to construct the URE.[712] The investment forms part of Ambiental's broader municipal waste services relationship with Joinville, whose concession was extended for another ten years beginning in November 2022.[713] [714] The project represents a privately financed facility embedded within Joinville's long-term municipal waste concession and broader waste-service system.[715] [716]



COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Coletivo Joinville Lixo Zero (Joinville Zero Waste Collective) has been the most visible organized critic of the URE, working alongside recycling cooperatives, waste pickers, the local bar association, academics and other civil-society organizations. Opponents have challenged the project's characterization as clean or renewable energy and raised concerns about air emissions, the burning of recyclable and compostable materials, impacts on recycling and waste-picker livelihoods, and the project's compatibility with the waste hierarchy.[717] At a December 2023 City Council hearing, the project was presented as an approximately $22.3 million USD (R$115 million) investment, while the Collective cited an estimated cost of $29.1 million USD (R$150 million) and questioned prioritizing such a large investment in incineration over other approaches to waste management.[718] Opposition continued as the project advanced: in November 2025, the Collective and recycling cooperatives helped organize another City Council public hearing opposing municipal-waste incineration and highlighting threats to recycling and the income of waste-picker families.

The Collective's campaign has also focused heavily on transparency and access to information. Beginning in late 2022 and early 2023, it repeatedly sought information from the municipality about Joinville's waste-management system and the proposed URE. Official municipal records show that the Collective submitted questions and proposals to city departments and the mayor's office in February 2023 and reported two months later that it had not received responses; municipal officials subsequently committed to answering the questions in writing.[719] The dispute eventually reached the Public Prosecutor's Office of Santa Catarina (MPSC). In 2023, complaints raised concerns about waste management practices and the URE, while a separate proceeding opened in 2024 specifically investigated whether inadequate municipal responses had violated the right of access to environmental information.[720] [721] Several related waste management matters have since been considered through additional prosecutorial proceedings.

The challenge to the URE itself ultimately escalated from public hearings and administrative complaints to formal litigation. In August 2023, the MPSC opened Preparatory Proceeding No. 06.2023.00003312-2 to investigate possible irregularities in the implementation of the facility by the Municipality of Joinville and Ambiental Limpeza Urbana e Saneamento.[722] The investigation later developed into a Civil Inquiry, and in July 2026 prosecutors filed a Public Civil Action seeking to halt the URE and annul its environmental licensing, including challenges concerning the environmental review and application of best available techniques for a potentially highly polluting activity.[723] The litigation represents the latest stage of a campaign that began years before the facility entered operation, moving from demands for information and public debate to regulatory investigation and a court challenge to the project's environmental authorization.

KEY COMMUNITY DEMANDS

Community advocates have called for greater transparency regarding the URE's technology and emissions, stronger air-quality and emissions monitoring, improved separation of recyclable and compostable materials, protection and strengthening of recycling systems, and greater investment in waste prevention, recycling and composting.[724] [725]

Coletivo Joinville Lixo Zero has emphasized the waste hierarchy, arguing that Joinville should prioritize reducing waste generation and recovering recyclable and organic materials before directing residual waste toward combustion.[726] That debate is particularly relevant given the city's own waste analysis, which classifies approximately 46.45% of the municipal waste stream as organic and 35.51% as recyclable.[727]

FACILITIES BEING BUILT



Construction began in May 2026 on Rome's planned 600,000-MT/year waste incinerator at Santa Palomba, with first waste deliveries scheduled for September 2029.[728] [729] The nearly $1.12 billion USD (€946.1 million) project will bind Rome to a 33-year concession for one of Europe's largest new municipal waste incinerators, even as the city plans to increase separate collection to 70% by 2035.[730] [731] The facility is expected to generate approximately 150,000 MT of bottom ash each year, while its experimental carbon capture system will initially address only part of the plant's CO2 stream.[732] Local governments and community groups have opposed the project over its size and location, raising concerns about air pollution, health, water resources, traffic, existing contamination and the potential for a large, long-lived incinerator to compete with waste reduction and recycling.[733] [734]

FACILITY FACTS

Location:	Santa Palomba, Italy
Population within 5 kilometers (km):	38,615
Facility Ownership:	RenewRome Group (consortium of Kanadevia Inova + partners Acea, Suez, Vianini Lavori and RMB
Facility Operators (Day-to-Day):	RenewRome Group
Expected First Year of Operation:	2029
Permitted Burning Capacity:	600,000 MT/year
Facility Type:	Advanced moving-grate "mass-burn" incineration combined with multi-stage flue gas treatment and experimental CO2 capture and liquefaction system
Project Investment:	~$1.12 billion USD (€946.1 million)
Expected CO_2 Impacts:	Publicly Unknown
Expected Incinerator Ash Created:	150,000 MT/year (bottom ash only)

FACILITY IMPACTS

FINANCIAL BURDEN

Roma Capitale currently lists the project investment at approximately $1.12 billion USD (€946.1 million).[735] The facility is being delivered as a public-private partnership (PPP) under project finance, with RenewRome responsible for designing, financing, constructing and operating the plant under a long-term concession from Roma Capitale.736 Earlier city planning documents had estimated approximately $828 million USD (€700 million) for the incinerator plus another $177 million USD (€150 million) for treatment and recovery infrastructure, illustrating how the projected capital requirement increased as the project moved toward construction.[737]

The project is officially classified by Roma Capitale as privately financed, rather than financed through direct municipal construction borrowing.[738] The financial commitment arises primarily through the long-term PPP concession, under which the private consortium finances the infrastructure and recovers its investment through operation of the waste treatment system over the concession period.[739]

CLIMATE IMPACT

No official facility-specific CO2 emissions estimates are publicly available. The project includes an experimental carbon capture system, rather than full-scale capture of the plant's entire CO2 stream.[740] The PAUR environmental authorization also requires extensive monitoring of atmospheric emissions, including continuous monitoring and additional controls associated with the emerging carbon capture process.[741] The plant's multi-stage flue-gas system is designed to control nitrogen oxides, sulfur and acid gases, particulate matter, organic pollutants, mercury and other metals, dioxins and furans, with emission monitoring data to be transmitted to ARPA Lazio once the plant begins operating.[742] [743]

COMMUNITY POLLUTION EXPOSURE

Santa Palomba lies at Rome's southern edge near several municipalities in the Castelli Romani and southern metropolitan area, and opposition to the project has repeatedly emphasized that its environmental footprint extends beyond Rome's administrative boundary. A total of 38,615 live within 5 kilometers of the proposed plant.[744] In 2022, 20 mayors representing communities with approximately 650,000 residents opposed the proposed location, citing its proximity to communities in Albano Laziale, Ardea, Ariccia, Pomezia and the surrounding area.[745]

Concerns have focused on air emissions, public health, water resources, traffic, soil impacts and the area's existing environmental burden.[746] Pomezia, Ardea, Marino and Ariccia brought legal action challenging the project and cited existing contaminated sites and "diffuse pollution" in the area among their concerns.[747] In response to these concerns, the project's 2026 authorization includes both an environmental monitoring program and a health surveillance and monitoring plan involving regional authorities, ARPA Lazio, health agencies and the regional epidemiology department.[748]

WASTE ENTRAPMENT

Roma Capitale signed a long-term concession with RenewRome in May 2025 covering construction and operation of the plant for approximately 33 years, with earlier procurement documents specifying 401 months—about 33 years and 5 months.[749] [750] The facility is designed around processing 600,000 MT of residual waste every year, creating a long-term contractual and financial relationship between the city's waste system and a high-capacity incineration facility.[751] The concession framework allows the plant's capacity to be used for waste from outside Rome when capacity is available, rather than requiring unused capacity to sit idle.
Rome simultaneously plans to raise waste separation collection to 70% by 2035.[752] The city and RenewRome maintain that the plant has been sized below Rome's approximately one million MT of residual waste requirement and therefore will not interfere with increased recycling.[753] [754] Critics, however, have argued that committing to 600,000 MT/year of thermal-treatment capacity for decades could compete with further waste prevention, reuse, recycling and composting.[755]

VALUABLE MATERIALS BURNED

A publicly available final breakdown of the future incinerator feed into has not yet been published. Rome's waste plan calls for expansion of separate collection and dedicated treatment of organic waste, paper and plastics, with the incinerator intended primarily for residual and non-recyclable material.[756] The exact composition of that residual stream will depend substantially on Rome's future success in reaching its separate-collection and recycling targets.

INCINERATOR ASH STATS

RenewRome now projects approximately 150,000 MT of bottom ash annually, equal to roughly one-quarter of the waste entering the facility.[757] The on-site ash treatment plant is designed to recover more than 13,500 MT/year of ferrous and non-ferrous metals, after which the remaining mineral fraction is intended to be stabilized and certified for reuse as secondary material in construction.[758]

Roma Capitale's waste plan states that more than 90% of heavy and light ash is intended for recovery, including use in road foundations and construction, and says that no dedicated service landfill for the incinerator is planned.[759] Residues from flue-gas treatment will require specialized management and are expected to be sent to authorized third-party treatment or recovery facilities.[760] No specific final receiving facility or municipality has yet been publicly identified.

FUNDERS

The project is being developed by RenewRome, whose consortium includes Acea Ambiente, Suez Italy, Kanadevia Inova, Vianini Lavori and RMB.[761] [762] Roma Capitale classifies the approximately $1.12 billion USD (€946.1 million) project as privately financed through a PPP structure.[763] [764] Kanadevia Inova serves as the lead Engineering, Procurement and Construction contractor.[765] The carbon-capture component is incorporated into the PPP project as an experimental ancillary facility rather than a separately identified climate finance project.[766]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Opposition has involved both local governments and community organizations across the southern Rome metropolitan area. Pomezia, Albano Laziale, Ardea, Ariccia and other neighboring municipalities have repeatedly opposed the Santa Palomba location, while neighborhood and environmental groups have pursued public campaigns and legal challenges.[767][768][769] In 2023, Pomezia, Ardea, Marino and Ariccia challenged the procurement process before the Lazio administrative court, citing concerns about air, water, soil, traffic, existing contamination and the cumulative environmental burden on the area.[770]

The conflict has continued as construction begins. In 2026, local governments renewed legal challenges and objections to the project, with Albano Laziale raising concerns about health, water resources, transportation and costs, while Pomezia's municipal council again considered formal opposition to the incinerator.[771][772] Several municipalities have also supported legal actions brought by local committees and associations challenging the project.[773]

KEY COMMUNITY DEMANDS

Opponents have called for reconsideration or cancellation of the Santa Palomba project, greater public participation and transparency, stronger health and environmental assessment, protection of groundwater and surrounding communities, and greater investment in waste reduction, separate collection, recycling and other alternatives to incineration.[774][775][776]

A central point of opposition has been the scale of the plant relative to Rome's long-term waste reduction and recycling goals. Local governments have argued that committing the region to 600,000 MT/year of incineration capacity for more than three decades risks undermining efforts to increase separate collection and material recovery, while project proponents maintain that the plant will handle only the residual fraction remaining after recycling.[777][778]

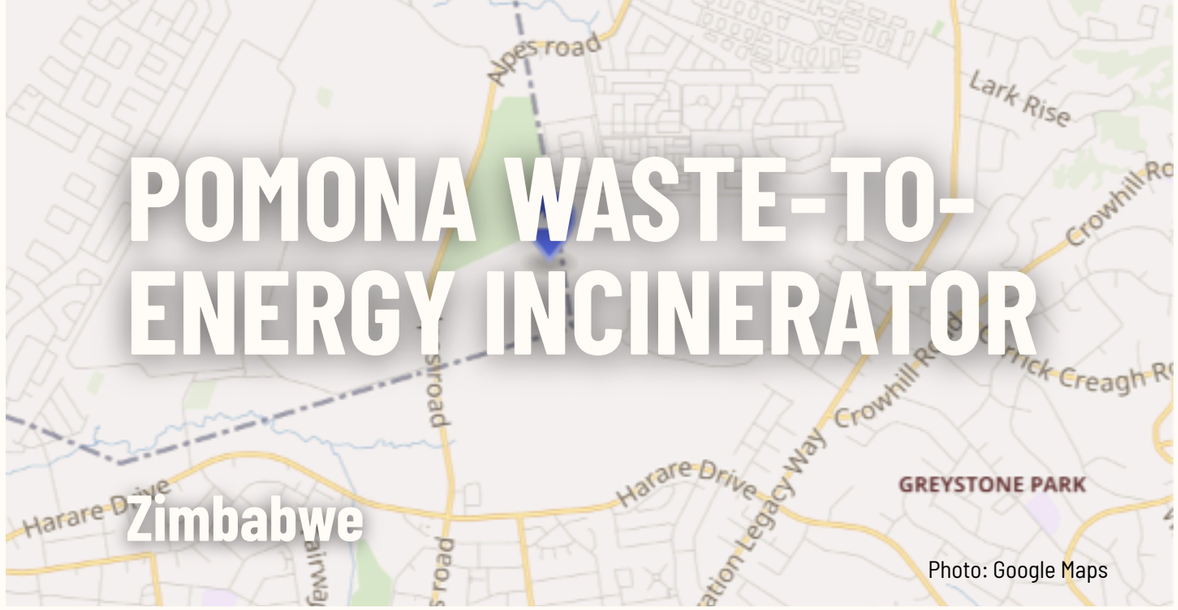


Photo: Google Maps

POMONA WASTE-TO-ENERGY INCINERATOR

Harare's planned Pomona Waste-to-Energy incinerator is the centerpiece of a controversial $344 million USD, 30-year waste concession that requires the city to pay for minimum quantities of waste whether or not they are actually delivered.[779] [780] The contract transfers control of Harare's principal dumpsite to private operator Geo Pomona and ultimately requires as much as 1,000 MT of municipal waste every day, creating a long-term financial incentive to maintain a large residual waste stream.[781] [782] The project has also become intertwined with a major international corruption controversy: Albania's Special Anti-Corruption Structure identified Mirel Mërtiri and Klodian Zoto as the de facto owners of Geogenix B.V., the Dutch parent company behind the Pomona concession, and alleges that they concealed their beneficial ownership and benefited from falsified invoices connected with Albania's Tirana incinerator concession.[783] Documents reported by Albanian media also identify Mërtiri as a Geogenix negotiator in Zimbabwe.[784] In Harare, residents' groups, civil society organizations and elected officials have challenged the Pomona agreement over its procurement, cost, minimum-payment guarantees and diversion of scarce public resources.[785]

FACILITY FACTS

Location:	Harare, Zimbabwe
Population within 5 kilometers (km):	127,723
Facility Ownership:	Geogenix BV (Dutch-based group)
Facility Operators (Day-to-Day):	Geo Pomona Waste Management (subsidiary of Geogenix BV)
Expected First Year of Operation:	2027
Permitted Burning Capacity:	365,000 MT/year
Facility Type:	High-temperature incineration combined with steam boiler and turbine systems
Project Investment:	~$344 million USD
Expected CO_2 Impacts:	Publicly Unknown
Expected Incinerator Ash Created:	Publicly Unknown

FACILITY IMPACTS

FINANCIAL BURDEN

The Pomona project is valued at approximately $344 million USD under the original 30-year agreement between Harare and Geogenix.[786] [787] The contract requires Harare to pay $40 USD per MT of waste, beginning with a minimum guaranteed delivery of 550 MT/day.788 If the city delivers less than the required amount, it must still pay as though the full minimum quantity had been delivered—an initial guaranteed payment of approximately $22,000 USD/day, $669,000 USD/month, or $8.03 million USD/year.[789]
The contractual requirement escalates to 650 MT/day in year two, 750 MT/day in year three, 850 MT/day in year four and 1,000 MT/day beginning in year five, raising the minimum annual payment to approximately $14.6 million USD once the full requirement applies.[790] The Zimbabwean government committed to support Harare's obligations through devolution funds, linking the private concession to public money otherwise allocated through Zimbabwe's intergovernmental financing system.[791] Harare's subsequent difficulty meeting the payments led the central government to assume responsibility for the arrangement, with the cost offset against the city's devolution allocations.[792]

The financial relationship expanded further in late 2024, when a separate five-year arrangement gave Geo Pomona responsibility for refuse collection and street cleaning in Harare at a reported minimum cost of approximately $2.7 million USD per month, or $162 million USD over five years.793 Combined with the original 30-year disposal concession, the agreements create substantial long-term fiscal exposure for Harare residents and the Zimbabwean public sector.

CLIMATE IMPACT

No comprehensive facility-specific estimate of its direct annual emissions has been publicly disclosed.

COMMUNITY POLLUTION EXPOSURE

Approximately 127,723 people live within 5 kilometers of the proposed facility.[794] Pomona has long been Harare's principal municipal dumpsite and has historically been associated with uncontrolled fires, smoke, odors and inadequate waste-management infrastructure. Harare's own waste planning documents describe Pomona as operating beyond capacity and lacking modern infrastructure such as methane capture and leachate controls.[795] Geo Pomona has since undertaken rehabilitation works, including waste compaction and covering, access controls, a weighbridge, leachate infrastructure and designated waste-management areas.[796]

The planned incinerator would introduce a new source of combustion emissions into this setting. Community concerns have focused not only on future air pollution and health impacts but also on affordability, transparency, public participation and the diversion of municipal resources from basic waste collection and other public services.[797]

WASTE ENTRAPMENT

The Pomona concession contains a particularly explicit form of put-or-pay waste lock-in. Harare must initially deliver at least 550 MT/day and pay $40 USD/MT; if it fails to supply the minimum quantity, the city is still invoiced as though it had delivered it.[798] [799] The required waste supply increases annually until reaching 1,000 MT/day—approximately 365,000 MT/year—from the fifth year onward.[800]

The arrangement therefore links Harare's finances directly to maintaining a large residual waste stream for decades. At the full requirement, the city is committed to approximately $14.6 million USD annually in minimum gate fees, even before accounting for other waste-management costs.[801] The original agreement runs for 30 years, after which the facility is intended to transfer to the city under the build-operate-transfer arrangement.[802] The project is designed around municipal waste generated within Harare, although the eventual 1,000-MT/day requirement creates substantial pressure on the city's collection system to deliver sufficient material.[803]

VALUABLE MATERIALS BURNED

Harare's municipal waste stream contains a substantial share of materials that can potentially be managed through composting, recycling and other forms of material recovery. The city's recent waste management documentation estimates approximately 50–60% organic material, 10–15% plastics, 5–10% paper and cardboard, and 5–8% glass and metals in the municipal waste stream.[804] Because the incinerator is designed for up to 1,000 MT/day, the degree to which recyclable and compostable materials are separated before combustion will significantly affect the composition of its future furnace feed.

