IMPERIAL BRANDS SCIENCE

BEYOND SMOKE

The science underpinning the development of our Next Generation Product portfolio

We believe in
SOMETHING BETTER
for the world's smokers,
allowing adult smokers
to enjoy nicotine on
their terms.

FOREWORD

We're committed to our mission of creating Something Better for the world's 1.1 billion smokers.

It's an ambitious journey we take very seriously, and one we're achieving through continued investment in trusted brands, innovation, best-in-class manufacturing, the highest quality standards and rigorous scientific research.

Beyond Smoke is a manifesto that articulates this commitment. It scientifically underpins the continued transformation of our business through the development of a broad range of potentially less harmful nicotine-containing Next Generation Products (NGPs) - including vape, heated and oral.

For some time scientific consensus has maintained that it's not nicotine, but rather inhaling the toxicants present in tobacco smoke, that causes smoking-related diseases. Today, driven by the availability of new and emerging technologies, we're able to de-couple nicotine from burning tobacco and revolutionise how nicotine is enjoyed by adult smokers.

The undeniable truth is traditional nicotine replacement therapies - many of which have been available for decades - are simply not satisfying enough for adult smokers and have failed to encourage behavioural change on a global scale. Unsurprisingly, most countries are therefore struggling to meet their smoking reduction targets.

Crucially, Beyond Smoke recognises the vital importance that NGPs are accepted by adult smokers, if they're to fulfil their role in

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tobacco harm reduction. If adult smokers cannot accept, and therefore don't adopt, next generation cigarette alternatives this precious opportunity will be lost.

In 2018, Imperial Brands filed over 140 patents with the UK Intellectual Property Office for NGP-related technologies - making us a top ten innovation company in this respect. This illustrates how we're investing in science, technology and engineering expertise to realise the commitment made in this manifesto.

It's also important to highlight how important quality is to building consumer and regulatory trust in NGP products. At Imperial Brands all our NGPs are subject to intense scientific assessment in order to demonstrate and substantiate their potential harm reduction profiles.

We look forward to continuing to engage with consumers, public health bodies and regulators to explore how the beliefs outlined within Beyond Smoke - and the way we bring these beliefs to life through our products and our people - can help to create Something Better for the world's smokers.

1

There are more than a BILLION smokers in the world

Smoking is a cause of serious diseases and a significant number of preventable deaths.

There are currently more than 1 billion smokers in the world. While global public health bodies have ensured the harms of smoking are well understood[1], the World Health Organisation (WHO) has forecast by 2025 this number will increase to around 1.5 billion[2].

Our position is clear: smoking is a cause of serious diseases in smokers including lung cancer, chronic obstructive pulmonary disease (COPD) and cardiovascular disease. Our ambition is to transition as many adult smokers who would otherwise continue to smoke to our alternative Next Generation Products (NGPs), which can potentially reduce the risks associated with continuing to smoke.

Public health bodies supporting the concept of Tobacco Harm Reduction (THR, discussed in Section 2) accept it's not nicotine but the Harmful and Potentially Harmful Constituents (HPHCs) generated by burning tobacco and found in cigarette smoke that cause, or potentially cause, smoking-related diseases.

Science and technology have progressed at an unprecedented rate over the past few decades. By decoupling nicotine from harmful tobacco smoke, we are now able to provide adult smokers with potentially harm-reduced alternatives to smoking.

Our responsibility as a multi-category NGP industry leader is to create better experiences and maximum choice for adult smokers who would otherwise continue to smoke.

IN SUMMARY

Our goal - and our responsibility as a multi-category NGP industry leader - is to create **Something Better** for the world's smokers. From a scientific perspective, this means substantiating our NGPs as being less harmful than cigarettes, and therefore likely to benefit wider population health.

[1]The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General, 2014. www.ncbi.nlm.nih.gov/pubmed/24455788

[2]WHO global report on trend in tobacco smoking 2000-2005 (2015). www.who.int/tobacco/publications/surveillance/reportontrendstobaccosmoking/en/

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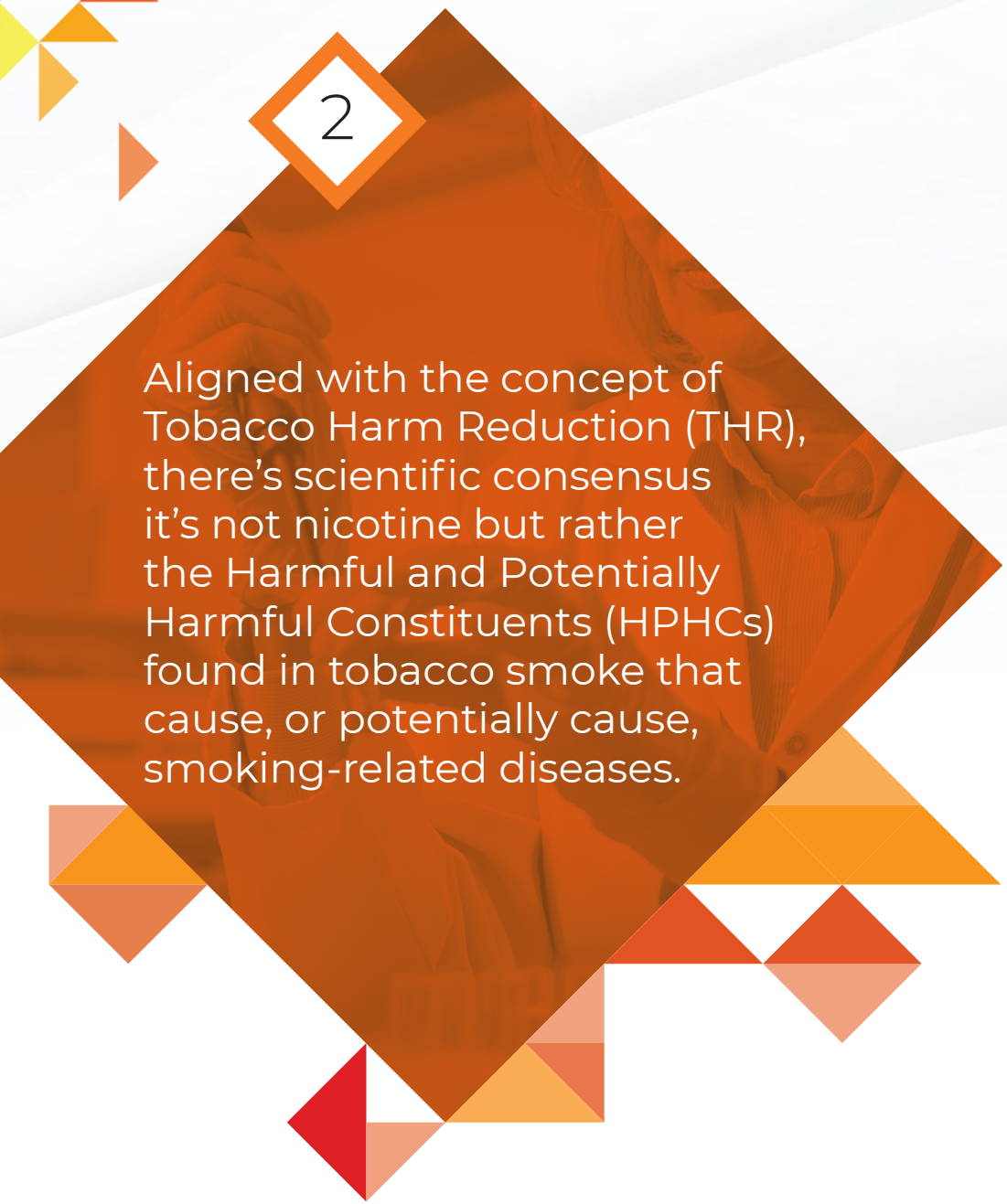

