

TOBACCO AND THE ENVIRONMENT

Tobacco use is not only a health issue — it is also an **environmental issue.**

1,134,292 cigarette butts were cleaned from **beaches and waterways** in 2021, making them the world's second most common type of litter after food wrappers.



1,134,292



40%

In California, **40% of fires** at waste facilities between 2016-2018 were **caused by lithium-ion batteries**, which are found in e-cigarettes.

600M

Approximately **600 million trees** are **chopped down** every year by the tobacco industry. On average each tree produces enough paper for **15 packs of cigarettes**. As of 2022, tobacco farming is responsible for 5% of all global deforestation.



2.7M TONS

In 2019, Americans generated **6.92 kilotons of consumer electronic waste**, including **e-cigarette waste**, that ultimately ends up in landfills or incinerators.



17M



Production and consumption of tobacco releases **carbon dioxide equivalent to driving 17 million gas powered cars** each year, according to a 2022 report from the World Health Organization.

TOBACCO AND THE ENVIRONMENT

E-cigarette and cigarette waste can make its way into the environment where it pollutes water, air, and land with toxic chemicals, heavy metals and residual nicotine. An **estimated 766,571 metric tons of cigarette butts make their way into the environment every year,**² and according to the Bureau of Investigative Journalism, at least five disposable e-cigarettes are being thrown away every second in the United States, amounting to 150 million devices per year — which together contain enough lithium for about 6,000 Teslas. E-cigarette waste contributes to the already overwhelming issue of general electronic waste: in 2019, Americans generated **6.92 kilotons of consumer electronic waste, including e-cigarette waste,** all bound for landfills or incinerators. The total amount of e-waste generated globally in 2019 was 53.6 metric tons, **and this number is projected to rise to 74.7 metric tons by 2030.**³

Cigarette butts are the most frequently littered item in U.S. beaches and waterways.⁵ The largest U.S. cigarette companies sold about 190.2 billion cigarettes nationwide in 2021 alone.⁴ Cigarette butts are often disposed of on streets, sidewalks, and other public areas, and may then be carried as runoff to drains and ultimately end up polluting rivers, beaches, and oceans.^{6,7} Because cigarette butts are primarily made of plastic filters that don't biodegrade, the butts that aren't eaten by wildlife simply pile up on shorelines or at the bottom of bodies of water.^{8,9-11}

The problem isn't limited to cigarettes. E-cigarettes contain plastic, electronic and chemical waste and many of them may also end up as litter – a growing problem as the products increase in popularity. **In 2022, 321.4 million units of e-cigarettes were sold,**¹² **generating \$5.1 billion** in convenience store e-cigarette sales alone.¹³ Corporations are projected to reach **\$8.3 billion** in annual e-cigarette revenue in 2023.¹⁴ The lack of safe and environmentally friendly ways to dispose of e-cigarette waste is a growing dilemma, especially given the rise of



disposable e-cigarettes. In 2022, the U.S. Food and Drug Administration found that 2.5 million middle school and high school students reported currently using e-cigarettes, with over half of them using disposables.³¹ After disposable e-cigarettes were exempted from federal restrictions on flavors in 2020, they skyrocketed in popularity, **with use increasing about 1,000% (from 2.4% to 26.5%) among high school e-cigarette users during 2019-2020.**¹⁵ Inexpensive, flavored disposable e-cigarettes such as Puff Bar, which controlled over half of the disposable e-cigarette market in 2021,¹⁶ and Elf Bar have gained popularity and further contribute to e-cigarette waste. This increase in disposable e-cigarette products will eventually become tons of e-cigarette waste as products reach end-of-life.¹⁷

LITTER

CIGARETTES

- Cigarette butts have comprised 30%-40% of items collected in annual coastal/urban cleanups since the 1980s.¹⁸
- Cigarette butts are the most prominently littered item on U.S. roadways, retail areas, storm drains, loading docks, construction sites and recreational areas.^{19,20}

- > Globally, **1,134,292 cigarette butts** were cleaned up in beaches and waterways in 2021, making them the world's second most common type of litter after food wrappers, exceeding plastic bags and straws.⁵ Cigarette butts collected in U.S. beaches and waterways amount to over half of that figure making them the number one littered item collected by environmental cleanup crews in the U.S.
- > However, not all cigarettes butts that are littered are collected. The 2020 Keep America Beautiful survey estimates that the actual number of cigarette butts polluting our environment is closer to **9.7 billion cigarette butts polluting roadways and waterways combined**, along with **392 million pieces of other tobacco-related products and packaging, making up nearly 20% of all U.S. litter.**²⁰
- > Environmental cleanup efforts are a valuable and helpful endeavor, but they are not enough to combat the effect of littered tobacco. **An overall reduction in tobacco use is essential** to curbing the detrimental effects on fish, wildlife, public health, and water quality.