INCINERATOR ASH STATS

No project-specific estimate of annual bottom ash, fly ash or air pollution control residue has yet been publicly disclosed for the Pomona incinerator.

FUNDERS

The original concession places responsibility for designing, financing, constructing and operating the project with Geogenix B.V. and its Zimbabwean operating company, Geo Pomona Waste Management.[805] Zimbabwe's Cabinet approved the project as a 30-year Design-Build-Operate and Transfer arrangement, with electricity from the future plant intended for the national grid.[806]

The project also benefits from substantial public financial commitments. Harare is contractually required to make minimum waste treatment payments, while the national government committed to support those obligations through devolution funding.[807] The project was also granted National Project Status, providing exemptions on imported capital equipment.[808]

The controversy surrounding Pomona extends beyond the terms of the Harare contract to Geogenix B.V.'s involvement in Albania's incinerator scandal. In August 2023, Albania's Special Anti-Corruption Structure (SPAK) announced that its investigation had identified Mirel Mërtiri and Klodian Zoto as the de facto owners of Integrated Energy B.V. SPV and its Dutch parent, Integrated Energy B.V., later renamed Geogenix B.V.[809] SPAK said evidence showed that Mërtiri and Zoto used other individuals and companies to conceal their beneficial ownership and directed decisions involving the concession company and its Dutch parent.[810]

SPAK's investigation into the Tirana incinerator concession also alleged the use of falsified invoices totaling $4.3 million USD (409.4 million Albanian lek), concealment of beneficial ownership and irregular conduct during the concession process.[811] [812] In December 2023, SPAK further alleged that an Albanian government official indirectly received $129,000 USD (€119,755) from Mërtiri and Zoto in connection with favorable treatment during the concession process.[813] These allegations concern the Albanian incinerator concessions rather than the Pomona project, but the corporate connection is direct: SPAK identifies the Dutch parent company as today's Geogenix B.V.[814]

Mërtiri's connection to Zimbabwe is also documented. Albanian investigative reporting published documents identifying Mirel Mërtiri as a negotiator for Geogenix in Zimbabwe during the development of the Pomona project.[815] In Zimbabwe itself, the concession was challenged over its procurement and approval process. Residents' organizations and Transparency International Zimbabwe criticized the absence of public consultation and competitive tendering, while Harare's incoming council attempted to cancel the agreement on grounds that its terms were prejudicial to the city.[816] [817] The central government subsequently directed the council to reverse that decision.[818]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Opposition to the Pomona agreement has included the Combined Harare Residents Association (CHRA), Harare Residents Association, Harare Metropolitan Residents Forum, Transparency International Zimbabwe, elected Harare councillors and parliamentarians.[819] [820] Residents challenged the transfer of the dumpsite, the $40/MT fee, the minimum guaranteed waste requirement, the absence of competitive tendering, and the potential diversion of municipal resources toward a private concession.[821]

The Combined Harare Residents Association specifically challenged provisions requiring the city to hand over Pomona without payment while simultaneously paying the private operator to dispose of waste there, and opposed the requirement that Harare pay for at least 550 MT/day whether or not that amount was actually delivered.[822] The dispute became severe enough that Harare City Council attempted to cancel the contract in 2022 before the central government intervened to keep the agreement in place.[823]

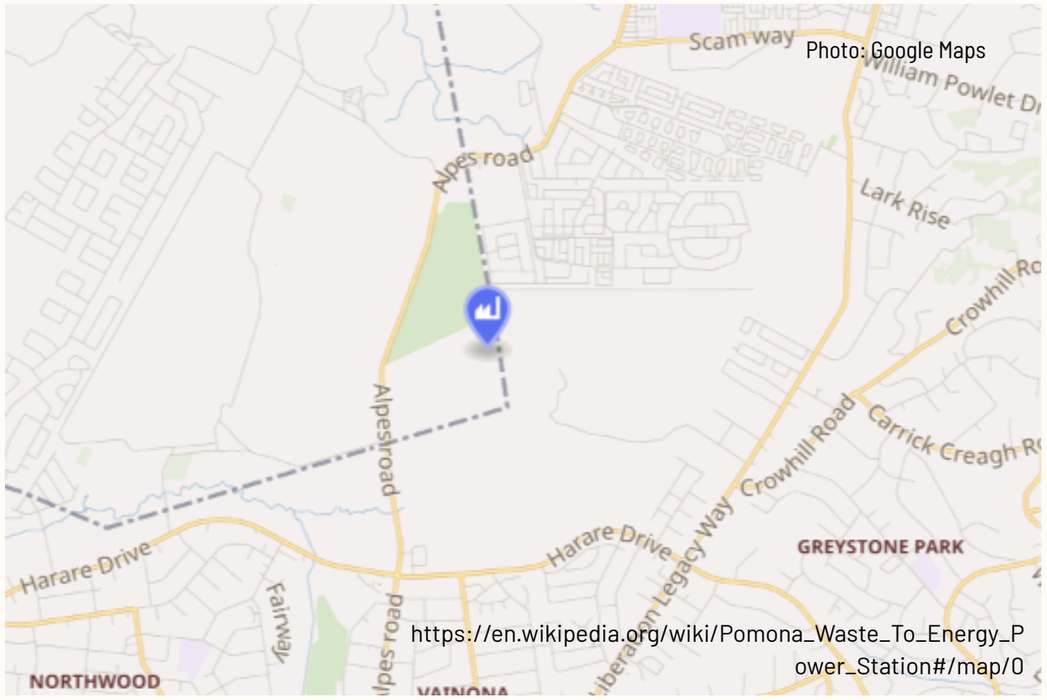


Photo: Google Maps

https://en.wikipedia.org/wiki/Pomona_Waste_To_Energy_Power_Station#/map/0

KEY COMMUNITY DEMANDS

Residents' organizations have demanded greater transparency and public participation, disclosure and review of the concession terms, protection of ratepayer funds, competitive and accountable procurement, and reconsideration of the minimum guaranteed waste-payment provisions.[824] [825] Opposition has also emphasized the need to direct scarce municipal resources toward reliable waste collection and public services rather than guaranteed payments under a long-term private concession.[826]

The future incinerator adds a further waste policy concern. With Harare's waste stream containing large quantities of organic material, plastics, paper, glass and metals, expanding composting, recycling and source separation could reduce the residual waste available for combustion.[827] The 30-year concession and eventual 1,000-MT/day minimum waste requirement instead create a financial structure in which the city remains obligated to pay for a large quantity of waste treatment for decades.[828]



ENERGY RECOVERY UNIT BARUERI (URE BARUERI)

Brazil

Now under construction in the densely urbanized western São Paulo metropolitan area, URE Barueri is designed to become Brazil's first large-scale mass-burn municipal waste incinerator, processing approximately 300,000 MT of waste per year when operations begin in 2027.[829] The project has drawn sustained community opposition over its proximity to residential areas, projected air emissions, ash generation, licensing history, and potential competition with recycling and composting.[830] The original environmental review projected approximately 293 MT/year of nitrogen oxides (NOx), 73 MT/year of sulfur oxides (SOx), 73 MT/year of carbon monoxide and 15 MT/year of particulate matter, while estimating that ash and slag would equal 12–14% of incoming waste.[831] At the same time, Barueri's 2026 waste plan shows that the plant's 870-MT/day capacity is roughly three times the amount of residual municipal waste the city itself generated in 2024, meaning the facility is explicitly designed to receive waste from surrounding municipalities as well.[832] The project is tied to a 30-year public-private partnership, long-term electricity contracts and approximately $77 million USD (R$395 million) in tax-incentivized infrastructure debt, creating financial and contractual commitments that will extend for decades.[833] [834]

FACILITY FACTS

Location:	Barueri, Brazil
Population within 5 kilometers (km):	538,955
Facility Ownership:	Orizon Valorização de Resíduos controls 80% of Barueri Energia Renovável S.A., and Sabesp (São Paulo State Basic Sanitation Company) controls 20%
Facility Operators (Day-to-Day):	Barueri Energia Renovável S.A
Expected First Year of Operation:	2027
Permitted Burning Capacity:	~300,000 MT/year
Facility Type:	"Mass-burn" incineration
Project Investment:	~$125 million USD (R$641.3 million)
Expected CO_2 Impacts:	Publicly unknown
Expected Incinerator Ash Created:	~49,500 MT/year

FACILITY IMPACTS

FINANCIAL BURDEN

The estimated cost of constructing URE Barueri has risen to approximately $125 million USD (R$641.3 million), up from an earlier budget of $117 million USD (R$600.5 million).[835] The project is being financed through shareholder capital and long-term debt, including a 2024 issuance of approximately $77 million USD (R$395 million) in infrastructure debentures by Barueri Energia Renovável S.A.[836] The bonds mature in 2043 and are secured by project assets and shareholder guarantees.[837]

The plant will receive revenue from both waste treatment and electricity sales. The project secured long-term electricity contracts through Brazil's 2021 A-5 energy auction at approximately $107/MWh (R$549.35/MWh), with roughly 75% of its guaranteed output contracted.[838] Current financial projections also assume a waste treatment tariff of approximately $24/MT (R$122/MT) for additional, non-contracted waste beginning in 2027.[839] The project debt qualifies as incentivized infrastructure debentures under Brazil's Law 12.431, providing federal tax advantages to eligible investors.[840] Sabesp's 20% equity investment also introduced public capital into the project when the then state-controlled utility acquired its stake in 2022.[841]

CLIMATE IMPACT

A facility-specific annual estimate of direct fossil and biogenic CO2 emissions from combustion has not been publicly disclosed. The original environmental review provides considerably more detail for conventional air pollutants, projecting 292.57 MT/year nitrogen oxides (NOx), 73.14 MT/year sulfur oxides (SOx), 73.14 MT/year carbon monoxide (CO), 14.63 MT/year particulate matter and 14.63 MT/year Volatile Organic Compounds (VOCs).[842] The Brazilian Federal Environmental Agency (CETESB) required continuous monitoring of regulated stack emissions and specifically required compensation equal to 110% of NOx emissions because the municipality was already classified as severely saturated for ozone.[843] Updated annual projections for heavy metals, dioxins and furans have not been publicly disclosed.

COMMUNITY POLLUTION EXPOSURE

URE Barueri is being built in the Aldeinha/Aldeia de Barueri area, within an increasingly urbanized part of the São Paulo metropolitan region.[844] Barueri's 2026 waste plan records 6,965 residents in Aldeia de Barueri, while community groups point to nearby apartment buildings, commercial areas and neighboring populations in Barueri and Carapicuíba as part of the larger exposed population.[845] [846]

In total, approximately 538,955 people live within 5 kilometers of the site.[847] The original CETESB assessment itself recognized potential concerns among residents over environmental impacts and identified air emissions, odors, noise, heavy truck traffic and public-health risks associated with waste storage among issues requiring controls.[848]

Opposition has intensified as construction has progressed. Coletivo SOS Barueri and allied organizations have raised concerns over air emissions, ash, proximity to homes and waterways, the project's environmental licensing, public participation, and the potential diversion of recyclable and compostable material into combustion.[849] In 2025, a new civil action sought to suspend construction while challenging the validity of the project's installation license and the adequacy of more recent environmental review; environmental authorities and the project company have maintained that the project remains properly licensed.[850]

WASTE ENTRAPMENT

The project originates in a 30-year public-private partnership signed between Barueri and the project concessionaire in January 2012.[851] [852] Under the arrangement, the private concessionaire is responsible for licensing, construction and operation, while the municipality is responsible for collecting and delivering residual municipal waste to the facility.[853]
The scale of the plant creates a particularly important waste supply issue. Barueri's 2026 waste plan reports that the city generated only about 290 MT/day of common waste and recycling rejects in 2024 that could potentially be incinerated, compared with the URE's 870-MT/day capacity.[854] The municipal plan explicitly states that the plant may therefore provide services to other municipalities, including Carapicuíba and Santana de Parnaíba, while the original Environmental Impact Assessment (EIA) was designed around receiving waste from all three municipalities.[855] [856] This means the plant has been constructed with approximately three times Barueri's current locally generated residual-waste supply, making regional waste imports integral to reaching its full design capacity.[857]

VALUABLE MATERIALS BURNED

Figures describing the future composition of the material entering the URE are not publicly available. However, Barueri's municipal waste characterization shows that its waste stream historically contained large quantities of materials that could instead be composted or recycled. The city's official gravimetric analysis found approximately 71.25% organic material, 13.75% plastics, 7.45% paper/cardboard/newspaper, and 2.70% metals and glass combined.[858]

INCINERATOR ASH STATS

The original EIA estimated that ash and slag would equal approximately 12–14% of the waste entering the combustion system.[859] At the current design throughput of approximately 300,000 MT/year, that corresponds to an estimated 36,000–42,000 MT of ash and slag annually. More detailed EIA projections identified 4,823 kg/hour of bottom ash and slag, 389 kg/hour of light boiler ash, and 971 kg/hour of flue-gas-treatment residues.[860] Assuming the original design basis of 8,000 operating hours annually, those rates would correspond to approximately 38,584 MT/year of bottom ash and slag, 3,112 MT/year of light boiler ash, and 7,768 MT/year of gas-treatment residue—about 49,500 MT/year combined before accounting for differences between the original and current plant design.[861]

The EIA classified bottom ash, slag and light boiler ash as Class IIA non-hazardous waste, destined for a Class II landfill after recovery of ferrous and non-ferrous metals.[862] Residues captured by the flue-gas-treatment system were classified as Class I hazardous waste and designated for disposal in a Class I landfill.[863] More recent project-finance projections assume ash-disposal costs of approximately $14/MT USD (R$73/MT) during 2027–2029 and anticipate that some ash could eventually be marketed for use in cement or other construction applications if regulatory approval is obtained.[864]

FUNDERS

URE Barueri is owned through Barueri Energia Renovável S.A., with Orizon Valorização de Resíduos holding 80% and Sabesp holding 20%.[865] Sabesp purchased its 20% interest for approximately $7.8 million USD (R$40 million) in 2022.[866]

Debt financing is also substantial. In 2024, Barueri Energia Renovável issued approximately $77 million USD (R$395 million) in infrastructure debentures, coordinated by BTG Pactual Investment Banking and Banco Modal, with the bonds scheduled to mature in March 2043.[867] The issuance was classified as an incentivized debenture under Law 12.431, a federal policy that provides tax advantages for qualifying infrastructure investments.[868] The project also benefits from long-term regulated electricity sales secured through federal energy auctions, including the 2021 A-5 auction.[869]

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

The principal local opposition organization is Coletivo SOS Barueri, which has organized residents against the project and assembled environmental, legal and health analyses challenging the incinerator.[870] The campaign has received support from organizations including the National Movement of Recyclable Waste Collectors (MNCR), Aliança Resíduo Zero Brasil, Instituto Pólis and GAIA, while regional activists, recycling advocates and other civil-society organizations have participated in the broader opposition.[871]

The dispute has increasingly focused on environmental licensing as construction has advanced. Instituto Pólis asked state and federal prosecutors to investigate the project in 2023, arguing that construction proceeded under an expired installation license and calling for suspension of the works.[872] A separate civil action filed in 2025 again challenged the licensing process and sought suspension of construction.[873] The project company and CETESB have disputed allegations that construction was proceeding illegally, maintaining that the project has complied with the applicable licensing requirements.[874]



KEY COMMUNITY DEMANDS

Community groups have called for suspension and reassessment of the project; updated environmental and health studies; greater transparency and public participation; stronger monitoring of air emissions; protection of nearby residents; and prioritization of waste prevention, recycling and composting over incineration.[875] [876] Particular concern has centered on the plant's location near residential development, its projected air emissions and ash, and the implications of committing the region to a high-capacity incinerator for decades.[877]

Waste picker and zero waste organizations have also argued that municipal policy should strengthen material recovery rather than create demand for combustible waste.[878] That concern is reinforced by Barueri's own 2026 waste plan: the URE is designed for [870] MT/day, while the municipality generated only about 290 MT/day of common waste and recycling rejects potentially available for incineration in 2024.[879]



3-IN-1 WTE COMPLEX: KHIANG KAN ENERGY PLANT + ME PREME ENERGY PLANT + PHRAOFA POWER PLANT

Thailand

Three industrial waste incinerators are being developed side-by-side at the Hi-Tech Kabin Industrial Estate in Prachinburi Province, Thailand, each structured as a separate 9.9-megawatt (MW) power plant but collectively representing 29.7 MW of waste-burning capacity.[880] [881] The three plants are part of Gulf Development's larger 12-incinerator GWTE Circular Economy Project, backed by more than $500 million USD in debt financing arranged by the Asian Development Bank (ADB) and other lenders, including the Asian Infrastructure Investment Bank (AIIB).[882] [883] The project's structure has become a central community concern: under Thai regulations, the individual 9.9-MW plants fell below the 10-MW threshold requiring a full Environmental Impact Assessment (EIA) and instead proceeded through the less stringent Code of Practice process, despite their close proximity and common corporate ownership.[884] Local residents and civil society organizations have challenged this fragmented assessment, arguing that the three facilities should be evaluated together for their cumulative pollution and health impacts.[885] The dispute has also become a human-rights issue: Thailand's National Human Rights Commission investigated complaints that residents opposing the projects were excluded, restricted and intimidated during public hearings, concluding that the process lacked genuine public participation.[886]

FACILITY FACTS

Location:	Prachinburi Province, Thailand
Population within 5 kilometers (km):	14,047
Facility Ownership:	Each plant is incorporated as a separate project company—Khiang Kan Energy Company Limited, Me Preme Energy Company Limited, and Phraofa Power Company Limited—under the wider Gulf Waste to Energy Holdings (GWTE)/Gulf Development corporate structure.
Facility Operators (Day-to-Day):	Khiang Kan Energy Company Limited, Me Preme Energy Company Limited, and Phraofa Power Company Limited
Expected First Year of Operation:	2027
Permitted Burning Capacity:	~164,250 MT/year (~54,750 MT/year at each incinerator)
Facility Type:	Industrial solid-waste incineration with steam-boiler electricity generation
Project Investment:	~$677 million USD (22.1 billion baht) - part of 12-incinerator GWTE portfolio
Expected CO_2 Impacts:	Publicly Unknown
Expected Incinerator Ash Created:	Publicly Unknown

FACILITY IMPACTS

FINANCIAL BURDEN

The three Prachinburi plants form part of the much larger 12-facility GWTE Circular Economy Project, whose total development cost has been estimated at approximately $677 million USD (22.1 billion baht).[887] The financing structure originally anticipated approximately 25% equity—$169 million USD (5.53 billion baht)—and 75% debt—$508 million USD (16.59 billion baht) across the twelve facilities.[888]

In February 2026, ADB signed loan agreements totaling approximately $511.9 million USD (16.6 billion baht) for the 12 companies.[889] ADB itself provided approximately $91.9 million USD (3.0 billion baht) from its ordinary capital resources and mobilized another $420 million USD (13.6 billion baht) from six parallel lenders.[890] AIIB separately identifies its approved participation as $63 million USD in non-sovereign financing.[891]

The projects also receive long-term public-policy support through Thailand's feed-in-tariff program. Each plant secured a 20-year PPA with the Provincial Electricity Authority at 6.08 baht/kWh, plus a 0.70-baht/kWh premium during the first eight years.[892] For the three Prachinburi plants alone, that creates 24 MW of contracted electricity capacity backed by long-term regulated power-purchase agreements.

