



The Green Puff: Transforming Cannabis Vaping into a Sustainable Practice

A Comprehensive Guide to
Reducing E-Waste and Promoting
Environmental Responsibility

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What is Sustainability in Cannabis Vaping?

The UN World Commission on Environment and Development defines sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”¹ When it comes to cannabis vaping, that goal can be interpreted as producing vape devices today without compromising the ability of future generations to live in a healthy environment. Companies in all industries would be wise to take an incredibly long view of the market, and recognize that the key to long-term market growth is stability, and the only way to ensure stability into the foreseeable future is to focus on sustainability.

Consider the example of California’s gold rush. Miners were focused only on short-term profits with no consideration for the long-term costs, and left an environmental mess that taxpayers are still paying to clean up over a century later.² As the cannabis industry has long been referred to as the “green rush,” cannabis companies and governmental regulators should learn from the cautionary tale of the gold rush.

Though most cannabis consumers are probably more familiar with terms like “vape pen”, “vape”, “cartridge”, “cart” or “vaping device,” a more accurate term for these devices is Electronic Cannabis Delivery System (ECDS), which we will be using throughout this paper. ECDS is modeled on the academic term for an e-cigarette, which is, Electronic Nicotine Delivery System (ENDS). Though this may seem like a small semantic change, it is important because not all ECDSs are technically pens, and nor are they all technically vaporizers (as research has shown that low quality devices smolder the oil inside).³



ECDS and ENDS waste was found to be 42 million kilograms (about 46,297 US tons) per year, globally.

In a 2023 United Nations report on ‘invisible’ e-waste (electronic products that are unwanted, not working, and nearing or at the end of their ‘useful life’, i.e., computers, televisions, VCRs, stereos, etc.), ECDS and ENDS waste was found

¹ <https://www.sustain.ucla.edu/what-is-sustainability/>

² <https://phys.org/news/2024-02-northern-california-polluted-properties.html>

³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8264932/>

to be 42 million kilograms (about 46,297 US tons) per year, globally.⁴ By comparison, that is fourteen times the amount of household medical equipment waste produced. While 42 million kilograms may sound like a lot, it is less than 0.5% of the total 9 billion kilograms of ‘invisible’ e-waste generated yearly. These wasted resources were found to be valued at \$9 billion per year, making this a major economic and environmental issue.⁵



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While there are potential health concerns with low quality ECDSs, ranging from heavy metals leaching into the oil to adulterants like vitamin E acetate, those are generally problems with illegal ECDSs, rather than those available through the legal market.^{6,7} ECDS-related health concerns have been well-documented by journalists and academics over many years and the focus of this current white paper is on environmental health — sustainability. Though our present focus is on sustainability, it is important to recognize that communities are only as healthy as their environment and many diseases are the result of environmental pollution.⁸

In this whitepaper we’ll outline the four major challenges to sustainability in cannabis vaping, and several solutions for businesses, governments, and consumers.

⁴ <https://drive.google.com/file/d/171a16yo5JoTf7tp6LbXVWiaF4D4M7Oa8/view>

⁵ <https://www.chemistryworld.com/news/disposable-vapes-contribute-to-nearly-10-bi...>

⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10034821/>

⁷ <https://www.chemistryworld.com/news/why-are-there-metal-particles-in-nev...>

⁸ <https://health.gov/healthypeople/objectives-and-data/browse-objectiv...>

Executive Summary

Challenges

- **Battery Waste:** The lithium-ion batteries in ECDSs are hazardous waste that pose environmental risks if not properly recycled.
- **Single Use Cartridges and Pens:** Single-use cartridges and all-in-one pens generate significantly more waste than other product types. Their disposal is complicated by the battery, mix of materials (metal, glass, plastic, or ceramic), and any remaining cannabis residue.
- **Vape Packaging Excesses:** ECDSs are the most over-packaged products on the market and often use multi-layered or excessively decorated packaging, further complicating disposal.
- **Environmental Costs of the Holistic Cannabis Market:** As a manufactured cannabis product, an ECDS can only be as sustainable as the cannabis extract used to fill it. This means consumers and brands alike should consider the environmental impacts of each step along the way before an extract goes into an ECDS.