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- > 79% of smokers consider cigarette butts to be litter, but the majority of smokers (72%) reported littering a butt on the ground at least once in their lifetime and 64% reported tossing them out of a car window at least once in their lifetime.²¹
- > Smokers litter 47% of the cigarette butts they smoke.²¹

E-CIGARETTES

In 2020, *Keep America Beautiful* counted **894,700 littered e-cigarettes** in U.S. roadways and waterways.²⁰

- > According to a 2022 Truth Initiative survey, **over two-thirds of disposable e-cigarette users disposed of the hazardous waste in the trash, where it can start fires in bins, waste trucks, or in waste processing facilities**^{22,23} and 9% of young users littered their devices on the ground. Only 8% of young vape users disposed of their e-cigarettes properly through e-waste facilities.^{24,25}
- > **Inadequate or nonexistent safe product disposal guidelines** from e-cigarette companies, **a lack of recycling programs** equipped to process e-cigarette waste, and **limited federal guidelines** inapplicable to the most popular variety of vapes and disposables, **all contribute to the environmentally and publicly hazardous**^{26,27} **disposal methods common among young users.**^{24,25}
- > **E-cigarette manufacturers do not provide guidance to consumers on how to dispose of used devices or pod/cartridge products**, and there are no receptacles or specific processes in place.²⁸
- > The average e-cigarette device has a short life span and is often replaced with a newer, more efficient version before it stops working.^{29,30} The **average e-cigarette battery only lasts approximately 6-8 months** with normal use.²⁹
- > Disposable e-cigarettes are single-use plastic products designed to reach their end-of-life much more quickly.²⁸

BIODEGRADABILITY

CIGARETTES

Cigarette filters are made from cellulose acetate, a plastic which only degrades under severe biological circumstances, such as when filters collect in sewage. In practice, **cigarette butts tossed on streets and beaches do not biodegrade.**^{7,31,32}

- Under optimal conditions, it can take at least **nine months for a cigarette butt to degrade.**
- The sun may break cigarette butts down, but only into smaller pieces of waste which dilute into water/soil.^{6,7,33}

Growing **concerns over the impact of tobacco waste** on the environment, as well as the substantial costs of cleanup, have prompted states, municipalities, and institutions to enact a variety of policy actions. For example, **312 municipalities prohibited smoking on beaches³⁴ and 1,497 prohibited smoking in parks as of July 2017.³⁵** In 2022, Florida passed a bill that allows municipalities and counties to restrict smoking on public beaches and in parks.^{36,37} This move was welcomed and backed by several local government bodies and constituents aiming to preserve the state's delicate natural ecosystem, which includes coral reefs, wetlands, a dense forests.³⁸ Additionally, four jurisdictions in California (Monterey, Monterey County, San Benito County, and Soledad) have prohibited the sale of single-use e-cigarettes.

E-CIGARETTES

Unlike cigarette butts, e-cigarette waste cannot be biodegradable even under severe weather conditions. E-cigarette cartridges discarded on streets mix with leaf litter and get pushed around by weather events, eventually breaking down into microplastics and chemicals that flow into storm drains to pollute waterways and wildlife.⁸ E-cigarette-related waste is potentially a more serious environmental threat than cigarette butts because it contains metal, circuitry, disposable plastic cartridges, batteries, and toxic chemicals in e-liquids.^{29,30} Currently, there are only two ways to safely dispose of e-cigarette cartridges: return to e-cigarette manufacturers and vendors for recycling

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or rinse under running water to remove nicotine residues, wrap in a scrap of biodegradable material, and discard as a plastic waste.⁴⁶

LAND, COASTAL AND WATER POLLUTION

Cigarette and e-cigarette waste can pollute soil, beaches, and waterways. Studies have also shown that cigarette and e-cigarette waste is harmful to wildlife.

