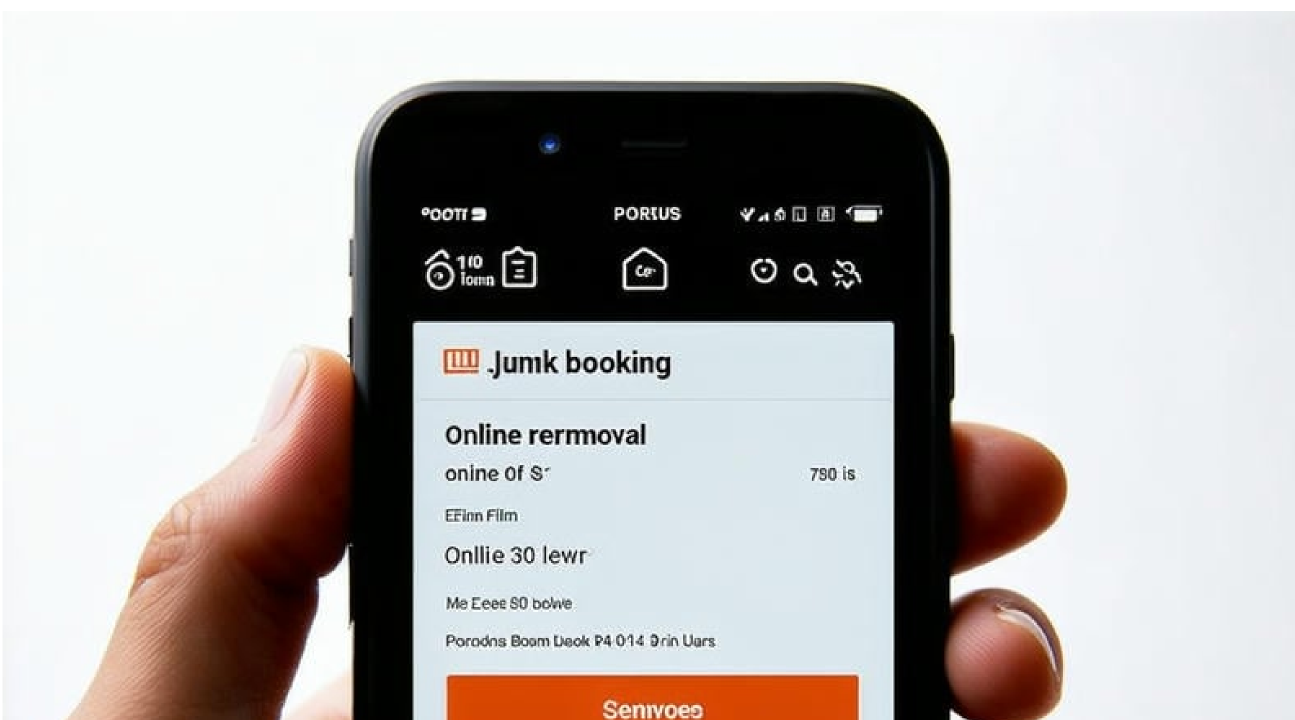
- **Understanding the Lifecycle of Electronic Devices**
  Understanding the Lifecycle of Electronic Devices Identifying Recyclable Components in Computers Examining Safe Data Destruction Protocols Researching Certified E-Waste Recycling Options Encouraging Proper Disposal of Obsolete Gadgets Exploring the Role of Precious Metals in Electronics Evaluating Techniques for Recovering Rare Materials Minimizing Environmental Risks in Circuit Board Handling Differentiating Between Reuse and Refurbishment Approaches Planning Secure Dropoff Events for Old Devices Learning How to Partner With Certified Handlers Recognizing International Guidelines for Tech Disposal
- **Understanding Flat Fee Arrangements in Waste Removal**
  Understanding Flat Fee Arrangements in Waste Removal Evaluating Volume Based Payment Models Comparing Time Based Service Charges Analyzing Seasonal Pricing Adjustments Understanding Bulk Rate Discount Options Reviewing the Effects of Dynamic Price Strategies Interpreting Customer Feedback on Transparent Pricing Clarifying Conditions for Fixed Price Estimates Selecting the Most Appropriate Rate Plan Reviewing the Impact of Competitive Local Rates Balancing Costs With Service Efficiency Differentiating Between Standard and Premium Fees
- **About Us**



In recent years, the burgeoning issue of electronic waste, often referred to as e-waste, has become a critical concern for environmentalists and policymakers alike. Local businesses appreciate their commitment to recycling **removal furniture** futon. As technology continues to advance at an unprecedented pace, the lifespan of electronic products shortens, leading to an exponential increase in discarded devices. This rise in e-waste necessitates effective processing practices to mitigate its environmental impact and recover valuable materials. One promising approach to enhancing these practices is the adoption of volume-based payment models, which align economic incentives with sustainable waste management.

E-waste processing involves several stages, including collection, sorting, dismantling, and recycling. Each stage presents unique challenges and opportunities for improvement. Traditionally, e-waste processors have been compensated based on weight; however, this method may not accurately reflect the true value and complexity of processing various types of electronics. A shift towards volume-based payment models could encourage more efficient handling by rewarding processors for optimizing space utilization during transportation and storage.

Volume-based payment models can drive innovation in e-waste logistics. By incentivizing reduced bulkiness rather than weight alone, these models encourage the development of compacting technologies that minimize the spatial footprint of discarded electronics. This not only lowers transportation costs but also reduces greenhouse gas emissions associated with moving large volumes over long distances.

Moreover, volume-based systems can promote better sorting practices at the source-households and businesses that generate e-waste. When disposal costs are tied to volume rather than weight, stakeholders are motivated to disassemble items into components or flatten them before discarding. Such behaviors facilitate easier identification and separation of valuable materials like precious metals or rare earth elements during subsequent recycling processes.

However, transitioning to volume-based payment models requires careful consideration of potential drawbacks. There is a risk that focusing solely on volume might overlook other important factors such as hazardous material content or recyclability rates-key considerations when evaluating overall environmental impact. Therefore, these models should be designed with flexibility in mind, allowing adjustments based on additional criteria beyond mere size reduction.

Furthermore, implementing volume-based payment systems necessitates collaboration across multiple sectors involved in e-waste management-from manufacturers designing products with end-of-life disposal in mind to governments enforcing regulations that support sustainable practices throughout product lifecycles.

In conclusion, while current e-waste processing practices face significant challenges due largely to outdated compensation structures centered around weight measurements alone; adopting innovative approaches like volume-based payment models holds promise for more effective solutions moving forward. By redefining how we evaluate success within this industry through metrics aligned with sustainability goals rather than purely economic ones-we open up new possibilities not just technologically but also environmentally-and ultimately pave our way towards greener futures where both people planet prosper together alike!

Evaluating Volume Based Payment Models - foam

1. cost
2. box
3. Appliance recycling

Importance of understanding the lifecycle in relation to e-waste —

In recent years, the growing concern over electronic waste (e-waste) has prompted a reevaluation of waste management systems worldwide. One innovative approach that has garnered attention is the implementation of volume-based payment models for e-waste management. This model offers several distinct advantages that make it an appealing solution for effectively addressing the challenges posed by increasing volumes of e-waste.

At its core, a volume-based payment model charges fees based on the amount of e-waste processed or collected. This system inherently incentivizes both consumers and manufacturers to minimize waste production. By aligning financial incentives with environmental goals, this model encourages stakeholders to adopt more sustainable practices. For example, consumers become more conscious about disposing of electronics only when necessary, while manufacturers are motivated to design products with longer life spans and easier recyclability.

One significant advantage of volume-based payment models is their potential to enhance resource efficiency within e-waste management systems. When organizations are charged according to the volume of e-waste they handle, there is a direct incentive to optimize their processes for greater efficiency. This can lead to innovative recycling techniques and improved logistics in handling e-waste, ultimately reducing costs and enhancing the overall sustainability of the operation.

Moreover, this model promotes accountability and transparency within the industry. By linking payments directly to the volume managed, stakeholders can easily track performance metrics and ensure compliance with environmental standards. It simplifies auditing processes and provides a clear framework for evaluating effectiveness in managing e-waste streams.

Another noteworthy advantage lies in fostering collaboration across different sectors involved in e-waste management. A volume-based approach necessitates cooperation among municipalities, waste management companies, manufacturers, and consumers to achieve common objectives. Such collaboration can lead to shared knowledge and resources that further improve system efficiency and drive innovation in tackling complex issues associated with electronic waste.

Furthermore, this payment model can have significant economic benefits by creating new market opportunities within the recycling industry. As demand for efficient processing increases due to cost implications tied directly with volume handled; businesses specializing in collection services or advanced recycling technologies stand poised at an advantageous position capable not only meeting demands but also driving growth through innovation aimed at improving process efficiencies further still enhancing profitability margins considerably over timeframes considered medium-to-long term oriented investments therein!

In conclusion then: adopting a volume-based payment model represents an advantageous strategy towards achieving sustainable solutions concerning escalating global concerns surrounding ever-increasing volumes generated from discarded electronics annually worldwide today! With its ability incentivize reduction resource consumption whilst promoting accountability transparency ultimately facilitating cross-sector collaborations leading economic benefits-this approach presents compelling case worth consideration policymakers seeking effective methods address critical issue facing our planet now future generations alike!

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Stages of the Electronic Device Lifecycle

Implementing volume-based payment models in the industry poses a series of challenges and limitations that require careful evaluation. These models, which reward entities based on the quantity of products or services delivered, rather than quality or value, can have far-reaching implications for both providers and consumers.

One primary challenge associated with volume-based payments is the potential misalignment of incentives. When compensation is tied to the amount produced, there can be a tendency to prioritize quantity over quality. This focus may lead to diminished standards in product or service delivery as organizations strive to maximize output at the expense of excellence. For industries where quality is paramount-such as healthcare, manufacturing, and education-this could result in significant negative outcomes. In healthcare, for instance, prioritizing volume could lead to rushed procedures or insufficient patient care, ultimately compromising patient safety and satisfaction.

Moreover, implementing volume-based payment systems often leads to increased operational costs.

Evaluating Volume Based Payment Models - construction

1. construction
2. customer
3. foam

Organizations may need to invest in additional resources such as labor and materials to boost production volumes. This can strain financial resources and potentially reduce profit margins if not managed efficiently. Additionally, maintaining high production levels could necessitate continuous upgrading of technology and infrastructure, further escalating costs.

Another limitation is the risk of market saturation. By focusing solely on increasing output, companies might flood the market with their products or services faster than demand can absorb them. This oversupply could drive prices down and erode profitability-a particularly dangerous scenario for industries with thin margins.

Furthermore, volume-based payment models tend to neglect customer satisfaction metrics. While businesses might succeed in producing large quantities quickly, they risk alienating their consumer base if those offerings do not meet customer expectations or needs. Discontented customers may turn elsewhere if they feel neglected by a company's focus on numbers over meaningful engagement.

Additionally, such models often lack adaptability in dynamic market conditions. In rapidly changing environments where consumer preferences shift frequently or technological advancements occur regularly, being tethered to a rigid framework centered around volume can hinder an organization's ability to pivot effectively when necessary.

Finally, there are ethical considerations inherent in these systems that cannot be ignored: rewarding sheer volume without regard for environmental impact raises serious concerns about sustainability practices within industries already grappling with climate change challenges.

In conclusion, while volume-based payment models offer certain benefits like predictable revenue streams through heightened productivity efforts; they also present numerous challenges ranging from compromised product/service quality due largely because incentive structures prioritize quantity above all else-as well increased operational expenditures due staffing requirements alongside potential issues surrounding ethics (sustainability). Therefore it becomes imperative that stakeholders thoroughly evaluate these implications before adopting such frameworks widely across various sectors so that any adverse effects stemming from misaligned priorities don't outweigh perceived gains achieved via higher outputs alone!

Design and manufacturing processes

In recent years, the escalating issue of electronic waste (e-waste) has emerged as a significant environmental challenge. As technology rapidly evolves, obsolete gadgets and devices accumulate, necessitating efficient and sustainable processing solutions. A promising approach to addressing this problem is the implementation of volume-based payment models in e-waste processing. By examining case studies of successful implementations of these models, we can glean valuable insights into their effectiveness and potential for broader application.

Volume-based payment models are predicated on the concept that recyclers or waste processors are compensated based on the amount of e-waste they handle. This model incentivizes processors to maximize efficiency and throughput while ensuring that more waste is diverted from landfills and channeled into recycling streams. One notable example of this model's success can be observed in Sweden, where a robust regulatory framework supports e-waste processing facilities through volume-based compensation schemes. Here, e-waste collection networks have expanded significantly, leading to higher recycling rates and more environmentally sound disposal practices.