Solutions

- **Materials and Recycling Innovation:** Companies can explore more sustainable materials such as bioplastics, ocean-bound plastics, or devices with easily recyclable components.
- **Refillable or Reusable Systems:** Refillable or reusable systems would greatly reduce the waste produced by cannabis vaping, similar to milk bottles which can be brought back to a store and sanitized before being used again.
- **Extended Producer Responsibility:** In order for refillable or reusable systems to become a reality, a necessary first step is to establish retailers or other business types as collection points for vape/battery waste through “take-back” or extended producer responsibility programs.
- **Regulatory Support:** These first three solutions will only be possible with support from cannabis regulators, waste regulators, and other state or local government entities. Regulatory support can take the form of improving the text of regulations themselves or could be a tax rebate system that offsets the cost of recycling programs or helps achieve price parity between bio-resins and plastic resins.

- **Consumer Education:** Consumers need to be educated about the environmental impact of different vape products, so they can make informed decisions when they vote with their dollars for more sustainable options.
- **Sungrown Cannabis:** One important step that vaporizer companies can take to reduce their environmental impact is to control their supply chain and use only sungrown cannabis processed with minimally toxic solvents, and captured by a closed-loop system.

Challenges To Sustainability in Cannabis Vaping

Battery Waste

The waste associated with ECDSs takes many forms, including product packaging (the box it is sold in), e-waste (the electronic components in the cartridge/pod/chamber), and the battery. In a cannabis vape, like The Blinc Group's Simpli Too, while the total device weighs 24.33 grams, the battery is just 19.05% of the total product weight. Though the lithium-ion batteries in ECDSs are much smaller than those in electric scooters or cars, they pose the same environmental risks if not properly disposed of. Improper disposal can lead to toxic chemicals leaching into the environment or potentially causing fires in waste facilities. Many waste haulers note that smaller batteries, like those in ENDSs or ECDSs, are more likely to quite literally fall through the cracks in equipment and end up on the floor, where they can be run over and start catastrophic fires.



The Environmental Protection Agency (EPA) notes that “Lithium-ion batteries and devices containing these batteries should NOT go in household garbage or recycling bins.”⁹ This is because “Most lithium-ion batteries on the market are likely to meet the definition of hazardous waste under the Resource Conservation and Recovery Act (RCRA).” As it is a hazardous waste, companies who generate lithium-ion battery waste are referred to by RCRA as hazardous waste generators. While households are exempt from RCRA regulations, individuals still have the responsibility to dispose of their lithium-ion batteries in a safe manner.

⁹ <https://www.epa.gov/recycle/used-lithium-ion-batteries>

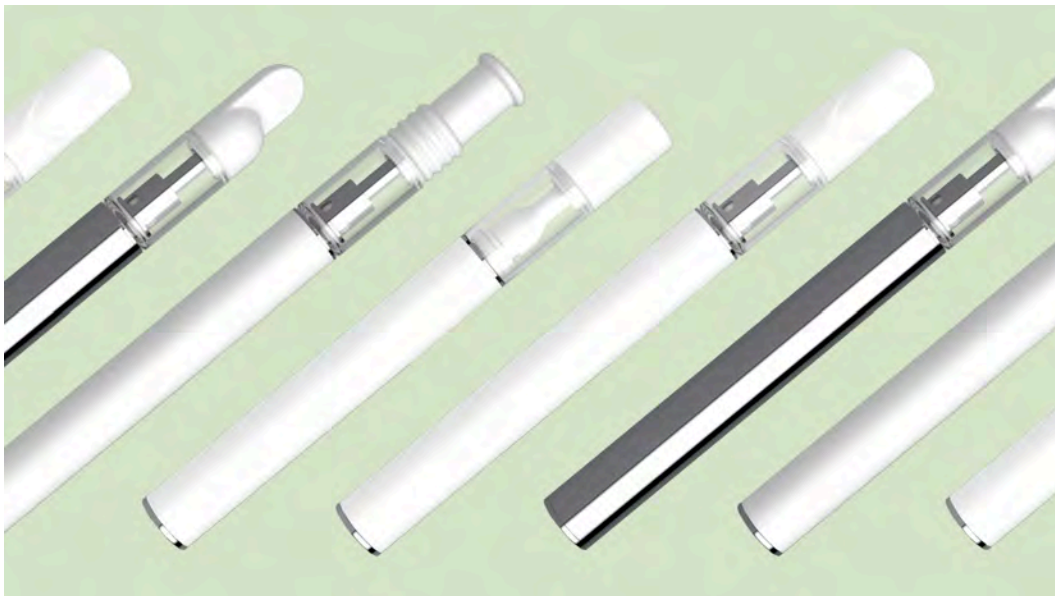
The EPA instructs that lithium-ion batteries should be brought to the appropriate household hazardous waste (HHW) or electronic waste collection site. The EPA also offered this guidance on how to minimize the risk of batteries causing fires, noting that batteries should either be placed in separate plastic bags or have the terminals taped.

