ZERO WASTE ALLIANCE IRELAND

Towards Sustainable Resource Management

Submission to the Department of the Environment, Climate and Communications in Response to the Department's Public Consultation on Disposable Vaping Devices

27 July 2023

Zero Waste Alliance Ireland is a member of

EEB European Environmental Bureau

and

IEN Irish Environmental Network

An Tinteán Nua, Ballymanus, Castlepollard, County Westmeath, Ireland
An Tinteán Nua, Baile Mhánais, Baile na gCros, Co. an Iarmhí, Éire, N91 PP76.
Telephone: +353 44 966 2222 Mobile: +353 85 215 5289 Email: admin@zwai.ie

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27 July 2023

Producer Responsibility Initiatives
Department of Environment, Climate and Communications,
29-31 Adelaide Rd,
Dublin 2,
D02 X285.

BY EMAIL TO:
PRI@decc.gov.ie

Dear Sir / Madam,

Response to Public Consultation on Waste Problems Resulting from the Use and Disposal of Disposable Vaping Devices

Submission by Zero Waste Alliance Ireland to the Department of Environment, Climate and Communications

On behalf of Zero Waste Alliance Ireland (ZWAI), we attach our submission in response to the Department's public consultation on the challenges to our current waste collection and recycling system caused by used disposable vaping devices.

ZWAI is very pleased to have the opportunity to respond to this important public consultation, and the intention of our submission is to provide observations on the size of the problem, the particular issues related to the use, discarding and eventual fate of disposable vaping devices (DVDs). Our submission also addresses the issues of whether these devices can be recycled, the generation of waste by the increasingly widespread use of DVDs, the wasteful use of critical raw materials and plastic in a disposable product, and the particular problems caused by lithium-ion batteries and electronic components contained in DVDs.

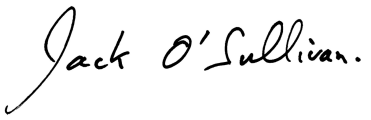
ZWAI would ask the Department to note that we have completed earlier today the online survey published on the Department's website; but, while we consider that the survey is reasonably useful, we feel it is not sufficiently comprehensive; and

therefore we wish to add the attached submission, which we hope will be useful in formulating Government policy on the sale, importation, advertising and use of disposable vaping devices.

We would be grateful if you could note that this letter forms part of our submission.

We look forward to your acknowledgement of the submission, and to seeing in due course the final version of the Department's proposed regulations.

Yours sincerely,



Jack O'Sullivan

On behalf of Zero Waste Alliance Ireland.

ZERO WASTE ALLIANCE IRELAND

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CONTENTS

Contd.

CONTENTS, CONTD.

Figures

Appendices

ZERO WASTE ALLIANCE IRELAND

Towards Sustainable Resource Management

ZWAI
ZERO WASTE ALLIANCE IRELAND

SUBMISSION TO THE DEPARTMENT OF THE ENVIRONMENT, CLIMATE AND COMMUNICATIONS IN RESPONSE TO THE DEPARTMENT'S PUBLIC CONSULTATION ON DISPOSABLE VAPING DEVICES

1. INTRODUCTION

On 01 June 2023, Mr Ossian Smyth, T.D., Minister of State at the Department of Environment, Climate and Communications (DECC), invited members of the public and interested organisations to participate in the Department's consultation on disposable vaping devices (DVDs), also known as electronic cigarettes or e-cigarettes, which are a growing environmental concern in Ireland and worldwide.

As an environmental NGO which has been working in the area of waste-related issues for more than two decades, Zero Waste Alliance Ireland is particularly concerned about the appearance of new and difficult types of waste, at a time when the reduction and eventual elimination of waste should be key targets. We have noted that the growth in the use of DVDs in world markets is fast changing the composition of e-waste[1], and that the global market for DVDs or e-cigarettes estimated to grow to US$ 48.9 billion by 2025.[2]

It is therefore very likely that if this new and unnecessary technology is not controlled in some appropriate way, the overall global quantity of e-waste is also

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[1] Roy Malon Shamhuyenhanzva, Asphat Muposhi and Delight Rufaro Hungwe, 2023. A downstream social norms approach for curtailing e-cigarette waste: Promising social marketing interventions from consumer interactions. Waste Management & Research 2023, Vol. 41(7) pp 1238–1245.

[2] Adroit Market Research, 2018. Global e-cigarette market size 2017 by type (disposable, rechargeable, modular), by region and forecast 2018 to 2025. Available at: https://www.adroitmarketresearch.com/industry-reports/e-cigarette-market

likely to rise; and, if e-cigarette waste is not responsibly managed, it has the potential to escalate into a materials management and waste management crisis. See, for example, the report by Kari Paul, published in the Guardian on 27 August 2019, which suggests that vaping could "*create a massive recycling disaster*".[3]

This public consultation is therefore very relevant to our primary areas of work which are focussed on prevention of waste, and on the elimination of wasting or discarding substances, materials, objects (natural or man-made) and products of every description. We especially oppose the end-of-life fate of these materials and objects by incineration or landfilling, resulting in the continuing extraction and processing of yet more raw materials to replace them.

Closely allied with these areas of work are our promotion of the Circular Economy, and our support for schemes such as "deposit and return" which would have the effect of increasing the rate at which materials and objects are re-used and recycled. These positive activities may be summarised as promoting the transition from a wasteful linear to a more efficient circular economy, together with accompanying changes in how our society values and uses non-living and living (plant-based and animal-based) materials, and the manufactured goods we produce from them. Relevant information about our objectives and work to date is provided in section 2 of this submission.

We at ZWAI are very pleased to have the opportunity to provide feedback by expressing our views to the DECC. We would like to see a nationwide banning of such devices, which we believe is the only solution to combating this needless waste source, particularly when considering that rechargeable devices are an option for users. We trust that the observations in this submission will be considered.

[3] Paul, K., 2019. Vaping's other problem: Are e-cigarettes creating a recycling disaster? Available at: https://www.theguardian.com/society/2019/aug/26/ vapings-other-problem-are-e-cigarettes-creating-a-recycling-disaster
At the time of her writing this report, Kari Paul was a reporter covering technology out of the Guardian's West Coast office in Oakland, California, USA.

2. ZERO WASTE ALLIANCE IRELAND (ZWAI)

At this point we consider that it is appropriate to mention the background to our submission, especially the history, policy, strategy and activities of ZWAI.