Aligned with the concept of Tobacco Harm Reduction (THR), there's scientific consensus it's not nicotine but rather the Harmful and Potentially Harmful Constituents (HPHCs) found in tobacco smoke that cause, or potentially cause, smoking-related diseases.

Tobacco Harm Reduction (THR) underpins the development of our NGP portfolio.

The notion of THR was introduced in 2001 by the US Institute of Medicine's report: 'Clearing the Smoke[3]'. It broadly defined THR as a means of reducing damage to the health of adult smokers who were uninterested or unwilling to stop consuming nicotine through traditional methods (primarily cigarette smoking) by encouraging their substitution with other nicotine-containing products that potentially posed fewer health risks.

'Clearing the Smoke' was the first official acknowledgment nicotine could be delivered to smokers without the harmful effects of cigarette smoke (formed by burning tobacco). This notion has been further reinforced by professional bodies, including the UK Royal College of Physicians[4].

Complete cessation of all tobacco and nicotine use is undoubtedly the best action adult smokers can take to improve their health. However, many public health bodies and scientific organisations are clear: encouraging and assisting smokers who aren't interested or willing to quit smoking to transition to potentially harm reduced NGP alternatives is the next best option.

Aligned with THR, our goal is to offer adult smokers who would otherwise continue to smoke the widest possible opportunity to choose a product - or range of products - less harmful for their health.

As stated by numerous public health bodies, nicotine is an addictive substance[5]. Until relatively recently, the only way to consume nicotine via inhalation was by burning tobacco. It's now clear the highest risk of harm comes from burning tobacco and inhaling the smoke. Tobacco smoke contains over 7000 chemicals, including nicotine, and around 100 of these chemicals have been classified by public health experts as causes or potentially causes of smoking related diseases. These chemicals are termed Harmful or Potentially Harmful Constituents (HPHCs)[6].

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[3]Clearing the Smoke. Assessing the science base for Tobacco Harm Reduction (2001). Stratton Washington, DC: The National Academies Press. https://doi.org/10.17226/10029

[4]Nicotine Without Smoke. Tobacco Harm Reduction. 28 April 2016. A report by the tobacco advisory group of the Royal College of Physicians. www.rcplondon.ac.uk/file/3563/download?token=xNK4-9a0

[5]Public Health England. www.gov.uk/government/publications/electronic-cigarettes-reports-commissioned-by-phe

[6]Harmful and Potentially Harmful Constituents in tobacco products and tobacco smoke. Established list. A notice by the Food and Drug Administration 04/03/2012. www.federalregister.gov/documents/2012/04/03/2012-7727/harmful-and-potentially-harmful-constituents-in-tobacco-products-andtobacco-smoke-established-list

2

From a THR perspective, the least harmful products are likely to be those where nicotine (without tobacco) is delivered with no HPHCs via a route that doesn't involve inhalation. Technology now allows nicotine to be delivered through products along a spectrum of risk, with cigarettes at one end and medically licensed nicotine replacement therapy (NRT) products at the other. See our Risk Spectrum in Section 5 for more information.

Smoking is addictive. However, there's an important and often ignored difference between addiction and dependency. Addiction is a dependence on an action which results in harm. We believe consumers should understand the true nature of nicotine and health risks associated with smoking tobacco; nicotine in the absence of harmful effects should be defined as a dependency, not an addiction[7].

Nicotine's safety profile, when decoupled from tobacco smoke in non-tobacco containing nicotine products used under normal conditions, has been established through years of pharmaceutical clinical trials, with the pharmaceutical industry having invested heavily in the development and commercialisation of various forms of NRT. Both the US FDA and UK Medicines and Healthcare products Regulatory Agency advocate this approach.

That said, some studies have suggested nicotine can potentially impair cognitive development if used by adolescents, as well as having adverse effects on developing foetuses[8]. For this reason, nicotine-containing products should not be used by youth or pregnant women. It has also been suggested by some public health bodies that "nicotine is no more harmful to health than caffeine[9]", while the scientific consensus is that nicotine does not cause cancer[10]. It's therefore not classified as a carcinogen by the WHO.

IN SUMMARY

Delivering nicotine alongside reduced levels of the harmful chemicals associated with burning tobacco and inhaling smoke is becoming increasingly accepted by many countries as a legitimate approach for adult smokers who would otherwise continue to smoke. This concept, known as Tobacco Harm Reduction, or THR, underpins the development of our NGP portfolio.

Nicotine is not the primary cause of smoking-related diseases; rather it's the products of tobacco combustion that drive biological mechanisms leading to disease.

Our goal is for adult smokers to understand the scientific basis for nicotine not being primarily responsible for smoking-related diseases, and that less harmful alternatives to cigarettes now exist.

[7]Reducing Youth Access and Appeal of Vaping Products: Consultation on Potential Regulatory Measures. Health Canada 2019. https://bit.ly/2LhWHoT

[8]US Surgeon General. https://jamanetwork.com/journals/jama/article-abstract/371944

[9]UK Royal Society for Public Health. www.rsph.org.uk/about-us/news/nicotine--no-more-harmful-to-health-than-caffeine-.html

[10]Bates, C. E-cigarette Summit. 15 Nov 2013. https://bit.ly/2vxlXwJ

3

Current tobacco control policies and licensed Nicotine Replacement Therapies (NRTs) are not helping enough adult smokers transition to less harmful alternatives quickly and efficiently enough.

Current tobacco control strategies in most countries focus on supply and demand measures intended to prevent initiation, reduce consumption and encourage cessation of cigarettes. While these measures have resulted in a slow decline in smoking prevalence in many countries, they are highly unlikely to eliminate smoking altogether or help countries achieve their public health goals within stated timeframes.

Over the past three decades, the effectiveness of medically licensed NRT products in facilitating adult smoker cessation has been limited. Smoking abstinence using NRTs is reportedly less than 7% after 12 months[11].