Another compelling case study comes from Japan, where volume-based models have been integrated with advanced sorting technologies to enhance processing capabilities. In Japanese cities like Tokyo and Osaka, e-waste processors have embraced automation to streamline operations and increase processing volumes. The success of these initiatives is reflected in both financial performance and environmental impact metrics. Processors receive payments commensurate with the tonnage processed, motivating them to continually refine methodologies for extracting valuable materials from discarded electronics.

In North America, certain municipalities have experimented with volume-based payment structures within public-private partnership frameworks. For instance, a pilot program in Toronto demonstrated that aligning financial incentives with processing volumes could lead to improved efficiencies across the entire supply chain-from collection points to final material recovery facilities. The program also highlighted the importance of transparency and collaboration between stakeholders to ensure fair compensation and accountability throughout the process.

These case studies underscore several key factors crucial for the successful implementation of volume-based models in e-waste processing. First is the establishment of supportive policies that facilitate market entry for processors while enforcing environmental standards. Second, technological innovation plays a vital role; investments in automated systems can significantly boost throughput capabilities while maintaining quality control over recycled materials.

Additionally, fostering partnerships among government entities, private industry players, and non-governmental organizations can create synergies that drive progress toward sustainability goals. By collaborating effectively across sectors, stakeholders can share best practices and resources to overcome challenges inherent in managing complex waste streams.

In conclusion, evaluating volume-based payment models through real-world examples offers compelling evidence of their potential efficacy in promoting sustainable e-waste management practices worldwide. As global awareness around electronic waste grows alongside technological advancements enabling more efficient recycling processes-these models present an attractive avenue worth exploring further by policymakers seeking innovative solutions tailored towards mitigating this pressing issue responsibly without compromising economic viability along its path forward globally at large scale levels too eventually someday soon enough hopefully indeed!

Usage phase: maintenance and longevity

In the landscape of healthcare and various service industries, the evaluation of volume-based payment models reveals a nuanced impact on diverse stakeholders, particularly processors, consumers, and regulatory bodies. These stakeholders navigate a complex web of interests and outcomes shaped by the incentives inherent in such models.

Processors, often represented by healthcare providers or service deliverers within other industries, find themselves primarily driven by the imperative to maximize output. Volume-based payment models reward these entities based on the quantity of services rendered or goods produced rather than the quality or outcome of these services. This framework can lead to certain efficiencies as processors seek to streamline operations and increase throughput. However, it may also incentivize practices that prioritize quantity over quality, potentially compromising the integrity of services provided. For instance, in healthcare settings, there might be an increase in diagnostic testing or procedures that do not necessarily align with patient needs but serve to augment billing opportunities.

Consumers are directly affected by this model through the quality and cost of services they receive. On one hand, increased competition among processors can lead to improved access and reduced wait times for services as providers vie for greater volumes. Yet, this model may inadvertently lead to overutilization of unnecessary services or procedures that do not enhance consumer well-being but inflate costs. Consumers could face higher out-of-pocket expenses without corresponding improvements in outcomes or satisfaction.

Regulatory bodies play a critical role in overseeing volume-based payment models to ensure they align with public interest goals such as affordability, accessibility, and quality assurance. These organizations must grapple with crafting regulations that curb potential abuses while fostering innovation and efficiency within industries reliant on these payment structures. Regulatory bodies are tasked with maintaining a delicate balance-promoting fair competition and protecting consumers from excessive charges arising from non-essential services.

The evaluation of volume-based payment models thus requires meticulous consideration from all stakeholders involved. Processors must navigate ethical considerations alongside operational goals; consumers need advocacy and protection against exploitative practices; regulatory bodies must anticipate challenges while creating frameworks that support balanced growth and equitable service distribution.

Ultimately, transitioning towards more value-oriented approaches-or hybrid models incorporating both volume and value metrics-could present a viable path forward. Such strategies would encourage sustainable practices where benefits extend across all stakeholders: ensuring fair compensation for processors based on positive outcomes rather than sheer numbers; empowering consumers with high-quality care at reasonable costs; enabling regulators to uphold standards promoting societal welfare effectively.

In sum, evaluating volume-based payment models necessitates an integrated approach acknowledging processor motivations, consumer impacts, and regulatory oversight complexities-all crucial elements shaping their success or failure across varied sectors today.

End-of-Life Management for Electronic Devices

In recent years, the healthcare industry has been undergoing a significant transformation, driven by the need to enhance efficiency, reduce costs, and improve patient outcomes. One area that has garnered considerable attention is volume-based payment models. These models traditionally reward providers based on the quantity of services rendered rather than the quality of care provided. However, as we look toward the future, innovations and technological advancements are poised to reshape these systems in profound ways.

Volume-based payment models have long been criticized for incentivizing higher volumes of services without necessarily improving health outcomes. The result is often an increase in unnecessary procedures and tests, leading to higher healthcare costs without corresponding benefits to patients. Recognizing these shortcomings, there has been a shift towards value-based care models that prioritize patient outcomes over service volume. Nonetheless, volume-based systems still play a crucial role in many healthcare settings, necessitating innovative approaches to make them more effective.

One promising avenue for innovation lies in leveraging data analytics and artificial intelligence (AI). By harnessing vast amounts of patient data, AI can help identify patterns and predict which interventions are most likely to be effective for specific populations. This can lead to more targeted care strategies within volume-based systems, ensuring that resources are allocated efficiently and effectively. For instance, predictive analytics can aid in identifying patients at high risk for certain conditions early on, enabling timely interventions that could prevent costly procedures down the line.

Additionally, telemedicine and digital health technologies offer new opportunities for transforming volume-based payment models. With the rise of remote monitoring devices and virtual consultations, healthcare providers can deliver continuous care without geographic constraints. This not only expands access but also allows for better management of chronic diseases through regular monitoring and timely adjustments in treatment plans. By incorporating these technologies into volume-based systems, it becomes possible to maintain a high service level while focusing on preventative care-potentially reducing overall healthcare costs.

Blockchain technology is another frontier with potential implications for volume-based payment models. Blockchain can provide secure and transparent record-keeping systems that ensure all transactions are accurately recorded and verifiable. This transparency could address issues related to billing fraud or discrepancies between services rendered and payments received-a common concern in traditional volume-based frameworks.

Furthermore, fostering a culture of collaboration among healthcare providers is essential for implementing successful innovations within these payment models. Interdisciplinary teams working together can optimize treatment plans by combining their expertise across different specialties. This approach aligns well with the principles of integrated care delivery systems where every team member's contribution leads towards achieving optimal patient outcomes even within a primarily volume-driven context.

In conclusion, while there are inherent challenges associated with traditional volume-based payment models-primarily due to their focus on quantity over quality-the future holds promising possibilities through technological advancements and innovative practices aimed at enhancing their efficacy in delivering better health outcomes alongside cost-efficiency improvements across various settings worldwide..

Evaluating Volume Based Payment Models - customer

1. contract
2. space
3. environmentalism

As we continue exploring new frontiers like AI-driven analytics or blockchain-enabled transparency mechanisms alongside embracing collaborative approaches integrating digital solutions such as telemedicine platforms into daily operations; stakeholders stand poised ready adaptively evolve these longstanding frameworks towards becoming truly transformative forces positively impacting global public health landscape ahead!

About Waste management

For the company, see **Waste Management (corporation)**. For other uses, see **Waste management (disambiguation)**.
"Waste disposal" redirects here. For the kitchen device, see **Garbage disposal unit**.
Not to be confused with **Sanitary engineering**.

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Find sources: **"Waste management"** – **news** · **newspapers** · **books** · **scholar** · **JSTOR** *(May 2011) (**Learn how and when to remove this message**)*

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Part of a **series** on

Pollution

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Air pollution from a factory

Air

- **Acid rain**
- **Air quality index**
- **Atmospheric dispersion modeling**
- **Chlorofluorocarbon**
- **Combustion**
- **Exhaust gas**
- **Haze**
- **Global dimming**
- **Global distillation**
- **Indoor air quality**
- **Non-exhaust emissions**
- **Ozone depletion**
- **Particulates**
- **Persistent organic pollutant**
- **Smog**
- **Soot**
- **Volatile organic compound**

Biological

- Biological hazard
- Genetic
- Illegal logging
- Introduced species
    - Invasive species

Digital

- Information

Electromagnetic

- Light
    - Ecological
    - Overillumination
- Radio spectrum

Natural

- Ozone
- Radium and radon in the environment
- Volcanic ash
- Wildfire

Noise

- Transportation
- Health effects from noise
- Marine mammals and sonar
- Noise barrier
- Noise control
- Soundproofing

Radiation

- Actinides
- Bioremediation
- Depleted uranium
- Nuclear fission
- Nuclear fallout
- Plutonium
- Poisoning
- Radioactivity
- Uranium
- Radioactive waste

Soil

- Agricultural
- Land degradation
- Bioremediation
- Defecation
- Electrical resistance heating
- Illegal mining
- Soil guideline values
- Phytoremediation

Solid waste

- Advertising mail
- Biodegradable waste
- Brown waste
- Electronic waste
- Foam food container
- Food waste
- Green waste
- Hazardous waste
- Industrial waste
- Litter
- Mining
- Municipal solid waste
- Nanomaterials
- Plastic
- Packaging waste
- Post-consumer waste
- Waste management

Space

- Space debris

Thermal

- Urban heat island

Visual

- Air travel
- Advertising clutter
- Overhead power lines
- Traffic signs
- Urban blight
- Vandalism

War

- Chemical warfare
- Herbicidal warfare
  - Agent Orange
- Nuclear holocaust
  - Nuclear fallout
  - Nuclear famine
  - Nuclear winter
- Scorched earth
- Unexploded ordnance
- War and environmental law

Water

- Agricultural wastewater
- Biosolids
- Diseases
- Eutrophication
- Firewater
- Freshwater
- Groundwater
- Hypoxia
- Industrial wastewater
- Marine
- Monitoring
- Nonpoint source
- Nutrient
- Ocean acidification
- Oil spill
- Pharmaceuticals
- Freshwater salinization
- Septic tanks
- Sewage
- Shipping
- Sludge
- Stagnation
- Sulfur water
- Surface runoff
- Turbidity
- Urban runoff
- Water quality
- Wastewater

Topics

- History
- Pollutants
  - Heavy metals
  - Paint

Misc

- Area source
- Brain health and pollution
- Debris
- Dust
- Garbology
- Legacy
- Midden
- Point source
- Waste
  - Toxic

Lists

- Diseases
- Law by country
- Most polluted cities
- Least polluted cities by PM2.5
- Treaties
- Most polluted rivers

Categories

- By country

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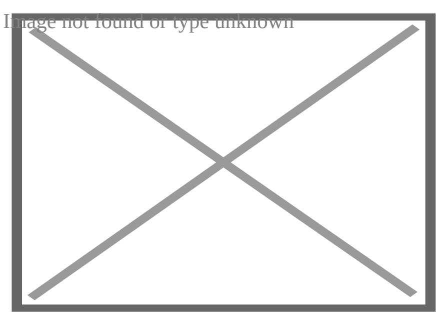

A specialized trash collection truck providing regular municipal trash collection in a neighborhood in Stockholm, Sweden

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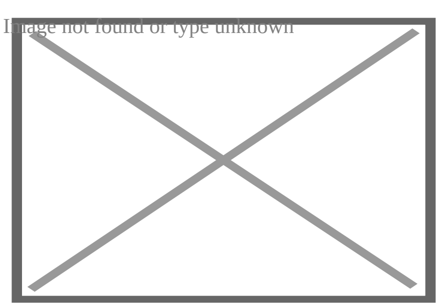
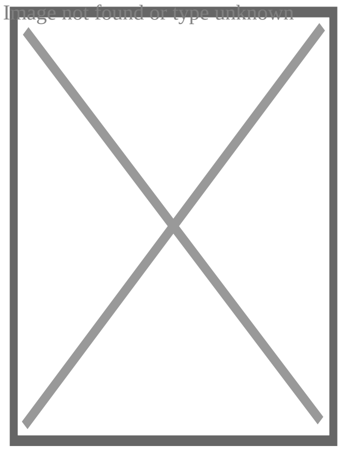
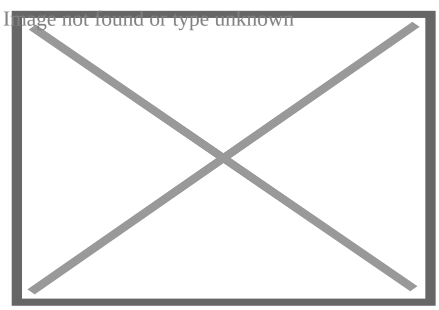


Waste pickers burning **e-waste** in **Agbogbloshie**, a site near Accra in Ghana that processes large volumes of international electronic waste. The pickers burn the plastics off of materials and collect the metals for recycling, However, this process exposes pickers and their local communities to toxic fumes.