The current challenge of battery waste has the potential to become a solution to that very same problem, thanks to recycling. Lithium-ion batteries are made from “critical minerals” like lithium, graphite, cobalt, or nickel, which in the case of Co and Ni, are heavy metals. A mineral is “critical” if it is “economically and strategically important to the US,” which means recycling those materials is a matter of national security. Beyond the economic argument, heavy metals and other potential toxic contaminants should be kept out of soils and groundwater and recycling is a great way to do that.⁹

Single Use Cartridges and Pens

The cannabis industry has a waste problem and that is not unique to cartridges. Google the name of any state with a large cannabis market and add the words “cannabis waste issues” and you are bound to find something. In California, cannabis organic waste is challenging the state’s ability to meet its environmental goals.¹⁰ In Washington, despite efforts to cut down on the amount of waste going to landfills, a majority of cannabis waste is still going to the dump.¹¹ Meanwhile, in Colorado, companies are working on figuring out better solutions to cannabis packaging waste, plant waste, and electricity usage.¹²

Research on cannabis waste is limited, and some of it, can be misleadingly inaccurate, such as a 2023 study that doesn’t include recycling as an appropriate method of cannabis waste disposal.¹³ A study presented to the ASTM International last fall and soon to be published in the ASTM’s Journal of Testing and Evaluation took a first look at the volume of cannabis consumer packaging produced in California every year. That study confirmed that cannabis vape products are the most over-packaged product category, but it also considered the weight of the device itself to be packaging, and only the oil inside was considered product weight. According to their findings, on average, the battery and packaging around the oil in an ECDS was 5,039% the oil inside the device.¹⁴



A major reason that ECDSs have a higher amount of waste than other products is they often contain a mix of materials (metals, plastics, ceramics, and glass or

¹⁰ <https://www.usnews.com/news/best-states/articles/2019-02-25/pot-challen...>

¹¹ <https://www.spokesman.com/stories/2024/mar/03/the-majority-of-mariju...>

¹² <https://www.aspenpublicradio.org/environment/2022-09-08/the-cannabis-ind...>

¹³ <https://www.sciencedirect.com/science/article/abs/pii/S0926669023004041>

¹⁴ <https://doi.org/10.1520/JTE20230806>

pyrex), that paired with their small size makes the device difficult to recycle, leading to landfill disposal and potential environmental contamination. Vape disposal is complicated by any cannabis residue left in devices, which is commonplace as the residue is sticky and there is no easy way to open up the chamber and clean it out. Some waste haulers and government regulators have raised concerns that cannabis residue left in an ECDS could be considered a Schedule I drug or hazardous waste, further complicating disposal.

You might be more familiar with calling single-use vape cartridges and all-in-one pens “disposable,” but that is not the most accurate way to describe them. As we discussed in the **Battery Waste** section previously, because they contain batteries these devices need specialized disposal at hazardous waste facilities and cannot go into the ordinary trash can (no batteries can). By calling them “disposable” it gives the false impression to the average consumer that battery-containing ECDSs can be thrown into the trash, leading to contamination at landfills. In an attempt to help educate consumers, California passed a pioneering law in 2021 which prohibits any label, advertising, or marketing from calling a single-use ECDS “disposable,” and it is likely this requirement could spread to other states.¹⁵

As the waste generated by single-use vape cartridges and all-in-one pens is significantly more than all other market sectors, it is incumbent on the manufacturers of those devices to help combat their waste. Despite ECDSs having a substantial uphill climb to become sustainable, many efforts are underway to make sustainability happen quickly and easily.