Many adult smokers are unable to quit smoking using NRT owing to the sub-optimal performance of the products. A key feature adult smokers demand when smoking cigarettes is satisfying nicotine delivery. It takes approximately seven seconds for the nicotine in cigarette smoke to be inhaled into the lungs, enter the bloodstream and bind to the appropriate receptors in the brain to provide the unique sensation adult smokers enjoy.

The peak nicotine concentration in the blood after smoking occurs approximately four minutes after the end of a cigarette and ends approximately two minutes later. Nicotine remains in the blood for around 12 hours following the end of a cigarette, resulting in a total nicotine delivery. NRT products like skin patches and chewing gum deliver nicotine much more slowly and at lower doses than cigarettes and are unable to replicate the characteristics adult smokers are used to.

It's of equal importance to understand the additional sensorial and behavioural aspects of the smoking experience. The hand-to-mouth gesture, as well as other attributes like sensory stimulation, are equally crucial contributory factors to the satisfaction of many adult smokers.

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[11]Konstantinos F (2017) Electronic cigarettes: an aid in smoking cessation, or a new health hazard? Ther Adv Respir Dis. https://doi.org/10.1177/1753465817744960

3

Finally, most adult smokers don't consider themselves to be patients[12]. We believe NGPs are more likely to succeed at transitioning adult smokers if they aren't perceived to be medical treatments for smoking, unlike NRTs. Our broad portfolio of NGPs allow the transition from smoking to non-smoking to be a pleasurable experience.

Many stakeholders, including public health organisations, healthcare professionals and regulators now recognise traditional NRTs are failing to encourage enough adult smokers to stop smoking quickly enough, and new THR policies are required to complement existing prevention and cessation strategies.

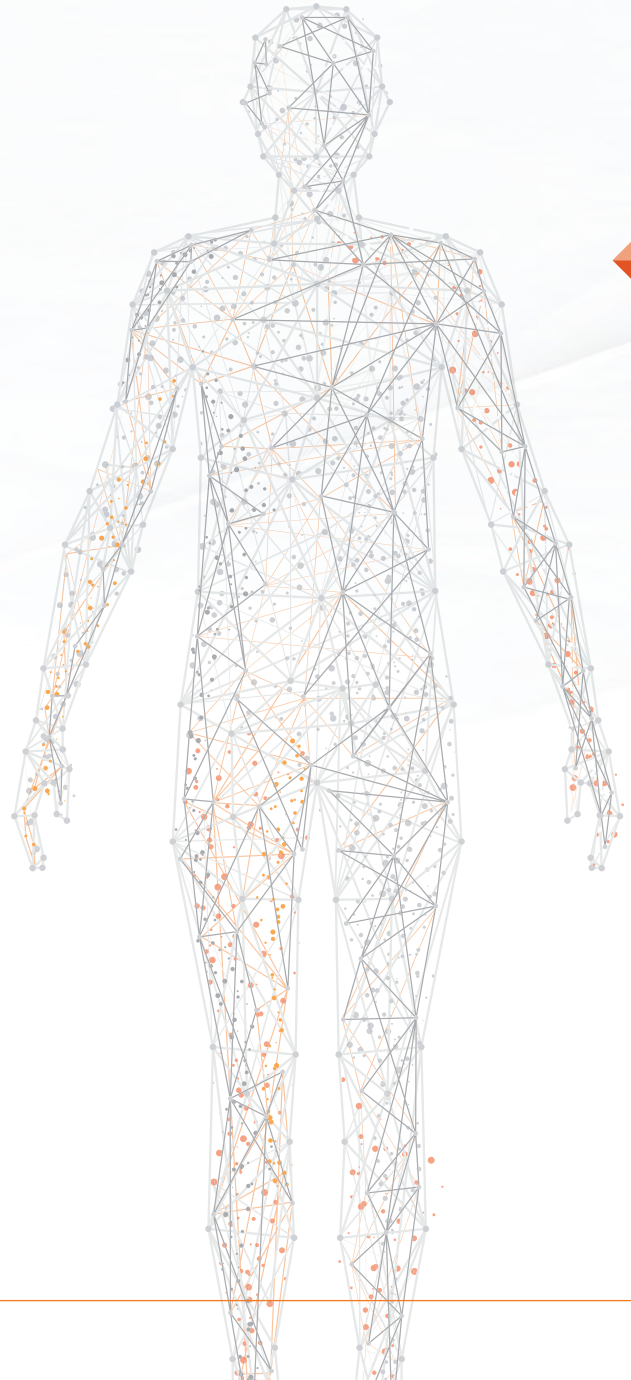
We're developing and commercialising a range of nicotine-containing NGPs which replicate many, or all, of the sensorial, pharmacological and behavioural elements of the smoking/tobacco experience. This will help to address many of the limitations of NRT, ensuring adult smokers who continue to smoke find a suitable product in our portfolio to transition to and continue to enjoy nicotine alongside potentially lower levels of harm.

IN SUMMARY

NRT has proved largely unsuccessful in helping enough adult smokers stop smoking quickly enough. Sub-optimal nicotine delivery and a failure to replicate the sensorial and behavioural aspects of smoking mean not enough adult smokers find them either an acceptable or effective alternative to smoking cigarettes.

Creating a less harmful nicotine product is one thing; it's quite another to ensure the product is acceptable and satisfying so adult smokers will want to transition and use it. Less harmful products that don't satisfy adult smokers will likely only generate minor public health benefits.

We're developing and commercialising a range of nicotine-containing NGPs which replicate many, or all, of the sensorial, pharmacological and behavioural elements of the smoking / tobacco experience.



[12]Morphett et al., Why Don't Smokers Want Help to Quit? Int J Environ Res Public Health. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4483718

4

Advancements in science and technology now allow us to offer adult smokers better alternatives to smoking cigarettes.

Improvements in science and technology over the past decade have dramatically improved our ability to provide adult smokers with better alternatives to smoking.

The global tobacco market continues to evolve rapidly, as more adult smokers transition from cigarettes to less harmful NGPs. Developments in batteries and nicotine extraction technology have led to tobacco-containing and tobacco-free NGPs. They have the potential to facilitate harm reduction on a population level at an unprecedented rate, delivering nicotine without any harmful tobacco smoke.

For instance, it's now possible to extract nicotine from tobacco in the form of a liquid. In this form, the liquid can be aerosolised, generating a smoke and tobacco-free nicotine vape which can be inhaled without the need to expose users to tobacco. Recent advances using microprocessors have also allowed us to heat tobacco to very controlled temperatures, ensuring nicotine can be released in an aerosol from tobacco without burning it.

Aside from technologically advanced devices, other forms of tobacco - specifically oral tobacco snus - demonstrate significant harm reduction potential. Although tobacco consumption in Sweden is on a comparable level with other countries in Europe (via the popularity of snus and not cigarettes), Sweden demonstrates one of the lowest rates of lung diseases in the world[13].