Containers for consumer waste collection at the **GdaÃ…â€žsk University of Technology**



A recycling and waste-to-energy plant for waste that is not exported

Waste management or **waste disposal** includes the processes and actions required to manage **waste** from its inception to its final **disposal**.**[1]** This includes the **collection**, **transport**, **treatment**, and disposal of waste, together with monitoring and regulation of the waste management process and waste-related **laws**, technologies, and economic mechanisms.

Waste can either be **solid**, **liquid**, or **gases** and each type has different methods of disposal and management. Waste management deals with all types of waste, including **industrial**, **biological**, household, municipal, organic, **biomedical**, **radioactive wastes.** In some cases, waste can pose a threat to human health.**[2]** Health issues are associated with the entire process of waste management. Health issues can also arise indirectly or directly: directly through the handling of solid waste, and indirectly through the consumption of water, soil, and food.**[2]** Waste is produced by human activity, for example, the extraction and processing of raw materials.**[3]** Waste management is intended to reduce the adverse effects of waste on human **health**, the **environment**, planetary resources, and **aesthetics**.

The aim of waste management is to reduce the dangerous effects of such waste on the environment and human health. A big part of waste management deals with **municipal solid waste**, which is created by industrial, commercial, and household activity.**[4]**

Waste management practices are not the same across countries (**developed** and **developing nations**); regions (**urban** and **rural areas**), and **residential** and **industrial** sectors can all take different approaches.**[5]**

Proper management of waste is important for building sustainable and liveable cities, but it remains a challenge for many developing countries and cities. A report found that effective waste management is relatively expensive, usually comprising 20%–50% of municipal budgets. Operating this essential municipal service requires integrated systems that are efficient, sustainable, and socially supported.**[6]** A large portion of waste management practices deal with **municipal solid waste** (MSW) which is the bulk of the waste that is created by household, industrial, and commercial activity.**[7]** According to the **Intergovernmental Panel on Climate Change** (IPCC), municipal solid waste is expected to reach approximately 3.4 Gt by 2050; however, policies and lawmaking can reduce the amount of waste produced in different areas and cities of the world.**[8]** Measures of waste management include measures for integrated techno-economic mechanisms**[9]** of a **circular economy**, effective disposal facilities, export and import control**[10][11]** and optimal **sustainable design** of products that are produced.

In the first **systematic review** of the scientific evidence around global waste, its management, and its impact on human health and life, authors concluded that about a fourth of all the municipal solid terrestrial waste is not collected and an additional fourth is mismanaged after collection, often being burned in open and uncontrolled fires – or close to one billion tons per year when combined. They also found that broad priority areas each lack a "high-quality **research** base", partly due to the absence of "substantial **research funding**", which motivated scientists often require.**[12][13]** Electronic waste (ewaste) includes discarded computer monitors, motherboards, mobile phones and chargers, compact discs (CDs), headphones, television sets, air conditioners and refrigerators. According to the Global E-waste Monitor 2017, India generates ~ 2 million tonnes (Mte) of e-waste annually and ranks fifth among the e-waste producing countries, after the **United States**, the **People's Republic of China**, **Japan** and **Germany**.**[14]**

Effective 'Waste Management' involves the practice of '7R' - 'R'efuse, 'R'educe', 'R'euse, 'R'epair, **'R'epurpose**, 'R'ecycle and 'R'ecover. Amongst these '7R's, the first two ('Refuse' and 'Reduce') relate to the non-creation of waste - by refusing to buy non-essential products and by reducing consumption. The next two ('Reuse' and 'Repair') refer to increasing the usage of the existing product, with or without the substitution of certain parts of the product. 'Repurpose' and 'Recycle' involve maximum usage of the materials used in the product, and 'Recover' is the least preferred and least efficient waste management practice involving the recovery of embedded energy in the waste material. For example, burning the waste to produce heat (and electricity from heat). Certain non-biodegradable products are also dumped away as 'Disposal', and this is not a "waste-'management'" practice.[15]

Principles of waste management

[edit]

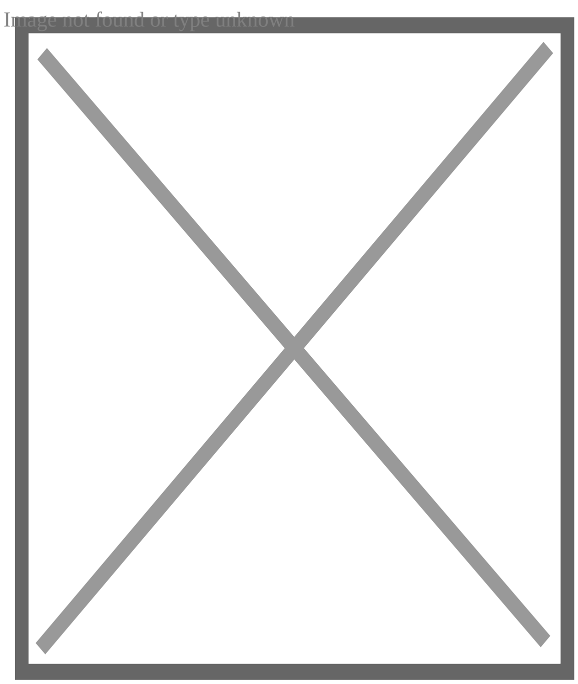


Diagram of the waste hierarchy

Waste hierarchy

[edit]

The **waste hierarchy** refers to the "3 Rs" **Reduce**, **Reuse** and **Recycle**, which classifies waste management strategies according to their desirability in terms of **waste minimisation**. The waste hierarchy is the bedrock of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of end waste; see: **resource recovery**.[16][17] The waste hierarchy is represented as a pyramid because the basic premise is that policies should promote measures to prevent the generation of waste.

The next step or preferred action is to seek alternative uses for the waste that has been generated, i.e., by re-use. The next is recycling which includes composting. Following this step is material recovery and **waste-to-energy**. The final action is disposal, in landfills or through incineration without **energy recovery**. This last step is the final resort for waste that has not been prevented, diverted, or recovered.[18][*page needed*] The waste hierarchy represents the progression of a product or material through the sequential stages of the pyramid of waste management. The hierarchy represents the latter parts of the life-cycle for each product.[19]

Life-cycle of a product

[**edit**]

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The life-cycle of a product, often referred to as the **product lifecycle**, encompasses several key stages that begin with the design phase and proceed through manufacture, distribution, and primary use. After these initial stages, the product moves through the waste hierarchy's stages of reduce, reuse, and recycle. Each phase in this lifecycle presents unique opportunities for policy intervention, allowing stakeholders to rethink the necessity of the product, redesign it to minimize its waste potential, and extend its useful life.

During the design phase, considerations can be made to ensure that products are created with fewer resources, are more durable, and are easier to repair or recycle. This stage is critical for embedding sustainability into the product from the outset. Designers can select materials that have lower environmental impacts and create products that require less energy and resources to produce.

Manufacturing offers another crucial point for reducing waste and conserving resources. Innovations in production processes can lead to more efficient use of materials and energy, while also minimizing the generation of by-products and emissions. Adopting cleaner production techniques and improving manufacturing efficiency can significantly reduce the environmental footprint of a product.

Distribution involves the logistics of getting the product from the manufacturer to the consumer. Optimizing this stage can involve reducing packaging, choosing more sustainable transportation methods, and improving supply chain efficiencies to lower the overall environmental impact. Efficient logistics planning can also help in reducing fuel consumption and greenhouse gas emissions associated with the transport of goods.

The primary use phase of a product's lifecycle is where consumers interact with the product. Policies and practices that encourage responsible use, regular maintenance, and the proper functioning of products can extend their lifespan, thus reducing the need for frequent replacements and decreasing overall waste.

Once the product reaches the end of its primary use, it enters the waste hierarchy's stages. The first stage, reduction, involves efforts to decrease the volume and toxicity of waste generated. This can be achieved by encouraging consumers to buy less, use products more efficiently, and choose items with minimal packaging.

The reuse stage encourages finding alternative uses for products, whether through donation, resale, or repurposing. Reuse extends the life of products and delays their entry into the waste stream.

Recycling, the final preferred stage, involves processing materials to create new products, thus closing the loop in the material lifecycle. Effective recycling programs can significantly reduce the need for virgin materials and the environmental impacts associated with extracting and processing those materials.

Product life-cycle analysis (LCA) is a comprehensive method for evaluating the environmental impacts associated with all stages of a product's life. By systematically assessing these impacts, LCA helps identify opportunities to improve environmental performance and resource efficiency. Through optimizing product designs, manufacturing processes, and end-of-life management, LCA aims to maximize the use of the world's limited resources and minimize the unnecessary generation of waste.

In summary, the product lifecycle framework underscores the importance of a holistic approach to product design, use, and disposal. By considering each stage of the lifecycle and implementing policies and practices that promote sustainability, it is possible to significantly reduce the environmental impact of products and contribute to a more sustainable future.

Resource efficiency

[**edit**]
Main article: **resource efficiency**

Resource efficiency reflects the understanding that global economic growth and development can not be sustained at current production and consumption patterns. Globally, humanity extracts more resources to produce goods than the planet can replenish. Resource efficiency is the reduction of the environmental impact from the production and consumption of these goods, from final raw material extraction to the last use and disposal.

Polluter-pays principle

[**edit**]

The **polluter-pays principle** mandates that the polluting parties pay for the impact on the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the unrecoverable materials.**[20]**

History

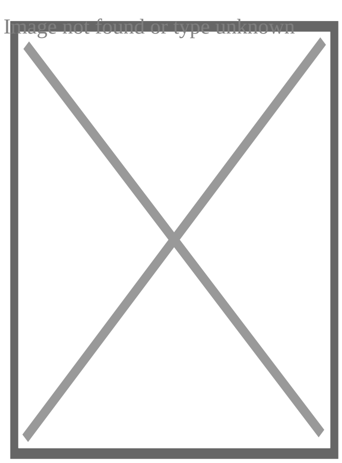
[**edit**]
Main article: **History of waste management**

Throughout most of history, the amount of **waste** generated by humans was insignificant due to low levels of **population density** and **exploitation of natural resources**. Common waste produced during pre-modern times was mainly ashes and human **biodegradable waste**, and these were released back into the ground locally, with minimum **environmental impact**. Tools made out of **wood** or **metal** were generally reused or passed down through the generations.

However, some civilizations have been more profligate in their waste output than others. In particular, the **Maya** of **Central America** had a fixed monthly ritual, in which the people of the village would gather together and burn their rubbish in large dumps.**[21]**[***irrelevan***

Modern era

[**edit**]

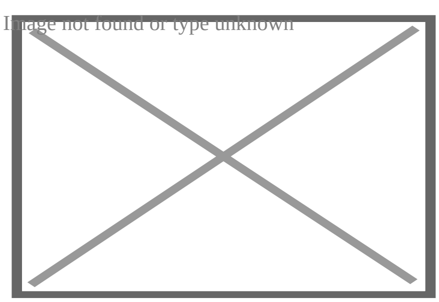


Edwin Chadwick's 1842 report *The Sanitary Condition of the Labouring Population* was influential in securing the passage of the first legislation aimed at waste clearance and disposal.

Following the onset of the Industrial Revolution, industrialisation, and the sustained urban growth of large population centres in England, the buildup of waste in the cities caused a rapid deterioration in levels of sanitation and the general quality of urban life. The streets became choked with filth due to the lack of waste clearance regulations.[22] Calls for the establishment of municipal authority with waste removal powers occurred as early as 1751, when Corbyn Morris in London proposed that "... as the preservation of the health of the people is of great importance, it is proposed that the cleaning of this city, should be put under one uniform public management, and all the filth be...conveyed by the Thames to proper distance in the country".[23]

However, it was not until the mid-19th century, spurred by increasingly devastating cholera outbreaks and the emergence of a public health debate that the first legislation on the issue emerged. Highly influential in this new focus was the report *The Sanitary Condition of the Labouring Population* in 1842[24] of the social reformer, Edwin Chadwick, in which he argued for the importance of adequate waste removal and management facilities to improve the health and wellbeing of the city's population.