CIGARETTES

- Cigarette butts cause **pollution** by being carried as runoff to drains and from there to rivers, beaches and oceans.⁶
- Preliminary studies show that **organic compounds** (such as nicotine, pesticide residues and metal) **seep from cigarette butts into aquatic ecosystems**, becoming acutely **toxic** to fish and microorganisms.
- In one laboratory study, the chemicals that leached from a single cigarette butt (soaked for 24 hours in a liter of water) released enough toxins to kill **50 percent of the saltwater and freshwater fish** exposed to it for 96 hours.²⁴
- Another laboratory study found that cigarette butts can be a source for **heavy metal contamination in water**, which may harm local organisms.³⁹

- A study of the effects of **roadside waste on soil** found that patterns of hydrocarbon levels in the soil were similar to those of littered cigarette butts. This indicates that the chemicals in the soil had seeped out of cigarette butts. **Some hydrocarbons are carcinogenic.**⁹⁻¹¹

E-CIGARETTES

- Both the batteries and e-cigarette devices themselves contain **hazardous substances such as lead and mercury.**⁴⁰
- Incompletely used liquid cartridges and refills **contain nicotine salts and heavy metals, which leach into soil and waterways or can be ingested by wildlife.**⁴¹
- Before lithium-ion batteries can be placed in the trash, they need to be **fully discharged and cooled, submerged in cold saltwater for two weeks** — covered securely with lid — and **wrapped in newspaper.**⁴⁶
- Lithium-ion batteries in e-cigarettes have been known to explode and cause fires in garbage trucks and waste management plants if damaged or exposed to extreme heat.⁴⁰
 - **In California, 40% of the fires at waste facilities between 2016-2018 were reported to have been caused by lithium-ion batteries.**^{42,43} Vape batteries may be the greatest threat to waste management programs.²³



- In New York in 2022, firefighters responded to **over 200 lithium-ion battery fires** stemming from e-scooters and bikes, making lithium-ion batteries the third leading cause of fires in the city.^{44,45}
- London Heathrow Airport's Grndon waste processing facility **reported three fires** within the past six months in 2023, **each suspected to be the result of discarded lithium-ion batteries in disposable vapes.** A study by *Material Focus*, a British not-for-profit aimed at reducing and recycling e-waste, found that 1.3 million disposable vapes are disposed of weekly in the U.K., **about 2 vapes per second.**
- In 2022, leaders from 18 different environmental and public health groups directed an open letter to the U.K.'s Environment Secretary and Health Secretary **urging them to launch a full-scale ban on disposable e-cigarettes.**⁴⁶

THE TOBACCO INDUSTRY'S EFFECTS ON DEFORESTATION

- Research has found that **growing tobacco contributes to deforestation**, especially in the developing world.⁴⁷ **Deforestation** for tobacco **plantations promotes soil degradation and "failing yields"** or the capacity for the land to support the growth of any other crops or vegetation.¹ Tobacco farming is responsible for 5% of all global deforestation.⁴⁸
- Tobacco farmers typically clear land by burning it. But this land is often agriculturally marginal and is abandoned after only a few seasons, **contributing in many cases to desertification.**¹ Burning increases **greenhouse gas levels** by generating water and air pollutants, and decreasing forest cover¹ which would otherwise absorb the almost 84 million metric tons of CO₂ emitted by tobacco production annually.⁴⁹
- **Production and consumption of tobacco releases carbon dioxide equivalent to driving 17 million gas powered cars each year**, according to a 2022 report from the World Health Organization.⁴⁸
- **718,217 pounds of toxic chemicals were released from U.S. tobacco production facilities in 2021.**⁵⁰ **This number has increased from 674,309 pounds in 2020.**⁵¹

- > **Tobacco production uses more water and wood, and has more pesticides applied to it, than most other crops**, further affecting water supplies and contamination of the soil.¹ Tobacco growth uses 22 billion tons of water every year.⁴⁸

CIGARETTES

- > Approximately **600 million trees are chopped down every year by the tobacco industry**. On average each tree produces enough paper for 15 packs of cigarettes.⁵²
- > Tobacco manufacturers use **four miles of paper every hour to wrap and package cigarettes** and other products — making the entire industry a sizeable contributor to deforestation.⁵² This also leads to the creation of over 2 million tons of packaging waste every year.⁴⁸