¹⁵ https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB1894

Cannabis Vapes Are Heavily Over-Packaged

Though ECDSs are small, they have a huge impact on cannabis waste. This is for two main reasons, first, they are between 14-30% of total sales, depending on the state and year the sales data is from.¹⁴ Second, as we just covered in the **Single Use Cartridges and Pens** section, ECDSs were found to have 5,039% more packaging than the average weight of the oil inside the device. Put another way, only 1.95% of the total device weight was actually the oil, everything else was waste.¹⁴



Only ingestible cannabis products (edible or drinkable products) had a lower product to packaging weight ratio than salad dressing or oil in glass bottles (68-80%), some of the heaviest food packaging commonly used. Other types of cannabis products also had significantly more packaging than product weight, such as concentrates (3,922%), flower (2,485%), prerolls (1,727%), and sublingual (324%).¹⁴ Beyond the device itself, there often are foam inserts and

other additional layers of packaging around the ECDS to protect it in transportation, in some cases as many as four or more layers of packaging.

In many cases the packaging is multi-layered or excessively decorated, which adds to the complexity of this waste stream. Unfortunately, many cannabis regulators have written rules that barely even mention ECDSs or batteries, let alone consider their waste impacts. In California, ECDSs produced an estimated 1,874,470 pounds of waste in 2022, nearly double the 1,001,350 pounds produced in 2018, which is also nearly double the 2017 estimate of 517,908 pounds. That waste included not just the used ECDS itself but also layers of plastic, foam, cardboard, and paper packaging.¹⁴



11,974 tons of cannabis consumer packaging waste produced in California in 2022

While 1,874,470 pounds (937.235 tons) may sound like a lot, by virtue of the small size of ECDSs, they are just 7.8% of the total 11,974 tons of cannabis consumer packaging waste produced in California in 2022. One important caveat to these findings is vape battery waste was not able to be included in the study's 2022 total, which likely would significantly inflate the waste weight. If battery waste was included, the study's author believes California's "cannabis consumer packaging waste stream would surpass the 16,805 tons of pharmaceutical HHW produced in 2021."¹⁴ The key difference between pharmaceutical HHW and ECDS or cannabis waste is there actually is infrastructure in place to collect pharmaceutical waste.

Environmental Costs of the Holistic Cannabis Market

No cannabis starts its life as a vape product, it is grown, extracted, and then used to fill a cartridge or other ECDS. As a manufactured cannabis product, to an extent, an ECDS can only be as sustainable as the cannabis extract used to fill it. In turn, that extract can only be as sustainable as the flower that went into it. Both cannabis consumers and brands should consider the environmental impacts of every step that cannabis took before it went into an ECDS.

Cannabis cultivation can be done in three main ways, it can be grown outdoors, in a greenhouse, or indoor. As both outdoor and greenhouse grown cannabis were grown under the sun they are collectively referred to as sungrown cannabis. As opposed to sungrown cannabis, where generally little to no energy is needed for cultivation, growing cannabis indoors is highly energy intensive. Just because two growers are both growing in the same style (indoor vs. sungrown) doesn't mean they are using the same amount of energy, as there is a wide degree of variation between grows. For example, an outdoor cultivator may use supplemental lighting or generators increasing their electricity costs or an indoor cultivator may use solar panels to offset theirs.

In 2020 the National Cannabis Industry Association (NCIA) released a white paper focused on sustainability in the cannabis industry, which thoroughly analyzed the data on the electricity consumption of cannabis cultivation. The NCIA white paper noted that 63% of cannabis cultivation takes place completely indoors, with 20% in greenhouses, leaving 17% grown outdoors.¹⁶ For the indoor cultivators, 30-60% of total operational expenses were their energy costs. In 2018, New Frontier Data released their Cannabis Energy Report, which analyzed a statistically representative sample of licensees and found that "legal cannabis cultivation in the U.S. consumes 1.1 million megawatt-hours (MWh) annually, the equivalent of 92,500 homes."¹⁷ That same year, Denver's Department of Public Health and Environment released an estimate that 4% of the city's energy use was due to cannabis operations, double what it was in 2017.¹⁶

After cannabis is grown, there can be additional energy costs associated with its storage. For example, if cannabis is dried and cured it can be stored at room temperature with no refrigeration, but increasingly cannabis extractors are creating "live" extractions using fresh frozen flower. In order for a live resin or a live rosin to be "live" the flower used in the extraction must stay frozen until it is extracted, which will increase the overall energy consumption.