CLIMATE IMPACT

A facility-specific annual estimate of direct fossil and biogenic CO2 emissions from combustion has not been publicly disclosed.

COMMUNITY POLLUTION EXPOSURE

Approximately 4,047 people live within 5 kilometers of the proposed plants.[893] The three Prachinburi facilities are being constructed in the same Hi-Tech Kabin Industrial Estate, creating a combined 29.7-MW cluster rather than three geographically isolated projects.[894] Local residents and civil-society groups have argued that evaluating each 9.9-MW plant independently understates the cumulative air-pollution, traffic, ash-handling and public-health burden created by multiple incinerators operating in close proximity.[895]

The controversy has extended beyond pollution to the right of affected communities to participate in project decisions. Residents filed complaints with Thailand's National Human Rights Commission (NHRC) over the public-hearing process for several GWTE facilities, including Me Preme and Phraofa.[896] According to the civil society submission to ADB, the NHRC found that exclusion of petitioners and dissenting residents, restrictions on their ability to express opinions and intimidating behavior at hearings resulted in a lack of genuine public participation.[897]

ADB and AIIB subsequently required site-specific stakeholder-engagement plans, grievance mechanisms and environmental monitoring arrangements.[898] ADB maintains that the projects underwent the environmental and social assessments required by Thai law and lender safeguards, including CoP reports, Initial Environmental Examinations and lender-level Environmental and Social Impact Assessments.[899]

WASTE ENTRAPMENT

These three plants are designed primarily for non-hazardous industrial waste rather than household municipal solid waste.[900] The 12-plant GWTE portfolio is expected to consume up to approximately 618,554 MT of sorted combustible industrial waste annually by 2029, creating substantial long-term demand for combustible waste across Thailand's central and eastern industrial regions.[901]
Each Prachinburi facility also holds a 20-year electricity PPA for 8 MW with the Provincial Electricity Authority.[902] These long-lived power contracts create a financial incentive to maintain fuel supply and electricity generation over two decades. Therefore, the three facilities represent 24 MW of contracted waste derived generation concentrated in a single industrial estate.

The project is explicitly designed around regional industrial-waste flows rather than waste generated solely within the immediate host community. ADB states that the full GWTE portfolio will draw sorted industrial waste from 11 provinces adjacent to the plants, meaning waste transportation between industrial areas is an integral part of the project's operating model.[903]

VALUABLE MATERIALS BURNED

Publicly available project documentation does not provide a reliable combined percentage breakdown for the Prachinburi cluster. Plastics and other fossil-derived combustible materials are expected within the industrial waste fuel stream, while metals and other non-combustible materials are intended to be removed through sorting before combustion.[904]

INCINERATOR ASH STATS

No reliable annual ash generation total or named final disposal facility has yet been identified for the three Prachinburi plants. Operation of the three incinerators will generate bottom ash, fly ash, used filtration material and other air-pollution-control residues.[905] AIIB specifically identifies handling of feedstock and combustion residues as an operational environmental risk and states that bottom ash, fly ash and other solid and hazardous wastes will be managed through licensed contractors.[906]

FUNDERS

The Prachinburi plants are part of the GWTE Circular Economy Project sponsored by Gulf Development Public Company Limited, one of Thailand's largest energy companies.[907] The 12 project companies—including Khiang Kan Energy, Me Preme Energy and Phraofa Power—are the borrowers under the international project finance structure.[908 909]

Asian Development Bank: approximately $91.9 million USD (3.0 billion baht) in direct ADB financing for the 12-plant portfolio, while ADB mobilized another $420 million USD (13.6 billion baht) from six parallel lenders.[910]

Asian Infrastructure Investment Bank: $63 million USD in approved non-sovereign financing for the same 12-project portfolio.[911]

Together, the financing arranged by ADB and participating lenders totals approximately $511.9 million USD (16.6 billion baht).[912] The three Prachinburi facilities are among the named borrower companies receiving financing through this structure.[913 914]

A central controversy surrounding the Prachinburi cluster is the decision to develop the facilities as three separate 9.9-MW projects rather than one 29.7-MW complex. Under the Thai regulatory framework cited in the project dispute, power plants with generating capacity of 10 MW or more require an Environmental Impact Assessment, while smaller facilities can proceed under the Energy Regulatory Commission's Code of Practice (CoP) framework.[915] Each of the three plants falls just 0.1 MW below that threshold.

Community organizations and environmental groups argue that the three facilities should have been assessed cumulatively because they share the same industrial estate,

common corporate control and overlapping environmental and community impacts.[916] The same issue extends beyond Prachinburi: all 12 GWTE facilities are individually rated at exactly 9.9 MW, producing a combined installed capacity of 118.8 MW.[917]

ADB disputes the claim that the projects escaped environmental review altogether. In its December 2025 response to GAIA, ADB stated that the facilities completed CoP reports required by the Energy Regulatory Commission, Initial Environmental Examinations required by the Industrial Estate Authority of Thailand, and lender-level Environmental and Social Impact Assessments.[918] The disagreement is therefore not over whether any environmental documents exist, but whether separately assessing closely connected 9.9-MW facilities adequately captures the cumulative impacts that would have been examined through Thailand's full EIA process.

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Community resistance has involved Strong Prachinburi, local affected residents and Thai environmental and human-rights organizations, supported by regional and international groups including Ecological Alert and Recovery–Thailand (EARTH), Environmental Justice Foundation (EJF), EnLaw, GAIA Asia Pacific, NGO Forum on ADB and Accountability Counsel.[919] Community concerns have focused on cumulative pollution, health and livelihood impacts, the fragmented 9.9-MW permitting structure, inadequate access to project information and the conduct of public consultations.

The dispute escalated to Thailand's National Human Rights Commission, which examined complaints regarding participation in public hearings for several of the GWTE projects.[920] Civil society organizations subsequently brought those findings and community concerns directly to ADB and AIIB during consideration of the international financing package.

In December 2025, GAIA Asia Pacific and NGO Forum on ADB formally urged ADB's Board to object to financing the project, citing safeguard categorization, inadequate disclosure, climate impacts, community participation and the cumulative risks of approving 12 incinerators together.[921] ADB approved the project later that month and signed the financing package in February 2026.[922] [923]

KEY COMMUNITY DEMANDS

Affected residents and civil society organizations have called for the three Prachinburi incinerators to be evaluated cumulatively as a single 29.7-MW industrial complex, rather than as three independent 9.9-MW projects.[924] They have also demanded meaningful public participation, accessible disclosure of environmental documents in Thai, stronger assessment of cumulative air pollution and health impacts, transparent emissions monitoring, and safeguards against intimidation or exclusion of residents who oppose the facilities.[925]

At the international finance level, campaigners have called on ADB and AIIB to apply stronger environmental and social due diligence, address the findings concerning community participation, reassess the project's climate claims and ensure that project information is disclosed early enough for affected communities to meaningfully participate before financing decisions are made.[926] [927]

FACILITIES CLOSED



VALLON INCINERATOR PLANT (CLOSED IN 2005)

Switzerland

Operating from 1958 to 2005, the municipally owned Vallon incinerator burned Lausanne's household waste for nearly five decades in the densely populated Vallon neighborhood. Although designed to burn approximately 73,000 MT of waste annually, the aging facility experienced recurring combustion and pollution-control problems, including historical exceedances for particulate matter, carbon monoxide, nitrogen oxides and mercury.[928] Decades after the plant opened, extensive dioxin and furan contamination was discovered in soils across Lausanne, with Swiss authorities identifying the former Vallon incinerator as the probable principal source.[929] [930] Residents had complained about black particulate fallout, smoke, odors and potential health risks since the 1960s, and the contamination discovered after closure has turned Vallon into a long-term environmental-liability case involving soil remediation, public-health monitoring and demands for greater government accountability.[931] A new facility named the Tridel Waste-to-Energy Plant was built and currently operates at the same location of the former Vallon Incinerator.

FACILITY FACTS

Location:	Lausanne, Switzerland
Population within 5 kilometers (km):	232,799
Facility Ownership:	Municipality of Lausanne
Facility Operators (Day-to-Day):	Lausanne's Service d'assainissement (municipal sanitation/waste management service)
First Year of Operation:	1958
Year of Closure:	2005
Designed Burning Capacity:	~73,000 MT/year
Facility Type:	"Mass-burn" incineration
Project Investment:	~$3.4 million USD (CHF 14.5 million)
CO_2 Impacts:	~60,000 MT/year
Incinerator Ash Created:	20,000–30,000 MT/year (during high-throughput period)

FACILITY IMPACTS

FINANCIAL BURDEN

The Vallon incinerator was financed primarily as a municipal public-works project by the City of Lausanne, rather than through a private developer or external financial institution. When the project was approved in 1954, construction was initially estimated at approximately $2.8 million USD (CHF 12 million), including roughly $1.5 million USD (CHF 6.5 million) for electromechanical equipment supplied by Von Roll, including the furnaces and major pollution-control equipment.[932] Lausanne subsequently approved approximately $580,000 USD (CHF 2.5 million) in additional funding in 1959, bringing documented municipal appropriations associated with construction and completion to approximately $3.4 million USD (CHF 14.5 million).[933]

No subsidies were provided for the facility. Instead, Lausanne relied on municipal financing and local cost recovery mechanisms, including a dedicated charge on property owners that contributed to financing the project.

CLIMATE IMPACT

Vallon operated before modern facility-level greenhouse gas reporting requirements, so no continuous inventory of facility-specific CO2, methane, or nitrous oxide emissions exists. Applying historical Swiss municipal-waste-incinerator factors to the plant's later operating throughput suggests Vallon produced a modeled estimate of approximately 60,000 MT of direct CO2 annually during its final operating period, roughly half of which was biogenic.[934] During the 1970s, investigations identified mercury contamination around the facility, while particulate measurements during one monitoring period ranged from approximately 70–415 mg/m^3, averaging around 260 mg/m^3 and substantially exceeding the applicable federal guideline.[935] Problems persisted as Swiss air-pollution standards tightened: monitoring in 1994 found carbon monoxide and nitrogen oxide (NOx) emissions approximately two to four times applicable limits, while further exceedances for carbon monoxide (CO) and particulate matter were recorded in 1997.[936] By 1999, NOx concentrations were approximately 4.8 times the applicable 80 mg/m^3 limit, alongside continuing particulate and CO problems. Engineering assessments associated the elevated CO and large quantities of unburned material in Vallon's ash with poor and incomplete combustion.[937]

The facility's most significant long-term pollution legacy, however, is widespread contamination by dioxins and furans (PCDD/Fs). Dioxin contamination discovered in Lausanne soils beginning in 2020–2021 led the Canton of Vaud to identify the former Vallon incinerator as the probable principal source, with some of the highest concentrations occurring around Vallon and neighboring areas.[938] A peer-reviewed reconstruction

of historical emissions estimates that Vallon may have released approximately 5,500–7,000 grams/year of total PCDD/Fs during much of the pre-1982 period and approximately 3,400–6,000 grams/year during its later operating period, depending particularly on the assumed performance of its wet-scrubber system.[939] These are modeled total PCDD/F emissions, not TEQ measurements.[940]

Researchers also found that temperatures within Vallon's electrostatic precipitators fell within a range favorable to additional dioxin formation. Their model estimated that approximately 1,115–1,419 grams WHO-2005 TEQ could have remained in Lausanne soils by 2022, compared with approximately 371 grams TEQ estimated from measured soil contamination; the larger modeled estimate carries substantial uncertainty because of assumptions about historical deposition and persistence.[941]

COMMUNITY POLLUTION EXPOSURE

Approximately 232,799 people live within 5 kilometers of the Vallon Incinerator site.[942] Residents living around Vallon experienced pollution concerns throughout much of the plant's operating life. Complaints began only a few years after opening and centered on black particulate fallout, smoke, odors, noise and fears about potential health effects.
Black, greasy particles locally known as “bruchons” regularly settled on windows, laundry, balconies, cars and other surfaces in the neighborhood.[943] These emissions became a defining feature of residents' experience with the plant before improved pollution-control equipment was installed in the early 1980s.[944]

The discovery of widespread soil contamination decades later confirmed that the environmental effects were not confined to visible smoke and particulate fallout. Dioxins are highly persistent compounds capable of remaining in soils for decades and entering the food chain. Cantonal authorities have consequently issued recommendations concerning gardening and consumption of foods produced on contaminated soils, particularly eggs from locally raised chickens.[945] [946]

The principal recurring community complaints were: (1) Black ash and particulate fallout coating homes, windows, laundry, balconies and vehicles; (2) Smoke and air pollution from the incinerator stack; (3) Fears of cancer, toxic exposure and other health effects; (4) Offensive odors and recurring neighborhood nuisance; and (5) Noise and disturbance associated with plant operation and waste handling.

In 1964, approximately 120 residents signed a petition concerning pollution from the incinerator. Municipal political representatives also questioned whether the plant's filters were adequately preventing dirty fallout from reaching surrounding neighborhoods.[947] [948] Residents continued to criticize authorities over subsequent decades for minimizing or inadequately addressing pollution concerns. Those historical complaints gained renewed significance after the extensive dioxin contamination was identified beginning in 2021.

The principal long-term health concern associated with Vallon is exposure to dioxins and furans, accompanied historically by exposure to particulate matter, mercury and other heavy metals, nitrogen oxides, carbon monoxide and other combustion pollutants.

A biomonitoring investigation conducted after the Lausanne contamination was discovered found no statistically significant overall increase in blood dioxin concentrations among adults living in contaminated areas compared with control participants. However, consumption of certain locally produced foods—particularly eggs from chickens raised on contaminated soils—was associated with higher concentrations, supporting concern about continuing dietary exposure pathways.[949] The absence of a population-wide difference in blood levels does not eliminate the documented environmental contamination. Swiss authorities continue to maintain land-use and food-consumption recommendations and are pursuing remediation of highly contaminated areas.[950]

WASTE ENTRAPMENT

Instead of put-or-pay or guaranteed minimum-tonnage contracts, municipalities outside Lausanne that used the facility generally paid the City of Lausanne a per-tonne fee for waste actually delivered, rather than guaranteeing a predetermined minimum amount of waste.
Nevertheless, Vallon developed a substantial regional waste catchment during its early decades. The number of municipalities sending waste to the facility increased from approximately 7 in 1959 to 41 in 1968 and as many as 55 by 1977.[951] During some periods, outside municipalities supplied a substantial share of the waste burned at Vallon.[952]

This regional role declined sharply around the beginning of the 1980s as other waste-management arrangements developed. Vallon subsequently became predominantly a Lausanne municipal facility.[953]

VALUABLE MATERIALS BURNED

The composition of waste burned at Vallon changed substantially during its nearly five decades of operation. Historical reconstruction of the waste stream relies on several datasets, including a 1982 Lausanne waste survey, a 1990 Lausanne household-waste survey, and the Swiss federal 2000/01 waste-composition study.[954] The evidence shows that Vallon continued to burn substantial quantities of materials that could increasingly be managed separately as municipal collection systems developed.

Food waste, other biodegradable household material and some garden waste represented an important fraction of Lausanne's residual waste stream. Organic material remained significant even during the later operating years, despite expansion of separate collection and composting programs.

Paper and cardboard historically represented one of the largest combustible components of Swiss household waste. Lausanne introduced a separate paper collection beginning in 1971, reducing—but not eliminating—the amount of recyclable fiber reaching Vallon.[955] [956]

The proportion of plastics in household waste increased substantially over Vallon's lifetime. The 2025 emissions reconstruction identified increasing plastics as a major reason estimated chlorine content in Vallon's incoming waste increased from approximately 0.3% during the earliest operating period to roughly 0.7% during 1995–2005.[957] Chlorinated materials are

particularly significant because chlorine is an important precursor in PCDD/F formation.[958] Metals and glass also entered the incinerator throughout much of its operating history. Lausanne began a separate glass collection in 1975, while batteries and thermometers were targeted for collection beginning in the late 1970s. Experimental aluminum recovery was also introduced around 1980.[959]

INCINERATOR ASH STATS

During much of Vallon's high-throughput period, the facility generated approximately 20,000–30,000 MT of incinerator residues annually, although quantities varied substantially.[960] In 1972, 1973, and 1981 the mass of recorded residues exceeded 50% of incoming waste throughput.[961] Such extraordinarily high residue ratios reflected the age and operating performance of the furnaces and the presence of substantial quantities of incompletely burned material.[962]

Performance improved substantially during the final years. Municipal records indicate approximately: 10,854 MT in 2000; 10,050 MT in 2001; 9,846 MT in 2002; 10,142 MT in 2023; and 10,228 MT in 2004.[963] During this period, ash represented approximately 18–21% of incoming waste, much closer to the residue rates commonly associated with municipal waste combustion.[964]

Vallon's waste residues included bottom ash/slag, boiler ash, fly ash and electrostatic-precipitator ash, with flue-gas-treatment sludge added after wet scrubbing was introduced. The more contaminated fine residues were managed differently from bulk bottom ash during portions of the plant's operating history.