E-CIGARETTES

- > Since e-cigarettes quickly rose in popularity in an under-regulated environment, we know little about how e-cigarettes are manufactured and the environmental impact of the production process. Because of the significant impact this rapid rise has had on public health, until recently research and policy on e-cigarettes has focused on the youth e-cigarette crisis and **lack of regulation rather than the product's environmental impact**.
- > E-cigarette companies were **required to submit information by September 9, 2020 on the environmental impact of their products as part of applications** to the Food and Drug Administration to keep their products on the market, but this information is not yet publicly available.⁵³
- > The lithium contained in e-cigarette batteries is not just an environmental and public health hazard when discarded, **but a precious natural resource that must be conserved, reused, and recycled**. The ten tons of lithium discarded in vapes yearly in the U.K. alone **is enough to construct 1,200 electric vehicles**. Meanwhile, the **International Energy Agency estimates the world will face lithium shortages by 2025**.⁵⁴ Combined with the complicated ethics of sourcing precious resources like lithium and cobalt, including human

718,217 pounds



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rights abuses like child labor, forced labor, and hazardous work conditions,⁵⁵ **disposable e-cigarettes are a tragic waste of this precious element.**⁴⁶

INDUSTRY ACCOUNTABILITY FOR TOBACCO WASTE

- > Many e-cigarette manufacturers simply direct users to hazardous waste/electronic waste disposal companies, which **often don't accept e-cigarettes**.⁵⁶
- > From the cellulose acetate of cigarette butts to e-liquid residue and batteries, waste management and hazardous waste **disposal plants are not currently equipped to handle either type of waste**. Federal regulations have not yet caught up to the need for guidance on disposal.
- > Currently, there is no legal way to recycle e-cigarettes in the U.S and no documented baseline standards for end-of-life disposal by manufacturers.⁵⁶ There is **no requirement in place to hold manufacturers accountable** for the post-consumer waste they helped produce or to devise a clear and safe system to dispose of these items as hazardous materials or e-waste.^{40,57}
- > Even though **guidance exists on best practices** for holding companies like tobacco manufacturers accountable for reducing or disposing of the post-consumer waste that results from use of their products, **they are not currently enforced across the industry by any governing body including the Environmental Protection Agency**.^{58,59}

➤ **States and local agencies that have the authority to enforce hazardous waste penalties can help reduce the environmental impact.** As of January 2022, violators of hazardous waste requirements **can incur civil penalties of up to \$81,540 per day.**^{58,60} In 2006, **Washington state** became one of the **first states in the nation to pass a law putting the responsibility for recycling e-waste on the producer**, not taxpayers. Manufacturers that produce electronics were required to pay for and manage their recycling.⁵⁸

TOBACCO INDUSTRY NEGLIGENCE

The tobacco industry is responsible for producing much more than tobacco products — they are guilty of creating hundreds of thousands of pounds of cigarette and e-cigarette waste each year. Cigarette and e-cigarette waste presents serious threats to the ecosystem and requires a long-term solution. Instead of accepting responsibility for their products, tobacco companies are presenting topical solutions to the environmental problems their products create in a ploy for positive press attention.

Some tobacco companies have included reducing the amount of cigarette butts in the environment as part of their **sustainability goals**. For example, Philip Morris International claims it endeavors to reduce plastic litter from its products by 50% from 2021 to 2025 as part of its “Our World Is Not an Ashtray” initiative.⁶¹ Campaigns like this one appear to be **hypocritical and misleading to the public**. The tobacco industry not only created this new waste stream in the first place, but they are also trying **to greenwash their harmful practices** through misdirection and public displays of eco-activism.

POLICIES TO PROTECT THE ENVIRONMENT

Tobacco manufacturers need to be held responsible for the extreme amounts of litter that their products create and should facilitate the environmentally safe disposal of their products — both combustible and electronic. Strong local regulations coupled with financial penalties are needed to limit e-cigarette waste and reduce the negative environmental



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consequences of tobacco products.⁶² Such policies have strong support, with 72% of U.S. adults supporting the addition of a \$0.75 litter fee for cigarette packs in a 2021 Truth Initiative study.⁶³ Increasing consumer awareness of the environmental toxicity and dangers posed by discarding cigarette⁶ and e-cigarette related waste into landfills,⁶⁴ and encouraging smokers and vapers to quit using these products altogether, are the best ways to protect the environment from tobacco product waste.