2.1 Origin and Early Activities of ZWAI

Zero Waste Alliance Ireland (ZWAI), established in May 1999, and registered as a company limited by guarantee in 2004, is a Non-Government Environmental Organisation (eNGO) and a registered charity.

During more than two decades ZWAI has prepared and submitted to the Irish Government and to State Agencies many policy documents on waste management, on using resources sustainably, on promoting re-use, repair and recycling, and on development and implementation of the Circular Economy. In recent years, ZWAI has also responded to the European Commission's calls for submissions on a variety of topics in the areas of wastewater, solid wastes, soil health and biological materials.

One of our basic guiding principles is that human societies must behave like natural ecosystems, living within the sustainable flow of energy from the sun and plants, producing no materials or objects which cannot be recycled back into the earth's systems, or reused or recycled into our technical systems, and should be guided by economic systems and practices which are in harmony with personal and ecological values.

Our principal objectives are:

i) sharing information, ideas and contacts,

ii) finding and recommending environmentally sustainable and practical solutions for domestic, municipal, industrial and agricultural waste management, and for more efficient and ecologically appropriate uses of natural resources such as scarce minerals, water and soil;

iii) lobbying Government and local authorities to implement environmentally sustainable waste management practices, including clean production, elimination of toxic substances from products, re-use, recycling, segregation of discarded materials at source, and other beneficial practices;

iv) lobbying Government to follow the best international practice and EU recommendations by introducing fiscal and economic measures designed to penalise the manufacturers of products which cannot be re-used, recycled or composted at the end of their useful lives, and to financially

support companies making products which can be re-used, recycled or are made from recycled materials;

v) raising public awareness about the long-term damaging human and animal health and economic consequences of landfilling and of the destruction of potentially recyclable or re-usable materials by incineration;

vi) investigating, raising public awareness and lobbying Irish Government departments and agencies about our country's failure to take adequate care of vulnerable and essential natural resources, including clean water and air, biodiversity, and soil;

vii) advocating changes in domestic and EU legislation to provide for more ecologically appropriate, environmentally sustainable and efficient uses of natural resources; and,

viii) maintaining contact and exchanging information with similar national networks in other countries, and with international zero waste organisations.

2.2 Our Basic Principles

In nature, the waste products of every living organism serve as raw materials to be transformed by other living creatures, or benefit the planet in other ways. Instead of organising systems that efficiently dispose of or recycle our waste, we need to design systems of production that have little or no waste to begin with.

There are no technical barriers to achieving a "zero waste society", only our habits, our greed as a society, and the current economic structures and policies which have led to the present environmental, social and economic difficulties.

"*Zero Waste"* is a realistic whole-system approach to addressing the problem of society's unsustainable resource flows – it encompasses waste elimination at source through product design and producer responsibility, together with waste reduction strategies further down the supply chain, such as cleaner production, product repairing, dismantling, recycling, re-use and composting.

ZWAI strongly believes that Ireland and other Member States, and the EU as a whole, should have a policy of not sending to other countries our discarded materials for further treatment or recycling, particularly to developing countries where local populations are being exposed to dioxins and other very toxic POPs. Relying on other countries' infrastructure to achieve our "recycling" targets is not acceptable from a global ecological and societal perspective.

ZWAI also strongly believes that soil and its associated biodiversity (surface and sub-surface living organisms) are vitally important components of the Earth's global ecosystem, and that the destruction or unnecessary wasting of these natural resources must not be allowed to continue.

2.3 What We are Doing

Our principal objective is to ensure that government agencies, local authorities and other organisations will develop and implement environmentally sustainable resources and waste management policies, especially resource efficiency, waste reduction and elimination, the promotion of re-use, repair and recycling, and the development and implementation of the Circular Economy.

As an environmental NGO, and a not-for-profit company with charitable status since 2005, ZWAI also campaigns for the implementation of the UN Sustainable Development Goals, including (but not limited to) Goal 12, Responsible Consumption and Production; Goal 6, Clean Water and Sanitation (having particular regard to the need to avoid wasting water); and Goal 15, to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and to halt and reverse land degradation and halt biodiversity loss.

In responding to many public consultations, members of ZWAI have made submissions and given presentations on how Ireland and the European Union should address the problem of plastic waste (March 2019), on single-use plastic packaging by the Irish food industry (November 2019), on transforming the construction industry so that it could become climate-neutral (instead of its present position as a major emitter of greenhouse gases and toxicants), on the general scheme of the Circular Economy Bill (October 2021), on the recovery and reuse of the phosphorus and nitrogen content of wastewater (2019 to 2022), on a proposed revision of the EU Regulation on Shipments of Waste (January 2022), on Ireland's energy security situation (October 2022), on Ireland's Fourth National Biodiversity Action Plan (November 2022), on Ireland's National Bioeconomy Action Plan 2023-2025 (January 2023), and on the recently published draft Waste Management Plan for a Circular Economy (July 2023).

It will be clear that ZWAI is primarily concerned with the very serious issue of the misuse of key natural resources, and the problems of discarded substances, materials and goods, whether from domestic, commercial or industrial sources, how these become "waste", and how such "waste" may be prevented by redesign along ecological principles. These same ecological principles can be applied to the many ways in which we abstract and use water as a resource, and to the equivalent volumes of wastewater produced as a consequence of these uses.

ZWAI is represented on the Irish Government's Waste Forum and Water Forum (An Fóram Uisce) by one of our Directors; ZWAI is a member of the **Irish Environmental Network** (IEN) and the Environmental Pillar, and is funded by the Department of Communications, Climate Action and the Environment through the IEN.

In 2019 ZWAI became a full member of the **European Environment Bureau** (EEB); and a member of the **Waste Working Group** of the EEB. Through the EEB, we contribute to the development of European Union policy on waste and the Circular Economy. In November 2021, the EEB established a **Task Force on the Built Environment**; ZWAI is a member of this group, and we contribute to discussions on the sustainability of construction materials, buildings and on the built environment.

3. DEFINING THE PROBLEM

The invitation by the Department of Environment, Climate and Communications to this public consultation, published on 01 June 2023, stated that:

> "*Disposable vaping devices present several challenges to our current waste collection and recycling system, including:*
>
> - *where lithium-ion batteries are contained in waste devices, these can present a risk to the health and safety of waste collection workers and others. When damaged, short-circuited or overheated, these batteries can catch fire;*
> - *the use of critical raw materials and plastic in a disposable product is wasteful; and,*
> - *the negative environmental impact of these devices especially where they are not disposed of in a responsible manner.*
>
> *Vaping products contain electronic components including a battery and require safe disposal when they become waste. They contain a complex mixture of materials, some of which may be hazardous and are not easily recyclable".*

While we agree that the above statement defines the problem very well, we would add that the widespread use of vaping devices creates a challenge to public health and to individual users' health, and the waste of material resources used in their manufacture must necessarily contribute to climate change, albeit to a relatively minor extent. We will address these additional concerns in subsequent sections of this submission.