Over its nearly five decades of operation, Vallon's incinerator residues were transported to a succession of disposal sites as existing locations reached capacity or disposal requirements changed. During the facility's early years, approximately 250,000 MT of slag and other residues were deposited in Lausanne's Upper Flon Valley before the area became saturated.[965] Disposal then shifted to the La Faraz site at Vufflens-la-Ville, near the Venoge River, where more than 200,000 MT were deposited before cantonal authorities closed the site in 1979.[966] Beginning in December 1979, residues were sent to En Craux in Châtel-Saint-Denis, Canton of Fribourg, which received approximately 27,000 MT in 1980 alone.[967] During the early 1980s, Lausanne divided residues between En Craux and Penthaz in Canton of Vaud; for example, approximately 11,000 MT went to Penthaz and 15,500 MT to Châtel-Saint-Denis in 1981, followed by approximately 9,000 MT and 10,500 MT, respectively, in 1982.[968]

Disposal practices shifted again in the mid-1980s. Approximately 13,000 MT of residue was temporarily stored at Plaine de Peccau/Chalet-à-Gobet in 1986 and another 14,000 MT in 1987, where the material was aged, screened and de-ironed before portions were reused in infrastructure, particularly forest roads.[969] From 1988, Penthaz became Vallon's principal destination, with more than 220,000 MT deposited at the Réverule and Colliare sites between 1988 and 2004.[970] After the remaining Penthaz disposal capacity closed, Vallon's residues were redirected to the Carrières du Lessus at Saint-Triphon, near Ollon, which received approximately 11,500 MT in 2005, the incinerator's final year of operation.[971] Taken together, these records show that Vallon's environmental footprint extended well beyond the incinerator itself, with hundreds of thousands of metric tons of combustion residue transported to multiple locations across the cantons of Vaud and Fribourg during its operating life.[972]

FUNDERS

Construction of the Vallon incinerator was financed as a municipal public-works project by the City of Lausanne. No subsidies or climate finance was provided, but Lausanne imposed a dedicated charge on property owners that contributed to financing the city's waste-management infrastructure, including the incinerator.[973]

Lausanne, on the trail of pollution: the story of ar incinerator

A team of scientists has reconstructed the events of the Vallon waste-to-energy plant and the invisible contamination that shocked the Canton of Vaud



A team of researchers has reconstructed the history of the Vallon incinerator, responsible for the dioxin contamination discovered in the soil of Lausanne in 2021 (Photo: City of Lausanne digitization workshop)

COMMUNITY RESISTANCE ORGANIZATIONS FIGHTING BACK

Opposition to Vallon was historically driven more by local residents, petitions and municipal political advocacy than by a single national anti-incinerator organization.
Residents began organizing within only a few years of the facility's opening. In 1964, approximately 120 residents petitioned Lausanne authorities over pollution from the plant, including black fallout and concerns about possible health consequences.[974] Municipal representatives also publicly questioned the effectiveness of Vallon's pollution-control equipment.[975] [976]

The primary community organization involved was the Association de Quartier du Vallon (AQV). Long before the full extent of the dioxin contamination became publicly known, neighborhood concerns had re-emerged after heavy metals were discovered in local garden soils. The AQV reports that it sought dioxin testing during the 2016–2017 period, citing Vallon's industrial history, but such testing was not undertaken at that time.[977]

Following the discovery of widespread contamination in 2021, the AQV became an important community voice on the legacy of the incinerator. It has organized public-information meetings, compiled historical newspaper and resident testimony, pushed for transparency and collaborated with researchers and public-health institutions examining Vallon's environmental history.[978]

KEY COMMUNITY DEMANDS

Because the Vallon incinerator has been closed since 2005, present-day community demands focus primarily on addressing its environmental and public-health legacy. Residents and community advocates have called for: (1) Comprehensive mapping and testing of contaminated soils; (2) Remediation of heavily contaminated public and residential land; (3) Transparent disclosure of historical emissions and government records; (4) Continued public-health monitoring and clear exposure guidance; (5) Accountability for the costs of contamination and remediation; and (6) Recognition of residents' decades-long pollution complaints and experiences.

The Association de Quartier du Vallon has repeatedly pressed authorities for greater transparency concerning the origins and consequences of the contamination. More recent political debates have also focused on who should pay for soil analysis, cleanup and other costs arising from pollution caused by a municipally owned facility.[979] [980]

CONCLUSION

Across these 20 facilities, incineration emerges as much more than a technology for disposing of waste. Each facility is tied to a larger system of financing, waste contracts, pollution controls, ash management, and public policy decisions that can persist for decades. The financial structures vary, but public financial exposure appears repeatedly through municipal borrowing, subsidies, public-private partnerships, government-backed financing, and international development finance. In Minneapolis, for example, Hennepin County had $37.7 million USD in outstanding capital-project debt associated with HERC at the end of 2022, scheduled to be repaid through 2042 if no additional debt were added.[981] The County also estimated that the aging facility would require another $5–6 million annually in capital improvements.[982]

Those investments can create pressure to maintain another long-term commitment: a reliable supply of waste. Harare's planned Pomona project provides one of the clearest examples. Its 30-year concession initially requires the city to deliver at least 550 MT of waste per day at $40 USD per MT, with the city still charged when it fails to provide the minimum quantity; the required tonnage eventually rises to 1,000 MT per day.[983] Arrangements like these illustrate the tension at the center of waste lock-in: governments can simultaneously have policies intended to reduce residual waste while contracts and infrastructure create financial incentives to maintain enough waste to keep an incinerator supplied.

The waste being burned also contains materials that could be managed further upstream. At Beddington in the United Kingdom, a 2022 analysis of household residual waste found that approximately half of the material in a typical rubbish bin could have been recycled through existing council collection services.[984] Burning the remaining waste does not make it disappear either: Environment Agency records show that Beddington produced 73,219 MT of bottom ash, along with thousands of metric tons of air-pollution-control residues that had to be transported elsewhere for treatment or recovery.[985] Incineration destroys potentially recoverable resources while creating another waste stream that must continue to be managed after combustion.

The consequences are also experienced by communities surrounding these facilities. In Delhi, Timarpur–Okhla operates only hundreds of meters from established residential neighborhoods, and residents have spent years challenging its pollution, ash management, monitoring, location and expansion. Government testing has documented emissions above applicable limits, including a 2021 dioxin/furan measurement 9.9 times the standard and hydrogen chloride at nearly four times its limit.[986] Residents and environmental groups have responded through litigation and organizing while calling for stronger pollution controls, independent monitoring, safer ash management, and greater investment in source separation, composting and recycling.[987]

Projects still being built show why these questions need to be confronted before decades of infrastructure and financing are locked in. In Thailand, three 9.9-MW incinerators are being constructed side-by-side in Prachinburi Province as part of a larger 12-plant waste-to-energy portfolio backed by more than $500 million USD in financing arranged by the Asian Development Bank and other lenders.[988] Local residents and civil-society organizations have challenged the separate assessment of the three neighboring plants and raised concerns about cumulative pollution and meaningful public participation.[989] The case demonstrates that decisions about incineration are not only technical decisions about waste disposal; they are also decisions about financing, environmental review, cumulative impacts, and whose voices shape infrastructure that may operate for decades.

And the consequences do not necessarily end when an incinerator closes. Lausanne's Vallon facility stopped operating in 2005, yet the discovery of widespread dioxin contamination years later has generated continuing demands for soil testing and remediation, health monitoring, transparency, and accountability for cleanup costs.[990] Its history provides an important endpoint to the cases examined here: the lifetime of an incinerator's impacts can extend beyond the lifetime of the furnace itself.

Taken together, these cases point toward a different approach. Rather than committing public resources and decades of waste to combustion, governments can invest further upstream: preventing unnecessary products and packaging, expanding reuse and refill, separating food and other organics, improving recycling, and designing systems that keep materials circulating. UNEP's Global Waste Management Outlook 2024 similarly calls for prioritizing waste prevention and finds that a circular economy scenario built around waste avoidance, sustainable practices and improved waste management could produce a net global economic gain of $108.5 billion annually by 2050.[991]

The measure of a successful waste system should not be how efficiently it burns an endless supply of discarded material, but how little waste it produces in the first place, how much value it keeps circulating, and how effectively it protects the communities living with the consequences of those decisions.



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49. **European Investment Bank, AZN Waste Incineration Plant.** Records a €233.2 million financing signature for the AZN project in December 1993. European Investment Bank — AZN Waste Incineration Plant financing European Investment Bank, AZN Waste Incineration Plant — source (https://www.eib.org/en/projects/all/19930113)
50. **Essent historical reporting.** Records project guarantees of up to €227 million (NLG 500 million) from PNEM, MEGA Limburg and Delta Nutsbedrijven. Essent historical annual report — AZN guarantees Essent historical reporting — source (https://biomassmurder.org/lobbyfacts/2001-04-26-rwe-essent-jaarverslag-2000-dutch.pdf)



51. **Historical project reporting.** Documents development of the regional Moerdijk incineration project involving North Brabant, Limburg and Zeeland. Historical record — development of Moerdijk incineratorHistorical project reporting — source (https://www.digibron.nl/viewer/collectie/Digibron/id/tag%3ARD.nl%2C19930623%3Anewsml_e90bbb22bbe367af67eeb2323ac79d33)
52. **Dutch Council of State, ECLI:NL:RVS:2007, December 19, 2007.** Dutch Council of State — AZN Moerdijk environmental permit case Dutch Council of State, ECLI:NL:RVS:2007, December 19, 2007 — source (https://uitspraken.rechtspraak.nl/details?id=ECLI%3ANL%3ARVS%3A2007%3ABC0533)
53. Ibid.
54. Ibid.
55. **Province of North Brabant, AZN Moerdijk environmental permit.** Province of North Brabant — AZN Moerdijk permit record Province of North Brabant, AZN Moerdijk environmental permit — source (https://www.brabant.nl/loket/besluiten-vergunningen-meldingen/125988)
56. **Environment Agency data compiled by UKWIN.** The 2025 Annual Performance Report records 963,290 MT combusted against a permitted capacity of 1.1 million MT/year. UKWIN — Entry for Runcorn Environment Agency data compiled by UKWIN — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
57. **UKWIN, Runcorn facility records.** Documents extensive complaints over noise, dust, smells, steam, transport and other disturbances, as well as legal proceedings brought on behalf of nearby households. UKWIN — Runcorn complaints and regulatory records UKWIN, Runcorn facility records — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
58. **European Investment Bank, 2009.** The EIB provided £182 million for the Greater Manchester project, including £82 million specifically to INEOS Runcorn TPS to finance incineration of the Greater Manchester SRF at Runcorn. The EIB also identifies Bank of Ireland (£95m), BBVA (£55m), Lloyds (£55m), SMBC (£40m) and HM Treasury's Infrastructure Finance Unit as participants in the wider financing. European Investment Bank — Greater Manchester Waste PPP financing European Investment Bank, 2009 — source (https://www.eib.org/en/press/all/2009-060-greater-manchester-waste-ppp-project-achieves-finanicla-close-with-help-of-gbp-182m-eib-loan)
59. **Environment Agency Pollution Inventory, 2025, compiled in UKWIN's Runcorn facility database.** Reports Runcorn's facility-specific annual emissions under permit XP3005LB. UKWIN — Runcorn 2024–2025 Environment Agency Pollution Inventory data Environment Agency Pollution Inventory, 2025, compiled in UKWIN's Runcorn facility data… — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
60. **BBC investigation, 2024; GAIA summary.** The BBC investigation documented flies, rats, smells, noise and other disturbances and reported a £1 million settlement involving approximately 180 households, with participating residents signing non-disclosure agreements. GAIA subsequently summarized the Runcorn case. BBC — Runcorn residents and £1 million settlement GAIA — Runcorn community impactsBBC investigation, 2024; GAIA summary — source (https://www.bbc.co.uk/news/articles/cwylepd79d5o)BBC investigation, 2024; GAIA summary — source (https://www.no-burn.org/england-falls-out-of-love-with-incinerators/)
61. **Environment Agency/UKWIN meeting record, January 2025.** Records residents' concerns about health, quality of life, complaints handling and regulatory response around Runcorn. UKWIN — Environment Agency meeting on Runcorn community concernsEnvironment Agency/UKWIN meeting record, January 2025 — source (https://ukwin.org.uk/library/72-EnvironmentAgencyMeetingNote-Matters-discussed-with-UKWIN-on-21-January-2025.pdf)
62. **Pennon Group, 2009 and 2010.** Developer announcements report approximately £235 million for Phase I, £160 million for Phase II, and £34–35 million for advanced/shared Phase II works. Pennon — Greater Manchester PFI and Runcorn Phase I financial close Pennon — Runcorn Phase II investmentPennon Group, 2009 and 2010 — source (https://www.pennon-group.co.uk/greater-manchester-pfi-contract-completion)Pennon Group, 2009 and 2010 — source (https://www.pennon-group.co.uk/media/news/runcorn-efw-phase-ii-epc-contract-signed)
63. **European Investment Bank, 2009.** The EIB provided £182 million for the Greater Manchester project, including £82 million specifically to INEOS Runcorn TPS to finance incineration of the Greater Manchester SRF at Runcorn. The EIB also identifies Bank of Ireland (£95m), BBVA (£55m), Lloyds (£55m), SMBC (£40m) and HM Treasury's Infrastructure Finance Unit as participants in the wider financing. European Investment Bank — Greater Manchester Waste PPP financing European Investment Bank, 2009 — source (https://www.eib.org/en/press/all/2009-060-greater-manchester-waste-ppp-project-achieves-finanicla-close-with-help-of-gbp-182m-eib-loan)
64. Ibid.
65. Ibid.
66. **Greater Manchester Combined Authority, 2019.** Following restructuring of the original PFI, GMCA confirmed that Viridor's separate 25-year Runcorn residual-waste agreement remained in force, with 16 years remaining in 2019 and an option for a further 15-year extension. GMCA — Continuing Runcorn waste contract Greater Manchester Combined Authority, 2019 — source (https://www.greatermanchester-ca.gov.uk/news/gmca-confirms-suez-as-preferred-tenderer/)
67. publications.parliament.uk — source (https://publications.parliament.uk/pa/cm201011/cmselect/cmpubacc/553/55305.htm)
68. **Environment Agency Pollution Inventory, 2025, compiled in UKWIN's Runcorn facility database.** Reports Runcorn's facility-specific annual emissions under permit XP3005LB. UKWIN — Runcorn 2024–2025 Environment Agency Pollution Inventory data Environment Agency Pollution Inventory, 2025, compiled in UKWIN's Runcorn facility data… — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
69. Ibid.
70. Ibid.
71. Ibid.
72. Ibid.
73. **Viridor, Runcorn Carbon Capture Project.** Viridor estimates proposed CCS could capture more than 900,000 MT CO2/year, approximately half from biogenic sources. Viridor — Runcorn carbon capture project Viridor, Runcorn Carbon Capture Project — source (https://www.viridor.co.uk/decarbonisation/carbon-capture-and-storage/)