In the UK, the Nuisance Removal and Disease Prevention Act of 1846 began what was to be a steadily evolving process of the provision of regulated waste management in London.[25] The Metropolitan Board of Works was the first citywide authority that centralized sanitation regulation for the rapidly expanding city, and the Public Health Act 1875 made it compulsory for every household to deposit their weekly waste in "moveable receptacles" for disposal—the first concept for a dustbin.[26] In the Ashanti Empire by the 19th century, there existed a Public Works Department that was responsible for sanitation in Kumasi and its suburbs. They kept the streets clean daily and commanded civilians to keep their compounds clean and weeded.[27]



Manlove, Alliott & Co. Ltd. 1894 destructor furnace. The use of incinerators for waste disposal became popular in the late 19th century.

The dramatic increase in waste for disposal led to the creation of the first incineration plants, or, as they were then called, "destructors". In 1874, the first incinerator was built in Nottingham by Manlove, Alliott & Co. Ltd. to the design of Alfred Fryer.[23]

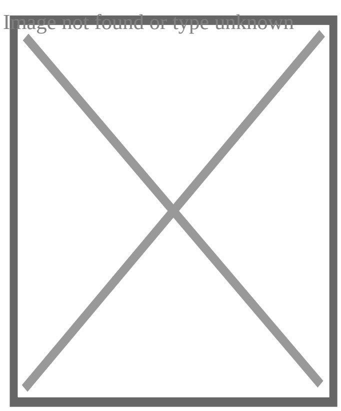
However, these were met with opposition on account of the large amounts of ash they produced and which wafted over the neighbouring areas.[28]

Similar municipal systems of waste disposal sprung up at the turn of the 20th century in other large cities of **Europe** and **North America**. In 1895, **New York City** became the first U.S. city with public-sector garbage management.[26]

Early **garbage removal trucks** were simply open-bodied **dump trucks** pulled by a team of horses. They became motorized in the early part of the 20th century and the first closed-body trucks to eliminate odours with a dumping lever mechanism were introduced in the 1920s in Britain.[29] These were soon equipped with 'hopper mechanisms' where the scooper was loaded at floor level and then hoisted mechanically to deposit the waste in the truck. The **Garwood Load Packer** was the first truck in 1938, to incorporate a hydraulic compactor.

Waste handling and transport

[**edit**]
Main articles: **Waste collection vehicle**, **Waste collector**, and **Waste sorting**



Moulded plastic, wheeled waste bin in **Berkshire**, England

Waste collection methods vary widely among different countries and regions. Domestic waste collection services are often provided by local government authorities, or by private companies for industrial and commercial waste. Some areas, especially those in less developed countries, do not have formal waste-collection systems.

Waste handling and transport

[**edit**]

Curbside collection is the most common method of disposal in most European countries, Canada, New Zealand, the United States, and many other parts of the developed world in which waste is collected at regular intervals by specialised trucks. This is often associated with curb-side waste segregation. In rural areas, waste may need to be taken to a transfer station. Waste collected is then transported to an appropriate disposal facility. In some areas, vacuum collection is used in which waste is transported from the home or commercial premises by vacuum along small bore tubes. Systems are in use in Europe and North America.

Main article: **Automated vacuum collection**

In some jurisdictions, unsegregated waste is collected at the curb-side or from waste transfer stations and then sorted into recyclables and unusable waste. Such systems are capable of sorting large volumes of solid waste, salvaging recyclables, and turning the rest into bio-gas and soil conditioners. In **San Francisco**, the local government established its *Mandatory Recycling and Composting Ordinance* in support of its goal of "Zero waste by 2020", requiring everyone in the city to keep recyclables and compostables out of the landfill. The three streams are collected with the curbside "Fantastic 3" bin system – blue for recyclables, green for compostables, and black for landfill-bound materials – provided to residents and businesses and serviced by San Francisco's sole refuse hauler, Recology. The city's "Pay-As-You-Throw" system charges customers by the volume of landfill-bound materials, which provides a financial incentive to separate recyclables and compostables from other discards. The city's Department of the Environment's Zero Waste Program has led the city to achieve 80% diversion, the highest diversion rate in North America.**[30]** Other businesses such as **Waste Industries** use a variety of colors to distinguish between trash and recycling cans. In addition, in some areas of the world the disposal of municipal solid waste can cause environmental strain due to official not having benchmarks that help measure the **environmental sustainability** of certain practices.**[31]**

Waste segregation

[**edit**]
Further information: **Waste separation**

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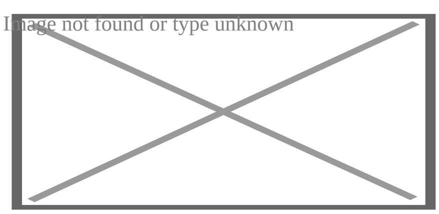

Recycling point at the GdaÃ…â€žsk University of Technology

This is the separation of wet waste and dry waste. The purpose is to recycle dry waste easily and to use wet waste as compost. When segregating waste, the amount of waste that gets landfilled reduces considerably, resulting in lower levels of air and water pollution. Importantly, waste segregation should be based on the type of waste and the most appropriate treatment and disposal. This also makes it easier to apply different processes to the waste, like composting, recycling, and incineration. It is important to practice waste management and segregation as a community. One way to practice waste management is to ensure there is awareness. The process of waste segregation should be explained to the community.[32]

Segregated waste is also often cheaper to dispose of because it does not require as much manual sorting as mixed waste. There are a number of important reasons why waste segregation is important such as legal obligations, cost savings, and protection of human health and the environment. Institutions should make it as easy as possible for their staff to correctly segregate their waste. This can include labelling, making sure there are enough accessible bins, and clearly indicating why segregation is so important.[33] Labeling is especially important when dealing with nuclear waste due to how much harm to human health the excess products of the nuclear cycle can cause.[34]

Hazards of waste management

[edit]

There are multiple facets of waste management that all come with hazards, both for those around the disposal site and those who work within waste management. Exposure to waste of any kind can be detrimental to the health of the individual, primary conditions that worsen with exposure to waste are **asthma** and **tuberculosis**.[35] The exposure to waste on an average individual is highly dependent on the conditions around them, those in less developed or lower income areas are more susceptible to the effects of waste product, especially though chemical waste.[36] The range of hazards due to waste is extremely large and covers every type of waste, not only chemical. There are many different guidelines to follow for disposing different types of waste.[37]

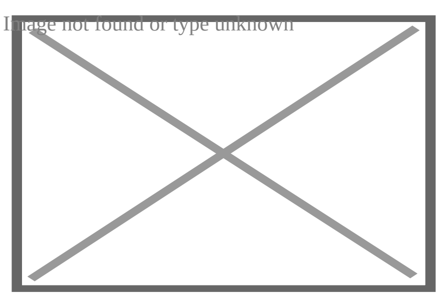

Diagram showing the multiple ways that incineration is hazardous to the population

The hazards of **incineration** are a large risk to many variable communities, including underdeveloped countries and countries or cities with little space for landfills or alternatives. Burning waste is an easily accessible option for many people around the globe, it has even been encouraged by the **World Health Organization** when there is no other option.[38] Because burning waste is rarely paid attention to, its effects go unnoticed. The release of hazardous materials and CO_2 when waste is burned is the largest hazard with incineration.[39]

Financial models

[**edit**]

In most developed countries, domestic waste disposal is funded from a national or local tax which may be related to income, or property values. Commercial and industrial waste disposal is typically charged for as a commercial service, often as an integrated charge which includes disposal costs. This practice may encourage disposal contractors to opt for the cheapest disposal option such as landfill rather than the environmentally best solution such as re-use and recycling.

Financing solid waste management projects can be overwhelming for the city government, especially if the government see it as an important service they should render to the citizen. Donors and grants are a funding mechanism that is dependent on the interest of the donor organization. As much as it is a good way to develop a city's waste management infrastructure, attracting and utilizing grants is solely reliant on what the donor considers important. Therefore, it may be a challenge for a city government to dictate how the funds should be distributed among the various aspect of waste management.[40]

An example of a country that enforces a waste tax is **Italy**. The tax is based on two rates: fixed and variable. The fixed rate is based on the size of the house while the variable is determined by the number of people living in the house.[41]

The World Bank finances and advises on solid waste management projects using a diverse suite of products and services, including traditional loans, results-based financing, development policy financing, and technical advisory. World Bank-financed waste management projects usually address the entire lifecycle of waste right from the point of generation to collection and transportation, and finally treatment and disposal.[6]

Disposal methods

[**edit**]

Landfill

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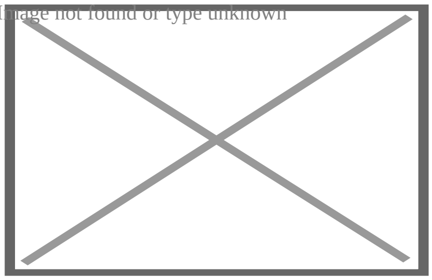
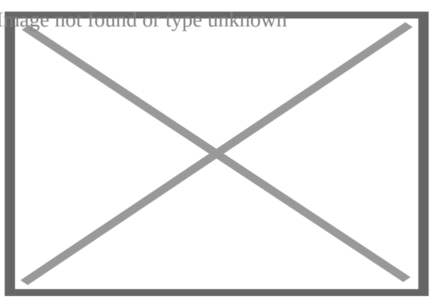
This section is an excerpt from **Landfill**.[**edit**]



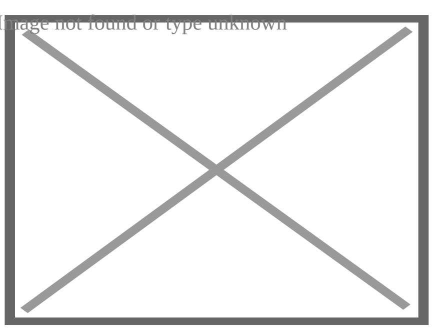
A landfill in **Ã…Â•ubna**, Poland in 1999

A **landfill[a]** is a site for the disposal of **waste** materials. It is the oldest and most common form of **waste disposal**, although the systematic burial of waste with daily, intermediate and final covers only began in the 1940s. In the past, waste was simply left in piles or thrown into pits (known in **archeology** as **middens**).

Landfills take up a lot of land and pose environmental risks. Some landfill sites are used for waste management purposes, such as temporary storage, consolidation and transfer, or for various stages of processing waste material, such as sorting, treatment, or recycling. Unless they are stabilized, landfills may undergo severe shaking or **soil liquefaction** of the ground during an **earthquake**. Once full, the area over a landfill site may be **reclaimed** for other uses.



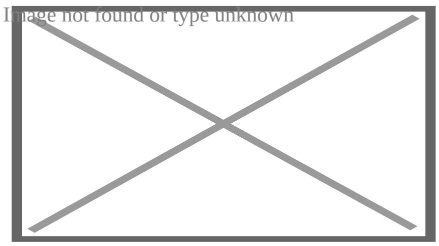
A **landfill compaction vehicle** in action.



Spittelau incineration plant in **Vienna**

Incineration

[**edit**]
Main article: **Incineration**



Tarastejärvi Incineration Plant in **Tampere**, Finland

Incineration is a disposal method in which solid organic wastes are subjected to combustion so as to convert them into residue and gaseous products. This method is useful for the disposal of both **municipal solid waste** and solid residue from wastewater treatment. This process reduces the volume of solid waste by 80 to 95 percent.**[42]** Incineration and other high-temperature waste treatment systems are sometimes described as "**thermal treatment**". Incinerators convert waste materials into **heat**, **gas**, **steam**, and **ash**.

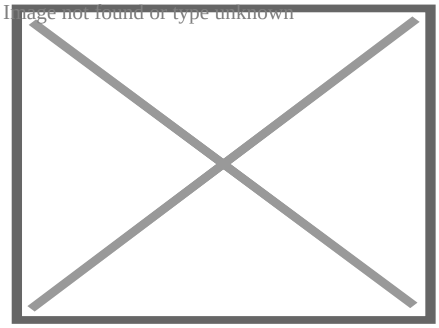
Incineration is carried out both on a small scale by individuals and on a large scale by industry. It is used to dispose of solid, liquid, and gaseous waste. It is recognized as a practical method of disposing of certain **hazardous waste** materials (such as biological **medical waste**). Incineration is a controversial method of waste disposal, due to issues such as the emission of gaseous **pollutants** including substantial quantities of **carbon dioxide**.