This additional observation - that consuming tobacco without burning it results in lower levels of disease - provides important glimpses into the mechanisms by which smoking causes diseases. Our wide NGP portfolio includes new tobacco-free products which deliver nicotine orally similarly to snus, potentially further reducing user risk through the elimination of both inhalation and tobacco as an ingredient.

Our goal is to provide adult smokers who would otherwise continue to smoke a range of high quality, scientifically substantiated products that allows them to transition away from cigarettes. All these products have one thing in common - the capability to deliver nicotine efficiently but without burning tobacco.

IN SUMMARY

NGPs are a major disruptive innovation. Technology has made it possible for adult smokers to consume nicotine without burning tobacco, making population level harm reduction a realistic possibility.

NGPs have the potential to help one billion smokers reduce, and eventually entirely replace, smoking. We are committed to continued NGP innovation, alongside promoting their harm reduction potential to adult smokers and global public health bodies.

[13] www.erswhitebook.org/chapters/the-burden-of-lung-disease/

5

We offer a broad portfolio of high quality, scientifically supported NGPs. They demonstrate varying harm reduction potential, but our research to date suggests all are likely to be less harmful relative to cigarettes.

Our NGPs are designed to be relatively and significantly less harmful than cigarettes for adult smokers. However, it's important to note no tobacco or nicotine-containing product is absolutely risk free.

The greatest risk reduction is, therefore, likely to be achieved by eliminating their use altogether.

While the inhalation of any material into the lung while using an NGP is likely to cause some additional biological effects, eliminating inhalation is likely to have a significant impact on the kinetic and sensorial characteristics of nicotine delivery.

It's therefore important to consider the balance between adequate similarity to cigarettes in terms of nicotine delivery / sensorial aspects and any reduction in risk. This dichotomy is addressed by the THR equation (discussed in Sections 6 & 7).

Figures 1a and **1b** illustrate our rationale for developing a risk spectrum, highlighting the science-based argumentations for NGP risk compared to cigarettes. We invest heavily in science and innovation and consider a wide NGP portfolio critical to allowing individual adult smokers to find alternative nicotine products they can successfully transition to.

It's important to note while the different platforms are described in terms of relative risk to one another, all are likely to be significantly less harmful than smoking cigarettes.

Figure 1a: Our rationale for developing a risk spectrum. Products placed lower on the spectrum do not contain or burn tobacco.

RATIONALE FOR THE RISK SPECTRUM

RISK

Nicotine	+	Ingredients	+	Tobacco	+	Lower temp (>100°C <350°C)	+	Higher temp (>350°C)	+	Inhalation	=	Cigarettes
Nicotine	+	Ingredients	+	Tobacco	+	Lower temp (>100°C <350°C)			+	Inhalation	=	Heated Tobacco
Nicotine	+	Ingredients	+	Tobacco							=	Snus
Nicotine	+	Ingredients				Lower temp (<250°C)			+	Inhalation	=	Vape
Nicotine	+	Ingredients									=	Tobacco-free OND
Nicotine	+	Ingredients									=	NRT
											=	**Quit nicotine & tobacco**

IN SUMMARY

The elimination of high temperature and tobacco brings the risk profile of vaping much closer to the risk profile of NRT.

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We believe vaping currently represents the most promising less harmful alternative to cigarettes, as the category demonstrates reduced risk potential while also achieving adult smoker acceptance through successfully mimicking many of the behavioural and sensorial aspects of the smoking experience. This position is supported by a growing independent scientific evidence base. Vaping is also currently the only NGP inhalation product category endorsed by numerous public health bodies.[14]

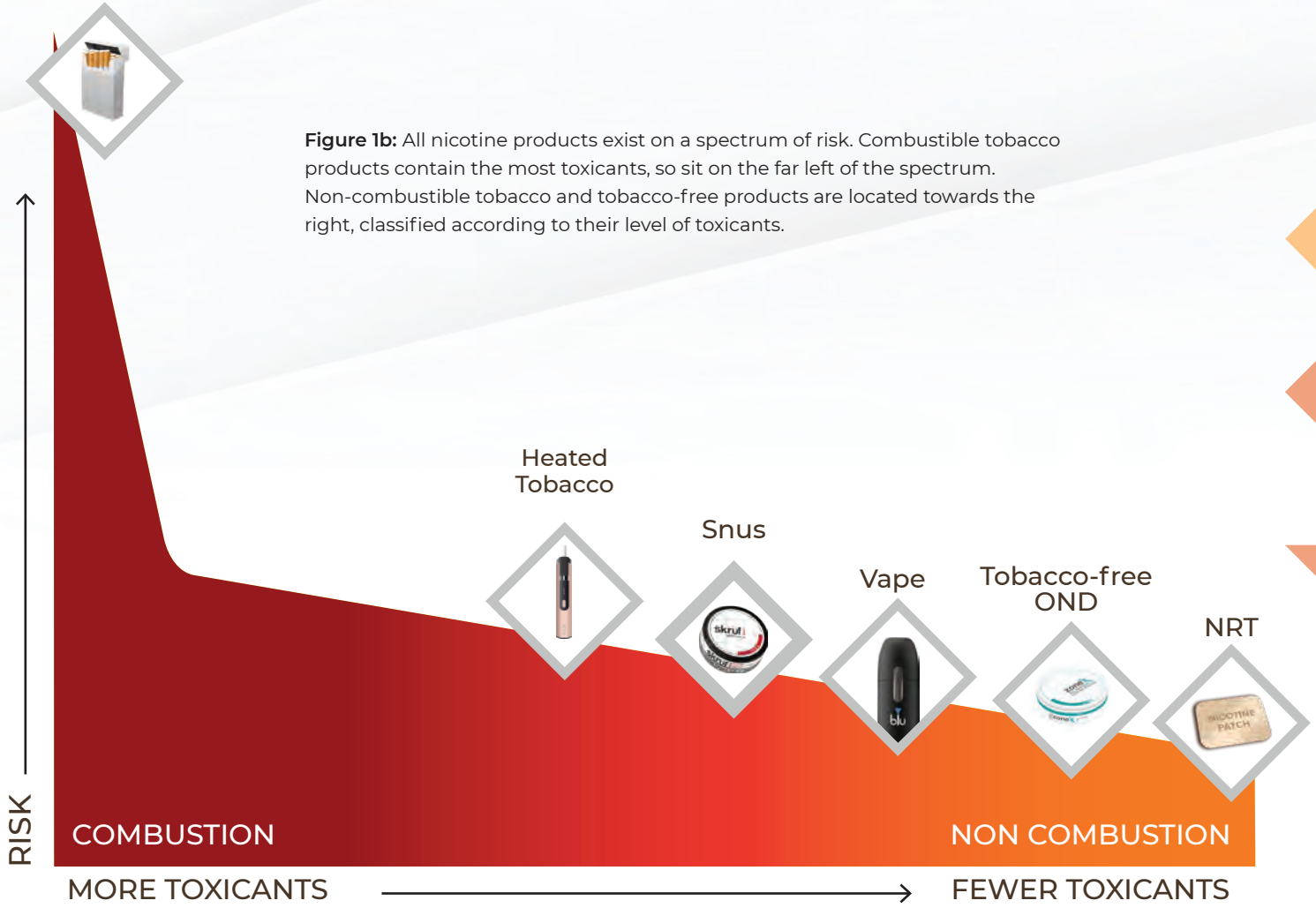

Figure 1b: All nicotine products exist on a spectrum of risk. Combustible tobacco products contain the most toxicants, so sit on the far left of the spectrum. Non-combustible tobacco and tobacco-free products are located towards the right, classified according to their level of toxicants.