74. **Maps.ie, Population Radius Tool.** Population within 5 km of the Runcorn Energy Recovery Facility calculated using the facility location and the Maps.ie radius population tool. Maps — source (https://www.maps.ie/population/)
75. **UKWIN, Runcorn facility records.** Documents extensive complaints over noise, dust, smells, steam, transport and other disturbances, as well as legal proceedings brought on behalf of nearby households. UKWIN — Runcorn complaints and regulatory recordsUKWIN, Runcorn facility records — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
76. **BBC investigation, 2024; GAIA summary.** The BBC investigation documented flies, rats, smells, noise and other disturbances and reported a £1 million settlement involving approximately 180 households, with participating residents signing non-disclosure agreements. GAIA subsequently summarized the Runcorn case. BBC — Runcorn residents and £1 million settlement GAIA — Runcorn community impacts BBC investigation, 2024; GAIA summary — source (https://www.bbc.co.uk/news/articles/cwylepd79d5o) BBC investigation, 2024; GAIA summary — source (https://www.no-burn.org/england-falls-out-of-love-with-incinerators/)
77. Ibid.
78. **Environment Agency/UKWIN meeting record, January 2025.** Records residents' concerns about health, quality of life, complaints handling and regulatory response around Runcorn. UKWIN — Environment Agency meeting on Runcorn community concerns Environment Agency/UKWIN meeting record, January 2025 — source (https://ukwin.org.uk/library/72-EnvironmentAgencyMeetingNote-Matters-discussed-with-UKWIN-on-21-January-2025.pdf)
79. **UK Parliament, Westminster Hall debate, July 15, 2026.** Runcorn MP Sarah Pochin raised the settlement, NDAs, odors, flies, rats, concerns about disease vectors, regulatory response and compensation for residents. UK Parliament — Waste Management Sites debate, July 2026 UK Parliament, Westminster Hall debate, July 15, 2026 — source (https://www.parallelparliament.co.uk/debate/2026-07-15/commons/westminster-hall/waste-management-sites)
80. Ibid.
81. **Greater Manchester waste strategy / original PFI documentation.** Greater Manchester's residual waste treatment system supplied approximately 325,000 MT/year of processed fuel to Runcorn Phase I. GMCA — Greater Manchester Waste Strategy 2026–2030 Greater Manchester waste strategy / original PFI documentation — source (https://www.greatermanchester-ca.gov.uk/media/yxubmont/interim-waste-strategy-2026-30-v12-accessible-v-2.pdf)
82. Ibid.
83. **Greater Manchester Combined Authority, 2019.** GMCA confirmed the continuing 25-year Runcorn contract, with 16 years remaining and an option to extend for another 15 years. GMCA — Runcorn long-term residual-waste agreement Greater Manchester Combined Authority, 2019 — source (https://www.greatermanchester-ca.gov.uk/news/gmca-confirms-suez-as-preferred-tenderer/)
84. **UKWIN / Environment Agency permit history**. Records the increase in road-delivered RDF and the 2023 authorization allowing up to 10% of capacity, or 110,000 MT/year, to consist of mixed municipal waste. UKWIN — Runcorn planning and permit history UKWIN / Environment Agency permit history — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
85. Ibid.
86. Greater Manchester Waste Composition Analysis, 2018–2019. Greater Manchester-wide analysis of kerbside residual waste, subsequently cited by Greater Manchester local authorities and UKWIN. It found that approximately 42.6% of residual waste could have been captured through existing kerbside recycling systems. Greater Manchester 2018–2019 Waste Composition Analysis — full documentGreater Manchester Waste Composition Analysis, 2018–2019 — source (https://docs.google.com/document/d/1xVocI-CsxYghuIqOB6Hi1oWZUCGMgc-v/edit?ouid=106816005806980458538&rtpof=true&sd=true&usp=sharing)
87. Greater Manchester Combined Authority. GMCA confirms that its 2018/19 composition analysis found food waste accounted for more than 28% of the residual bin. GMCA — Greater Manchester waste-composition findingsGreater Manchester Combined Authority — source (https://democracy.greatermanchester-ca.gov.uk/documents/g4309/Public%20reports%20pack%2018th-Mar-2022%2010.00%20Greater%20Manchester%20Green%20City%20Region%20Partnership.pdf?T=10)
88. Viridor Energy, Runcorn Energy Recovery Facility Annual Performance Report 2025, submitted to the Environment Agency; data reproduced in UKWIN's Environment Agency archive. The 2025 report records approximately 963,290 MT of waste combusted and facility output data including approximately 190,320 MT of IBA and 28,354 MT of APC residue, for approximately 218,674 MT combined. UKWIN's Runcorn archive provides the underlying 2025 Annual Performance Report together with previous years' operator reports. UKWIN — Runcorn facility archive and 2025 Annual Performance Report UKWIN — Runcorn 2025 Annual Performance Report file Viridor Energy, Runcorn Energy Recovery Facility Annual Performance Report 2025, submit… — source (https://ukwin.org.uk/incinerators/library/Cheshire/72) Viridor Energy, Runcorn Energy Recovery Facility Annual Performance Report 2025, submit… — source (https://ukwin.org.uk/library/72-AnnualPerformanceReport-2025.xlsm)
89. Ibid.
90. Halton Borough Council, Johnson's Lane IBA Recycling Facility planning application. The Council's planning documentation states that the Johnson's Lane facility was intended to accept IBA primarily from the Runcorn ERF and process up to 250,000 MT/year. The treatment recovers metals and produces secondary aggregate from the mineral component of the ash. Halton Borough Council — Johnson's Lane IBA facility planning record Halton Borough Council, Johnson's Lane IBA Recycling Facility planning application — source (https://moderngov.halton.gov.uk/documents/s36259/Johnsons%20Lane%2014%2000613%20FUL.pdf)
91. Ibid.

92. **BBC Shared Data Unit / BBC investigation, 2024.** BBC analysis combining incinerator locations with the English Index of Multiple Deprivation found that incinerators are disproportionately concentrated in poorer communities and highlighted Runcorn in its investigation of community impacts. The BBC's underlying methodology and data have also been published through its Shared Data Unit repository. BBC Shared Data Unit — UK incinerator and deprivation analysis BBC investigation — Runcorn community impacts BBC Shared Data Unit / BBC investigation, 2024 — source (https://github.com/BBC-Data-Unit/incinerators) BBC Shared Data Unit / BBC investigation, 2024 — source (https://www.bbc.co.uk/news/articles/cwylepd79d5o)
93. **European Investment Bank, 2009.** The EIB provided approximately US128million(£82million)directlytoINEOSRuncornTPSforRuncornPhaselaspartofalarge rUS285 million (£182 million) EIB financing package. European Investment Bank — Greater Manchester/Runcorn financing package European Investment Bank, 2009 — source (https://www.eib.org/en/press/all/2009-060-greater-manchester-waste-ppp-project-achieves-finanicla-close-with-help-of-gbp-182m-eib-loan)
94. **Pennon Group, 2009.** The developer documented approximately US133million(£85million)ofViridorinvestment,withpotentialadditionalmezzaninefinanc ingofapproximatelyUS63 million (£40 million). Pennon Group — Greater Manchester PFI and Runcorn financial close Pennon Group, 2009 — source (https://www.pennon-group.co.uk/greater-manchester-pfi-contract-completion)
95. **Pennon Group, 2010.** Viridor announced approximately US247million(£160million)ofcapitalinvestmentforPhaseII,financedfromavailableintern alresources,togetherwithapproximatelyUS53 million (£34 million) of advanced/shared works. Pennon Group — Runcorn Phase II investment Pennon Group, 2010 — source (https://www.pennon-group.co.uk/media/news/runcorn-efw-phase-ii-epc-contract-signed)
96. **UK Parliament, Committee of Public Accounts and Environment, Food and Rural Affairs Committee.** Parliamentary records document approximately US188million(£120million)inTreasurylendingandapproximatelyUS195 million (£124.5 million) in PFI credits supporting the wider Greater Manchester Waste PFI. These supported the broader PFI rather than constituting Runcorn-specific grants. UK Parliament — Treasury financing of Greater Manchester Waste PFI UK Parliament — Greater Manchester PFI support UK Parliament, Committee of Public Accounts and Environment, Food and Rural Affairs Com… — source (https://publications.parliament.uk/pa/cm201011/cmselect/cmpubacc/553/55305.htm)
97. UK Parliament, Committee of Public Accounts and Environment, Food and Rural Affairs Com… — source (https://publications.parliament.uk/pa/cm200910/cmselect/cmenvfru/230/230i.pdf)
98. **European Investment Bank, 2009.** The EIB provided approximately US128million(£82million)directlytoINEOSRuncornTPSforRuncornPhaselaspartofalarge rUS285 million (£182 million) EIB financing package. European Investment Bank — Greater Manchester/Runcorn financing package European Investment Bank, 2009 — source (https://www.eib.org/en/press/all/2009-060-greater-manchester-waste-ppp-project-achieves-finanicla-close-with-help-of-gbp-182m-eib-loan)
99. **UKWIN, Runcorn facility library.** Identifies CHAIN and Halton Action Group Against the Incinerator among campaign groups associated with Runcorn and maintains extensive planning, permitting, complaints and Environment Agency records. UKWIN — Runcorn campaign and regulatory archive UKWIN, Runcorn facility library — source (https://ukwin.org.uk/incinerators/library/Cheshire/72)
100. Ibid.
101. **Environment Agency/UKWIN meeting record, January 2025.** Records residents' concerns about health, quality of life, complaints handling and regulatory response around Runcorn. UKWIN — Environment Agency meeting on Runcorn community concerns Environment Agency/UKWIN meeting record, January 2025 — source (https://ukwin.org.uk/library/72-EnvironmentAgencyMeetingNote-Matters-discussed-with-UKWIN-on-21-January-2025.pdf)
102. **UK Parliament, Westminster Hall debate, July 15, 2026.** Runcorn MP Sarah Pochin raised the settlement, NDAs, odors, flies, rats, concerns about disease vectors, regulatory response and compensation for residents. UK Parliament — Waste Management Sites debate, July 2026 UK Parliament, Westminster Hall debate, July 15, 2026 — source (https://www.parallelparliament.co.uk/debate/2026-07-15/commons/westminster-hall/waste-management-sites)
103. **New York State Department of Environmental Conservation (NYSDEC), New York State Solid Waste Management Plan, Appendix D (2023).** Primary state source. NYSDEC reports a permitted annual capacity of 1,040,250 U.S. tons/year for the Hempstead Resource Recovery Facility, equivalent to approximately 943,700 metric tons/year. It also reports that the facility processed 1,037,652 U.S. tons in 2018 New York State Department of Environmental Conservation (NYSDEC), New York State Solid … — source (https://dec.ny.gov/environmental-protection/waste-management/solid-waste-management-planning)
104. **NYSDEC, New York State Solid Waste Management Plan, Appendix D; NYSDEC, Brookhaven Landfill.** NYSDEC reports that Hempstead produced 217,475 U.S. tons of ash residue in 2018, equivalent to approximately 197,290 MT. NYSDEC confirms that Brookhaven's landfill cells receive ash NYSDEC, New York State Solid Waste Management Plan, Appendix D; NYSDEC, Brookhaven Land… — source (https://dec.ny.gov/environmental-protection/waste-management/solid-waste-program/brookhaven-landfill)
105. **NYSDEC, Hempstead Ash Management Investigation and Enforcement Action (2024–2025).** Primary regulatory sources. NYSDEC's investigation documented historical violations of Hempstead's ash-management requirements, particularly between 2007 and 2013. The resulting 2025 settlement required Reworld Hempstead to pay a $378,500 civil penalty and provide $500,000 for an Environmental Benefit Project, for a combined $878,500. The groundwater plume at Brookhaven should be treated separately: NYSDEC has documented the contamination, but available evidence does not establish Hempstead ash as its specific source. NYSDEC, Hempstead Ash Management Investigation and Enforcement Action (2024–2025) — source (https://apps.cio.ny.gov/apps/mediacontact/public/view.cfm?parm=3BB900A6-A89C-57ED-1CEFC31B691B48F1)

106. **Town of Hempstead, Preliminary Official Statement (April 25, 2024).** Primary municipal financial source. The Town's agreement with the facility extends through August 19, 2034 and obligates the Town to pay service fees for a minimum 420,000 U.S. tons/year whether or not that tonnage is delivered, subject to contractual adjustments and mitigation. That equals approximately 381,000 MT/year. This is the primary source supporting the characterization of the contract as a put-or-pay arrangement. Town of Hempstead, Preliminary Official Statement (April 25, 2024) — source (https://www.munistat.com/wp-content/uploads/2024/04/HempsteadTNApril24BONDSPOS.pdf)
107. **Town of Hempstead, Official Statement and financial disclosures.** Primary municipal financial source documenting the resource-recovery facility's IDA financing, private equity, limited-obligation bond structure, redemption of the project bonds, and long-term service agreement. Town of Hempstead, Official Statement and financial disclosures — source (https://www.munistat.com/wp-content/uploads/2024/04/HempsteadTNApril24BONDSPOS.pdf)
108. **Town of Hempstead Industrial Development Agency, Financial Assistance and Frequently Asked Questions.** Primary source explaining the public benefits associated with IDA financing, including tax-exempt industrial revenue bonds and their reduced borrowing costs. Town of Hempstead Industrial Development Agency, Financial Assistance and Frequently As… — source (https://tohida.org/financial-assistance/) Town of Hempstead Industrial Development Agency, Financial Assistance and Frequently As… — source (https://tohida.org/frequently-asked-questions/)
109. **Town of Hempstead, Official Statement and financial disclosures.** Primary municipal financial source documenting the resource-recovery facility's IDA financing, private equity, limited-obligation bond structure, redemption of the project bonds, and long-term service agreement. Town of Hempstead, Official Statement and financial disclosures — source (https://www.munistat.com/wp-content/uploads/2024/04/HempsteadTNApril24BONDSPOS.pdf)
110. Ibid.
111. U.S. Environmental Protection Agency, Greenhouse Gas Reporting Program, Covanta Hempstead, Reporting Year 2023. Primary source. Reports 297,727 MT fossil CO2, 517,964 MT biogenic CO2, 299.09 MT CH_4, 39.265 MT N_2O, and 316,905.2 MT CO2e in reported non-biogenic greenhouse-gas emissions. U — source (https://ghgdata.epa.gov/ghgp/html/2023.do?et=undefined&id=1002398)
112. Ibid.
113. Maps.ie, Population Radius Tool. Population within 5 km of the Hempstead Resource Recovery Facility calculated using the facility location and the Maps.ie radius population tool. Maps — source (https://www.maps.ie/population/)
114. New York State Department of Environmental Conservation, Hempstead Ash Management Investigation and 2025 Enforcement Settlement. Primary sources documenting historical violations involving bottom- and fly-ash management, the $378,500 penalty and $500,000 environmental-benefit project, and current compliance. ery_issued%2002-27-24.pdf B48F1 New York State Department of Environmental Conservation, Hempstead Ash Management Inves… — source (https://extapps.dec.ny.gov/fs/programs/press/MaterialsManagement/Ash_Management_Resource_Recovery_issued%2002-27-24.pdf)
115. Ibid.
116. **NYSDEC, Hempstead Municipal Waste Combustion Facility Annual Report (2021); Town of Brookhaven Financial Statements.** Primary sources documenting 212,359 tons of Hempstead ash disposed at Brookhaven in 2021 and the approximately 230,000-ton annual ash arrangement. acility/Annual%20Reports_by%20Activity%20Type/Municipal%20Waste%20Combustors_MWC/MWC%2 0Annual%20Reports%20-%202021/R1/30E06_Hempstead_Resource_Recovery_Facility_mwc_R1_2021 .2022-2-25.AR.pdf NYSDEC, Hempstead Municipal Waste Combustion Facility Annual Report (2021); Town of Bro… — source (https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20Facility/Annual%20Reports_by%20Activity%20Type/Municipal%20Waste%20Combustors_MWC/MWC%20Annual%20Reports%20-%202021/R1/30E06_Hempstead_Resource_Recovery_Facility_mwc_R1_2021.2022-2-25.AR.pdf) NYSDEC, Hempstead Municipal Waste Combustion Facility Annual Report (2021); Town of Bro… — source (https://www.brookhavenny.gov/ArchiveCenter/ViewFile/Item/3397) NYSDEC, Hempstead Municipal Waste Combustion Facility Annual Report (2021); Town of Bro… — source (https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20F)
117. Ibid.
118. **NYSDEC, Brookhaven Landfill Odor Enforcement and Community Air-Quality Investigation; New York Appellate Division, Klaus v.** Town of Brookhaven (2026). Primary sources documenting odor and airborne-particle complaints, reported health symptoms and the absence of an established causal relationship between landfill emissions and reported illnesses. NYSDEC, Brookhaven Landfill Odor Enforcement and Community Air-Quality Investigation; N… — source (https://content.govdelivery.com/accounts/NYSDEC/bulletins/26081fa) NYSDEC, Brookhaven Landfill Odor Enforcement and Community Air-Quality Investigation; N… — source (https://www.nycourts.gov/reporter/current/3dseries/2026/2026_03669.shtml)
119. **New York State Department of Health, Drinking Water Contaminants and Health Information.** Primary public-health source describing potential health effects associated with PFAS and 1,4-dioxane exposure. out_dw New York State Department of Health, Drinking Water Contaminants and Health Information — source (https://www.health.ny.gov/statistics/environmental/public_health_tracking/about_pages/drinking_water/about_dw) New York State Department of Health, Drinking Water Contaminants and Health Information — source (https://www.health.ny.gov/statistics/environmental/public_health_tracking/about_pages/drinking_water/ab)