The extraction process itself can be very energy intensive and use solvents that further challenge the sustainability of the end product. For example, extractors can do a hydrocarbon extraction using butane, pentane, or hexane, which are

¹⁶ <https://thecannabisindustry.org/wp-content/uploads/2020/11/NCIA-Environmental-Po...>

¹⁷ <https://newfrontierdata.com/product/2018-cannabis-energy-report/>

then purged at the end of the process. A hydrocarbon extraction can be made more sustainable by using what is called a closed loop system, that allows the solvents to be captured and reused, rather than evaporated and purged. Rather than making an extraction using solvents, it is also possible to make a solventless product, like rosin, a concentrate made through gentle heat and lots of pressure.

Cannabis extractors looking to improve sustainability should pay attention not just to the energy used to create the extract, but the waste solvents produced and how they are disposed of. In 2021, the executives of a California-based cannabis company pleaded guilty in federal court to illegal dumping of hazardous waste. As a result of dumping 220 gallons of ethanol used in cannabis extraction, and intentionally not preparing a required waste manifest, the company agreed to pay over \$70,000, with potential criminal charges for the executives involved.¹⁸

¹⁸ <https://www.justice.gov/usao-sdca/pr/cannabis-processing-firm...>

Solutions To Sustainability in Cannabis Vaping

Materials and Recycling Innovation

One option which every company theoretically has access to is to explore more sustainable materials such as bioplastics, ocean-bound plastics, or devices with easily recyclable components. Unfortunately, using more sustainable packaging is easier said than done, as IRS tax code 280E limits what can be declared a business expense and allows the federal government to effectively tax cannabis businesses into insolvency. So while many cannabis companies want to be more sustainable, they often find it cost prohibitive after paying their 280E and other tax burdens to state or local governments. In a recent survey of cannabis operators focused on sustainability, one of the most commonly provided solutions to help the industry be more sustainable was an end to 280E taxes, which make it nearly impossible to run a business, let alone, a sustainable business.¹⁴

The recent announcement that the DEA may move cannabis from Schedule I to Schedule III offers some potential relief from 280E taxes, as it only applies to those who profit from “trafficking” Schedule I or II drugs. Until rescheduling goes through a public comment period and is finalized, businesses will continue to be responsible for their 280E tax burden. Once cannabis is officially rescheduled, businesses will have significantly more resources to devote to sustainability, such as ECDS or packaging waste recycling programs.



Materials innovation is much easier when it comes to the product packaging rather than the ECDS itself. For example, while ocean-bound plastic or bio-resins

are wonderful materials for the external product packaging, they may not meet the material needs for manufacturing an ECDS itself. Besides innovation with the materials, ECDS manufacturers can innovate ways to make their devices easier to recycle or clean out any remaining cannabis residue. The Blinc Group's Simpl Too was designed with recycling in mind to give companies a more sustainable option with their vaporizer hardware and empower consumers to recycle the battery.¹⁹

If cannabis licensees, like dispensaries, are allowed to become points of collection for take-back recycling (more on that in the **Extended Producer Responsibility** section), then there would be a source of recyclable materials to make new ECDSs. Without take-back programs, it is still possible to use batteries made from recycled lithium-ion batteries, but take-back programs would provide a new supply of recycled materials.

Another area of revolutionary innovations is in the equipment recycling facilities use to scan and sort recyclable materials. Efforts are currently underway to train machine learning models to recognize a wide range of waste and recyclables.²⁰ Once these models are trained on traditional types of recyclable materials it will be easier to adapt them to recognize ECDSs or their small lithium-ion batteries.

¹⁹ <https://theblincgroup.com/aio-simpl-too-powered-by-blinc/>

²⁰ <https://cnr.ncsu.edu/news/2023/11/ai-waste-management/>

Refillable or Reusable Systems

Many cannabis vaping companies have the aspirational goal of creating refillable or reusable devices. Refillable or reusable systems would greatly reduce the waste produced by cannabis vaping when compared to repeatedly manufacturing new devices. While reusable and refillable cannabis vaporizers are plentiful when it comes to those that can be filled with flower, it is much more difficult to find refillable systems that use high potency oils like those found in single use cartridges or pods. As cannabis is still a medical product for many people, including those with health issues that limit their ability to refill their own device, many cannabis consumers prefer prefilled cartridges or pods.