3.1 Types and Components of Vaping Devices, and their Uses

The most commonly used form of disposable vaping devices (DVDs) are e-cigarettes: hand-held electronic devices that heat a liquid, called an e-liquid, in order to produce an aerosol for inhalation. E-Liquid usually contains nicotine, together with propylene glycol, glycerol and flavourings. E-Cigarette use is widely considered to be less harmful to health than cigarette smoking, since users are exposed to much lower levels of toxicants and carcinogens; but there is a growing recognition that significant health damage can be caused by the use of these devices.

In our introduction, we referred to both vaping devices and e-cigarettes; they are similar but there are some differences, as the figure below will show.

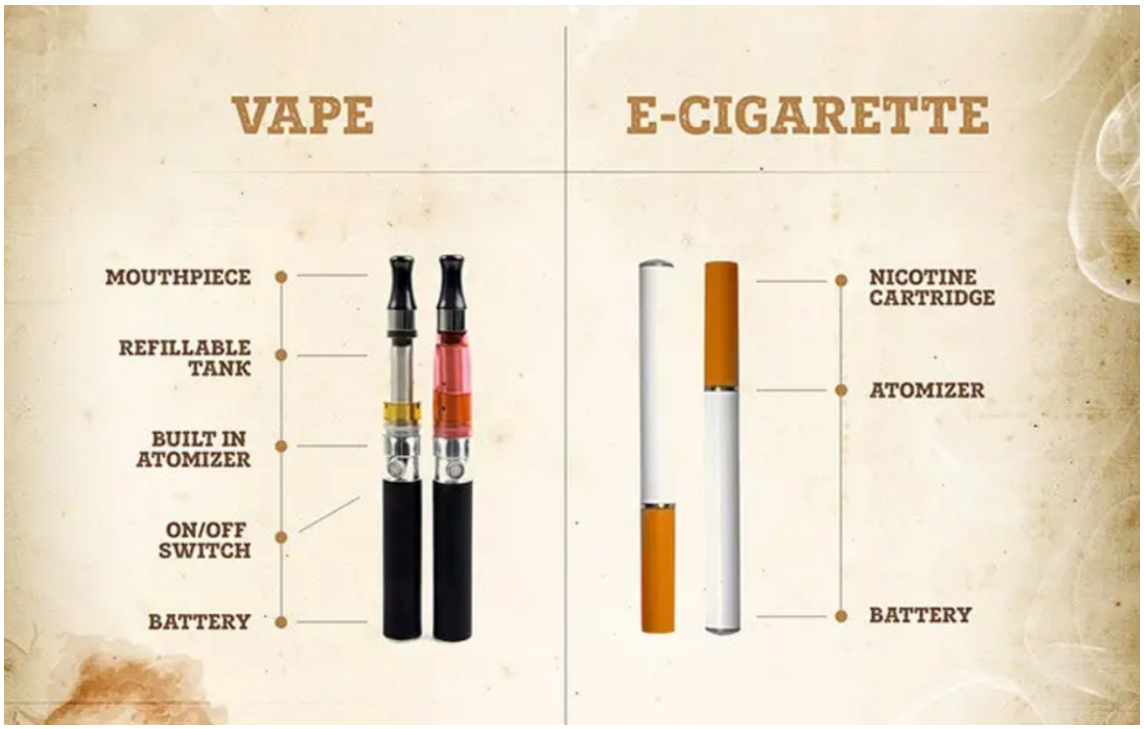

Figure 3.1 Differences between a vape and an e-cigarette

The terms vapes and e-cigarettes are often used interchangeably, especially by the media, but they are two distinctly different things. E-cigarettes, or electronic cigarettes, are devices that look similar to traditional cigarettes. They generally consist of a one-piece unit that is used until it runs out, and it is then discarded. These devices cannot be modified, taken apart, or refilled.

Vapes, on the other hand, are popular devices that consist of a rechargeable battery and refillable tank. They can be used again and again, with the possibility of mixing and match different parts and pieces, and can continue to be re-filled

with the user's favourite e-liquid of choice. Nevertheless, they are also discarded at the end of their useful lives.

The principal components of a vape include a battery (generally a lithium-ion battery), a heater element, switch and a tank

The composition of DVDs can vary slightly, but generally consists of the following elements:

- a cartridge or tank, usually made from plastic, containing the e-liquid;
- a small lithium-ion battery as a power source;
- a metal coil as a heating element – the type of metal can vary, but it must have a high electrical resistance; and commonly-used metal heating elements are made from stainless steel, nichrome, or copper;[4]
- the coil is generally wrapped around a wick made from cotton; and,
- a logic board, which is a small electronic component needed to operate the unit, and to control the voltage of the heating element.