IN SUMMARY

Our NGPs are designed for - and only marketed towards - existing adult smokers and current adult NGP users.

We believe a wide nicotine-containing NGP portfolio, supported by strong brands and underpinned by best-in-class science, offers the best chance of satisfying the varying preferences of adult smokers and assisting more of them in transitioning.

Our risk spectrum places products that generate the fewest toxicants (i.e. do not contain or burn tobacco) further to the right of the scale.

Vape products don't contain tobacco and provide satisfying nicotine delivery. Unlike NRT products and snus / tobacco-free OND products, they also replicate many of the behavioural and sensorial elements of the smoking experience.

Scientific evidence has led both ourselves and many public health bodies to believe vaping currently represents the most promising, less harmful alternative to cigarettes.

[14] www.fontemscience.com/wp-content/uploads/2019/08/publichealth.jpeg

6

The THR equation demonstrates the importance of balancing individual risk reduction and product acceptance by current adult smokers who would otherwise continue to smoke.

For THR to succeed in efficiently reducing harm compared with continued smoking, a harm reduced product should fulfil two key criteria:

[1] It must be scientifically demonstrated as significantly less harmful than cigarettes.

[2] It should be acceptable and satisfying for current adult smokers, so they transition completely.

The THR equation (Figure 2) demonstrates while it's important to ensure new products are lower risk compared to cigarettes, harm reduction can only be achieved if products are acceptable to current adult smokers and they successfully transition exclusively and don't resume smoking.

For example, a completely 'harmless' product, or one with very low risk to cigarettes (e.g. NRT), will have very limited harm reduction impact if it fails to encourage significant numbers of adult smokers to transition.

Conversely, a product deemed acceptable to adult smokers as a smoking alternative that offers no reduction in risk will be equally ineffective.

IN SUMMARY

Only if significant numbers of adult smokers successfully transition from cigarettes to less harmful NGP alternatives can a substantial benefit to population health be realised.

Figure 2: The THR equation* acknowledges harm reduction will only be achieved if a reduced risk product is accepted and used by a large number of adult smokers.

*Bates, Clive. Presented at E-Cigarette Summit, 2013 https://fr.slideshare.net/lindsayfox/clive-bates-e-cigarette-summit

7

We've modified the THR equation to consider recent public health concerns around NGPs acting as a potential 'gateway' to nicotine use and smoking for never smokers, vulnerable populations and youth.

The established THR equation demonstrates our research and development efforts need to focus on both reduced risk potential and adult smoker acceptance.

However, given the public health scrutiny around vaping acting as a potential 'gateway' to nicotine use and ultimately smoking among youth and vulnerable populations, it's important our assessment framework activities also take these aspects into consideration.

We recognise significant public health benefits can only be fully achieved at a population level when many adult smokers transition from cigarettes to less harmful NGPs, while significant numbers of non-smokers and youth do not begin using these products. That's why we're clear only adult smokers and current adult NGP users should use our products, and why the notion of consumer acceptance needs to include elements addressing unintended use.

NGPs should be targeted at - and only used by - adult smokers who would otherwise continue to smoke. The unintended use groups are, simply, everyone else.

Intended users need to use NGPs for a sustained period, and ideally completely transition from cigarettes (termed 'off-ramping' by the US Federal Drug Administration [FDA])[15]. Conversely, unintended users should not be using NGPs at all ('on-ramping'). Consumer acceptance, therefore, becomes a formula of product appeal to current adult smokers plus their use of these products, corrected for by the number of unintended users (Figure 3).

Continued...

[15] www.fda.gov/news-events/press-announcements/statement-fda-commissioner-scott-gottlieb-md-meetings-industry-related-agencys-ongoing-policy

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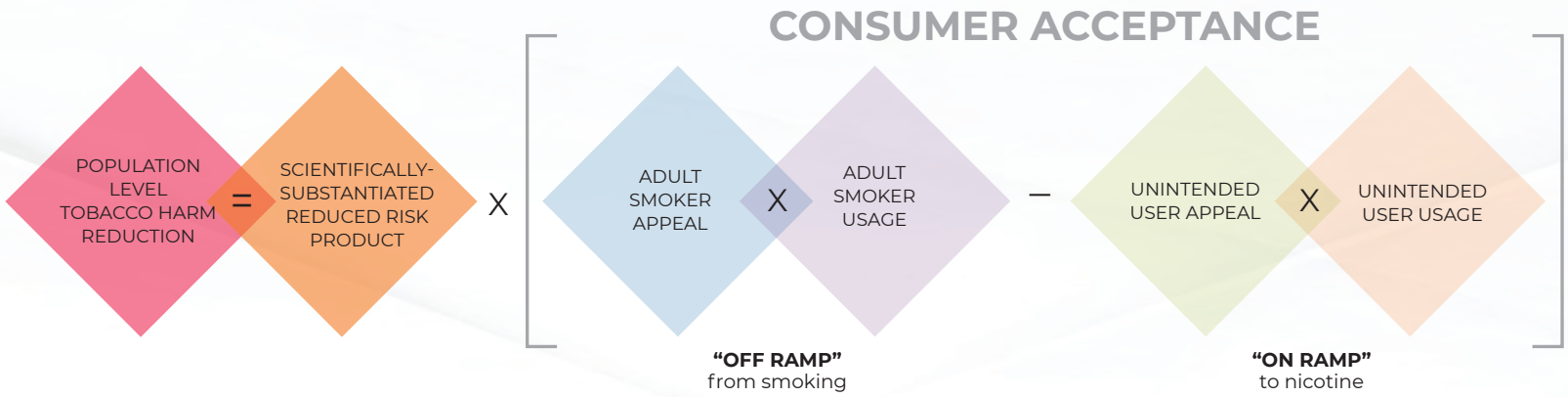
We believe our comprehensive scientific assessment framework (discussed in Section 8) addresses all elements of this modified THR equation, providing us with the confidence our NGP platforms can potentially result in population level harm reduction.

Figure 3: The modified THR equation acknowledges population level tobacco harm reduction can only be achieved if a scientifically-substantiated reduced risk product is accepted and used by a large number of adult smokers, while significant numbers of never smokers, vulnerable population and youth do not also begin using it.



IN SUMMARY

The current THR equation does not take into consideration the potential consequences of unintended use.