Incineration is common in countries such as **Japan** where land is more scarce, as the facilities generally do not require as much area as landfills. **Waste-to-energy** (WtE) or energy-from-waste (EfW) are broad terms for facilities that burn waste in a furnace or boiler to generate heat, steam, or electricity. Combustion in an incinerator is not always perfect and there have been concerns about pollutants in gaseous emissions from incinerator stacks. Particular concern has focused on some very persistent **organic compounds** such as **dioxins**, **furans**, and **PAHs**, which may be created and which may have serious environmental consequences and some heavy metals such as **mercury[43]** and **lead** which can be volatilised in the combustion process..

Recycling

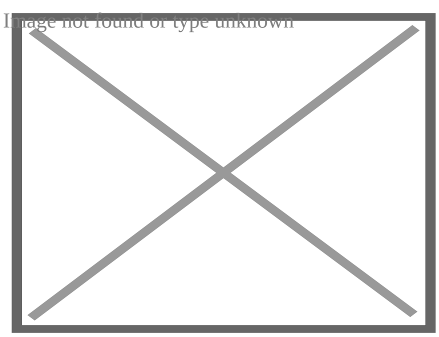
[edit]

Main article: Recycling



Steel crushed and baled for recycling

Recycling is a resource recovery practice that refers to the collection and reuse of waste materials such as empty beverage containers. This process involves breaking down and reusing materials that would otherwise be gotten rid of as trash. There are numerous benefits of recycling, and with so many new technologies making even more materials recyclable, it is possible to clean up the Earth.[44] Recycling not only benefits the environment but also positively affects the economy. The materials from which the items are made can be made into new products.[45] Materials for recycling may be collected separately from general waste using dedicated bins and collection vehicles, a procedure called kerbside collection. In some communities, the owner of the waste is required to separate the materials into different bins (e.g. for paper, plastics, metals) prior to its collection. In other communities, all recyclable materials are placed in a single bin for collection, and the sorting is handled later at a central facility. The latter method is known as "single-stream recycling".[46][47]



A recycling point in Lappajärvi, Finland

The most common consumer products recycled include aluminium such as beverage cans, copper such as wire, steel from food and aerosol cans, old steel furnishings or equipment, rubber tyres, polyethylene and PET bottles, glass bottles and jars, paperboard cartons, newspapers, magazines and light paper, and corrugated fiberboard boxes.

PVC, **LDPE**, **PP**, and **PS** (see **resin identification code**) are also recyclable. These items are usually composed of a single type of material, making them relatively easy to recycle into new products. The recycling of complex products (such as computers and electronic equipment) is more difficult, due to the additional dismantling and separation required.

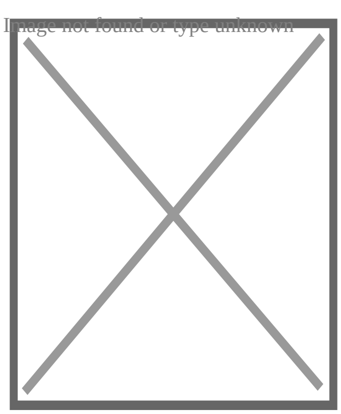
The type of material accepted for recycling varies by city and country. Each city and country has different recycling programs in place that can handle the various types of recyclable materials. However, certain variation in acceptance is reflected in the resale value of the material once it is reprocessed. Some of the types of recycling include waste paper and cardboard, **plastic recycling**, **metal recycling**, electronic devices, **wood recycling**, **glass recycling**, cloth and textile and so many more.**[48]** In July 2017, the Chinese government announced an import ban of 24 categories of recyclables and **solid waste**, including **plastic**, textiles and mixed paper, placing tremendous impact on developed countries globally, which exported directly or indirectly to China.**[49]**

Re-use

[**edit**]

Biological reprocessing

[**edit**]
Main articles: **Composting**, **Home composting**, **Anaerobic digestion**, and **Microbial fuel cell**



An active **compost** heap

Recoverable materials that are organic in nature, such as **plant material**, food scraps, and paper products, can be recovered through **composting** and digestion processes to **decompose** the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity and heat (CHP/cogeneration) maximising efficiencies. There are different types of composting and digestion methods and technologies. They vary in complexity from simple home compost heaps to large-scale industrial digestion of mixed domestic waste. The different methods of biological decomposition are classified as aerobic or anaerobic methods. Some methods use the hybrids of these two methods. The anaerobic digestion of the organic fraction of solid waste is more environmentally effective than landfill, or incineration.[50] The intention of biological processing in waste management is to control and accelerate the natural process of decomposition of organic matter. (See resource recovery).

Energy recovery

[edit]
Main article: Waste-to-energy

Energy recovery from waste is the conversion of non-recyclable waste materials into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolyzation, anaerobic digestion, and landfill gas recovery.[51] This process is often called waste-to-energy. Energy recovery from waste is part of the non-hazardous waste management hierarchy. Using energy recovery to convert non-recyclable waste materials into electricity and heat, generates a renewable energy source and can reduce carbon emissions by offsetting the need for energy from fossil sources as well as reduce methane generation from landfills.[51] Globally, waste-to-energy accounts for 16% of waste management.[52]

The energy content of waste products can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel. Thermal treatment ranges from using waste as a fuel source for cooking or heating and the use of the gas fuel (see above), to fuel for boilers to generate steam and electricity in a turbine. Pyrolysis and gasification are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability. The process usually occurs in a sealed vessel under high pressure. Pyrolysis of solid waste converts the material into solid, liquid, and gas products. The liquid and gas can be burnt to produce energy or refined into other chemical products (chemical refinery). The solid residue (char) can be further refined into products such as activated carbon. Gasification and advanced Plasma arc gasification are used to convert organic materials directly into a synthetic gas (syngas) composed of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam. An alternative to pyrolysis is high-temperature and pressure supercritical water decomposition (hydrothermal monophasic oxidation).

Pyrolysis

[edit]
Main article: Pyrolysis

Pyrolysis is often used to convert many types of domestic and industrial residues into a recovered fuel. Different types of waste input (such as plant waste, food waste, tyres) placed in the pyrolysis process potentially yield an alternative to fossil fuels.[53] Pyrolysis is a process of thermo-chemical decomposition of organic materials by heat in the absence of stoichiometric quantities of oxygen; the decomposition produces various hydrocarbon gases.[54] During pyrolysis, the molecules of an object vibrate at high frequencies to the extent that molecules start breaking down. The rate of pyrolysis increases with temperature. In industrial applications, temperatures are above 430 °C (800 °F).[55]

Slow pyrolysis produces gases and solid charcoal.[56] Pyrolysis holds promise for conversion of waste biomass into useful liquid fuel. Pyrolysis of waste wood and plastics can potentially produce fuel. The solids left from pyrolysis contain metals, glass, sand, and pyrolysis coke which does not convert to gas. Compared to the process of incineration, certain types of pyrolysis processes release less harmful by-products that contain alkali metals, sulphur, and chlorine. However, pyrolysis of some waste yields gases which impact the environment such as HCl and SO_2.[57]

Resource recovery

[edit]
Main article: Resource recovery

Resource recovery is the systematic diversion of waste, which was intended for disposal, for a specific next use.[58] It is the processing of recyclables to extract or recover materials and resources, or convert to energy.[59] These activities are performed at a resource recovery facility.[59] Resource recovery is not only environmentally important, but it is also cost-effective.[60] It decreases the amount of waste for disposal, saves space in landfills, and conserves natural resources.[60]

Resource recovery, an alternative approach to traditional waste management, utilizes life cycle analysis (LCA) to evaluate and optimize waste handling strategies.

Comprehensive studies focusing on mixed municipal solid waste (MSW) have identified a preferred pathway for maximizing resource efficiency and minimizing environmental impact, including effective waste administration and management, source separation of waste materials, efficient collection systems, reuse and recycling of non-organic fractions, and processing of organic material through anaerobic digestion.

As an example of how resource recycling can be beneficial, many items thrown away contain metals that can be recycled to create a profit, such as the components in circuit boards. Wood chippings in pallets and other packaging materials can be recycled into useful products for horticulture. The recycled chips can cover paths, walkways, or arena surfaces.

Application of rational and consistent waste management practices can yield a range of benefits including:

1. Economic – Improving economic efficiency through the means of resource use, treatment, and disposal and creating markets for recycles can lead to efficient practices in the production and consumption of products and materials resulting in valuable materials being recovered for reuse and the potential for new jobs and new business opportunities.
2. Social – By reducing adverse impacts on health through proper waste management practices, the resulting consequences are more appealing to civic communities. Better social advantages can lead to new sources of employment and potentially lift communities out of poverty, especially in some of the developing poorer countries and cities.
3. Environmental – Reducing or eliminating adverse impacts on the environment through reducing, reusing, recycling, and minimizing resource extraction can result in improved air and water quality and help in the reduction of **greenhouse gas emissions**.
4. Inter-generational Equity – Following effective waste management practices can provide subsequent generations a more robust economy, a fairer and more **inclusive society** and a cleaner environment.[18][*page needed*]

Waste valorization

[**edit**]

This section is an excerpt from **Waste valorization**.[**edit**]

Waste valorization, beneficial reuse, beneficial use, value recovery or waste reclamation[61] is the process of **waste** products or **residues** from an economic process being **valorized** (given economic value), by **reuse** or **recycling** in order to create economically useful materials.[62][61][63] The term comes from practices in **sustainable manufacturing** and **economics**, **industrial ecology** and waste management. The term is usually applied in industrial processes where residue from creating or processing one good is used as a raw material or energy feedstock for another industrial process.[61][63] **Industrial wastes** in particular are good candidates for valorization because they tend to be more consistent and predictable than other waste, such as **household waste**.[61][64]

Historically, most industrial processes treated waste products as something to be disposed of, causing **industrial pollution** unless handled properly.[65] However, increased regulation of residual materials and socioeconomic changes, such as the introduction of ideas about **sustainable development** and **circular economy** in the 1990s and 2000s increased focus on industrial practices to **recover these resources** as **value add** materials.[65][66] Academics focus on finding economic value to reduce environmental impact of other industries as well, for example the development of **non-timber forest products** to encourage conservation.

Liquid waste-management

[**edit**]

Liquid waste is an important category of waste management because it is so difficult to deal with. Unlike solid wastes, liquid wastes cannot be easily picked up and removed from an environment. Liquid wastes spread out, and easily pollute other sources of liquid if brought into contact. This type of waste also soaks into objects like soil and groundwater. This in turn carries over to pollute the plants, the animals in the ecosystem, as well as the humans within the area of the pollution.[67]

Industrial wastewater

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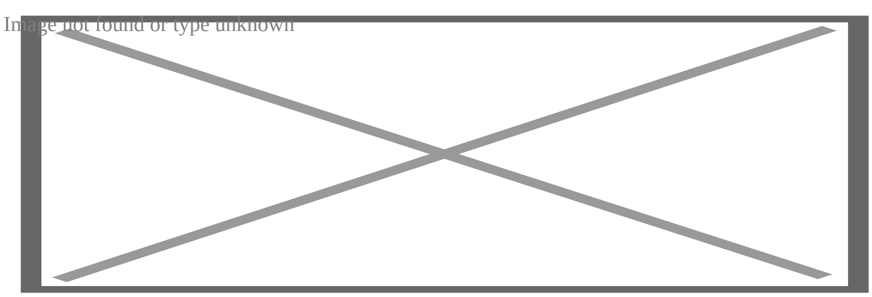
This section is an excerpt from **Industrial wastewater treatment**.[**edit**]



Wastewater from an industrial process can be converted at a treatment plant to solids and treated water for reuse.

Industrial wastewater treatment describes the processes used for **treating wastewater** that is produced by industries as an undesirable by-product. After treatment, the treated industrial wastewater (or effluent) may be reused or released to a **sanitary sewer** or to a **surface water** in the environment. Some industrial facilities generate wastewater that can be treated in **sewage treatment plants**. Most industrial processes, such as **petroleum refineries**, chemical and **petrochemical** plants have their own specialized facilities to treat their wastewaters so that the pollutant concentrations in the treated wastewater comply with the regulations regarding disposal of wastewaters into **sewers** or into rivers, lakes or **oceans**.**[68]**:Ã¢â‚¬Å 1412Ã¢â‚¬Å This applies to industries that generate wastewater with high concentrations of organic matter (e.g. oil and grease), toxic pollutants (e.g. heavy metals, **volatile organic compounds**) or nutrients such as **ammonia**.**[69]**:Ã¢â‚¬Å 180Ã¢â‚¬Å Some industries install a pre-treatment system to remove some pollutants (e.g., toxic compounds), and then discharge the partially treated wastewater to the municipal sewer system.**[70]**:Ã¢â‚¬Å 60Ã¢â‚¬Å

Most industries produce some **wastewater**. Recent trends have been to minimize such production or to recycle treated wastewater within the production process. Some industries have been successful at redesigning their manufacturing processes to reduce or eliminate pollutants.**[71]** Sources of industrial wastewater include battery manufacturing, chemical manufacturing, electric power plants, **food industry**, iron and steel industry, metal working, mines and quarries, nuclear industry, **oil and gas extraction**, **petroleum refining** and **petrochemicals**, pharmaceutical manufacturing, **pulp and paper industry**, smelters, **textile mills**, industrial **oil contamination**, water treatment and **wood preserving**. Treatment processes include brine treatment, solids removal (e.g. chemical precipitation, filtration), oils and grease removal, removal of biodegradable organics, removal of other organics, removal of acids and alkalis, and removal of toxic materials.