Those companies who are selling ECDS and are trying to be more sustainable often look to the example of milk bottles, which can be brought back to a store, sent to a dairy, and sanitized before being used again. Another model of regulations that can be looked at when crafting rules around hygiene for reusable or refillable ECDSs are federal guidelines on the reprocessing of medical devices.²¹ Improperly sanitized ECDSs could spread diseases and create a liability nightmare for companies, so these devices would need to be manufactured with the goal of making hygienic cleaning simple and easy.



To effectively manage the hygiene concerns associated with reusable ECDS, it is paramount to establish stringent standards and protocols for consumer use. Given that manufacturers relinquish control over the substances introduced into the device post-purchase, there is a heightened risk of contamination from external elements and improper refills. This risk is exemplified by the practice of consumers refilling screw-on cartridges with potentially untested and unsafe

²¹ <https://www.fda.gov/medical-devices>

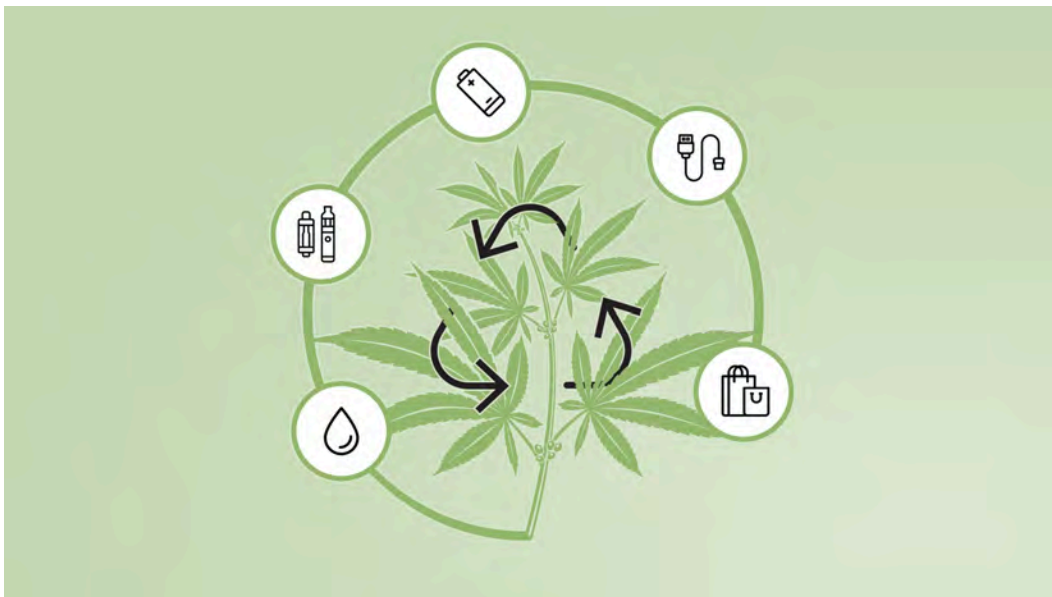
extracts, which not only compromises the intended functionality and safety of the device but also elevates the potential for adverse health effects. Consequently, manufacturers must incorporate mechanisms that can either restrict the use of unauthorized substances or ensure that the device maintains its integrity even when exposed to a range of inputs.

Moreover, the liability associated with these reusable devices necessitates a robust legal framework that clearly delineates the responsibilities of both manufacturers and consumers. This framework should ideally include comprehensive guidance on the proper maintenance and sanitation of these devices, thus safeguarding both user safety and product efficacy. Additionally, the economic implications of implementing such measures, while potentially substantial, are a necessary investment in ensuring the long-term viability and safety of reusable ECDS products.

Extended Producer Responsibility

As we saw with the example of milk bottles and medical devices, there needs to be a point of collection for recyclable, reusable, or refillable ECDSs. For ECDSs, the most logical point of collection would be dispensaries or other cannabis businesses accessible to the public, like consumption lounges. Those businesses are already licensed to have cannabis products on site, which makes them a more compliant point of collection than other businesses who commonly collect ECDSs. Aside from cannabis businesses, other types of businesses that already collect ECDS waste are hotels, airports, schools, and police stations. It is likely that if cannabis businesses were established ECDS collection points then hotels, airports, and other businesses without licenses to handle cannabis would have less of a waste burden.

In order for refillable or reusable vape systems to become a reality, a necessary first step is to establish retailers or other business types as collection points for battery and ECDS waste. There already are some companies with ECDS or battery take-back programs around the United States, but those programs are limited in scope and only handle a small portion of the total waste produced. It is not clear what percentage of ECDSs or their batteries are currently being recycled via a take-back program, but estimates are generally less than 10%.