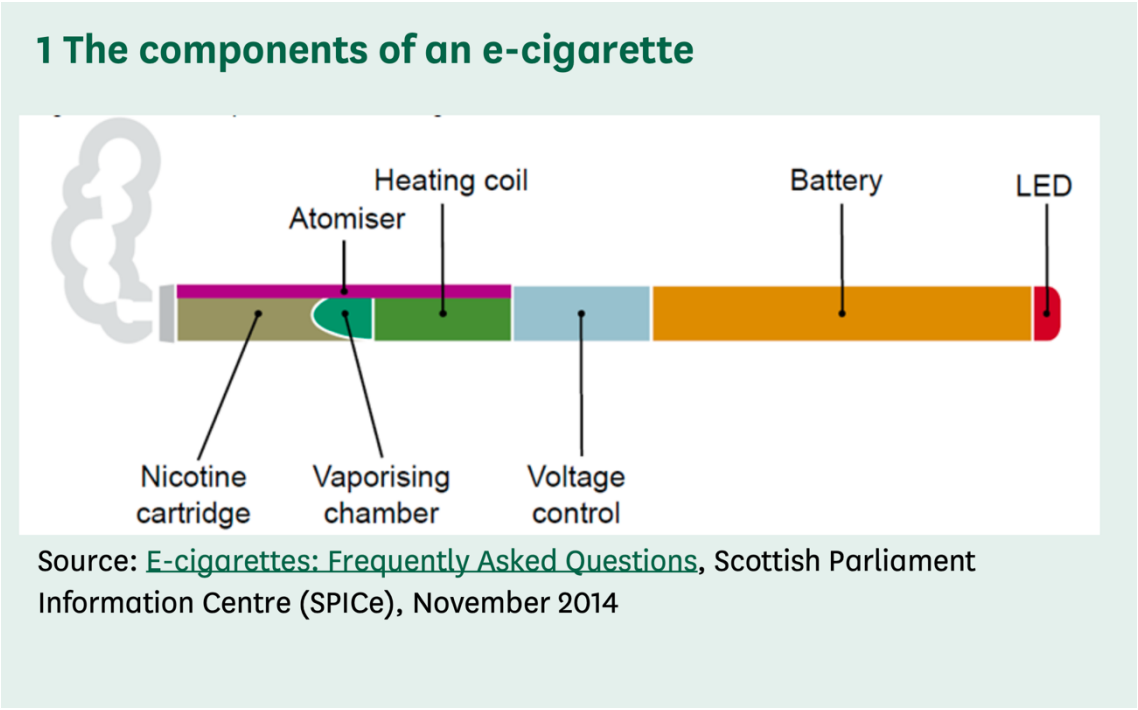

Figure 3.2 The principal components of an e-cigarette

[4] Environmental impact of disposable vapes, House of Commons Library, 28-Nov-2022. https://commonslibrary.parliament.uk/research-briefings/cdp-2022-0216/#:~:text=A%20typical%20disposable%20vape%20pen,rubber%20parts%2C%20may%20not%20be.

Electronic cigarettes or vapes) work by heating a solution of water, flavouring, propylene glycol (or vegetable glycerine) and, typically, nicotine to create a vapour that the user inhales. The act of using an e-cigarette is often referred to as 'vaping', and the liquid is referred to a 'e-liquid' or 'vape juice'. The device consists of a mouthpiece, a battery-powered heating element, a cartridge or refillable tank containing the liquid solution and an atomiser that vaporises the solution when heated (see figure 3.2 above).

A disposable vape consists of four primary components: the battery, the logic board, the wick and the heating coil. Those components work together to ensure that the device works safely and delivers a flavourful, satisfying "puff" every time.

However, we should point out that the word "puff", which is used extensively when describing and marketing vaping devices, does not mean an exhalation of the user's breath, which is the normal meaning of the work "puff". Instead, the user carries on doing what he or she does when smoking a cigarette – inhaling the vapour when it is in the user's mouth. That gives the same or a very similar sensation, so that the user is less likely to find herself or himself missing the feel of tobacco smoking in the previously standard way. In this way, vaping devices are sold as a 'safer' replacement for cigarettes.

The components of a vaping device work as follows.

i) The battery supplies power to the device, and the battery in a disposable vape can usually supply several hundred 'puffs' before it dies. At that point, the user needs to replace the device unless the battery is rechargeable. If it is a disposable vape with a USB port, the battery can be recharged when it dies, and use of the device can be continued until it runs out of e-liquid (often referred to as 'vape juice').

ii) The logic board controls the functions of a disposable vape. It interfaces with the battery and the 'puff' sensor to deliver power to the heating coil when the user 'puffs' on the device. The logic board is also responsible for the device's safety functions, which may include automatic overheating, short circuit and low voltage protection. In a rechargeable disposable vape, the logic board also handles the charging function and ensures that the battery stops charging when it reaches its target voltage.

iii) The wick holds the disposable vape's e-liquid and supplies the heating coil with vape juice. In most disposable vapes, the wick is wrapped around the coil. When the user inhales, the coil vaporises the vape juice (e-liquid) in the inner part of the wick. After the user puffs on the device, the process of absorption brings more vape juice to the coil from the outer part of the wick. This continues until the wick is dry, and at that point, it's time to replace the device.

iv) The coil is a heating element made from a metal or alloy with a high electrical resistance. When electricity passes through the coil, the resistance causes the coil to produce heat, which vaporises the e-liquid.

v) The tank or cartridge holds the liquid solution described above, containing nicotine and flavourings.

All disposable vapes are puff activated, which means that the device generates vapor when the user 'puffs' on the mouthpiece, i.e., when the user inhales. Between 'puffs', the wick refreshes the coil with more 'vape juice'. That process continues until the wick is dry, or the battery runs out of power.

Product innovation has been rapid. In 2014, it was estimated that there were over 460 brands of e-cigarette and 7,500 flavours of solution.[5] The first generation of e-cigarettes, available from the mid 2000s onwards, tended to look like 'traditional' cigarettes and were often disposable. Second generation e-cigarettes, in contrast, were larger and not designed to resemble a cigarette. The Royal College of Physicians (RCP) noted that they are "*typically the size of a large fountain pen, and incorporate a more powerful battery linked to a permanent vaporiser, and a tank system that users can refill with nicotine solution"*.[6] There are also some 'closed systems' that cannot be modified, and these disposable '*ready to go vapes'* come pre-filled and cannot be re-filled.[7] Research undertaken in summer 2022 estimated that over one million disposable vapes are thrown away every week in the UK.[8]

A third generation of refillable e-cigarettes has also been developed. These are designed to be customised by the user to suit their preferences and tend to show little resemblance to a conventional cigarette.[9] Some, for example, have a more powerful battery, thereby allowing for variable voltage and adjustable air flow to alter the delivery of nicotine. Others may also include downloadable software to monitor usage and consumption via a mobile phone app.[10]

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[5] Zhu, Shu-Hong, *et al.*, 2014. Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. Tobacco Control, Vol 23, iii3–iii9, 2014.

[6] Royal College of Physicians, Nicotine without smoke. Tobacco harm reduction. A report by the Tobacco Advisory Group of the Royal College of Physicians, 28 April 2016.

[7] World Health Organization, WHO Report on the Global Tobacco Epidemic, 2021: Addressing new and emerging products, July 2021, page 32.

[8] One million single use vapes thrown away every week contributing to the growing e-waste challenge in the UK - Material Focus, July 2022.

[9] DL Eaton, LY Kwan, K Stratton (eds) Public Health Consequences of E-Cigarettes, Chapter 3, E- Cigarette Devices, Uses, and Exposures, January 2018.

[10] National Centre for Smoking Cessation and Training (NCSCT), Electronic cigarettes: A briefing for stop smoking services, 2016, page 6.