120. **NYSDEC, Brookhaven Landfill Groundwater Investigation; Town of Brookhaven, Landfill Groundwater Information; Inside Climate News (2026).** Primary and secondary sources documenting the PFAS/1,4-dioxane groundwater contamination, historical landfill cells, plume investigation and approximately 8,000-foot plume. NYSDEC, Brookhaven Landfill Groundwater Investigation; Town of Brookhaven, Landfill Gro… — source (https://dec.ny.gov/environmental-protection/waste-management/solid-waste-program/brookhaven-landfill) NYSDEC, Brookhaven Landfill Groundwater Investigation; Town of Brookhaven, Landfill Gro… — source (https://www.brookhavenny.gov/417/Town-Solid-Waste-Management-Facility) NYSDEC, Brookhaven Landfill Groundwater Investigation; Town of Brookhaven, Landfill Gro… — source (https://insideclimatenews.org/news/08062026/new-york-brookhaven-landfill-pollution/)
121. **NYSDEC, Brookhaven Landfill Disadvantaged Community Review (2025).** Primary source determining that the landfill is located in or potentially affects a state-designated disadvantaged community and requiring analysis of disproportionate environmental burdens. NYSDEC, Brookhaven Landfill Disadvantaged Community Review (2025) — source (https://dec.ny.gov/sites/default/files/2025-08/brookhavenlandfillnotice2025812.pdf)
122. **Town of Hempstead, Preliminary Official Statement (2020).** Primary municipal financial source. Documents the Covanta Service Agreement through August 19, 2034 and states that the Town must pay service fees for a minimum 420,000 tons annually whether or not that tonnage is actually delivered, subject to adjustment and mitigation provisions. Town of Hempstead — Official Statement Town of Hempstead, Preliminary Official Statement (2020) — source (https://www.munistat.com/wp-content/uploads/2020/11/HempsteadNovember202BAPOS-11-23-2020.pdf)
123. **Town of Brookhaven, Financial Statements (2020), Note 6, "Trash for Ash." Primary municipal source.** Documents the amended agreement under which approximately 170,000 tons of Brookhaven MSW were processed at Hempstead while Brookhaven received approximately 230,000 tons of ash, with fees for both streams assessed per ton. Town of Brookhaven — Financial Statements Town of Brookhaven, Financial Statements (2020), Note 6, "Trash for Ash — source (https://www.brookhavenny.gov/ArchiveCenter/ViewFile/Item/3397)
124. **Town of Brookhaven, Preliminary Official Statement (2024).** Primary municipal financial source. Describes the later trash-for-ash arrangement as approximately 220,000 tons/year of Brookhaven waste sent to Hempstead and approximately 210,000 tons/year of Hempstead ash returned to Brookhaven; identifies December 31, 2024 as the agreement's expiration date. Town of Brookhaven — 2024 Official Statement Town of Brookhaven, Preliminary Official Statement (2024) — source (https://www.munistat.com/wp-content/uploads/2024/07/BrookhavenTNJuly24BNPOS.pdf)
125. **Covanta Holding Corporation, Annual Report/Form 10-K (2020).** Primary corporate/regulatory disclosure. Reports a North Hempstead agreement for approximately 140,000 tons annually, commencing January 1, 2021, for an initial five-year term with options to extend for another ten years. Covanta — 2020 Annual Report Covanta Holding Corporation, Annual Report/Form 10-K (2020) — source (https://investors.covanta.com/image/21-080%2BCovanta%2B%2801602%2B%26%2B98124%29%2B-%2BAnnual%2BReport%2Bv01..pdf)
126. **New York State Department of Environmental Conservation (NYSDEC), Hempstead Resource Recovery Facility, 2023 Annual Solid Waste Report.** Primary regulatory source documenting the municipal solid waste processed at the Hempstead facility. The annual report provides facility-specific waste reporting, although the 34% organics, 26% paper/cardboard, 18% plastics, and 12% metals/glass breakdown should be treated as a waste-composition estimate rather than a NYSDEC-measured facility composition study. NYSDEC — Hempstead Resource Recovery Facility 2023 Annual Report New York State Department of Environmental Conservation (NYSDEC), Hempstead Resource Re… — source (https://extapps.dec.ny.gov/fs/projects/SWMF/Annual%20Reports_Solid%20Waste%20Management%20Facility/Annual%20Reports_by%20Activity%20Type/Municipal%20Waste%20Combustors_MWC/MWC%20Annual%20Reports%20-%202023/R1/30E06_Hempstead_Resource_Recovery_Facility_mwc_R1_2023.2024-2-27.AR.pdf)
127. **Town of Hempstead, Recycling Code and Recycling Information.** Primary municipal sources identifying paper, cardboard, plastics, glass, metals, and yard waste among materials addressed through the Town's recycling/source-separation system. The Town currently accepts specified plastics, cans and glass, mixed paper, and cardboard through its recycling program and separately collects yard waste. Town of Hempstead — Recycling Code; Town of Hempstead — Recycling Information Town of Hempstead, Recycling Code and Recycling Information — source (https://ecode360.com/15515888) Town of Hempstead, Recycling Code and Recycling Information — source (https://www.hempsteadny.gov/228/Recycling-Information)
128. **New York State Department of Environmental Conservation, New York State Solid Waste Management Plan, Appendix D (2023).** Primary state source. NYSDEC's compilation of 2018 facility annual reports records 1,037,652 U.S. tons of waste processed and 217,475 U.S. tons of ash residue produced by the Hempstead Resource Recovery Facility. The reported ash quantity converts to approximately 197,290 metric tons. NYSDEC — New York State Solid Waste Management Plan, Appendices New York State Department of Environmental Conservation, New York State Solid Waste Man… — source (https://dec.ny.gov/sites/default/files/2023-12/finalsswmpappendices2023.pdf)
129. **Town of Brookhaven, Preliminary Official Statement (2024).** Primary municipal financial source. Brookhaven reports that it receives ash from multiple Long Island resource-recovery facilities and states that under its agreement with Covanta Hempstead, approximately 210,000 U.S. tons of Hempstead ash per year were sent to the Brookhaven Landfill for disposal. The document identifies approximately 350,000 tons of total ash received annually from three area waste-combustion facilities. Town of Brookhaven — 2024 Preliminary Official Statement Town of Brookhaven, Preliminary Official Statement (2024) — source (https://www.munistat.com/wp-content/uploads/2024/07/BrookhavenTNJuly24BNPOS.pdf)

130. **New York State, North Bellport NY Forward Strategic Investment Plan (2025).** Primary state planning source. States that the Brookhaven Town Landfill opened in North Bellport in 1974, identifies several NYSDEC potential environmental-justice areas within North Bellport, and concludes that the entire North Bellport project area qualifies as a potential environmental justice area. It also documents longstanding community concerns regarding air and water contamination and health impacts associated with the landfill. New York State, North Bellport NY Forward Strategic Investment Plan (2025) — source (https://www.ny.gov/sites/default/files/2025-05/northbellport_nyf2_sip.pdf)
131. **New York State Department of Environmental Conservation, Brookhaven Landfill EJ/CLCPA Review (August 12, 2025).** Primary regulatory source. NYSDEC states that the landfill site is located within a Disadvantaged Community mapped by the Climate Justice Working Group and finds that the project "is in, or potentially impacts, a disadvantaged community," requiring a Disproportionate Burden Analysis. NYSDEC — Brookhaven Landfill Environmental Justice and CLCPA Review New York State Department of Environmental Conservation, Brookhaven Landfill EJ/CLCPA R... — source (https://dec.ny.gov/sites/default/files/2025-08/brookhavenlandfillnotice2025812.pdf)
132. **STAT, "A Textbook Case of Environmental Racism: The Battle Over the Brookhaven Landfill" (2023); Brookhaven Landfill Action and Remediation Group (BLARG).** Secondary and community sources documenting the environmental-justice concerns surrounding the landfill, its proximity to predominantly Black and Latino North Bellport, community opposition to continued ash disposal, and concerns regarding cumulative pollution and health burdens. STAT — The Battle Over the Brookhaven Landfill BLARG — Brookhaven Landfill Environmental Justice STAT, "A Textbook Case of Environmental Racism: The Battle Over the Brookhaven Landfill... — source (https://www.statnews.com/2023/05/22/north-bellport-new-york-brookhaven-landfill-environmental-racism/) STAT, "A Textbook Case of Environmental Racism: The Battle Over the Brookhaven Landfill... — source (https://www.landfillaction.org/environmental-justice)
133. **Town of Hempstead, Official Statement and financial disclosures.** Primary municipal source documenting the Hempstead facility's original financing through IDA-issued tax-exempt bonds and private equity and explaining the associated project and municipal contractual structure. Town of Hempstead, Official Statement and financial disclosures — source (https://www.munistat.com/wp-content/uploads/2024/04/HempsteadTNApril24BONDSPOS.pdf)
134. Ibid.
135. **EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U.S.** Securities and Exchange Commission, Covanta merger filings. Primary corporate and regulatory sources. EQT Infrastructure V acquired Covanta in a transaction valued at approximately $5.3 billion including assumption of net debt; the acquisition was completed November 30, 2021. Ste-to-energy-solutions-for-usd-53-billion-2021-07-14 EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U — source (https://eqtgroup.com/news/eqt-infrastructure-to-acquire-covanta-holding-corporation-a-global-leader-in-waste-to-energy-solutions-for-usd-53-billion-2021-07-14) EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U — source (https://www.sec.gov/Archives/edgar/data/225648/000119312521343811/d151614d8k.htm) EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U — source (https://eqtgroup.com/news/eqt-infrastructure-to-acquire-covanta-holding-corporation-a-global-leader-in-wa)
136. **GIC and EQT, "EQT Broadens Reworld Investor Base, Welcoming GIC as Strategic Investor," October 2, 2024.** Primary corporate/institutional-investor source. Documents GIC's agreement to acquire a 25% minority interest in Reworld Waste, LLC through a combination of primary and secondary capital, with EQT Infrastructure remaining the largest shareholder. stor/ GIC and EQT, "EQT Broadens Reworld Investor Base, Welcoming GIC as Strategic Investor,"... — source (https://www.gic.com.sg/newsroom/all/eqt-broadens-reworld-investor-base-welcoming-gic-as-strategic-investor/) GIC and EQT, "EQT Broadens Reworld Investor Base, Welcoming GIC as Strategic Investor,"... — source (https://www.gic.com.sg/newsroom/all/eqt-broadens-reworld-investor-base-welcoming-gic-as-strategic-inve)
137. **EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U.S.** Securities and Exchange Commission, Covanta merger filings. Primary corporate and regulatory sources. EQT Infrastructure V acquired Covanta in a transaction valued at approximately $5.3 billion including assumption of net debt; the acquisition was completed November 30, 2021. Ste-to-energy-solutions-for-usd-53-billion-2021-07-14 EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U — source (https://eqtgroup.com/news/eqt-infrastructure-to-acquire-covanta-holding-corporation-a-global-leader-in-waste-to-energy-solutions-for-usd-53-billion-2021-07-14) EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U — source (https://www.sec.gov/Archives/edgar/data/225648/000119312521343811/d151614d8k.htm) EQT, "EQT Infrastructure to Acquire Covanta Holding Corporation," July 14, 2021; U — source (https://eqtgroup.com/news/eqt-infrastructure-to-acquire-covanta-holding-corporation-a-global-leader-in-wa)

138. **GIC and EQT, "EQT Broadens Reworld Investor Base, Welcoming GIC as Strategic Investor," October 2, 2024.** Primary corporate/institutional-investor source. Documents GIC's agreement to acquire a 25% minority interest in Reworld Waste, LLC through a combination of primary and secondary capital, with EQT Infrastructure remaining the largest shareholder. stor/ GIC and EQT, "EQT Broadens Reworld Investor Base, Welcoming GIC as Strategic Investor,"... — source (https://www.gic.com.sg/newsroom/all/eqt-broadens-reworld-investor-base-welcoming-gic-as-strategic-investor/) GIC and EQT, "EQT Broadens Reworld Investor Base, Welcoming GIC as Strategic Investor,"... — source (https://www.gic.com.sg/newsroom/all/eqt-broadens-reworld-investor-base-welcoming-gic-as-strategic-inve)
139. **NJDEP; Reworld Essex solid-waste permit renewal.** NJDEP identifies the official facility as the Essex County Resource Recovery Facility, with a permitted capacity of 985,500 U.S. tons/year. Reworld's permit history records first burn in November 1990 and commercial operation in February 1991. NJDEP; Reworld Essex solid-waste permit renewal — source (https://dep.nj.gov/dshw/swp/incinerators/)
140. **U.S.** EPA Greenhouse Gas Reporting Program; GAIA/Ironbound Community Corporation. EPA-derived 2023 facility data report 384,141 MT of fossil CO2 and 469,506 MT of biogenic CO2, totaling 853,647 MT of direct CO2. The same dataset reports 402,308 MT CO2e excluding separately reported biogenic CO2. GAIA and ICC additionally report 2,202,482 pounds of NOx in 2017, equivalent to approximately 999 MT, along with PM2.5, mercury, lead and hazardous-air-pollutant emissions. U.S. EPA — Greenhouse Gas Reporting Program data GAIA & Ironbound Community Corporation — The Fight to Close the Essex County Incinerator U — source (https://www.epa.gov/ghgreporting/find-and-use-ghgrp-data) U — source (https://www.no-burn.org/ironbound-community-corporation/)
141. **New York City Department of Sanitation (DSNY), Solid Waste Management Plan Biennial Update.** DSNY documents a 20-year government-to-government agreement with the Port Authority of New York and New Jersey for use of the Essex facility. The agreement allows up to 1,800 U.S. tons (approximately 1,633 MT) per operating day of Manhattan waste; service began in October 2012. NYC DSNY — Solid Waste Management Plan Biennial Update New York City Department of Sanitation (DSNY), Solid Waste Management Plan Biennial Update — source (https://a860-gpp.nyc.gov/downloads/q811kn460?locale=en)
142. **Essex County Resource Recovery Facility Solid Waste Permit Renewal Application.** Facility records for 2015–2019 report annual ash generation of 193,551, 202,036, 198,219, 192,446 and 187,896 U.S. tons, respectively. The five-year average of 194,830 U.S. tons/year converts to approximately 176,747 MT/year, rounded to 177,000 MT/year in the blurb. The same permit identifies ash disposal/processing arrangements. ECRRF — NJDEP Solid Waste Permit Renewal Application Essex County Resource Recovery Facility Solid Waste Permit Renewal Application — source (https://www.reworldwaste.com/hubfs/Essex%20DEP%20Submittals/Covanta%20Essex%20Company%20Solid%20Waste%20Permit%20Renewal%20Application%20with%20NOD%20responses.pdf?hsLang=en)
143. **GAIA / Ironbound Community Corporation, "The Fight to Close the Essex County Incinerator." ICC describes more than four decades of organizing against major pollution sources in the Ironbound and its continuing campaign against the Essex incinerator.** The profile documents ICC's work on environmental justice, facility pollution and alternatives to continued waste burning. GAIA & ICC — The Fight to Close the Essex County Incinerator GAIA / Ironbound Community Corporation, "The Fight to Close the Essex County Incinerator — source (https://www.no-burn.org/ironbound-community-corporation/)
144. **New Jersey Legislature, public hearing on solid-waste/resource-recovery financing.** The legislative record states that the Essex County Resource Recovery Facility cost approximately $346 million, including approximately $252 million in Port Authority funds, and that approximately $190 million of the initial Port Authority investment remained outstanding at the time of the hearing. New Jersey Legislature — hearing record New Jersey Legislature, public hearing on solid-waste/resource-recovery financing — source (https://dspace.njstatelib.org/server/api/core/bitstreams/7555e1d3-6fa5-4525-9ab6-cea05fa971c6/content)
145. Ibid.
146. **Atlantic Coast Demolition & Recycling, Inc. v. Board of Chosen Freeholders (U.S. District Court for the District of New Jersey, 1996).** The federal court's account of the Essex project documents approximately $205 million in Port Authority Consolidated Revenue Bonds used in connection with construction of the resource-recovery facility. Federal court decision — Essex County Resource Recovery Facility financing Atlantic Coast Demolition & Recycling, Inc — source (https://law.justia.com/cases/federal/district-courts/FSupp/931/341/2346731/)
147. **New Jersey Environmental Justice Alliance, Ironbound Community Corporation & Earthjustice, New Jersey's Dirty Secret.** The report finds that New Jersey's incinerators collectively received nearly $30 million in clean-energy subsidies from utilities and ratepayers since 2004. NJEJA — New Jersey's Dirty Secret New Jersey Environmental Justice Alliance, Ironbound Community Corporation & Earthjusti... — source (https://njeja.org/incinerators-new-jerseys-dirty-secret/)
148. **U.S.** Environmental Protection Agency, Greenhouse Gas Reporting Program (GHGRP), Essex facility reporting, 2023. Facility-level reporting provides the underlying fossil CO2, biogenic CO2, methane and nitrous-oxide emissions used above. EPA — Greenhouse Gas Reporting Program U — source (https://ghgdata.epa.gov/ghgp/main.do)
149. Ibid.
150. Global Alliance for Incinerator Alternatives (GAIA) / New Jersey Environmental Justice Alliance, Essex incinerator profile. Reports 2020 annual emissions of 1,525,395 lb NOx, 70,695 lb PM2.5, 38,076.96 lb total hazardous air pollutants, 19.4 lb lead and 11.2 lb mercury. The figures above have been converted from pounds to metric tons. GAIA — New Jersey Environmental Justice Alliance: Essex Incinerator Data Global Alliance for Incinerator Alternatives (GAIA) / New Jersey Environmental Justice ... — source (https://www.no-burn.org/new-jersey-environmental-justice-alliance/)

151. **GAIA / Ironbound Community Corporation, "The Fight to Close the Essex County Incinerator." The facility profile reports 2017 emissions of 2,202,482 lb NOx, 54,520.9 lb PM2.5, 247.16 lb lead, 29.06 lb mercury and 38,076.96 lb total hazardous air pollutants, while describing the cumulative industrial pollution burden experienced by the surrounding Ironbound community.** GAIA & Ironbound Community Corporation — Essex County Incinerator GAIA / Ironbound Community Corporation, "The Fight to Close the Essex County Incinerator — source (https://www.no-burn.org/ironbound-community-corporation/)
152. Ibid.
153. **Maps.ie, Population Radius Tool.** Population within 5 km of the Essex County Resource Recovery Facility calculated using the facility location and the Maps.ie radius population tool. Maps — source (https://www.maps.ie/population/)
154. **NJDEP/Reworld, Environmental Justice Review materials for the Essex facility.** Regulatory documentation addressing cumulative environmental and public-health stressors affecting surrounding overburdened communities. Essex Environmental Justice Review NJDEP/Reworld, Environmental Justice Review materials for the Essex facility — source (https://www.reworldwaste.com/hubfs/Reworld%20Essex%20AO-25%20Hearing%20Response%20to%20Comments%20Document%20Final.pdf)
155. **Earthjustice and Ironbound Community Corporation, Covanta Essex pollution investigation (2019).** Documents residents' reports of pink and purple smokestack plumes, permit concerns and community demands for enforcement. Earthjustice — Covanta Pink Smoke Investigation Earthjustice and Ironbound Community Corporation, Covanta Essex pollution investigation… — source (https://earthjustice.org/press/2019/covanta-pink-smoke-ironbound-community-air-violations-investigation)
156. **Ironbound Community Corporation, East Ironbound Neighborhood Plan.** Community planning source documenting cumulative environmental burdens and health vulnerabilities in Newark's Ironbound. ICC — East Ironbound Neighborhood Plan Ironbound Community Corporation, East Ironbound Neighborhood Plan — source (https://ironboundcc.org/wp-content/uploads/2019/11/2018-East-Ironbound-Neighborhood-Plan.pdf)
157. New York City Department of Sanitation (DSNY), Solid Waste Management Plan Biennial Update Report (2023). DSNY confirms its 20-year government-to-government agreement with the Port Authority for the Essex County Resource Recovery Facility, allowing delivery of up to 1,800 U.S. tons per operating day from specified Manhattan collection districts. DSNY reported average deliveries of 1,199 U.S. tons/day in 2023. NYC DSNY — 2023 Solid Waste Management Plan Biennial Update New York City Department of Sanitation (DSNY), Solid Waste Management Plan Biennial Upd… — source (https://a860-gpp.nyc.gov/downloads/q811kn460?locale=en)
158. Ibid
159. **Port Authority of New York and New Jersey, financial disclosures.** Port Authority records document its long-term contractual arrangements at the Essex facility, including the assumption by the private facility operator of Port Authority obligations under the New York City waste-disposal contract. Port Authority — 2013 Financial Statements Port Authority of New York and New Jersey, financial disclosures — source (https://www.panynj.gov/content/dam/corporate/financial-statements-pdfs/financial-statement-2013.pdf)
160. **New York City Department of Sanitation (DSNY), 2019–2020. Solid Waste Management Plan: 2019–2020 Biennial Update.** DSNY reported that 395,795.33 U.S. tons of DSNY-managed waste were delivered to the Essex County Resource Recovery Facility in 2019, equivalent to approximately 359,060 metric tons. New York City Government New York City Department of Sanitation — 2019–2020 Biennial Update
161. Essex County Board of County Commissioners, Ordinance O-2025-00013, Fourth Supplemental Agreement. The ordinance establishes a January 1, 2026–December 31, 2030 extension between ECUA and the Port Authority for disposal of approximately 425,000 U.S. tons/year (385,550 MT/year) of processible municipal and commercial waste at the ECRRF pursuant to regulatory waste flow control. County records state that the preceding agreement expired December 31, 2025. Essex County — Fourth Supplemental Agreement Ordinance https://ecode360.com/ES1525/document/753197161.pdf
162. **New Jersey Department of Environmental Protection (NJDEP), Essex County Solid Waste Management Plan.** NJDEP currently directs all processible municipal solid waste types 10, 23, 25 and 27 generated within Essex County to the Essex County Resource Recovery Facility; commercial processible waste is treated differently under the current state summary. NJDEP — Essex County Solid Waste Flow Control New Jersey Department of Environmental Protection (NJDEP), Essex County Solid Waste Man… — source (https://dep.nj.gov/wastecompliance/solid-waste/solid-waste-management-plans/)
163. **New York City Department of Sanitation (DSNY), Solid Waste Management Plan Biennial Update Report (2023).** DSNY confirms its 20-year government-to-government agreement with the Port Authority for the Essex County Resource Recovery Facility, allowing delivery of up to 1,800 U.S. tons per operating day from specified Manhattan collection districts. DSNY reported average deliveries of 1,199 U.S. tons/day in 2023. NYC DSNY — 2023 Solid Waste Management Plan Biennial Update New York City Department of Sanitation (DSNY), Solid Waste Management Plan Biennial Upd… — source (https://a860-gpp.nyc.gov/downloads/q811kn460?locale=en)
164. **Essex County Board of County Commissioners, Ordinance O-2025-00013, Fourth Supplemental Agreement.** The ordinance establishes a January 1, 2026–December 31, 2030 extension between ECUA and the Port Authority for disposal of approximately 425,000 U.S. tons/year (385,550 MT/year) of processible municipal and commercial waste at the ECRRF pursuant to regulatory waste flow control. County records state that the preceding agreement expired December 31, 2025. Essex County — Fourth Supplemental Agreement Ordinance Essex County Board of County Commissioners, Ordinance O-2025-00013, Fourth Supplemental… — source (https://ecode360.com/ES1525/document/753197161.pdf)
165. **New Jersey Department of Environmental Protection, New Jersey Greenhouse Gas Inventory, using the 2022 NJDEP Waste Characterization Study.** NJDEP calculates statewide disposed-waste averages of approximately 22.1% paper, 18.9% food scraps and 4.6% yard waste from the state's 2022 physical waste-characterization data. New Jersey Department of Environmental Protection, New Jersey Greenhouse Gas Inventory,… — source (https://www.nj.gov/dep/dshw/recycling/WasteCharacteriazation.pdf)