Sewage sludge treatment

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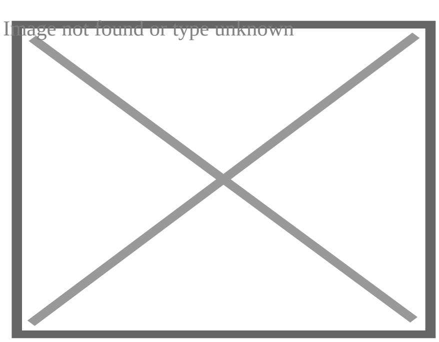
This section is an excerpt from **Sewage sludge treatment**.[**edit**]



Sludge treatment in anaerobic digesters at a sewage treatment plant in Cottbus, Germany

Sewage sludge treatment describes the processes used to manage and dispose of sewage sludge produced during sewage treatment. Sludge treatment is focused on reducing sludge weight and volume to reduce transportation and disposal costs, and on reducing potential health risks of disposal options. Water removal is the primary means of weight and volume reduction, while pathogen destruction is frequently accomplished through heating during thermophilic digestion, composting, or incineration. The choice of a sludge treatment method depends on the volume of sludge generated, and comparison of treatment costs required for available disposal options. Air-drying and composting may be attractive to rural communities, while limited land availability may make aerobic digestion and mechanical dewatering preferable for cities, and economies of scale may encourage energy recovery alternatives in metropolitan areas.

Sludge is mostly water with some amounts of solid material removed from liquid sewage. Primary sludge includes settleable solids removed during primary treatment in primary clarifiers. Secondary sludge is sludge separated in secondary clarifiers that are used in secondary treatment bioreactors or processes using inorganic oxidizing agents. In intensive sewage treatment processes, the sludge produced needs to be removed from the liquid line on a continuous basis because the volumes of the tanks in the liquid line have insufficient volume to store sludge.[72] This is done in order to keep the treatment processes compact and in balance (production of sludge approximately equal to the removal of sludge). The sludge removed from the liquid line goes to the sludge treatment line. Aerobic processes (such as the activated sludge process) tend to produce more sludge compared with anaerobic processes. On the other hand, in extensive (natural) treatment processes, such as ponds and constructed wetlands, the produced sludge remains accumulated in the treatment units (liquid line) and is only removed after several years of operation.[73]

Sludge treatment options depend on the amount of solids generated and other site-specific conditions. Composting is most often applied to small-scale plants with aerobic digestion for mid-sized operations, and anaerobic digestion for the larger-scale operations. The sludge is sometimes passed through a so-called pre-thickener which de-waters the sludge. Types of pre-thickeners include centrifugal sludge thickeners,[74] rotary drum sludge thickeners and belt filter presses.[75] Dewatered sludge may be incinerated or transported offsite for disposal in a landfill or use as an agricultural soil amendment.[76]

Energy may be recovered from sludge through methane gas production during anaerobic digestion or through incineration of dried sludge, but energy yield is often insufficient to evaporate sludge water content or to power blowers, pumps, or centrifuges required for dewatering. Coarse primary solids and secondary sewage sludge may include toxic chemicals removed from liquid sewage by sorption onto solid particles in clarifier sludge. Reducing sludge volume may increase the **concentration** of some of these toxic chemicals in the sludge.**[77]**

Avoidance and reduction methods

[**edit**]
Main article: **Waste minimization**

An important method of waste management is the prevention of waste material being created, also known as **waste reduction**. Waste Minimization is reducing the quantity of hazardous wastes achieved through a thorough application of innovative or alternative procedures.**[78]** Methods of avoidance include reuse of second-hand products, repairing broken items instead of buying new ones, designing products to be refillable or reusable (such as cotton instead of plastic shopping bags), encouraging consumers to avoid using **disposable products** (such as disposable **cutlery**), removing any food/liquid remains from cans and packaging,**[79]** and designing products that use less material to achieve the same purpose (for example, lightweighting of beverage cans).**[80]**

International waste trade

[**edit**]

This section is an excerpt from **Global waste trade**.[**edit**]

The **global waste trade** is the **international trade** of **waste** between countries for further **treatment**, **disposal**, or **recycling**. Toxic or **hazardous wastes** are often imported by **developing countries** from developed countries.

The **World Bank** Report *What a Waste: A Global Review of Solid Waste Management*, describes the amount of solid waste produced in a given country. Specifically, countries which produce more solid waste are more economically developed and more industrialized.**[81]** The report explains that "Generally, the higher the economic development and rate of urbanization, the greater the amount of solid waste produced."**[81]** Therefore, countries in the **Global North**, which are more economically developed and urbanized, produce more solid waste than **Global South** countries.**[81]**

Current international trade flows of waste follow a pattern of waste being produced in the Global North and being exported to and disposed of in the Global South. Multiple factors affect which countries produce waste and at what magnitude, including geographic location, degree of **industrialization**, and level of integration into the global economy.

Numerous scholars and researchers have linked the sharp increase in waste trading and the negative impacts of waste trading to the prevalence of **neoliberal economic policy**.**[82][83][84][85]** With the major economic transition towards neoliberal economic policy in the 1980s, the shift towards **"free-market"** policy has facilitated the sharp increase in the global waste trade. **Henry Giroux**, Chair of Cultural Studies at McMaster University, gives his definition of neoliberal economic policy:

> "Neoliberalism ...removes economics and markets from the discourse of social obligations and social costs. ...As a policy and political project, neoliberalism is wedded to the privatization of public services, selling off of state functions, deregulation of finance and labor, elimination of the welfare state and unions, liberalization of trade in goods and capital investment, and the marketization and **commodification** of society."[86]

Given this economic platform of privatization, neoliberalism is based on expanding free-trade agreements and establishing open-borders to international trade markets. **Trade liberalization**, a **neoliberal** economic policy in which trade is completely **deregulated**, leaving no tariffs, quotas, or other restrictions on international trade, is designed to further developing countries' economies and integrate them into the global economy. Critics claim that although free-market trade liberalization was designed to allow any country the opportunity to reach economic success, the consequences of these policies have been devastating for Global South countries, essentially crippling their economies in a servitude to the Global North.[87] Even supporters such as the **International Monetary Fund**, "progress of integration has been uneven in recent decades."[88] Specifically, developing countries have been targeted by trade liberalization policies to import waste as a means of **economic expansion**.[89] The guiding neoliberal economic policy argues that the way to be integrated into the global economy is to participate in trade liberalization and exchange in international trade markets.[89] Their claim is that smaller countries, with less infrastructure, less wealth, and less manufacturing ability, should take in hazardous wastes as a way to increase profits and stimulate their economies.[89]

Challenges in developing countries

[**edit**]

Areas with developing economies often experience exhausted waste collection services and inadequately managed and uncontrolled dumpsites. The problems are worsening.[18][*page needed*][90] Problems with governance complicate the situation. Waste management in these countries and cities is an ongoing challenge due to weak institutions, chronic under-resourcing, and rapid urbanization.[18][*page needed*] All of these challenges, along with the lack of understanding of different factors that contribute to the hierarchy of waste management, affect the treatment of waste.[91][*full citation needed*]

In developing countries, waste management activities are usually carried out by the poor, for their survival. It has been estimated that 2% of the population in Asia, Latin America, and Africa are dependent on waste for their livelihood. Family organized, or individual manual scavengers are often involved with waste management practices with very little supportive network and facilities with increased risk of health effects. Additionally, this practice prevents their children from further education. The participation level of most citizens in waste management is very low, residents in urban areas are not actively involved in the process of waste management.[92]

Technologies

[edit]
See also: **Environmental monitoring**, **Border control**, and **Materials recovery facility**

Traditionally, the **waste management industry** has been a late adopter of new technologies such as **RFID** (Radio Frequency Identification) tags, GPS and integrated software packages which enable better quality data to be collected without the use of estimation or manual data entry.[93] This technology has been used widely by many organizations in some industrialized countries. Radiofrequency identification is a tagging system for automatic identification of recyclable components of municipal solid waste streams.[94]

Smart waste management has been implemented in several cities, including San Francisco, Varde or Madrid.[95] Waste containers are equipped with **level sensors**. When the container is almost full, the sensor warns the pickup truck, which can thus trace its route servicing the fullest containers and skipping the emptiest ones.[96]

Statistics and trends

[edit]

The "Global Waste Management Outlook 2024," supported by the Environment Fund - **UNEP**'s core financial fund, and jointly published with the **International Solid Waste Association** (ISWA), provides a comprehensive update on the trajectory of global waste generation and the escalating costs of waste management since 2018. The report predicts municipal solid waste to rise from 2.3 billion tonnes in 2023 to 3.8 billion tonnes by 2050. The direct global cost of waste management was around USD 252 billion in 2020, which could soar to USD 640.3 billion annually by 2050 if current practices continue without reform. Incorporating life cycle assessments, the report contrasts scenarios from maintaining the status quo to fully adopting **zero waste** and **circular economy** principles. It indicates that effective waste prevention and management could cap annual costs at USD 270.2 billion by 2050, while a circular economy approach could transform the sector into a net positive, offering a potential annual gain of USD 108.5 billion. To prevent the direst outcomes, the report calls for immediate action across multiple sectors, including development banks, governments, municipalities, producers, retailers, and citizens, providing targeted strategies for waste reduction and improved management practices.[97]

Waste generated by country, 2020[98]

Country	GDP (USD)	Population	Total waste generated (t)	Share of population living in urban areas	Waste generated per capita (kg/person)
Aruba	35,563	103,187	88,132	44%	854
Afghanistan	2,057	34,656,032	5,628,525	26%	162
Angola	8,037	25,096,150	4,213,644	67%	168
Albania	13,724	2,854,191	1,087,447	62%	381
Andorra	43,712	82,431	43,000	88%	522
United Arab Emirates	67,119	9,770,529	5,617,682	87%	575
Argentina	23,550	42,981,516	17,910,550	92%	417
Armenia	11,020	2,906,220	492,800	63%	170
American Samoa	11,113	55,599	18,989	87%	342
Antigua and Barbuda	17,966	96,777	30,585	24%	316
Australia	47,784	23,789,338	13,345,000	86%	561
Austria	56,030	8,877,067	5,219,716	59%	588
Azerbaijan	14,854	9,649,341	2,930,349	56%	304
Burundi	840	6,741,569	1,872,016	14%	278
Belgium	51,915	11,484,055	4,765,883	98%	415
Benin	2,227	5,521,763	685,936	48%	124
Burkina Faso	1,925	18,110,624	2,575,251	31%	142
Bangladesh	3,196	155,727,056	14,778,497	38%	95
Bulgaria	22,279	7,025,037	2,859,190	76%	407
Bahrain	47,938	1,425,171	951,943	90%	668
Bahamas	35,400	386,838	264,000	83%	682
Bosnia and Herzegovina	12,671	3,535,961	1,248,718	49%	353
Belarus	18,308	9,489,616	4,280,000	79%	451
Belize	7,259	359,288	101,379	46%	282
Bermuda	80,982	64,798	82,000	100%	1,265
Bolivia	7,984	10,724,705	2,219,052	70%	207