These types of extended producer responsibility (EPR) programs assign “producers greater responsibility for the end-of-life management of the products they introduce to the market and encourage innovations in product design.”²² According to the National Conference of State Legislatures, in the US, the products most often to have EPR programs are “electronics, mercury

²² <https://www.ncsl.org/environment-and-natural-resources>

thermostats, batteries, pharmaceuticals, paint, fluorescent lighting and mattresses.”²² EPR programs have been a growing trend around the world for the last two decades and some American lawmakers have expressed an interest in requiring EPR for ECDS and ENDS devices.

In the **Battery Waste** section we discussed how recycling batteries doesn’t just make long-term economic sense and improve our environmental health, it also is a matter of national security, as it lets countries retain critical minerals they may not otherwise be able to mine. According to the NCI’s sustainability white paper, four things are needed to realize a functioning dispensary-based ECDS EPR program.¹⁶ They are:

1. ECDS products designed for reuse and not disposability.
2. A recycler with the capability to process ECDS components and lithium-ion batteries.
3. A viable end market for the recycled materials.
4. Laws and regulations that allow for the ECDS byproducts to be recycled.

Regulatory Support

The first three solutions (**Refillable or Reusable Systems, Materials and Recycling Innovation**, and **Extended Producer Responsibility**) will largely only be possible with adequate support from cannabis regulators, waste regulators, and other state or local government entities involved with waste processing. Regulatory support can take the form of improving the text of regulations themselves to actually allow for the recycling or reuse of cannabis waste. Changes may need to be made to multiple sets of regulations, for example, to waste regulations as well as cannabis regulations. Regulatory support could also be a program of tax rebates to help offset the costs of using more sustainable packaging materials, to achieve price parity between bio-resins and plastic resins, or to help pay for vape recycling programs.

Oregon is possibly the only state that currently allows cannabis licensees to “give or sell marijuana waste to a producer, processor, or wholesale licensee or research certificate holder.”²³ Such a transaction must be recorded into Oregon’s track and trace system in accordance with state regulations. Legalizing the sale or gifting of cannabis waste to other licensees is a necessary change to create an end market for recycled waste and close the loop on a circular economy. Without an end market for recycled materials there is no purpose in recycling and it would just be a waste of resources. If cannabis regulators are looking for some low hanging fruit to improve cannabis vape sustainability, they should follow Oregon’s lead and create an end market for recycled cannabis waste.



Regulators can also look for commonly found issues in cannabis regulations that make ECDS and battery recycling difficult or impossible. Often, cannabis waste

²³ <https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=296415>

must be 'rendered unusable or unrecognizable,' which also means unrecyclable, because once an ECDS is put through an industrial shredding machine it is much harder to recycle the battery or other materials. One issue that has arisen in multiple states is a requirement that all waste produced at a facility must be rendered at that facility, rather than a centralized location like a hazardous waste or recycling facility. One major barrier to the creation of dispensary-based EPR programs is regulations that prohibit cannabis products with any sign of use at a licensed facility. While that was a well-intentioned way to prevent illegal consumption on site, it also is a ban on take-back recycling, as all returned products would show signs of use.

Another way regulators can support cannabis companies in transitioning to more sustainable business models could be a program of tax rebates to help offset costs. While presently, the cost of traditional plastic resins is cheaper than hemp bio-resins, the cost of hemp resin is consistently getting cheaper. A tax rebate could create a price parity allowing more companies to switch to bio-resins, ocean-bound plastic, or other sustainable packaging materials. A government rebate program could also be used to support companies setting up vape take-back recycling programs. As was noted in the **Materials and Recycling Innovation** section, 280E taxes are one of the biggest impediments to sustainability in cannabis vaping. Both the federal government and state governments should work to address the issue of cannabis taxation.



Finally, a more long-term strategy regulators can employ to greatly reduce cannabis waste would be to offer cannabis consumers a tax rebate to purchase a lockable medication safe. After a few years of tax rebates to help offset the cost, presumably everyone who needed a safe would have one and child-resistant packaging (CRP) requirements could be eliminated for cannabis products. While well-intentioned, research has shown CRP to be one of the main factors

increasing the weight of cannabis waste after legalization.¹⁴ CRP requirements for cannabis are generally much stricter than those for alcohol, tobacco, or toxic cleaning products, and reducing the environmental burden of CRP would greatly improve sustainability.