Our modified THR equation takes into consideration the impact of unintended use (i.e. portions of the population for whom NGPs are not targeted towards, like youth or never smokers).

Unintended use would introduce new elements of risk and harm to public health on a population level, rendering the positive effects of NGPs to current adult smokers less effective.

Our approach scientifically ensures users of our NGPs are limited to adult smokers who would otherwise continue to smoke, as well as current NGP users.

We are committed to monitoring scientific developments and product use while also establishing post-market longitudinal studies to understand the ongoing impact of NGPs on population level harm.

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As a responsible manufacturer, we scientifically substantiate the harm reduction potential of our NGPs using state-of-the-art assessment techniques while continually assessing our products to ensure they are of the highest quality in terms of manufacture, engineering and ingredients.

As worldwide NGP usage by adult smokers continues to increase, so does our need for a greater scientific understanding of these products. We believe robust and comprehensive scientific assessments of the comparative risk of NGPs compared to cigarettes should form the basis of evidence-based global regulation, and our scientific assessment framework assesses benefits and risks among both individuals and populations. We also believe manufacturers must be able to stand behind their products by being able to fully characterise and guarantee what their consumers are being exposed to.

We develop comprehensive scientific evidence packages to demonstrate the harm reduction potential of our NGPs. To build the evidence base underpinning our risk spectrum, we have established a comprehensive scientific assessment approach which addresses all aspects of the THR equation (Figure 4).

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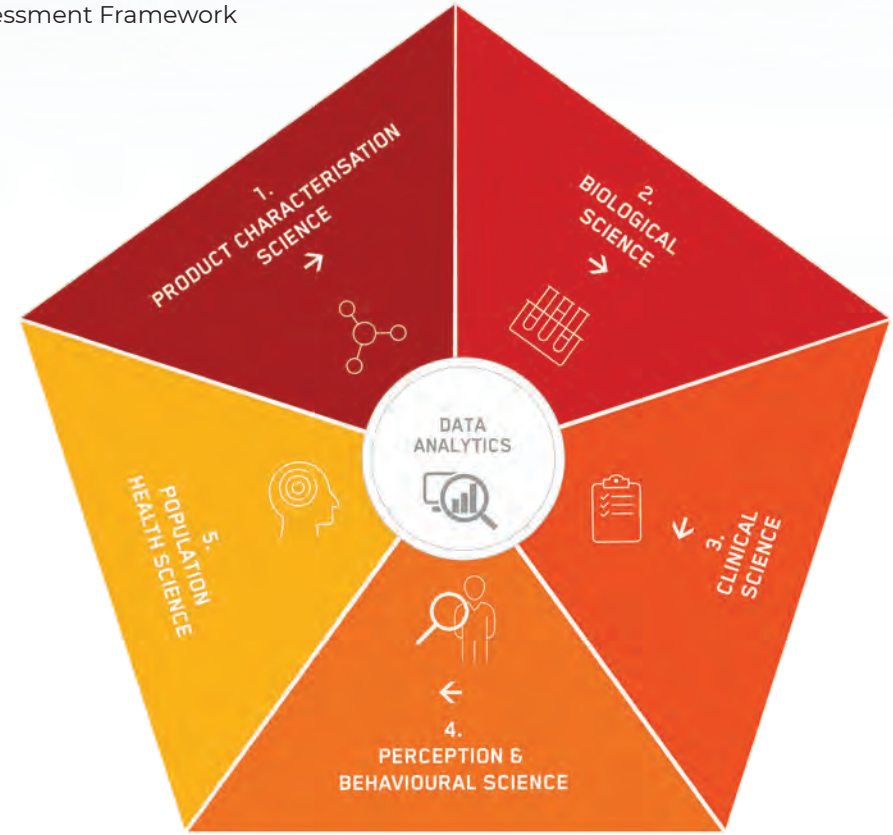
Figure 4: Our Scientific Assessment Framework



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1. Product Characterisation Science

The initial part of our assessment framework measures the chemical constituents in our NGPs, and what our consumers are exposed to. Harmful and Potentially Harmful Constituents (HPHCs), which are classified by public health experts as causes, or potential causes, of smoking related diseases, are routinely measured in our products and compared to levels in either combusted cigarette smoke or another tobacco product comparator (e.g. oral tobacco). Only if significant reductions in HPHCs are observed will the NGP proceed further in its development and along our scientific assessment framework process. Product characterisation studies also measure the chemical and microbial stability of the product; consumer exposure parameters (e.g. particle size of aerosols, mouth level exposure studies) and the impact of NGP aerosols on indoor air quality.

Our NGPs also undergo rigorous risk assessment by our in-house professional toxicologists and other specialists to determine the suitability of ingredients and materials. Our product stewardship assessment process for ingredient selection is depicted in Figure 5. As a responsible manufacturer we continuously review this approach.

2. Biological Science

Once the product characterisation science has demonstrated an NGP has reduced levels of toxicants relative to a combusted cigarette, we determine the product's biological impact through a series of laboratory-based techniques. We have adopted in-vitro toxicology and in-vitro models of disease which are ethical, animal free methodologies. Our approach is based on principles derived from several U.S. National Research Council (NRC) documents on Toxicity Testing in the 21st Century[16]. The NRC's vision is to "transform toxicity testing from a system based on whole animals to one focused on in-vitro methods, based on biological processes; preferably in human cell lines". We endorse this mindset in our testing strategy, and engage external stakeholders to endorse this approach.

3. Clinical Science

Clinical studies are conducted to confirm the reductions in HPHCs and toxicity measured in the laboratory studies also translates following adult smoker NGP usage.

Our clinical assessments measure:

- How adult smokers' bodies absorb the nicotine delivered by NGPs and how long it remains present in the body following use of the NGP compared to the tobacco product comparator.
- Whether the NGP is likely to be acceptable to adult smokers, particularly in reducing their desire to smoke.
- Our biomarkers of exposure to HPHCs studies determine whether adult smokers are exposed to less of these harmful chemicals when they transition to our NGPs, and if biomarkers of disease are reduced following NGP usage in human subjects.

Our worldwide partners and collaborators are carefully selected to ensure consistently high standards of ethical practice and scientific conduct. We adhere to the highest standards when conducting clinical studies to ensure the safety and wellbeing of our subjects.

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[16] www.ncbi.nlm.nih.gov/pubmed/20574894

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4. Perception & Behavioural Science

Our Perception and Behavioural (P&B) science studies use qualitative methods and standardised quantitative instruments to help us understand elements including prevalence of use, perceptions of harmfulness and addictiveness, likelihood of smoking cessation, likelihood of transitioning and the likelihood of initiation and relapse associated with our NGPs. In parallel, ongoing evaluation of how products are used by adult smokers following commercialisation - including both intended and unintended use - is crucial for assessing potential health benefits. Our P&B program, along with regulatory and commercial controls including age restrictions, advertising restrictions, post market monitoring and enforcement, helps provide additional safeguards intended to minimise unintended use of our NGPs. Minimising youth appeal and preventing youth access to NGPs is a key priority for Imperial Brands. We are unequivocal that NGPs should be used by adult smokers only, and any use of such products by those under the legal age is completely unacceptable.