Brazil	14,596	208,494,896	79,069,584	87%	379
Barbados	15,445	280,601	174,815	31%	623
Brunei	60,866	423,196	216,253	78%	511
Bhutan	6,743	686,958	111,314	42%	162
Botswana	14,126	2,014,866	210,854	71%	105
Central African Republic	823	4,515,392	1,105,983	42%	245
Canada	47,672	35,544,564	25,103,034	82%	706
Switzerland	68,394	8,574,832	6,079,556	74%	709
Channel Islands	46,673	164,541	178,933	31%	1,087
Chile	20,362	16,829,442	6,517,000	88%	387
China	16,092	1,400,050,048	395,081,376	61%	282
Côte d'Ivoire	3,661	20,401,332	4,440,814	52%	218
Cameroon	3,263	21,655,716	3,270,617	58%	151
Democratic Republic of the Congo	1,056	78,736,152	14,385,226	46%	183
Republic of the Congo	4,900	2,648,507	451,200	68%	170
Colombia	12,523	46,406,648	12,150,120	81%	262
Comoros	2,960	777,424	91,013	29%	117
Cape Verde	6,354	513,979	132,555	67%	258
Costa Rica	18,169	4,757,575	1,460,000	81%	307
Cuba	12,985	11,303,687	2,692,692	77%	238
Curaçao	27,504	153,822	24,704	89	161
Cayman Islands	66,207	59,172	60,000	100%	1,014
Cyprus	39,545	1,198,575	769,485	67%	642
Germany	53,785	83,132,800	50,627,876	77%	609
Djibouti	6,597	746,221	114,997	78%	154
Dominica	11,709	72,400	13,176	71%	182
Denmark	57,821	5,818,553	4,910,859	88%	844
Dominican Republic	15,328	10,528,394	4,063,910	83%	386
Algeria	11,826	40,606,052	12,378,740	74%	305
Ecuador	11,896	16,144,368	5,297,211	64%	328

Egypt	10,301	87,813,256	21,000,000	43%	239
Eritrea	1,715	4,474,690	726,957	41%	162
Spain	40,986	47,076,780	22,408,548	81%	476
Estonia	36,956	1,326,590	489,512	69%	369
Ethiopia	1,779	99,873,032	6,532,787	22%	65
Finland	48,814	5,520,314	3,124,498	86%	566
Fiji	10,788	867,086	189,390	57%	218
France	46,110	67,059,888	36,748,820	81%	548
Faroe Islands	44,403	48,842	61,000	42%	1,249
Federated States of Micronesia	3,440	104,937	26,040	23%	248
Gabon	18,515	1,086,137	238,102	90%	219
United Kingdom	46,290	66,460,344	30,771,140	84%	463
Georgia	12,605	3,717,100	800,000	59%	215
Ghana	3,093	21,542,008	3,538,275	57%	164
Gibraltar	43,712	33,623	16,954	100%	504
Guinea	1,623	8,132,552	596,911	37%	73
Gambia	2,181	1,311,349	193,441	63%	148
Guinea-Bissau	1,800	1,770,526	289,514	44%	164
Equatorial Guinea	24,827	1,221,490	198,443	73%	162
Greece	30,465	10,716,322	5,615,353	80%	524
Grenada	13,208	105,481	29,536	37%	280
Greenland	43,949	56,905	50,000	87%	879
Guatemala	8,125	16,252,429	2,756,741	52%	170
Guam	59,075	159,973	141,500	95%	885
Guyana	9,812	746,556	179,252	27%	240
Hong Kong	57,216	7,305,700	5,679,816	100%	777
Honduras	5,396	9,112,867	2,162,028	58%	237
Croatia	28,829	4,067,500	1,810,038	58%	445
Haiti	2,953	10,847,334	2,309,852	57%	213
Hungary	32,643	9,769,949	3,780,970	72%	387
Indonesia	10,531	261,115,456	65,200,000	57%	250
Isle of Man	44,204	80,759	50,551	53%	626

India	6,497	1,352,617,344	189,750,000	35%	140
Ireland	83,389	4,867,316	2,910,655	64%	598
Iran	14,536	80,277,424	17,885,000	76%	223
Iraq	10,311	36,115,648	13,140,000	71%	364
Iceland	55,274	343,400	225,270	94%	656
Israel	37,688	8,380,100	5,400,000	93%	644
Italy	42,420	60,297,396	30,088,400	71%	499
Jamaica	9,551	2,881,355	1,051,695	56%	365
Jordan	10,413	8,413,464	2,529,997	91%	301
Japan	41,310	126,529,104	42,720,000	92%	338
Kazakhstan	22,703	16,791,424	4,659,740	58%	278
Kenya	3,330	41,350,152	5,595,099	28%	135
Kyrgyzstan	4,805	5,956,900	1,113,300	37%	187
Cambodia	3,364	15,270,790	1,089,000	24%	71
Kiribati	2,250	114,395	35,724	56%	312
Saint Kitts and Nevis	25,569	54,288	32,892	31%	606
South Korea	42,105	51,606,632	20,452,776	81%	396
Kuwait	58,810	2,998,083	1,750,000	100%	584
Laos	6,544	6,663,967	351,900	36%	53
Lebanon	16,967	5,603,279	2,040,000	89%	364
Liberia	1,333	3,512,932	564,467	52%	161
Libya	8,480	6,193,501	2,147,596	81%	347
Saint Lucia	14,030	177,206	77,616	19%	438
Liechtenstein	45,727	36,545	32,382	14%	886
Sri Lanka	12,287	21,203,000	2,631,650	19%	124
Lesotho	1,979	1,965,662	73,457	29%	37
Lithuania	37,278	2,786,844	1,315,390	68%	472
Luxembourg	114,323	619,896	490,338	91%	791
Latvia	30,982	1,912,789	839,714	68%	439
Macau	117,336	612,167	377,942	100%	617
Morocco	6,915	34,318,080	6,852,000	64%	200
Monaco	43,712	37,783	46,000	100%	1,217
Moldova	10,361	3,554,108	3,981,200	43%	1,120
Madagascar	1,566	24,894,552	3,768,759	39%	151
Maldives	17,285	409,163	211,506	41%	517

Mexico	19,332	125,890,952	53,100,000	81%	422
Marshall Islands	3,629	52,793	8,614	78%	163
North Macedonia	16,148	2,082,958	626,970	58%	301
Mali	2,008	16,006,670	1,937,354	44%	121
Malta	43,708	502,653	348,841	95%	694
Myanmar	1,094	46,095,464	4,677,307	31%	101
Montenegro	20,753	622,227	329,780	67%	530
Mongolia	10,940	3,027,398	2,900,000	69%	958
Northern Mariana Islands	60,956	54,036	32,761	92%	606
Mozambique	1,217	27,212,382	2,500,000	37%	92
Mauritania	4,784	3,506,288	454,000	55%	129
Mauritius	20,647	1,263,473	438,000	41%	347
Malawi	999	16,577,147	1,297,844	17%	78
Malaysia	23,906	30,228,016	12,982,685	77%	429
Namibia	6,153	1,559,983	256,729	52%	165
New Caledonia	57,330	278,000	108,157	72%	389
Niger	1,038	8,842,415	1,865,646	17%	211
Nigeria	4,690	154,402,176	27,614,830	52%	179
Nicaragua	4,612	5,737,723	1,528,816	59%	266
Netherlands	56,849	17,332,850	8,805,088	92%	508
Norway	64,962	5,347,896	4,149,967	83%	776
Nepal	2,902	28,982,772	1,768,977	21%	61
Nauru	11,167	13,049	6,192	100%	475
New Zealand	41,857	4,692,700	3,405,000	87%	726
Oman	30,536	3,960,925	1,734,885	86%	438
Pakistan	4,571	193,203,472	30,760,000	37%	159
Panama	28,436	3,969,249	1,472,262	68%	371
Peru	11,877	30,973,354	8,356,711	78%	270
Philippines	7,705	103,320,224	14,631,923	47%	142
Palau	18,275	21,503	9,427	81%	438
Papua New Guinea	3,912	7,755,785	1,000,000	13%	129
Poland	33,222	37,970,872	12,758,213	60%	336

Puerto Rico	34,311	3,473,181	4,170,953	94%	1,201
Portugal	34,962	10,269,417	5,268,211	66%	513
Paraguay	11,810	6,639,119	1,818,501	62%	274
Palestine	5,986	4,046,901	1,387,000	77%	343
French Polynesia	60,956	273,528	147,000	62%	537
Qatar	96,262	2,109,568	1,000,990	99%	475
Romania	29,984	19,356,544	5,419,833	54%	280
Russia	26,013	143,201,680	60,000,000	75%	419
Rwanda	1,951	11,917,508	4,384,969	17%	368
Saudi Arabia	48,921	31,557,144	16,125,701	84%	511
Sudan	4,192	38,647,804	2,831,291	35%	73
Senegal	3,068	15,411,614	2,454,059	48%	159
Singapore	97,341	5,703,600	1,870,000	100%	328
Solomon Islands	2,596	563,513	179,972	25%	319
Sierra Leone	1,238	5,439,695	610,222	43%	112
El Salvador	7,329	6,164,626	1,648,996	73%	267
San Marino	58,806	33,203	17,175	97%	517
Somalia	1,863	14,317,996	2,326,099	46%	162
Serbia	18,351	6,944,975	2,347,402	56%	338
South Sudan	1,796	11,177,490	2,680,681	20%	240
São Tomé and Príncipe	3,721	191,266	25,587	74%	134
Suriname	16,954	526,103	78,620	66%	149
Slovakia	31,966	5,454,073	2,296,165	54%	421
Slovenia	39,038	2,087,946	1,052,325	55%	504
Sweden	52,609	10,285,453	4,618,169	88%	449
Eswatini	8,321	1,343,098	218,199	24%	162
Seychelles	23,303	88,303	48,000	58%	544
Syria	8,587	20,824,892	4,500,000	55%	216
Chad	1,733	11,887,202	1,358,851	24%	114
Togo	1,404	7,228,915	1,109,030	43%	153
Thailand	16,302	68,657,600	26,853,366	51%	391
Tajikistan	2,616	8,177,809	1,787,400	28%	219

Image not found or type unknown Turkmenistan	11,471	5,366,277	500,000	53%	93
Image not found or type unknown Timor-Leste	3,345	1,268,671	63,875	31%	50
Image not found or type unknown Tonga	5,636	104,951	17,238	23%	164
Image not found or type unknown Trinidad and Tobago	28,911	1,328,100	727,874	53%	548
Image not found or type unknown Tunisia	10,505	11,143,908	2,700,000	70%	242
Image not found or type unknown Turkey	28,289	83,429,616	35,374,156	76%	424
Image not found or type unknown Tuvalu	3,793	11,097	3,989	64%	360
Image not found or type unknown Tanzania	2,129	49,082,996	9,276,995	35%	189
Image not found or type unknown Uganda	1,972	35,093,648	7,045,050	25%	201
Image not found or type unknown Ukraine	11,535	45,004,644	15,242,025	70%	339
Image not found or type unknown Uruguay	20,588	3,431,552	1,260,140	96%	367
Image not found or type unknown United States of America	61,498	326,687,488	265,224,528	83%	812
Image not found or type unknown Uzbekistan	5,164	29,774,500	4,000,000	50%	134
Image not found or type unknown Saint Vincent and the Grenadines	11,972	109,455	31,561	53%	288
Image not found or type unknown Venezuela	14,270	29,893,080	9,779,093	88%	327
Image not found or type unknown British Virgin Islands	24,216	20,645	21,099	49%	1,022
Image not found or type unknown United States Virgin Islands	30,437	105,784	146,500	96%	1,385
Image not found or type unknown Vietnam	5,089	86,932,496	9,570,300	37%	110
Image not found or type unknown Vanuatu	3,062	270,402	70,225	26%	260
Image not found or type unknown Samoa	6,211	187,665	27,399	18%	146
Image not found or type unknown Yemen	8,270	27,584,212	4,836,820	38%	175
Image not found or type unknown South Africa	12,667	51,729,344	18,457,232	67%	357
Image not found or type unknown Zambia	3,201	14,264,756	2,608,268	45%	183
Image not found or type unknown Zimbabwe	3,191	12,500,525	1,449,752	32%	116

Waste management by region

[edit]

China

[edit]

Municipal solid waste generation shows spatiotemporal variation. In spatial distribution, the point sources in eastern coastal regions are quite different. Guangdong, Shanghai and Tianjin produced MSW of 30.35, 7.85 and 2.95 Mt, respectively. In temporal distribution, during 2009–2018, Fujian province showed a 123% increase in MSW generation while Liaoning province showed only 7% increase, whereas Shanghai special zone had a decline of ?11% after 2013. MSW composition characteristics are complicated. The major components such as kitchen waste, paper and rubber & plastics in different eastern coastal cities have fluctuation in the range of 52.8–65.3%, 3.5–11.9%, and 9.9–19.1%, respectively. Treatment rate of consumption waste is up to 99% with a sum of 52% landfill, 45% incineration, and 3% composting technologies, indicating that landfill still dominates MSW treatment.[99]

Morocco

[edit]

Morocco has seen benefits from implementing a $300 million sanitary **landfill** system. While it might appear to be a costly investment, the country's government predicts that it has saved them another $440 million in damages, or consequences of failing to dispose of waste properly.[100]

San Francisco

[edit]

San Francisco started to make changes to their waste management policies in 2009 with the expectation to be zero waste by 2030.[101] Council made changes such as making recycling and composting a mandatory practice for businesses and individuals, banning **Styrofoam** and plastic bags, putting charges on paper bags, and increasing garbage collection rates.[101][102] Businesses are fiscally rewarded for correct disposal of recycling and composting and taxed for incorrect disposal. Besides these policies, the waste bins were manufactured in various sizes. The compost bin is the largest, the recycling bin is second, and the garbage bin is the smallest. This encourages individuals to sort their waste thoughtfully with respect to the sizes. These systems are working because they were able to divert 80% of waste from the landfill, which is the highest rate of any major U.S. city.[101] Despite all these changes, Debbie Raphael, director of the San Francisco Department of the Environment, states that zero waste is still not achievable until all products are designed differently to be able to be recycled or compostable.[101]

Turkey

[edit]

This section is an excerpt from **Waste management in Turkey**.[edit]

This article needs to be **updated**. Please help update this article to reflect recent events or newly available information. *(January 2022)*

Turkey generates about 30 million tons of solid **municipal waste** per year; the annual amount of waste generated per capita amounts to about 400 kilograms.[103] According to **Waste Atlas**, Turkey's waste collection coverage rate is 77%, whereas its unsound waste disposal rate is 69%.[103] While the country has a strong legal framework in terms of laying down common provisions for waste management, the implementation process has been considered slow since the beginning of 1990s.