A macro-level solution to the cannabis waste issue is to bring as many sales as possible into the legal market. The NCIA was unequivocally clear in their white paper, “unregulated sales of products lead to an unregulated waste stream, outside of regulatory control.”¹⁶ That means the most important thing cannabis regulators can do to reduce the negative environmental impacts of cannabis would be issue as many licenses as possible, rather than impose artificially strict license caps like some states have proposed (before ultimately raising or removing those caps).

Consumer Education

In a capitalist economy, the ultimate power consumers can exercise is voting with their dollars. In order for cannabis consumers to vote for more sustainable cannabis products through their purchases companies need to do more to educate consumers. A 2023 survey found that “More than half (58%) of consumers indicated they are willing to spend more money on products that are deemed sustainable or environmentally friendly.”²⁴ If a vape company is sourcing only sustainably cultivated sungrown cannabis they should tell their consumers why that matters to them (i.e. more terpenes, lower cost, better for the environment). Similarly, if they are using more sustainable methods of extraction, such as solar power or a closed loop system that captures their solvents, that is a selling point to sustainability-minded shoppers.



More than half (58%) of consumers indicated they are willing to spend more money on products that are deemed sustainable or environmentally friendly.

Furthermore, companies can't just stop at educating their consumers, they need to support them when it comes to responsibly disposing of or recycling their ECDS. One strategy companies can use to support their customers is to establish take-back programs for cannabis waste. A companion strategy companies can employ with a take-back program is to provide an economic incentive to consumers who go through the extra step of bringing their waste back, similar to the deposit on milk bottles.

²⁴ <https://www.prnewswire.com>

Sungrown Cannabis

As we discussed in the section on the **Environmental Costs of the Holistic Cannabis Market**, ECDSs are manufactured products, and can only be as sustainable as the extract and manufacturing process that created them. A critically important step vaporizer companies can take to reduce their environmental impact is to control their supply chain. By controlling their supply chain companies can ensure they are using the most sustainable cannabis flower possible, such as sungrown cannabis using homemade compost teas. For many years sungrown cannabis got a bad reputation for not having as much “bag appeal” as indoor cannabis, in other words, it didn’t look as pretty, but that is starting to change. Research has shown that growing cannabis under UV light, such as natural sunlight, yields higher terpene content, so while the flower may not look as pretty, it has a much stronger flavor and scent.²⁵ Another benefit for companies looking to be more sustainable and make the switch to sungrown cannabis is that it tends to be cheaper than indoor. That lower cost and higher terpene content makes sungrown cannabis ideal for vape oil.

²⁵ <https://hightimes.com/grow/growing-for-terpenes/>

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Arnaud Dumas de Raully is the Co-founder and CXSO of The Blinc Group, which champions safety, innovation, and quality in cannabis vaping. An engineer by training, Arnaud ensures Blinc's products lead the market in safety standards. His entrepreneurial journey began at Fat Smoke, France's first electronic cigarette company, where he was President and Co-founder. He also served as President of FIVAPE, the French vaping trade federation, and as a founding Board member of the Vapor Technology Association in the US.

A recognized authority in cannabis vaping technology, regulation, and supply chain, Arnaud is a key consultant for regulatory bodies across North America, Europe, and Asia. He holds chairmanships in ISO TC126/SC3 and CEN TC437, standardizing vaping products. Fluent in French, English, and Spanish, Arnaud speaks internationally, sharing insights gained from an extensive education that includes an Executive MBA and a Master's in Engineering.



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Mitchell Colbert is a journalist and educator who has written nearly 200 articles for over a dozen outlets including High Times, Leafly, and Cannabis Now. Mitchell is a co-author of multiple whitepapers focused on sustainability in the cannabis and hemp industries and The Budtender's Guide, a companion textbook for the training course he helped create at Oaksterdam University. He also is a published researcher who recently presented a novel study on cannabis packaging waste in California.

Since 2018, Mitchell has lobbied around the United States to legalize the recycling of cannabis waste, specifically vape waste. He currently is the Chief Compliance Officer for the hemp company VerdureX and a member of the SB 54 Working Group in California, representing the cannabis and hemp industries in the implementation of a first-in-the-nation plastic packaging EPR law.



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