The federal government could do more as well, including ensuring the tobacco industry is held accountable for waste they produce and enforcing all guidance and best practices regarding tobacco products waste disposal; establishing product and packaging standards that reduce the amount of packaging waste, plastics waste, and hazardous chemicals from tobacco products; requiring tobacco companies to establish recycling programs and other options for properly disposing of tobacco product waste. On a global scale, 175 countries in the United Nations have already committed to developing a legally binding international treaty against pollution and waste from plastic production, use, and disposal by 2024. This treaty, when drafted and enacted, will address the “root causes of plastic pollution” rather than its symptoms. This will be achieved by targeting the entire lifecycle of a single use plastic product from design to production and disposal.⁶⁵ This move towards a circular economy from global leaders may finally make an impact on tobacco industry waste,⁶⁶ along with many other environmentally detrimental industries and practices.

REFERENCES

- 1 Tobacco Atlas. Environment. <https://tobaccoatlas.org/topic/environment/>. Published 2020. Accessed August 5, 2020.
- 2 Stigler-Granados P, Fulton L, Nunez Patlan E, Terzyk M, Novotny TE. Global Health Perspectives on Cigarette Butts and the Environment. *International journal of environmental research and public health*. 2019;16(10):1858.
- 3 Forti V, BCP, Kuehr R., Bel G. *The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential*. 2020.
- 4 Federal Trade Commission. *Cigarette Report For 2021*. Federal Trade Commission;2023.
- 5 Ocean Conservancy. *Connect + Collect, 2022 Report*. Ocean Conservancy: International Coastal Clean Up;2022.
- 6 Novotny TE, Lum K, Smith E, Wang V, Barnes R. Cigarettes butts and the case for an environmental policy on hazardous cigarette waste. *Int J Environ Res Public Health*. 2009;6:1691-1705.
- 7 Luke JA. Degradability of Filter Materials and Plastics Packaging. Impact of Environmental Regulations on Packing and Product Web site. <http://legacy.library.ucsf.edu/tid/rvj95a99/pdf>. Published 1991. Accessed.
- 8 Mock J, Hendlin YH. Notes from the Field: Environmental Contamination from E-cigarette, Cigarette, Cigar, and Cannabis Products at 12 High Schools—San Francisco Bay Area, 2018–2019. *Morbidity and Mortality Weekly Report*. 2019;68(40):897.
- 9 Micevska T, Warne MS, Pablo F, Patra R. Variation in, and causes of, toxicity of cigarette butts to a cladoceran and microtox. *Archives of environmental contamination and toxicology*. 2006;50(2):205-212.
- 10 Register K. Cigarette Butts as Litter-Toxic as Well as Ugly. *Underwater Naturalist, Bulletin of the American Littoral Society*. 2000;5(2).
- 11 Slaughter E, Gersberg R, Watanabe K, Rudolph J, Novotny TE. Toxicity of Cigarette Butts, and their Chemical Components, to Marine and Freshwater Fish. *Tob Control*. 2011;20:i23-i27.
- 12 CDC Foundation. *Monitoring U.S. E-Cigarette Sales: National Trends*. 2022.
- 13 CSP. *The Future of Behind the Counter*. CSPDAILYNEWS.COM: The Business of Convenience Retail;2022.
- 14 Revenue in the e-cigarette market in the United States from 2014 to 2027 (in billion U.S. dollars) Statista Consumer Market Outlooks; 2022. <https://www.statista.com/forecasts/1344540/united-states-revenue-in-the-e-cigarette-market?locale=en>.
- 15 Wang TW, Neff LJ, Park-Lee E, Ren C, Cullen KA, King BA. E-cigarette Use Among Middle and High School Students — United States, 2020. *Morbidity and Mortality Weekly Report*. 2020;69.
- 16 Truth Initiative. *E-Cigarettes: Facts, Stats and Regulations*. 2021.
- 17 Ali FR DM, Vallone D, et al. . E-cigarette Unit Sales, by Product and Flavor Type — United States, 2014–2020. *Morbidity and Mortality Weekly Report*. 2020.
- 18 World Health Organization. *Tobacco and its environmental impact: an overview*. Geneva;2017.
- 19 Keep America Beautiful. Littering Behavior in America: Results of a National Study. http://www.kab.org/site/DocServer/KAB_Report_Final_2.pdf?docID=4581. Published 2009. Accessed.
- 20 Keep America Beautiful. *2020 National Litter Survey Summary Report: May 2021*. Keep America Beautiful: Keep America Beautiful;2021.