Information in the above three paragraphs has been summarised from an excellent research briefing report on the regulation of e-cigarettes, prepared and published by the House of Commons Library, London, in June 2023.[11]

3.2 Vaping Device Waste

Vaping device waste, which includes disposable devices, e-liquid containers, packaging, and batteries, comprises not one but three forms of waste. Often, these vaping devices are incorrectly disposed of and are often seen littering streets, waterways and the environment.

An article published in the medical Journal, *The Lancet*, summarised some of the environmental impacts from vaping.[12]

Historically, even before the development of vaping, tobacco waste was one of the most abundant forms of plastic pollution in the world, with trillions of individual cigarette butts polluting the global environment every year.[13] Cigarette butts and their filters are made of a common man-made plastic, and when thrown into soil and water, release harmful chemicals before turning into microplastic pollution. Discarded cigarette butts present a serious threat to human health and wildlife, and are an example of how the tobacco industry has had a substantial adverse impact on the environment for decades.

The Lancet article rhetorically asked whether it is legitimate to question whether vaping is more eco-friendly than smoking, or "*whether the tobacco industry has actually gone from bad to worse"*. The article observed that "*a new threat is now facing our planet: vape waste, including disposable devices, e-liquid containers, packaging, and batteries, comprising not one but three forms of waste"*, and "*the vape industry could soon be the next environmental crisis in terms of plastic pollution".*

The article expressed serious concern that incorrect disposal of disposable vapes could release, plastic, electronical and hazardous chemical wastes into the environment, referring to these wastes as "*targeting mainly young people, these new devices are a worrying health concern, but are also highly concerning on an ecological level".* We refer further to health issues in section 3.4 below.

[11] The regulation of e-cigarettes; House of Commons Library, Research Briefing, 27-June-2023.

[12] From smoking to vaping: a new environmental threat? The Lancet, Vol 10, July 2022, published online 23 May 2022.

[13] Novotny TE, Slaughter E. Tobacco product waste: an environmental approach to reduce tobacco consumption. Curr Environ Health Rep 2014; 1: 208–16.

3.3 Environmental Impacts of Plastic, Batteries, and Heavy Metals on the Environment

The resource extraction required and the production process of the different components in DVDs all have an impact on the environment. Additionally, DVDs are increasingly found littering streets in Ireland and abroad. One citizen who frequently cleans along the River Bride in Cork stated that they once found 50 DVDs that were disposed of into the river, and this is not the only story like this.[14] [15]

Chris Moody, who heads the Save Our Bride Otters campaign and who regularly cleans sections of the River Bride, said he finds them in the River Bride as well as in drain culverts and in one incident, found 50 single-use vape products that were discarded into the river.

Figure 3.3 Plastic waste: single-use vapes dumped in River Bride, Blackpool. Picture: Chris Moody / @savebrideotters

[14] https://www.wcl.org.uk/docs/assets/uploads/WCL_Disposable_Vapes_Briefing.Mar23.pdf

[15] https://www.irishexaminer.com/lifestyle/outdoors/arid-41100340.html#:~:text=The%20fires%20are%20just%20one,parks%20and%20across%20city%20centres.

He has also called for disposable vapes to be banned: "*I really think disposable vapes should be banned outright. There are too many of them being discarded into the environment. They shouldn't be put in the bin either. The EPA says retailers are obliged to take them back for recycling but I would be very curious to see if they are returned in any significant number. There are many parts to each device — lithium battery, plastic parts, aluminium case, electronic circuitry and a small tank with vaping fluid. There is quite a bit of effort (and cost I would think) to disassemble each and every returned device.*

"*Are the vapes that are sent for recycling in Ireland actually recycled or just shipped off somewhere else (somewhere with less environmental protections perhaps) to become someone else's problem?"* [16]

The components of vapes are all harmful when discarded into the environment. Lastly, the faulty disposal of DVDs leads to a loss of valuable resources such as the lithium and metals inside, which could have been reused if disposed of properly. In sections 3.3.1 to 3.3.3 below we address the different components of DVDs and their environmental impact during production and when they enter the environment as litter.

3.3.1 Plastic

Plastic is made from fossil fuels, and when dumped into the environment it does not degrade but simply breaks into smaller and smaller pieces called microplastics. "The Plastic Crisis" can no longer be ignored and more extreme measures should be introduced to combat our plastic waste. It is a well-known fact that plastic pollution is a huge global problem, with approximately 7 billion of the 9.2 billion tonnes of all plastic produced from 1950-2017 resulting in plastic waste, ending up in landfills or dumped, and ultimately entering our oceans, ecosystems and food chain as microplastics. We do not yet fully understand the long-term effects of this on our health as a species, the other species that inhabit our earth and that we depend on, or the global health of our planet.

According to the UN, plastic pollution can alter habitats and natural processes, reducing ecosystems' ability to adapt to climate change, directly affecting millions of people's livelihoods, food production capabilities and social well-being.[17]

[16] Disposable vapes are flooding the environment with plastic waste and creating an eyesore; Sabah Meddings, Irish Examiner, Monday, 27 March, 2023.

[17] https://www.unep.org/plastic-pollution#:~:text=Plastic%20pollution%20can%20alter%20habitats,t%20exist%20in%20a%20vacuum.

3.3.2 Lithium-ion Batteries

Due to lithium's ability to convert chemical energy into electrical energy so efficiently, the demand for lithium-ion batteries is rising rapidly. These batteries are used to power many of our devices including DVDs, mobile phones, laptop computers and electric cars. Demand is expected to grow by an estimated 18-20 fold by 2050.[18] This trend will increase pressure on the mining of this resource in vulnerable countries, consequently, affecting the communities where the extraction takes place. During mining, 95% of the extracted brine water is lost through evaporation.[19] In arid environments like those of Chile and Argentina where lithium is mined, this process depletes local water resources.[20]

As DVDs batteries degrade, their toxic compounds progressively leach into the environment. Additionally, batteries deposited in rubbish bins pose both an explosion and a fire risk in waste and recycling facilities or trucks.[21]

Any type of resource extraction is harmful to the planet, and removing these raw materials can result in soil degradation, water shortages, biodiversity loss, damage to ecosystem functions and an increase in global warming. When we think of extraction, we think of fossil fuels like coal and gas, both of which are burned, resulting in massive emissions of greenhouses gases. Even though. lithium is not a fossil fuel, it falls into the same category, and can be described as the non-renewable mineral that makes renewable energy possible - often touted as the "next oil".[22]

3.3.3 Heavy Metals

The environmental consequences of these batteries does not start and end with lithium extraction. Unfortunately there are several other ingredients in lithium and lithium-ion batteries that are also a cause for concern.