166. **New Jersey Department of Environmental Protection/Rutgers University, 2022 New Jersey Waste Characterization Study.** The study physically sorted New Jersey disposed waste. Its urban Passaic County residential sample contained 19.3% food waste, 10.3% plastic film, 9.2% compostable paper, 5.8% corrugated cardboard and 2.6% rigid plastic. The study emphasizes that food waste was the largest component in each sampled residential waste stream. NJDEP — 2022 New Jersey Waste Characterization Study New Jersey Department of Environmental Protection/Rutgers University, 2022 New Jersey W… — source (https://www.nj.gov/dep/dshw/recycling/WasteCharacteriazation.pdf)
167. **Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Application.** Facility records report average annual post-combustion recovery of approximately 21,633 U.S. tons of ferrous metal and 3,455 U.S. tons of non-ferrous metal during 2015–2019, equivalent to approximately 19,625 MT and 3,134 MT, respectively. Essex County Resource Recovery Facility — Solid Waste Permit Renewal Application Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Application — source (https://4944195.fs1.hubspotusercontent-na1.net/hubfs/4944195/Essex%20DEP%20Submittals/Covanta%20Essex%20Company%20Solid%20Waste%20Permit%20Renewal%20Application%20with%20NOD%20responses.pdf)
168. **Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Application, §6.3.11, "Ash Residue Generation and Characterization." Facility operating records report 193,551 U.S.** tons in 2015; 202,036 tons in 2016; 198,219 tons in 2017; 192,446 tons in 2018; and 187,896 tons in 2019, averaging 194,830 U.S. tons/year (176,747 MT/year). The same source reports average ash content of approximately 20% during 2015–2019, compared with the earlier EIS projection of 27–28%. Essex County Resource Recovery Facility — NJDEP Solid Waste Permit Renewal Application Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Applicatio… — source (https://4944195.fs1.hubspotusercontent-na1.net/hubfs/4944195/Essex%20DEP%20Submittals/Covanta%20Essex%20Company%20Solid%20Waste%20Permit%20Renewal%20Application%20with%20NOD%20responses.pdf)
169. **Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Application, §6.3.11.** The facility combines fly ash and bottom ash into a combined ash residue. NJDEP requires monthly TCLP testing—based on ten samples per month—for regulated metals and annual analysis for dioxins and furans. The facility's 2015–2019 testing characterized the combined residue as non-hazardous under applicable regulatory criteria. Essex ECRRF — Ash Generation and Characterization Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Applicatio… — source (https://www.reworldwaste.com/hubfs/Essex%20DEP%20Submittals/Covanta%20Essex%20Company%20Solid%20Waste%20Permit%20Renewal%20Application%20with%20NOD%20responses.pdf?hsLang=en)
170. Ibid.
171. **New Jersey Department of Environmental Protection, Statewide Solid Waste Management Plan (2006).** NJDEP explicitly reported that "ash from the resource recovery facility is direct-hauled out-of-state." Federal court records also describe Essex County's integrated waste-management system as including contracts for transportation and disposal of incinerator ash at landfills outside New Jersey. NJDEP — 2006 Statewide Solid Waste Management Plan Atlantic Coast Demolition v. Board of Chosen Freeholders — Federal Court New Jersey Department of Environmental Protection, Statewide Solid Waste Management Pla… — source (https://www.nj.gov/dep/dshw/recycling/swmp/pdf/swmp2006.pdf) New Jersey Department of Environmental Protection, Statewide Solid Waste Management Pla… — source (https://law.justia.com/cases/federal/district-courts/FSupp/931/341/2346731/)
172. **Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Application, §6.1.6.** The permit identifies the Gloucester County Solid Waste Complex Landfill, 503 Monroeville Road, Swedesboro, NJ, as the contracted ash-disposal landfill beginning January 1, 2020. It also identifies Covanta Metals Marketing, Keystone Industrial Port Complex, 500 Middle Drive, Fairless Hills, PA, as an authorized destination where Essex ash could be processed through a Total Ash Processing System. ECRRF — Ash Disposal and Processing Facilities Essex County Resource Recovery Facility, Solid Waste Facility Permit Renewal Applicatio… — source (https://4944195.fs1.hubspotusercontent-na1.net/hubfs/4944195/Essex%20DEP%20Submittals/Covanta%20Essex%20Company%20Solid%20Waste%20Permit%20Renewal%20Application%20with%20NOD%20responses.pdf)
173. Ibid.
174. **Reworld, Essex Facility FAQ.** Reworld states that residual ash is routinely managed for use as landfill daily cover and confirms that Essex ash is routinely subjected to EPA's TCLP testing procedure. Reworld — Essex Ash FAQ Reworld, Essex Facility FAQ — source (https://www.reworldwaste.com/where-we-are/facilities/essex/faqs)
175. **New Jersey Department of Environmental Protection (NJDEP), Essex County Resource Recovery Facility records and solid-waste permit materials.** Primary regulatory sources documenting the facility's official name, location, operating history, technology and permitted capacity. NJDEP — New Jersey Resource Recovery Facilities Essex County Resource Recovery Facility — Permit Renewal New Jersey Department of Environmental Protection (NJDEP), Essex County Resource Recove… — source (https://dep.nj.gov/dshw/swp/incinerators/) New Jersey Department of Environmental Protection (NJDEP), Essex County Resource Recove… — source (https://www.reworldwaste.com/hubfs/Essex%20DEP%20Submittals/Covanta%20Essex%20Company%20Solid%20Waste%20Permit%20Renewal%20Application%20with%20NOD%20responses.pdf)
176. **EQT and GIC, Reworld investment announcements.** Primary corporate sources documenting EQT Infrastructure V's acquisition of Covanta and GIC's subsequent 25% minority investment in Reworld. EQT — Reworld and GIC Investment EQT and GIC, Reworld investment announcements — source (https://eqtgroup.com/news/eqt-broadens-reworld-investor-base-welcoming-gic-as-strategic-investor-2024-10-02)

177. Ibid.
178. **Government of India, Press Information Bureau, "Municipal & Urban Waste Based Power Projects," 2013;** Rajya Sabha, Waste-to-Energy Plants, 2016. Government of India — Timarpur-Okhla project cost, technology and commissioning Government of India, Press Information Bureau, "Municipal & Urban Waste Based Power Pro… — source (https://www.pib.gov.in/newsite/erelcontent.aspx?lang=2&reg=48&relid=94202)
179. Ibid.
180. **Comptroller and Auditor General of India, Case Study: Timarpur Okhla Integrated Municipal Solid Waste Management Project**. CAG of India — Timarpur-Okhla PPP case study Comptroller and Auditor General of India, Case Study: Timarpur Okhla Integrated Municip… — source (https://cag.gov.in/uploads/media/CaseStudyPPP-20200526204240.pdf)
181. **New Delhi Municipal Council, PPP Project for Development of an Integrated Waste Treatment Complex at Okhla Compost Plant Site**, May 16, 2007. NDMC — Timarpur-Okhla PPP and public support arrangements New Delhi Municipal Council, PPP Project for Development of an Integrated Waste Treatme… — source (https://ndmc.gov.in/hi/council/Resolutions%202007/year%20wise/2007/16.05.2007.pdf)
182. **Government of India, Ministry of Environment and Forests, Lok Sabha Unstarred Question No. 2025, August 19, 2013.** Parliament of India — Pollution monitoring at the Okhla WTE plant Government of India, Ministry of Environment and Forests, Lok Sabha Unstarred Question No — source (https://eparlib.sansad.in/bitstream/123456789/643997/1/143402.pdf)
183. **Central Pollution Control Board, response before the National Green Tribunal concerning waste-to-energy plant compliance, 2025.** CPCB / National Green Tribunal — Timarpur-Okhla dioxin and HCl violations Central Pollution Control Board, response before the National Green Tribunal concerning… — source (https://www.greentribunal.gov.in/sites/default/files/news_updates/Reply%20by%20CPCB%20dated%2010.01.2025%20in%200A%20536%20of%202024%20%28NEWS%20ITEM%20TITLED%20WASTE%20TO%20ENERGY%20SMOKESCREEN%20OR%20SOLUTION%20APPEARING%20IN%20THE%20INDIAN%20DEVELOPMENT%20REVIEW%20DATED%2027.03.2024%29.pdf)
184. **Timarpur-Okhla Waste Management Company / Mantec Consultants, Draft EIA Report for Expansion of Waste to Energy Plant up to 40 MW, 2022**. Delhi Pollution Control Committee — Timarpur-Okhla expansion EIA Timarpur-Okhla Waste Management Company / Mantec Consultants, Draft EIA Report for Expa… — source (https://www.dpcc.delhigovt.nic.in/uploads/pdf/Draft_EIA-EMP_Report_14-07-2022.pdf)
185. **Government of India, Press Information Bureau, "Municipal & Urban Waste Based Power Projects," 2013;** Rajya Sabha, Waste-to-Energy Plants, 2016. Government of India — Timarpur-Okhla project cost, technology and commissioning Government of India, Press Information Bureau, "Municipal & Urban Waste Based Power Pro… — source (https://www.pib.gov.in/newsite/erelcontent.aspx?lang=2&reg=48&relid=94202)
186. **Timarpur-Okhla Waste Management Company / Mantec Consultants, Draft EIA Report for Expansion of Waste to Energy Plant up to 40 MW, 2022.** Delhi Pollution Control Committee — Timarpur-Okhla expansion EIA Timarpur-Okhla Waste Management Company / Mantec Consultants, Draft EIA Report for Expa… — source (https://www.dpcc.delhigovt.nic.in/uploads/pdf/Draft_EIA-EMP_Report_14-07-2022.pdf)
187. **Government of India, Ministry of New and Renewable Energy, municipal solid waste-to-energy financial assistance program.** Government of India — Central financial assistance for municipal waste-to-energy projects Government of India, Ministry of New and Renewable Energy, municipal solid waste-to-ene… — source (https://cms.rajyasabha.nic.in/UploadedFiles/Debates/OfficialDebatesDatewise/Floor/240/F01.08.2016.pdf)
188. **New Delhi Municipal Council, PPP Project for Development of an Integrated Waste Treatment Complex at Okhla Compost Plant Site, May 16, 2007.** New Delhi Municipal Council — Timarpur-Okhla project and public support arrangements New Delhi Municipal Council, PPP Project for Development of an Integrated Waste Treatme… — source (https://ndmc.gov.in/hi/council/Resolutions%202007/year%20wise/2007/16.05.2007.pdf)
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263. **NOAH AS — Langøya hazardous-waste treatment facility.** NOAH documents its treatment and stabilization of inorganic hazardous waste at Langøya and the use of treated material in rehabilitation of the island's former limestone quarries. NOAH — Langøya treatment and rehabilitation facility NOAH AS — Langøya hazardous-waste treatment facility — source (https://www.noah.no/en/langoya/)
264. **City of Copenhagen (2012), ARC/Amager Bakke financing approval.** Municipal records document the approximately DKK 3.95 billion borrowing framework, the municipal guarantees and Copenhagen's approximately DKK 2.5–2.53 billion share of the financial exposure. City of Copenhagen — Amager Bakke financing and municipal guarantees City of Copenhagen (2012), ARC/Amager Bakke financing approval — source (https://www.kk.dk/dagsordener-og-referater/%C3%98konomiudvalget/m%C3%B8de-02102012/referat/punkt-7)
265. **KommuneKredit — institutional and funding structure.** KommuneKredit is the specialized credit institution for Danish municipalities and regions and funds its lending primarily through bond issuance in domestic and international capital markets. KommuneKredit — Official website KommuneKredit — institutional and funding structure — source (https://www.kommunekredit.com/)
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268. **Zero Waste Europe (2019), "A Danish fiasco: the Copenhagen incineration plant." Provides the approximately 560,000 MT/year capacity, €534 million project cost, waste-import history and critique of incineration overcapacity.** Zero Waste Europe — A Danish fiasco: the Copenhagen incineration plant Zero Waste Europe (2019), "A Danish fiasco: the Copenhagen incineration plant — source (https://zerowasteeurope.eu/2019/11/copenhagen-incineration-plant/)
269. **City of Copenhagen, 2012 — ARC / Amager Bakke financing and municipal guarantees.** Municipal records document the DKK 3.95 billion borrowing framework and distribution of guarantee exposure among the owner municipalities. City of Copenhagen — Amager Bakke financing approval City of Copenhagen, 2012 — ARC / Amager Bakke financing and municipal guarantees — source (https://www.kk.dk/dagsordener-og-referater/%C3%98konomiudvalget/m%C3%B8de-02102012/referat/punkt-7)
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271. **POLITICO Europe (2019), "Not enough's rotten in the state of Denmark." Documents opposition from Danish NGOs, including NOAH/Friends of the Earth Denmark, and concerns that Amager Bakke could normalize incineration rather than waste prevention, reuse, and recycling.** POLITICO Europe — Denmark's garbage gamble and Amager Bakke POLITICO Europe (2019), "Not enough's rotten in the state of Denmark — source (https://www.politico.eu/article/denmark-garbage-gamble-amager-bakke-plant-waste/)
272. **City of Copenhagen (2022), agreement concerning ARC's finances and waste imports.** The City states that increasing recycling was reducing residual waste sent to ARC and documents the temporary expansion of waste imports, the required hierarchy for sourcing waste, and annual reporting requirements for imported waste and associated CO2 emissions. City of Copenhagen — ARC financial agreement and waste-import restrictions City of Copenhagen (2022), agreement concerning ARC's finances and waste imports — source (https://www.kk.dk/nyheder/ny-aftale-skal-redde-arcs-oekonomi-uden-at-mindske-genanvendelsen-af-affald)
273. **Danish Parliament (Folketinget), Energy, Supply and Climate Committee (2016).** Parliamentary records document an agreement limiting Amager Bakke's incineration to 409,000 MT/year despite approximately 560,000 MT/year of installed capacity, together with restrictions on importing waste for combustion. Danish Parliament — Amager Bakke capacity and waste-import restrictions Danish Parliament (Folketinget), Energy, Supply and Climate Committee (2016) — source (https://www.ft.dk/samling/20151/almdel/EFK/spm/292/index.htm)