- 21 Weblert T, Jakubowski K. Attitudes, Beliefs, and Behaviors about Cigarette-Butt Littering among College-Aged Adults in the United States. *Int J Environ Res Public Health*. 2022.
- 22 Lawrence A, McKenna Jr. Research Group. *Electronic Cigarette Fires and Explosions in the United States 2009 - 2016*. U.S. Fire Administration;2017.
- 23 Office of Resource Conservation and Recovery. *An Analysis of Lithium-ion Battery Fires in Waste Management and Recycling*. United States Environmental Protection Agency: United States Environmental Protection Agency;2021.
- 24 Donovan E, Aarvig K, Azadi M, Schillo B. SRNT 2023 29th Annual Meeting Rapid Abstracts: Recent Challenges In The Tobacco Product Waste Stream: Examining How Young Disposable E-cigarette User Dispose of Their E-Cigarettes. Abstract presented at SRNT 2023 29th Annual Meeting; 2023; San Antonio, Texas.
- 25 Truth Initiative. Most young users put disposable e-cigarettes in trash, creating huge streams of toxic and hazardous waste, as companies fail to take responsibility. 2022.
- 26 Hendlin YH. Alert: Public Health Implications of Electronic Cigarette Waste. *American Journal of Public Health*. 2018.
- 27 Pourchez J, Mercier C, Forest V. From smoking to vaping: a new environmental threat? *The Lancet: Respiratory Medicine*. 2022;10(7).
- 28 Krause MJ, Townsend TG. Hazardous waste status of discarded electronic cigarettes. *Waste Management*. 2015;39:57-62.
- 29 Cloud Nine E-cigarette Reviews. E-cigarettes – How Long Do They Last Before You Need a Replacement? <https://cloudnineeigreviews.com/electronic-cigarettes/how-long-do-cigarettes-last/>. Published 2020. Accessed 2020.
- 30 Ahmed SF. The Global Cost of Electronic Waste - Computers, phones, and other digital devices increasingly are made to be thrown away—which is bad for both consumers and the environment. An Object Lesson. In. *The Atlantic*, 2016.
- 31 Ach A. Biodegradable Plastics Based on Cellulose Acetate. *J Macromol Sci Pure*. 1993;30:733-740.
- 32 Ishigaki T, Sugano W, Nakanishi A, Tateda M, Ike M, Fujita M. The degradability of biodegradable plastics in aerobic and anaerobic waste landfill model reactors. *Chemosphere*. 2003;54:225-233.
- 33 Hons NS. Photodegradation of Cellulose Acetate Fibers. *J Polym Sci Pol Chem*. 1977;15:725-744.
- 34 American Nonsmokers' Rights Foundation. Municipalities with Smokefree Beach Laws. 2017.
- 35 American Nonsmokers' Rights Foundation. Municipalities with Smokefree Park Laws. 2017.
- 36 Health & Human Services Committee, Fine and Altman Arrington, Bartleman, et al. HB105 Regulation of Smoking by Counties and Municipalities. In: HOUSE OF REPRESENTATIVES STAFF ANALYSIS, ed. Hunschofsky, Joseph; Killebrew, LaMarca, Massullo; Mooney; Morales; Robinson, F.; Tant; Toledo; Woodson GBbHSCaFaAABBBBCDEG-MGG, trans: Florida State Legislature; 2022.
- 37 Health & Human Services Committee, Fine and Altman Arrington, Bartleman, et al. CS/HB 105 (2022) -Regulation of Smoking by Counties and Municipalities. In: Florida House of Representatives, ed. myfloridahouse.gov;2022.
- 38 Martinez M. These Florida cities are now banning smoking, vaping at parks and beaches. *WESH* 2022.
- 39 Moerman JW, Potts GE. Analysis of Metals Leached from Smoked Cigarette Litter. *Tobacco Control*. 2011;20(Suppl 1):i30-5.
- 40 Forster M. What happens when you throw away e-cigarettes? <https://missionlocal.org/2018/11/what-happens-when-you-throw-away-an-e-cigarette/>. Published 2018. Accessed.
- 41 Hopkins B. Open Vs Closed Systems: Which Is Right For You? In. *Vapor Vanity*;2020.
- 42 Mize J. Batteries cited as cause of Wash. recycling truck fire (reprint). *The Columbian*;2019.
- 43 California Product Stewardship Council. Fire Incident Survey Results 4/9/18. https://4aef0410-d204-448c-9525-d5fbfceb006e.filesusr.com/ugd/ad724e_312a645a03374a038119f5e7790dc79a.pdf. Published 2018. Accessed.
- 44 Kelly SM. Lithium-ion battery fires are happening more often. Here's how to prevent them. *CNN Business*;2023.
- 45 Rincón S. New legislation introduced in New York City to help prevent lithium-ion battery fires. *ABC 7 NY*;2023.
- 46 Duffy S, Kingsley L, Stancliffe R, et al. Letter to Ministers on Disposable Vapes. In: Thérèse Coffey SB, ed;2022.