5. Population Health Science

Our population health science studies aim to understand population knowledge, attitudes, usage patterns and behaviours once our NGPs are on the market. This includes data with respect to adverse events and health related outcomes, plus data collected through P&B studies and population-wide surveillance. In the absence of epidemiology data, sales data and product usage questionnaires can provide important information on rates of initiation, cessation and prolongation in real-life patterns.

6. Data Analytics

Data analytics underpin all the steps in our framework. We use statistics and data analytics methods, processes, algorithms and systems to extract knowledge and insights. We also combine domain expertise, programming skills, data analysis and machine learning to understand, analyse and extract meaningful information from both our structured and unstructured data.

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IN SUMMARY

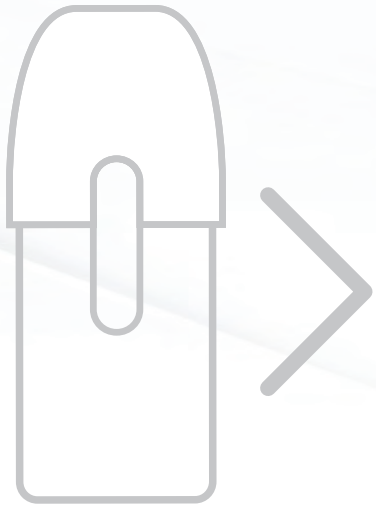
As a responsible multi-category NGP manufacturer, we continually assess our NGPs to ensure they are of the highest quality in terms of manufacture, engineering and ingredients.

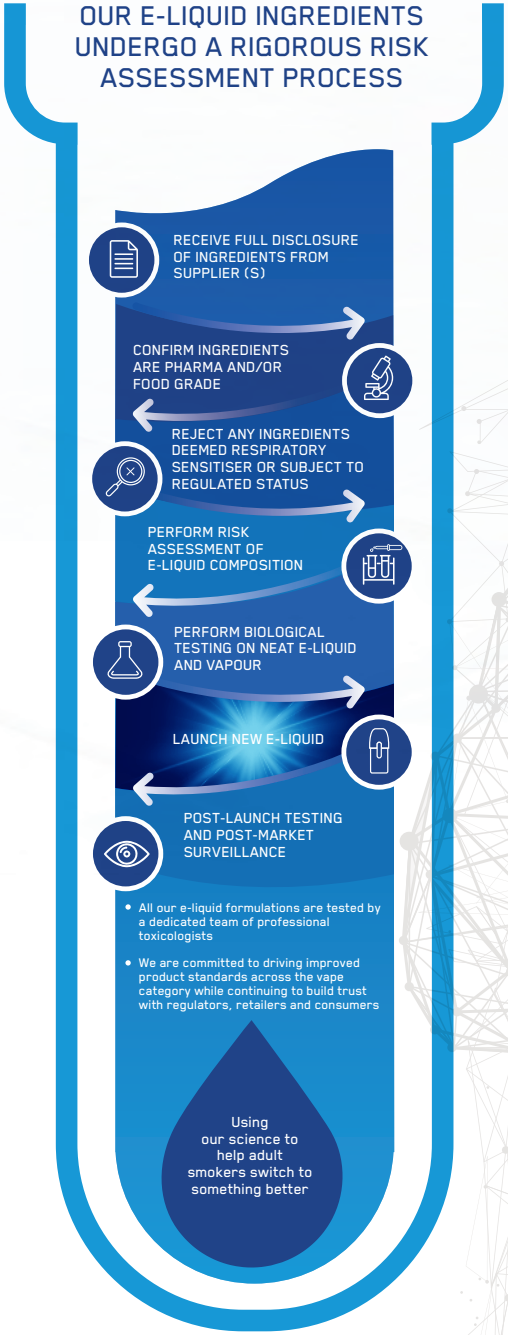
Our scientific assessment framework is tailored to address all the elements of the modified THR equation, providing us with confidence that - when marketed and adopted by the intended audience (adult smokers who would otherwise continue to smoke) - our NGPs will contribute to a positive impact on population health.

We believe openness, transparency and collaboration enhance the scientific understanding of how our NGPs work and is in the best interests of our adult smoker consumers.

We also believe the robust and comprehensive scientific assessment of the comparative risk of NGPs compared to cigarettes should form the basis of evidence-based global regulation.

Figure 5: Our product stewardship process for e-liquids





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It's essential NGPs deliver nicotine in a similar way to cigarettes to help facilitate adult smoker transition. The popularity of vaping suggests replicating elements like the behaviours and ritual cues of smoking cigarettes is also important.

We take our commitment to adult smokers seriously and want to offer NGP alternatives that help them in their journeys away from cigarettes. Our experience and published scientific research demonstrate satisfactory nicotine delivery is critical to adult smoker NGP acceptability. For this reason, we're continuing to conduct scientific research into the effects of nicotine levels on adult smoker transitioning.

As discussed previously, current medically licenced NRTs have limited success as they do not replicate the smoking experience and are therefore not acceptable alternatives for most adult smokers. One of the reasons is the poor mechanism of nicotine delivery. To help understand whether our NGPs are likely to be acceptable to adult smokers, we conduct pharmacokinetic (PK) and pharmacodynamic (PD) studies, which are types of clinical research (see Section 8).

PK: These primarily involve observing nicotine pharmacokinetics and blood plasma levels, helping us understand how adult smokers' bodies absorb the nicotine delivered by NGPs, and how long it's present in the body following use of the product.

PD: By monitoring any reduction in smoking desire, we can understand how adult smokers feel after using NGPs, focusing primarily on their desire to smoke again.

There have been a number of unsuccessful attempts over the years to produce an inhaled product which delivers nicotine through the lung, mimicking the sensory experience of smoking. Following technological advances, our goal is to develop more effective and satisfying harm reduced NGPs that mimic - as closely as possible - the rituals, PKs and PDs of cigarettes to facilitate adult smoker transition and further realise the harm reduction potential of NGPs.