Cobalt, nickel, lead and mercury have all been found to be present in DVDs, and their extraction (mining) and processing come with heavy environmental and public health costs. Studies have shown that fish in bodies of water lying close to cobalt mines in the Congo have high levels of the metal. This contamination is destroying ecosystems and entering our food chain. Cobalt is considered

[18] https://www.nature.com/articles/s43017-022-00387-5

[19] https://www.sciencedirect.com/science/article/abs/pii/S0303243419300996

[20] Friends of the Earth Europe: https://www.foeeurope.org/sites/default/files/publications/13_factsheet-lithium-gb.pdf

[21] From smoking to vaping: a new environmental threat? PDF in google drive

[22] https://www.euronews.com/green/2022/02/01/south-america-s-lithium-fields-reveal-the-dark-side-of-our-electric-future

harmful to ecosystems and represents a significant human health risk as it is also a potential carcinogen.[23]

When DVDs are disposed of incorrectly, these heavy metals also leach into the environment. In addition, they are a finite resource, and the question must be asked – why are we disposing of them so carelessly? As far as ZWAI is concerned, the use of these relatively rare materials in manufactured objects which are used for a short time, thrown away and not recycled, constitutes a serious waste.

3.3.4 Why Disposable Vaping Devices do not fit into our Current Waste Collection and Recycling System, and the Problem of Composite Materials

Disposable vapes fall under Waste Electrical and Electronic Equipment (WEEE), and WEEE must be recycled in a dedicated recycling plant. Currently, consumers can return their DVDs to any retailer of the product or bring them to a WEEE/battery reception area.[24] The question remains as to realistically how many people are doing this. According to a survey conducted by The Vape Redemption Project, a student enterprise initiative from Trinity College Dublin that seeks to promote the recycling of disposable vapes, 71,8% of third-level students (56/78) did not know that DVDs were recyclable.[25]

Disposable vaping devices are not made to be taken apart or disassembled, and they are composed of composite materials which make recycling difficult, if not impossible. In 2022, Zero Waste Alliance Ireland undertook a research project to examine the environmental challenges and possible sustainable alternatives to pharmaceutical blister packages which are widely used in the packaging and marketing of products such as pills, tablets and capsules. Blister packages are made from composite materials which include plastic and aluminium foil, which together provide durability and low permeability to moisture and gases.

The fact that composite materials are used in pharmaceutical blister packages is not the only reason why the blister packages are not recycled, as the type of material used in a blister package also creates a serious barrier to recycling. For example, the use of PVC (polyvinyl chloride) instead of, or in addition to PET (polyethene terephthalate) or PP (polypropylene) further complicates the recycling process, and makes it almost impossible to achieve satisfactorily or economically.

[23] https://earth.org/cobalt-mining-in-congo/

[24] https://www.weeeireland.ie/vape-e-cigarette-device-recycling/

[25] https://trinitynews.ie/2023/03/vapes-the-recyclable-product-that-barely-anyone-is-recycling/

One of the solutions suggested by our research is the creation of a new type of blister pack that is mono-material and easier to be recycled, together with the discovery of new materials which are more environmentally sustainable and friendly to the environment. It is perhaps easy to see that these possible solutions would not be practicable for the manufacture of disposable vaping devices.

The separation of the different elements and components in vaping devices is not straightforward and can even be dangerous if attempted by consumers, primarily because of the lithium-ion battery inside.[26] Currently, ERP Recycling is in charge of the recycling of disposable vapes in Ireland and promotes the free recycling of disposable vaping devices by placing them whole into the WEEE/battery collection box. ERP takes the vapes apart and recovers some of the materials for use in producing new products.[27]

The wasteful nature of these types of packaging must no longer be ignored, particularly when alternative and more environmentally friendly options exist. The same can be said for DVDs, which are even more wasteful considering the composition of the various elements within them. Given the urgency of the environmental crisis, it is essential that consumer products such as DVDs made from composite materials, and which include toxic substances, should banned from the market, especially if their rechargeable counterparts already exist. As Dr Catherine Gemmell, Scotland conservation officer at the Marine Conservation Society pointed out,

> *"Disposable options are a step backward when we need to be moving toward a society of reuse."*[28]

3.4 Health Impacts in General

Even though human health and public health are not major concerns of Zero Waste Alliance Ireland, we have always been aware that the production of waste has not only environmental consequences, but also human and public health consequences. We therefore cannot ignore the long-term health impacts of vaping, even though these are currently still uncertain and in serious need of further research. As Dr Paul Kavangh, who leads the HSE Public Health

[26] https://www.circularonline.co.uk/opinions/disposable-e-cigarettes-small-weee-needs-a-big-solution/

[27] https://erp-recycling.org/ie/news-and-events/2023/05/vape-e%E2%80%91cigarette-device-recycling/#:~:text=ERP%20Ireland%20offers%20FREE%20recycling,single%20use%20or%20rechargeable%20batteries.

[28] Disposable vapes are flooding the environment with plastic waste and creating an eyesore; Irish Examiner, 27-March-2023.docx

Medicine Lead with the Tobacco Free Ireland Programme, highlighted in an article by the Irish examiner,

> *"People often ask us what we think about using an e-cigarette or vaping as a way to help them stop smoking. Our advice is that the best thing you can do for your health is not to smoke or vape. There is no certainty at this point that e-cigarettes support people to quit and we have questions about their safety profile. If someone is wondering about quitting with an e-cigarette or vape, the best advice I would offer is that they would discuss the option of using licensed NRT (nicotine replacement therapy) to help with cravings and nicotine withdrawal with stop smoking advisor."*

An article published by the Lancet in 2022 entitled "*Chemical Elements, Flavor Chemicals, and Nicotine in Unused and Used Electronic Cigarettes Aged 5–10 Years and Effects of pH"* highlights some health concerns which should not be ignored. The study analysed 181 flavours of "*vape juice"* and found that every sample contained elements/metals, some of which (selenium, aluminium, tin, arsenic, chromium, lead, nickel, zinc, copper, manganese) are present before use and are known to be harmful to human health.[29]

Every sample that was analysed contained hydroxyacetone which is a combustible material, and the long term health effects of this chemical have not yet been studied. Hydroxyacetone is a propanone, i.e., acetone in which one of the methyl hydrogens is replaced by a hydroxy group. It has a role as a human metabolite, an *Escherichia coli* metabolite and a mouse metabolite. It is functionally related to acetone and has been widely used in the cleaning industry, as a food additive and a flavouring agent. It has however been linked to polycystic kidney disease.