United Kingdom

[edit]
See also: **Food waste in the United Kingdom**

Waste management policy in England is the responsibility of the **Department of the Environment, Food and Rural Affairs** (DEFRA). In England, the "Waste Management Plan for England" presents a compilation of waste management policies.[104] In the devolved nations such as Scotland Waste management policy is a responsibility of their own respective departments.

Zambia

[edit]

In Zambia, ASAZA is a community-based organization whose principal purpose is to complement the efforts of the Government and cooperating partners to uplift the standard of living for disadvantaged communities. The project's main objective is to minimize the problem of indiscriminate littering which leads to land degradation and pollution of the environment. ASAZA is also at the same time helping alleviate the problems of unemployment and poverty through income generation and payment of participants, women, and unskilled youths.[105]

E-waste

[edit]

A record 53.6 million metric tonnes (Mt) of electronic waste was generated worldwide in 2019, up 21 percent in just five years, according to the UN's Global E-waste Monitor 2020, released today. The new report also predicts global e-waste – discarded products with a battery or plug – will reach 74 Mt by 2030, almost a doubling of e-waste in just 16 years. This makes e-waste the world's fastest-growing domestic waste stream, fueled mainly by higher consumption rates of electric and electronic equipment, short life cycles, and few options for repair. Only 17.4 percent of 2019's e-waste was collected and recycled. This means that gold, silver, copper, platinum, and other high-value, recoverable materials conservatively valued at US$57 billion – a sum greater than the Gross Domestic Product of most countries – were mostly dumped or burned rather than being collected for treatment and reuse.[106] E-wasteis predicted to double by 2050.[107][108]

Transboundary movement of e-waste

[edit]

The Transboundary E-waste Flows Monitor quantified that 5.1 Mt (just below 10 percent of the total amount of global e-waste, 53.6 Mt) crossed country borders in 2019. To better understand the implication of transboundary movement, this study categorizes the transboundary movement of e-waste into controlled and uncontrolled movements and also considers both the receiving and sending regions.[109]

Scientific journals

[edit]
See also: **Category: Waste management journals**

Related scientific journals in this area include:

- ***Environmental and Resource Economics***
- ***Environmental Monitoring and Assessment***
- ***Journal of Environmental Assessment Policy and Management***
- ***Journal of Environmental Economics and Management***

See also

[edit]
- **Biomedical waste**
- **Burning**
- **Co-processing**
- **Curb mining**
- **Electronic waste recycling**
- **Extended producer responsibility**
- **Food loss and waste**
- **Food rescue**
- **International Waste Working Group – IWWG**
- **Landfarming**
- **Leaf Bank**
- **List of waste disposal incidents**
- **List of waste management acronyms**
- **List of waste types**
- **Milorganite**
- **National Cleanup Day**
- **Pallet crafts**
- **Refill (scheme)**
- **Reuse of bottles**
- **Solid waste policy in India**
- **Solid waste policy in the United States**
- **Timber recycling**
- **Upcycling**
- **Waste management in Turkey**
- **Waste minimisation**
- **Zabbaleen**
- **Zero waste**

Notes

[edit]

1. ^ Also known as a tip, dump, rubbish tip, rubbish dump, garbage dump, trash dump, or dumping ground.

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- **v**
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Biosolids, **waste**, and **waste management**

Major types

- **Agricultural wastewater**
- **Biodegradable waste**
- **Biomedical waste**
- **Brown waste**
- **Chemical waste**
- **Construction waste**
- **Demolition waste**
- **Electronic waste**
  - **by country**
- **Food waste**
- **Green waste**
- **Hazardous waste**
- **Heat waste**
- **Industrial waste**
- **Industrial wastewater**
- **Litter**
- **Marine debris**
- **Mining waste**
- **Municipal solid waste**
- **Open defecation**
- **Packaging waste**
- **Post-consumer waste**
- **Radioactive waste**
- **Scrap metal**
- **Sewage**
- **Sharps waste**
- **Surface runoff**
- **Toxic waste**

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Processes

- Anaerobic digestion
- Balefill
- Biodegradation
- Composting
- Durable good
- Ecological design
- Garden waste dumping
- Illegal dumping
- Incineration
- Landfill
- Landfill mining
- Mechanical biological treatment
- Mechanical sorting
- Photodegradation
- Reclaimed lumber
- Recycling
  - appliance recycling
  - battery recycling
  - bottle recycling
  - fluorescent lamp recycling
  - land recycling
  - plastic recycling
  - textile recycling
  - timber recycling
  - tire recycling
  - water heat recycling
  - water recycling shower
- Repurposing
- Resource recovery
- Reusable packaging
- Right to repair
- Sewage treatment
- Urban mining
- Waste collection
- Waste sorting
- Waste trade
- Waste treatment
- Waste-to-energy

Countries

- Afghanistan
- Albania
- Armenia
- Australia
- Belgium
- Bangladesh
- Brazil
- Bosnia and Herzegovina
- Egypt
- Georgia
- Hong Kong
- India
- Israel
- Japan
- Kazakhstan
- New Zealand
- Russia
- South Korea
- Sri Lanka
- Switzerland
- Syria
- Tanzania
- Taiwan
- Thailand
- Turkey
- United Kingdom
- United States

Agreements

- Bamako Convention
- Basel Convention
- EU directives
  - batteries
    - Recycling
  - framework
  - incineration
  - landfills
  - RoHS
  - vehicles
  - waste water
  - WEEE
- London Convention
- Oslo Convention
- OSPAR Convention

Occupations	◦ Sanitation worker ◦ Street sweeper ◦ Waste collector ◦ Waste picker
Other topics	◦ Blue Ribbon Commission on America's Nuclear Future ◦ China's waste import ban ◦ Cleaner production ◦ Downcycling ◦ Eco-industrial park ◦ Extended producer responsibility ◦ High-level radioactive waste management ◦ History of waste management ◦ Landfill fire ◦ Sewage regulation and administration ◦ Upcycling ◦ Waste hierarchy ◦ Waste legislation ◦ Waste minimisation ◦ Zero waste

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Recycling

Materials

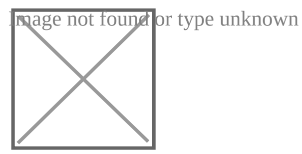
- Aluminium
- Asphalt
- Concrete
- Copper
- Cotton
- Energy
- Glass
- Gypsum
- Paper
- Plastic
- Refrigerant
- Scrap
- Timber
- Cooking oil
- Water

Products

- Appliances
- Automotive oil
- Batteries
- Bottles
  - PET bottles
- Computers
- Drugs
- Fluorescent lamps
- Lumber
- Mobile phones
- Paint
- Ships
- Textiles
- Tires
- Vehicles

Apparatus

- Bins
- Blue bags
- Blue boxes
- Codes
- Collection
- Materials recovery facility
- Waste sorting



Countries

- Rate by country
- Australia
- Brazil
- Canada
- Ireland
- Israel
- Japan
- Malaysia
- Mongolia
- The Netherlands
- Switzerland
- Taiwan
- United Kingdom
  - Northern Ireland
- United States

Concepts	◦ Circular economy ◦ Dematerialization ◦ Downcycling ◦ Durable good ◦ Eco-industrial park ◦ Ecological design ◦ Extended producer responsibility ◦ Green economy ◦ Industrial ecology ◦ Industrial metabolism ◦ Interchangeable parts ◦ Land recycling ◦ Material flow analysis ◦ Precycling ◦ Product stewardship ◦ Recycling (ecological) ◦ Refill (campaign) ◦ Repairability ◦ Resource recovery ◦ Reusable packaging ◦ Reuse of bottles ◦ Reuse of human excreta ◦ Repurposing ◦ Reuse ◦ Right to repair ◦ Symbol (Green Dot) ◦ Upcycling ◦ Urban lumberjacking ◦ Waste hierarchy ◦ Waste minimisation ◦ Waste picking ◦ Wishcycling ◦ Zero waste

See also

- Bottle cutting
- Cogeneration
- Composting
- Container-deposit legislation
- Dumpster diving
- Ethical consumerism
- Freeganism
- Pallet crafts
- Reverse vending machine
- Simple living
- Waste
- Waste-to-energy
- Waste collection
- Waste management law
- Waste management
- Water heat recycling
- Water recycling shower

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About New Hanover County

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Driving Directions in New Hanover County

Driving Directions From La Guera Authentic Mexican to The Dumpo Junk Removal & Hauling

Driving Directions From Zaxbys Chicken Fingers & Buffalo Wings to The Dumpo Junk Removal & Hauling

Driving Directions From Brooklyn Pizza Co. to The Dumpo Junk Removal & Hauling

Driving Directions From Cape Fear Seafood Company to The Dumpo Junk Removal & Hauling

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Driving Directions From Poplar Grove Plantation to The Dumpo Junk Removal & Hauling

Driving Directions From Cape Fear Museum of History and Science to The Dumpo Junk Removal & Hauling

Driving Directions From Bluethenthal Wildflower Preserve to The Dumpo Junk Removal & Hauling

Driving Directions From Burgwin-Wright House and Gardens to The Dumpo Junk Removal & Hauling

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Reviews for

Image not found or type unknown

Kelly Vaughn

(5)

Great service with professionalism. You can't ask for more than that!

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Greg Wallace

(5)

I highly recommend Dumpo Junk Removal. Very professional with great pricing and quality work.

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Kirk Schmidt

(5)

They are great with junk removal. Highly recommend them

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Jennifer Davidson

(5)

Great work! Bryce and Adrian are great!

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Howard Asberry

(5)

The manager was very helpful, knowledgeable and forthright. He definitely knew what he was talking about and explained everything to me and was very helpful. I'm looking forward to working with him

Evaluating Volume Based Payment Models**View GBP**

Check our other pages :

- **Understanding Flat Fee Arrangements in Waste Removal**
- **Reviewing the Impact of Competitive Local Rates**

Frequently Asked Questions

How do volume-based payment models impact the financial sustainability of e-waste processing companies?

Volume-based payment models can enhance financial sustainability by incentivizing the processing of larger quantities of e-waste, thereby potentially lowering unit costs through economies of scale. However, they may also pressure companies to prioritize quantity over quality, which could lead to inefficiencies if not managed properly.

What are the potential environmental implications of using volume-based payment models in e-waste processing?

These models can encourage the efficient collection and recycling of a greater volume of e-waste, reducing landfill use and promoting resource recovery. However, they may also lead to shortcuts or inadequate treatment processes if facilities strive for higher volumes without ensuring proper handling practices.

How do volume-based payment models affect stakeholder relationships within the e-waste supply chain?

Such models typically create stronger incentives for collaboration among stakeholders, including collectors and recyclers, as all parties benefit from increased volumes. Conversely, they might also foster competitive tensions or conflicts regarding pricing and quality standards if one party prioritizes volume excessively over comprehensive service delivery.

The Dumpo Junk Removal

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State : NC

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Google Business Profile

Company Website : **https://thedumpo.com/**