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277. **Syctom / Issy Urbaser Energie, Dossier d'information du public Isséane 2024.** Reports 536,000 MT of waste incinerated, 252,060 MT of fossil CO2, annual releases of regulated air pollutants, and 76,588 MT of bottom ash plus 12,703 MT of fly ash in 2024. Syctom — Isséane 2024 Public Information File Syctom / Issy Urbaser Energie, Dossier d'information du public Isséane 2024 — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/dip/Isseane/DIP_2024_Isseane.pdf)
278. **Syctom, Rapport d'activité 2009.** Places the completed Isséane investment at approximately US$836 million (€600 million, excluding VAT). Syctom's earlier financial reporting identified Isséane as a principal driver of the authority's increased borrowing during construction. Syctom — 2009 Activity Report Syctom, Rapport d'activité 2009 — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/rapport_d_activite/RA09.pdf)
279. **CNIID / Écologie Sans Frontière and Val de Seine Vert.** Environmental organizations challenged Isséane over its stack height, pollutant dispersion, emissions, cumulative urban pollution and health protections, while also advocating greater waste prevention and material recovery. CNIID — Isséane legal challenge and community demands Val de Seine Vert — Isséane stack-height concerns CNIID / Écologie Sans Frontière and Val de Seine Vert — source (https://www.cniid.org/espace_telechargement/CP/20110406_DP_Isseane.pdf) CNIID / Écologie Sans Frontière and Val de Seine Vert — source (https://valdeseinevert.org/les-cheminees-disseane-seraient-elles-trop-courtes/)
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281. **Chambre régionale des comptes d'Île-de-France.** Earlier audit documents placed the planned Isséane investment at approximately US$736 million (€528 million excluding VAT). French Regional Audit Chamber — Syctom Financial Review Chambre régionale des comptes d'Île-de-France — source (https://www.ccomptes.fr/sites/default/files/EzPublish/IFR200655.pdf)
282. **Syctom project documentation.** Syctom stated that subsidies represented only 2% of approximately US836million(€600million)investedinIsséane,equivalenttoapproximatelyUS16.7 million (€12 million). Syctom — Public Debate Project Financing Documentation Syctom project documentation — source (https://cpdp.debatpublic.fr/cpdp-traitement-dechets-ivry/IMGS/DOSSIER_MO/DOSSIER_DEBAT_SYCTOM.PDF)
283. **Syctom, 2007 Activity Report.** Syctom reported approximately US813million(€592.85million)inoutstandingdebtatyear-end2007,comparedwithapproximatelyUS745 million (€543.91 million) one year earlier, and stated that this level resulted chiefly from Isséane, for which few subsidies had been received. Syctom — 2007 Annual Report Syctom, 2007 Activity Report — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/Annual_reports/annualreport2007.pdf)
284. **Syctom / Issy Urbaser Energie, Dossier d'information du public Isséane 2024 (2025).** Reports Isséane's 2024 waste throughput and facility environmental performance. Syctom — Isséane 2024 Public Information File Syctom / Issy Urbaser Energie, Dossier d'information du public Isséane 2024 (2025) — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/dip/Isseane/DIP_2024_Isseane.pdf)
285. **Syctom, "Captation et valorisation du CO2 des fumées d'incinération." Syctom explicitly distinguishes total physical CO2 emissions, which include fossil and biogenic CO2, from its official carbon inventories, which report fossil CO2.** Syctom — Fossil and biogenic CO2 accounting Syctom, "Captation et valorisation du CO2 des fumées d'incinération — source (https://www.syctom-paris.fr/engagements/innovations/captation-et-valorisation-du-co2-des-fumees-dincineration.html)
286. **Syctom, Débat d'Orientations Budgétaires 2020; Syctom administrative records on the UIOM-C14 program.** Syctom commissioned repeated carbon-14 analysis of Isséane's combustion gases specifically to distinguish fossil from biogenic carbon. Preliminary results found the biogenic share at approximately 60%, compared with the conventional 50% assumption. The estimated 2024 biogenic CO2 figure of ~378,000 MT is calculated from this measured proportion and the reported 252,060 MT fossil figure; it is therefore derived rather than directly reported for 2024. Syctom — 2020 Budget Orientation Report and Isséane carbon-14 results Syctom, Débat d'Orientations Budgétaires 2020; Syctom administrative records on the UIO… — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/budget/DOB-syctom-2020.pdf)
287. **Syctom / Issy Urbaser Energie, Dossier d'information du public Isséane 2024, Table 19.** Reports the actual 2024 annual pollutant flows: NOx 82,189 kg; CO 32,757 kg; SO_2 9,489 kg; HCl 7,962 kg; NH_3 3,329 kg; TOC 1,366 kg; dust 795 kg; HF 78 kg; mercury 3 kg; nine-metal group 11 kg; Cd+Tl 0.08 kg; and dioxins/furans 23.1 mg I-TEQ. The report also documents mercury exceedance events in 2024 associated with mercury present in incoming waste. Syctom — Isséane 2024 emissions data Syctom / Issy Urbaser Energie, Dossier d'information du public Isséane 2024, Table 19 — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/dip/Isseane/DIP_2024_Isseane.pdf)

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290. **Maps.ie, Population Radius Tool.** Population within 5 km of the Isseane Incinerator calculated using the facility location and the Maps.ie radius population tool. Maps — source (https://www.maps.ie/population/)
291. **Val de Seine Vert / Le Parisien (2011).** Documents the challenge by Écologie Sans Frontière and CNIID to Isséane's operating authorization, including concerns over the plant's short stacks, NOx emissions, pollutant dispersion, cumulative urban pollution and the absence of a dedicated epidemiological study around the facility. Val de Seine Vert — Legal challenge to Isséane Le Parisien — Environmental groups challenge Isséane Val de Seine Vert / Le Parisien (2011) — source (https://valdeseinevert.org/un-recours-contre-isseane/) Val de Seine Vert / Le Parisien (2011) — source (https://www.leparisien.fr/hauts-de-seine-92/issy-les-moulineaux-92130/deux-associations-reclament-toujours-la-fin-d-isseane-20-09-2011-1616100.php)
292. Ibid.
293. **Urbaser Environnement, 2019.** The Isséane operating contract runs 99 months (8 years and 3 months) and represented approximately US$246 million (€220 million) in turnover, using the Federal Reserve's 2019 annual-average exchange rate. Urbaser — Isséane operating contract Urbaser Environnement, 2019 — source (https://www.urbaserenvironnement.fr/en/news/180-urbaser-environnement-wins-the-operating-contract-for-the-isseane-waste-to-energy-plant)
294. **Syctom, 2024 Activity Report and Isséane Public Information File.** Both report 536,000 MT incinerated in 2024 and an authorized capacity of 536,000 MT/year. Syctom — Isséane 2024 Public Information File Syctom, 2024 Activity Report and Isséane Public Information File — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/dip/Isseane/DIP_2024_Isseane.pdf)
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296. **Syctom, Rapport d'activité 2024 (2025), "La composition des flux majoritaires de collecte." Syctom's characterization of residual municipal waste reports 24.9% organic waste, 36.2% paper and packaging, 6.5% glass, 6.2% materials with dedicated collection/recovery streams, 7.3% sanitary textiles, and 18.9% waste without a dedicated recovery stream.** Syctom concludes that 73.8% of the residual bin could be diverted from incineration and directed toward an appropriate treatment or recovery stream. Syctom — 2024 Activity Report and Waste Composition Data Syctom, Rapport d'activité 2024 (2025), "La composition des flux majoritaires de collecte — source (https://www.syctom-paris.fr/fileadmin/user_upload/RA_Syctom_2024_version_numerique_planche.pdf)
297. Ibid.
298. **Syctom / Issy Urbaser Energie, 2024.** Reports 76,588 MT of bottom ash, 12,703 MT of fly ash and 102,610 MT of total treatment by-products in 2024. Syctom — Isséane 2024 Public Information File Syctom / Issy Urbaser Energie, 2024 — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/dip/Isseane/DIP_2024_Isseane.pdf)
299. Ibid.
300. **Syctom / Issy Urbaser Energie, 2024.** Identifies Villeparisis and Guitrancourt as destinations for fly ash and Villeparisis as the destination for wastewater-treatment sludge. Syctom — Isséane residue-management documentation Syctom / Issy Urbaser Energie, 2024 — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/dip/Isseane/DIP_2024_Isseane.pdf)
301. **Syctom, 2009 Activity Report.** Reports an Isséane investment cost of approximately US$836 million (€600 million excluding VAT). Syctom — 2009 Activity Report Syctom, 2009 Activity Report — source (https://www.syctom-paris.fr/fileadmin/mediatheque/documentation/rapport_d_activite/RA09.pdf)
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304. **Le Parisien / Val de Seine Vert, 2011.** Documents the legal challenge by Écologie Sans Frontière and CNIID over stack height, emissions, cumulative pollution and calls for health assessment. Le Parisien — Associations challenge Isséane permit Val de Seine Vert — Legal challenge to Isséane Le Parisien / Val de Seine Vert, 2011 — source (https://www.leparisien.fr/hauts-de-seine-92/issy-les-moulineaux-92130/deux-associations-reclament-toujours-la-fin-d-isseane-20-09-2011-1616100.php) Le Parisien / Val de Seine Vert, 2011 — source (https://valdeseinevert.org/un-recours-contre-isseane/)
305. **Val de Seine Vert, 2024.** The local environmental association continues to review Isséane's annual operating and emissions performance through the facility monitoring process. Val de Seine Vert — Isséane annual review Val de Seine Vert, 2024 — source (https://valdeseinevert.org/isseane-bilan-annuel-de-lincinerateur/)
306. **CNIID and Écologie Sans Frontière, 2011, Isséane legal challenge.** The organizations explicitly demanded (1) modification of the height of Isséane's two stacks and (2) revision of pollutant-emission limits in accordance with the facility's health-risk assessment. Their challenge sought cancellation of the operating authorization and a new environmental-impact assessment subject to public inquiry. CNIID — Isséane legal challenge and demands CNIID and Écologie Sans Frontière, 2011, Isséane legal challenge — source (https://www.cniid.org/espace_telechargement/CP/20110406_DP_Isseane.pdf)

307. **Val de Seine Vert (2011), "Les cheminées d'Isséane seraient-elles trop courtes?" Documents demands to increase Isséane's approximately 26-meter stacks, with opponents discussing heights of 30–50 meters to improve dispersion of residual air pollution away from surrounding buildings and populations.** Val de Seine Vert — Isséane stack-height concerns Val de Seine Vert (2011), "Les cheminées d'Isséane seraient-elles trop courtes?" Docume… — source (https://valdeseinevert.org/les-cheminees-disseane-seraient-elles-trop-courtes/)
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309. Ibid.
310. **Val de Seine Vert (2024), "Isséane, bilan annuel de l'incinérateur." Val de Seine Vert continues to participate alongside residents and other environmental organizations in the official commission monitoring Isséane's operations and environmental performance.** Val de Seine Vert — 2024 Isséane monitoring review Val de Seine Vert (2024), "Isséane, bilan annuel de l'incinérateur — source (https://valdeseinevert.org/isseane-bilan-annuel-de-lincinerateur/)
311. **Val de Seine Vert, "L'usine Isséane." The local environmental organization identifies health protection as its primary concern and explicitly advocates reducing waste generation as much as possible and recovering materials that cannot be avoided.** Val de Seine Vert — Isséane campaign and waste-reduction position Val de Seine Vert, "L'usine Isséane — source (https://valdeseinevert.org/heliport/lusine-isseane/)
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314. **Australian Renewable Energy Agency, Australia's First Energy-From-Waste Plant to be Built in WA, October 18, 2018.** Australian Renewable Energy Agency — Kwinana project cost, technology and capacity Australian Renewable Energy Agency, Australia's First Energy-From-Waste Plant to be Bui… — source (https://arena.gov.au/news/australias-first-energy-from-waste-plant-to-be-built-in-wa/)
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316. **Clean Energy Finance Corporation, Kwinana Energy-from-Waste Plant Targets Household, Commercial, Industrial Waste.** Clean Energy Finance Corporation — Kwinana financing, ownership and waste contracts Clean Energy Finance Corporation, Kwinana Energy-from-Waste Plant Targets Household, Co… — source (https://www.cefc.com.au/case-studies/kwinana-efw-plant-targets-household-commercial-industrial-waste/)
317. **Australian Renewable Energy Agency / Kwinana Waste-to-Energy Project Company, Kwinana Waste to Energy Project: Life Cycle Assessment.** Australian Renewable Energy Agency — Kwinana lifecycle assessment and gross greenhouse-gas emissions Australian Renewable Energy Agency / Kwinana Waste-to-Energy Project Company, Kwinana W… — source (https://arena.gov.au/assets/2018/12/kwinana-waste-to-energy-project.pdf)
318. **Western Australia Environmental Protection Authority, Kwinana Waste to Energy Project: Public Environmental Review — Response to Submissions, 2014; Office of the Environmental Protection Authority, Annual Report 2014–15.** Environmental Protection Authority — Community submissions and cumulative-pollution concerns Office of the Environmental Protection Authority — Public submissions and environmental concerns Western Australia Environmental Protection Authority, Kwinana Waste to Energy Project: … — source (https://www.epa.wa.gov.au/sites/default/files/Proponent_response_to_submissions/Kwinana-WtE-PER-RTS-dec2014.pdf) Western Australia Environmental Protection Authority, Kwinana Waste to Energy Project: … — source (https://www.parliament.wa.gov.au/publications/tabledpapers.nsf/displaypaper/3913379addd9cc07b558f9ef48257eca0006c016/%24file/3379.pdf)
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321. **Macquarie Group, Australia's First Thermal Waste-to-Energy Facility Reaches Financial Close, October 18, 2018.** Macquarie Group — Kwinana financing and financial close Macquarie Group, Australia's First Thermal Waste-to-Energy Facility Reaches Financial C… — source (https://www.macquarie.com/sg/en/about/news/2018/australia-s-first-thermal-waste-to-energy-facility-reaches-finan.html)

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530. **Minnesota Statutes §§115A.85–115A.86 and §473.848.** Minnesota's waste-designation framework authorizes contractual and regulatory mechanisms requiring designated waste to use specified facilities; state law also restricts land disposal of unprocessed waste when processing capacity is available. Minnesota Statutes §§115A — source (https://www.revisor.mn.gov/statutes/cite/115A.85) Minnesota Statutes §§115A — source (https://www.revisor.mn.gov/statutes/cite/115A.86) Minnesota Statutes §§115A — source (https://www.revisor.mn.gov/statutes/cite/473.848)
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985. **UK Environment Agency, Waste Data Interrogator 2023–24, Beddington facility records.** Environment Agency records show 73,219 MT of bottom ash, equivalent to roughly 23% of waste entering the furnace, as well as 6,233 MT of solid gas-treatment waste leaving Beddington for recovery in 2024. The report traces bottom ash to processing/recovery destinations in Derbyshire and Cambridgeshire. UK Environment Agency, Waste Data Interrogator 2023–24, Beddington facility records — source (https://www.data.gov.uk/dataset/81f9d676-e77c-4d68-ab0c-b67e0b0b353e/2024-waste-data-interrogator)
986. **Central Pollution Control Board, Government of India, response before the National Green Tribunal, Original Application No.** 536 of 2024, January 10, 2025; Timarpur-Okhla Waste Management Company Limited/Mantec Consultants, Draft Environmental Impact Assessment Report for Expansion of Waste to Energy Plant up to 40 MW, 2022. Government testing reported dioxins/furans at 0.99 ng TEQ/Nm^3 in 2021, compared with a 0.1 ng TEQ/Nm^3 limit, and hydrogen chloride at 198 mg/Nm^3, compared with a 50 mg/Nm^3 limit. The EIA places Haji Colony approximately 330 meters and Sukhdev Vihar approximately 470 meters from the facility. Central Pollution Control Board, Government of India, response before the National Gree… — source (https://www.greentribunal.gov.in/sites/default/files/news_updates/Response%20of%20CPCB%20in%20OA%20NO%20536%20of%202024%20%28NEWS%20ITEM%20TITLED%20WASTE%20TO%20ENERGY%20SMOKESCREEN%20OR%20SOLUTION.pdf)
987. **National Green Tribunal, Sukhdev Vihar Residents Welfare Association & Others v.** State of National Capital Territory of Delhi & Others; Demaria, F. & Schindler, S., “Pathways for Sustainable Urban Waste Management and Reduced Environmental Health Risks in India: Winners, Losers, and Alternatives to Waste to Energy in Delhi,” Frontiers in Sustainable Cities, 2020. The sources document community challenges concerning pollution, monitoring, ash, expansion and the plant's proximity to residential areas, as well as demands for upstream alternatives. National Green Tribunal, Sukhdev Vihar Residents Welfare Association & Others v — source (https://www.frontiersin.org/journals/sustainable-cities/articles/10.3389/frsc.2020.00014/full)
988. **Asian Development Bank, GWTE Circular Economy Project: Report and Recommendation of the President, February 2026.** ADB documents a portfolio of 12 industrial waste-to-energy plants, each with 9.9 MW installed capacity, across five Thai provinces, including Prachinburi. The three Prachinburi facilities examined in this report—Khiang Kan Energy, Me Preme Energy and Phraofa Power—form a combined 29.7-MW cluster. The report's facility profile documents the broader financing package involving ADB and AIIB. Asian Development Bank – GWTE Circular Economy Project Asian Development Bank, GWTE Circular Economy Project: Report and Recommendation of the… — source (https://www.adb.org/projects/58132-001/main)

989. **The Prachinburi facility analysis documents concerns raised by local residents and civil-society organizations regarding the treatment of the three neighboring 9.9-MW facilities as separate projects, their cumulative pollution and health impacts, and participation in the public-hearing process.** ADB maintains that the facilities underwent the assessments required by Thai law and lender safeguards, including Code of Practice reports, Initial Environmental Examinations, and lender-level environmental and social assessments. The Prachinburi facility analysis documents concerns raised by local residents and civi… — source (https://www.adb.org/projects/58132-001/main)
990. **Lausanne municipal records and the Vallon research summarized in the facility profile document continuing debates over dioxin contamination, soil remediation, public-health monitoring, responsibility for cleanup costs and application of the polluter-pays principle following the facility's 2005 closure.** Lausanne municipal records and the Vallon research summarized in the facility profile d… — source (https://libra.unine.ch/server/api/core/bitstreams/ae057e1a-29fe-495f-9e55-d129caf2eb5e/content)
991. **United Nations Environment Programme (UNEP) and International Solid Waste Association, Global Waste Management Outlook 2024: Beyond an Age of Waste – Turning Rubbish into a Resource, February 2024.** UNEP – Global Waste Management Outlook 2024 United Nations Environment Programme (UNEP) and International Solid Waste Association, … — source (https://www.unep.org/resources/global-waste-management-outlook-2024)

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GAIA is a network of grassroots groups as well as national and regional alliances representing more than 1000 organizations from 101 countries. With our work we aim to catalyze a global shift towards environmental justice by strengthening grassroots social movements that advance solutions to waste and pollution. We envision a just, Zero Waste world built on respect for ecological limits and community rights, where people are free from the burden of toxic pollution, and resources are sustainably conserved, not burned or dumped.

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The Burn Book:
Incinerators that Threaten the Climate, Public Health, and our Finances

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