Selenium, which is an impurity of propylene glycol and glycerine (two primary ingredients present in all "vape juices"), can cause cytotoxicity to bronchial epithelial cells and is on the Federal Drug Administration's (FDA) Harmful and Potentially Harmful list and the Agency for Toxic Substances and Disease Research's (ATSDR) Priority List of Hazardous Substances list. Concentrations of some elements (copper, manganese, zinc, nickel) are higher in e-liquids after use, presumably because they are released during heating.[30]

The study published in the Lancet journal concluded that, overall, heavy metals present in "vape juice" increase with time and when the liquid is heated. They

[29] Chemical Elements, Flavour Chemicals, and Nicotine in Unused and Used Electronic Cigarettes Aged 5–10 Years and Effects of pH Monique Williams, Wentai Luo, Kevin McWhirter, Omeka Ikegbu and Prue Talbot

[30] *ibid*

also concluded that more research is needed to establish the long term health and safety effects.

3.5 Use of DVDs by Children and Adolescents

DVDs are marketed by the tobacco companies in a way that makes them appear harmless and appealing to the younger generation. The bright colours used on the disposable devices, the fonts and names of the devices (such as "Lost Mary", "Elf Bar" and "Geek Bar"), as well as the sweet "vape juice" flavours all contribute to a growing number of children and adolescents using the devices, with little to no understanding of the impacts these uses might have on their health. The devices are almost like "toys" which can simply be tossed away after use.

At the same time, it should be pointed out that nicotine is one of the world's most addictive substances (even more so than illegal opioid drugs such as Heroin and Cocaine).[31] By giving power to the tobacco companies to continue the sale and distribution of DVDs, we are encouraging our younger generations to become highly dependent and reliant on such companies to get their nicotine "fix".

According to an annual survey by Action on Smoking and Health (Ash), there is a 50% increase in those trying vapes. According to the survey, 7.6% of children vape, with disposables the most-used vapes.[32] Even more concerning, an article by the Guardian illustrates cases of teenagers being hospitalised and even dying due to collapsed lungs from excessive vape use. The article highlights:

> *"vapes, particularly the disposable kind, do not need to be as colourful as they are; they don't have to be as small as possible. Adolescents love that, because they can hide it. Adults don't need to hide it. That's why I don't believe it when the vaping industry says 'we are not designing for children'".*[33]

Due to the lack of studies into the long term health effects of vaping devices, many people feel that the issue of vaping, particularly the disposable kind, has been abandoned by government and legislation.[34] The Royal College of Paediatrics and Child Health in the UK believe that disposable vapes should be banned because of their popularity among children – with many parents now

[31] https://www.ucsfhealth.org/conditions/nicotine-dependence

[32] https://www.theguardian.com/society/2023/jun/14/the-child-vaping-crisis-from-what-my-daughter-says-90-of-her-year-do-it#:~:text=Last%20month%2C%20the%20annual%20survey,disposables%20the%20most%2Dused%20vapes.

[33] ibid

[34] ibid

feeling they are fighting a losing battle.[35] Banning disposable devices would indeed make vaping far less accessible to younger generations. It takes a lot more commitment and dedication to purchase a reusable, refillable device, which would in turn hopefully discourage our youth from vaping altogether.

4. REGULATION

This is a growing concern for government, and the Department of Environment, Climate and Communications has stated that the following three options are currently being considered:

1. The complete banning of DVDs;
2. a deposit return scheme to incentivise those who use DVDs to return the devices to retailers when empty, with new legislation introduced to require producers to fund these arrangements; or,
3. make no legislative change but improve the producer responsibility scheme to ensure all producers placing devices on the market are registered; ensure enforcement of EPR requirements is adequate; improve education and awareness around returning devices into the WEEE and battery collection schemes for responsible recycling.

Many countries have already banned DVDs because of their effects on the environment. Their composition makes these devices difficult to recycle and the responsibility to recycle them currently falls on the consumer, resulting in many of these devices being carelessly disposed of due to a lack of recycling facilities and a lack of knowledge on how to correctly dispose of them.

Australia for example has recently banned the importation and sale of all vaping devices (DVDs and rechargeable), unless they are supplied by prescription through a licensed pharmacist. This decision was announced by the Australian government amid concerns that a growing black market in vapes was fuelling a rise in child and adolescent vaping and nicotine addiction. This move also includes restrictions on flavours, a shift to plain packaging, and a reduction in the concentration and volume of nicotine permitted in the devices.

Other countries which have an outright ban on the sale, distribution and importation of e-cigarettes include Brazil and Singapore,[36] and the World Health

[35] https://www.rcpch.ac.uk/news-events/news/childrens-doctors-call-outright-ban-disposable-e-cigarettes.

[36] World Health Organization, WHO Report on the Global Tobacco Epidemic, Country Profile: Brazil, 2015; World Health Organization, WHO Report on the Global Tobacco Epidemic, Country Profile: Singapore, 2015.

Organisation (WHO) reported in 2021 that "32 countries currently ban ENDS [electronic nicotine delivery systems]".[37]

Other countries, including Malta, regulate e-cigarettes as tobacco products, meaning that they cannot be advertised, they cannot be used in enclosed public spaces, and they can only be used by adults over the age of 18.[38] Some countries – including Cambodia, Jordan, Nepal, Panama, Syrian Arab Republic, Thailand, Turkmenistan and United Arab Emirates – have gone further and banned the use of e-cigarettes in their entirety.

On 19 May 2014, the European Union Tobacco Products Directive (TPD)[39] entered into force with the aim to "*improve the functioning of the internal market for tobacco and related products while ensuring a high level of health protection for European citizens*". Article 20 of the TPD introduced new regulatory controls for nicotine-containing e-cigarettes and refill containers, though it does not cover nicotine-containing products that are authorised as medicines. These controls aim to ensure:

- minimum standards for the safety and quality of all e-cigarettes and refill containers;
- that information is provided to consumers so that they can make informed choices; and,
- an environment that protects children from starting to use these products.

Ireland complies with the Tobacco Products Directive (TPD), which has been transposed into Irish legislation by S.I. No. 271 of 2016, European Union (Manufacture, Presentation and Sale of Tobacco and Related Products) Regulations 2016. Nicotine-containing e-cigarettes are regulated as tobacco products. Vaping is not officially prohibited in public places, but many locations have imposed their own vaping bans. Domestic advertising is permitted within the confines of EU law and cross-border sales remain legal providing the retailer is registered with the government.