- 47 Geist HJ. Global assessment of deforestation related to tobacco farming. *Tobacco Control*. 1999;8(1):18-28.
- 48 No Tobacco WHO. *Tobacco: poisoning our planet*. WHO: WHO;2022.
- 49 Carcinogenic waste and disappearing forests: tobacco is contaminating life on our planet [press release]. United Nations2022.
- 50 Chemical Report; TRI Explorer (2021 National Analysis Dataset (released March 2023)) Environmental Protection Agency; 2023. https://enviro.epa.gov/triexplorer/tri_release.chemical, Accessed 03.2023.
- 51 Chemical Report; Tri Explorer; 2020 Dataset. EPA; 2021. https://enviro.epa.gov/triexplorer/release_chem?p_view=USCH&trilib=TRIQ1&sort=_VIEW_&sort_fmt=1&state=All+states&county=All+counties&chemical=All+chemicals&industry=3122&year=2020&tab_rpt=1&fld=RELLBY&fld=TSFDSP.
- 52 WHO Framework Convention on Tobacco Control. Tobacco: a Barrier to Sustainable Development. Accessed April 2023. https://www.fctc.org/wp-content/uploads/2015/03/Tobacco_sustainable_development_190315.pdf
- 53 Ebbs S. E-cigarettes highlight the challenges of dealing with plastic waste - Lawmakers announced a new bill to tackle plastic pollution this week. *ABC News*,2020.
- 54 Agency IE. *The Role of Critical Minerals in Clean Energy Transitions*. Paris: International Energy Agency;2021.
- 55 Bureau of International Labor Affairs. *2022 List of Goods Produced by Child Labor or Forced Labor*. U.S. Department of Labor: Bureau of International Labor Affairs;2022.
- 56 PEGEX. How E-Cigarettes Could Provide a Model for All E-Waste. Hazardous Waste. <https://www.hazardouswasteexperts.com/hazardous-waste-management-e-cigarettes/>. Published 2017. Accessed.
- 57 Chang H. Research gaps related to the environmental impacts of electronic cigarettes. *Tobacco control*. 2014;23 Suppl 2(Suppl 2):ii54-ii58.
- 58 Washington Environment Council. Black Friday Goes Green as Manufacturers Help Consumers Recycle. <https://wecprotects.org/black-friday-goes-green-manufacturers-help-consumers-recycle/>. Published 2020. Accessed.
- 59 Leclerc SH, Badami MG. Extended producer responsibility for E-waste management: Policy drivers and challenges. *Journal of Cleaner Production*. 2020;251:119657.
- 60 Environmental Protection Agency. Civil Monetary Penalty Inflation Adjustment. In: Agency EP, ed. Vol 87. Federal Register : Rules and Regulations2022.
- 61 Businesswire. PMI Launches "Our World Is Not an Ashtray" Initiative and Aims to Halve Plastic Litter from Products by 2025. *Businesswire*2020.
- 62 Shevchenko T, Laitala K, Danko Y. Understanding Consumer E-Waste Recycling Behavior: Introducing a New Economic Incentive to Increase the Collection Rates. *Sustainability*. 2019;11(9):2656.
- 63 Patel M CA, Folger S. Support for cigarette filter waste policies among US adults. *Tobacco control*. 2021;32.
- 64 Templeton N. The Dark Side of Recycling and Reusing Electronics: Is Washington's E-Cycle Program Adequate? *Seattle Journal for Social Justice*., 2008;7(2).
- 65 Plastic Treaty progress puts spotlight on circular economy [press release]. United Nations,2023.
- 66 Stop Tobacco Pollution Alliance. UN TREATY ON PLASTIC POLLUTION. Action on Smoking and Health,. <https://ash.org/plastic-pollution/>. Published 2022. Accessed



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