The requirements for e-cigarettes set out in the TPD, and implemented in EU Member States (including Ireland) to varying degrees, cover product standards

[37] World Health Organization, WHO Report on the Global Tobacco Epidemic, 2021: Addressing new and emerging products, July 2021, page 42.

[38] R D Kennedy et al, 2017. Global approaches to regulating electronic cigarettes, Tobacco Control, November 2017, 26, pp 440-445.

[39] Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the Approximation of the Laws, Regulations and Administrative Provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC.

and nicotine strength; safety; labelling and packaging, notification and vigilance; advertising and annual reporting, as follows:

a) **Product standards and nicotine strength**:

- e-cigarette tanks are limited to a capacity of no more than 2ml;
- the maximum volume of e-liquid for sale in one refill container is restricted to 10ml;
- e-liquids are limited to a nicotine strength of no more than 20mg/ml;
- certain ingredients/additives including colourings, caffeine and taurine are banned; and,
- nicotine doses should be delivered by e-cigarettes at consistent levels under normal conditions of use.

b) **Safety**:

- e-cigarettes and refill products must be:
- child-resistant and tamper evident;
- protected against breakage and leakage;
- e-cigarettes and refill products must have a mechanism that ensures refilling without leakage (unless it is a disposable e-cigarette); and,
- the implementation of standards for ensuring refilling without leakage.

c) **Labelling and packaging**:

- new labelling and warning requirements include:

  – stating all substances contained in the product, and information on the product's nicotine strength, on the label;

  – displaying instructions for use, information on addictiveness, and toxicity on the packaging and accompanying information leaflet. This should include a reference that the product is not recommended for use by young people and non-smokers, as well as warnings for specific risk groups and possible adverse effects;

  – a health warning covering 30% of the surfaces of the unit packet and any outside packaging stating "*This product contains nicotine which is a highly addictive substance.*"

d) **Notification and vigilance**:

- all e-cigarettes and e-liquids are required to be notified to the appropriate authority before they can be sold, and producers of new, or substantially modified, e-cigarette and refill container products must submit a notification to the relevant authority six months before they intend to put their product on the market;
- • a producer of electronic cigarettes or refill containers must establish and maintain a system for collecting information about all of the suspected adverse effects on human health of the product.

e) **Advertising**:

- advertising or promotion (directly or indirectly) of e-cigarettes and refill containers in print media, on the radio and television is prohibited; and,
- promotional elements are not allowed on e-cigarette packaging and cross-border advertising and promotion of e-cigarettes is prohibited.

f) **Annual reporting requirements**:

- Manufacturers and importers of electronic cigarettes and refill containers will have to submit, annually (in the case of Ireland, to the Health Service Executive):

  – comprehensive data on sales volumes, by brand name and type of the product;

  – information on the preferences of various consumer groups, including young people, non-smokers and the main types of current users;

  – the mode of sale of the products; and

  – executive summaries of any market surveys carried out in respect of the above.

While the Tobacco Products Directive might appear to be comprehensive, it does not include harmonise rules on important environmental and public health issues such as:

- smoke-free environments;
- domestic advertising;

- domestic sales arrangements;
- age limits for electronic cigarettes or refill containers;
- nicotine-free e-cigarettes;
- flavourings of e-cigarettes; and,
- waste generation and waste management.

Instead, Member States are free to regulate such matters within the remit of their own jurisdiction and are encouraged to do so in the Directive.

In 2022, The Secretary of State for Health and Social Care in Britain commissioned Dr Javed Khan to undertake an independent review into the British Government's tobacco control policies and its ambition to make England smokefree by 2030.[40] The Khan Review was published in June 2022, and it made five recommendations that were specifically aimed at preventing young people, and those who have never smoked, from taking up vaping:

1. Ban cartoon characters or images appealing to young people from vaping products;

2. Review the way flavours are described – or even the flavours themselves – to ensure vapes do not appeal to young people;

3. Prohibit vaping companies from giving away vapes for free;

4. Make the use (or even the possession) of any age restricted products illegal on school and college premises; and,

5. Update the school health education curriculum to talk about the risks of vaping and its age restrictions; this should include guidance on policies associated with cannabis vaping among young people, and can be added to the associated material that teachers use on the risks related to smoking and drinking.

As noted at the beginning of this section, possible options for control or regulation of DVDs are:

4. The complete banning of DVDs;
5. A deposit return scheme; or,
6. Improve the producer responsibility scheme to ensure responsible recycling.

[40] Dr Javed Khan, 2022. Independent report, Making smoking obsolete. Office for Health Improvement and Disparities, published 9 June 2022, updated 25 August 2022.

We will examine each of these briefly.

4.1 A Complete Ban on the Importation and Sale of DVDs

A significant number of countries as detailed above have opted for this approach, and therefore it is our preferred option; and we would strongly advise the Department to adopt it.

4.2 A Deposit Return Scheme

While a deposit return scheme might appear to be a reasonable option, it is our experience that this type of scheme has taken so long to be implemented in Ireland for much simpler consumer products and packaging, for example PET drinks bottles, glass bottles and aluminium cans, that it would be unlikely for a similar scheme to be implemented for e-cigarettes and other DVDs. It is also very likely that such a scheme would be strongly resisted by the tobacco industry, in the same way as other deposit return schemes have been resisted by the waste industry.

It is therefore not our recommended option.

4.3 An Improved Producer Responsibility Scheme

Also experience that such a scheme would be difficult to implement, and quite likely to fail. As an example, we would point to the producer responsibility scheme for end of life vehicle tyres, which was originally intended to ensure widespread or nearly complete recycling of the valuable materials contained in these used products, namely rubber, steel and nylon.

Unfortunately, the current scheme which has been in operation for several years does not appear to have led to any significant amount of recycling; instead, a very high proportion of used tyres are burned as co-fuel in cement plants. In our opinion, this represents an extraordinary waste of potentially useful recyclable materials.

5. CONCLUSION

Having reviewed the environmental issues, the nature and components of disposable vaping devices, the difficulty of recycling them, the impacts of their continued use on public health and individual health (especially among young people), and the options put forward by the Department, it is our conclusion that the best way forward would be the implementation of a complete ban on the importation, advertising and sale of these products.

Zero Waste Alliance Ireland

This submission was researched by Sara Borkent (ZWAI member), Órla Coutin (ZWAI administrator and researcher) and Jack O'Sullivan (ZWAI founder member and director), and was edited by Órla Coutin and Jack O'Sullivan.

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