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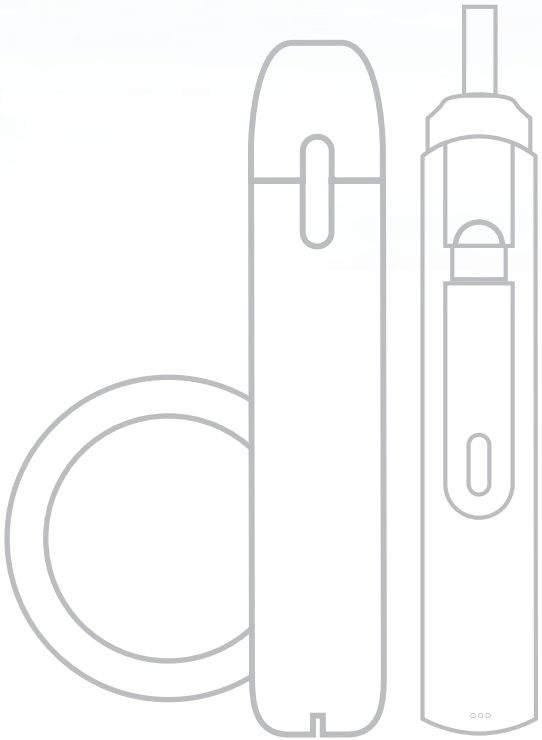

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Figure 6 illustrates a typical PK curve from a cigarette, and what we hope to replicate via our NGPs. As a comparator, a typical PK profile for an NRT chewing gum and patch is also shown. It's clear NRT delivery kinetics are very different compared to cigarettes.

For the vape category, the European Union Tobacco Products Directive (EUTPD) mandates the maximum nicotine content of an e-liquid cannot exceed 20 mg/mL.

Both Public Health England and the UK Royal College of Physicians have stated the current cap on nicotine concentrations imposed by the EUTPD may limit the effectiveness of vaping as a smoking substitute, particularly for heavier smokers. Furthermore, the UK House of Commons Science and Technology Committee - subsequently endorsed by the UK Government - concluded the EUTPD 20 mg/mL limit on nicotine strength was holding back vaping as a stop-smoking measure, as users must puff harder to consume nicotine. This may have deterred heavier smokers from persisting with the category.

We also contend this non-evidence based, arbitrary value currently mandated by the EUTPD. Independent research suggests the use of lower nicotine concentration e-liquids may be associated with 'compensatory behaviour', as vapers puff more deeply, more frequently and for longer to obtain the appropriate level of nicotine that reduces their desire to smoke[17].

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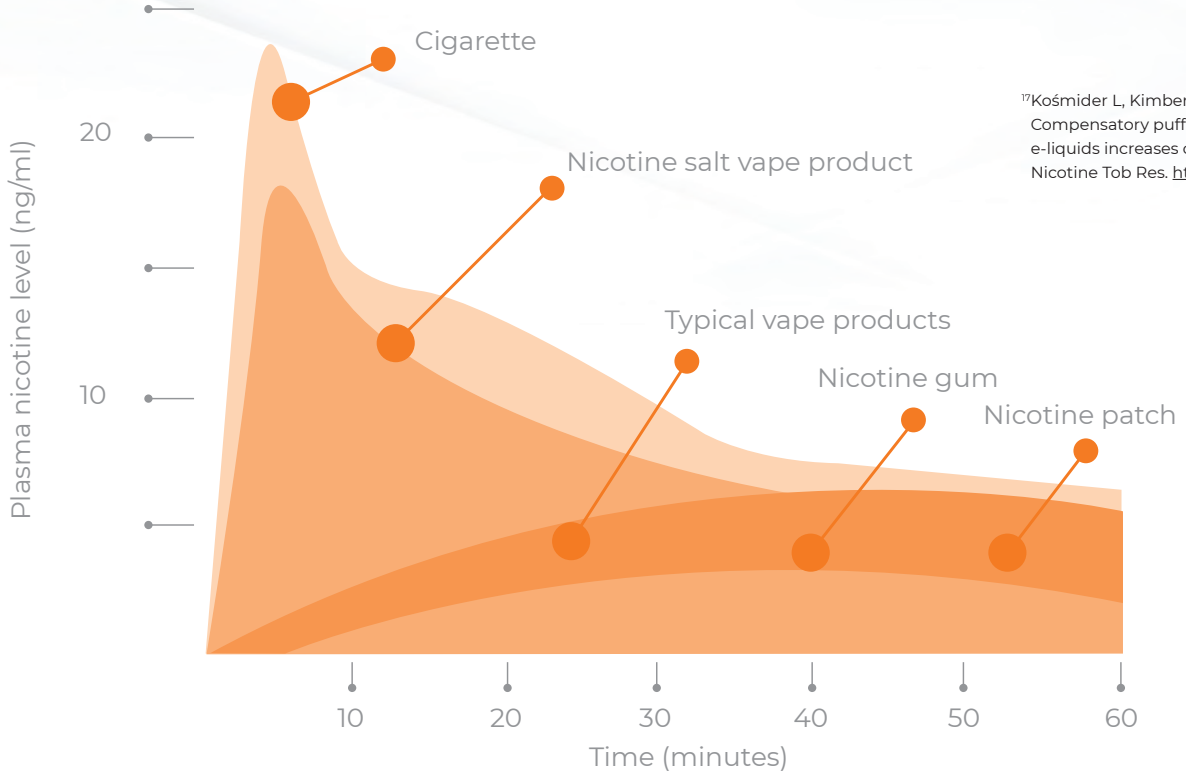

Figure 6: Graph comparing nicotine delivery in blood for cigarettes, vapes +/- nicotine salts, plus nicotine gums and patches.
Note: E-liquids containing nicotine salts more closely mimic the PK profile of cigarettes.

[17]Kośmider L, Kimber CF, Kurek J, Corcoran O, Dawkins L (2017) Compensatory puffing with lower nicotine concentration e-liquids increases carbonyl exposure in e-cigarette aerosols. Nicotine Tob Res. https://doi.org/10.1093/ntr/ntx162

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We believe the EUTPD nicotine concentration limit should be reviewed in line with current scientific literature, including our own studies[18]. Higher nicotine strength liquids with suitable flavour options that can be marketed to adult smokers may maximise the public health potential of vaping.

Research suggests there is a minimum level of nicotine required by adult smokers to assist their transition journey. There may also be a level above which additional nicotine in vapes is not necessary to attract and satisfy adult smokers. In our view, exceeding that level is unnecessary and vape nicotine levels should not be 'uncapped'. We'll continue to monitor whether high levels of nicotine in vapes are likely to facilitate adult smoker transitioning and share our findings with regulators.

We also believe nicotine strength optionality is integral to adult smokers' personal vaping journeys, while also preventing potential smoking relapse by current vapers. This includes offering nicotine-free products to provide a complete nicotine off-ramp to adult smokers who choose this path.

Finally, as the technology and innovation of NGPs continues to evolve, their effectiveness as nicotine delivery devices improves. Specifically looking at vaping, nicotine delivery is dependent on the individual characteristics of vape devices and liquids, including device type (i.e. open vs. closed systems), battery size, nicotine e-liquid concentration, as well as individual user experience and product use behaviours. Our ability to deliver nicotine will likely become even more efficient through further technological advances.

In terms of open system vapes, devices can be customised mechanically by users to increase power, which can increase nicotine yields. As variable and increased voltage open system vapes can deliver increased nicotine concentrations, they're able to mimic or exceed the nicotine delivery profiles of cigarettes - even when using low nicotine strength e-liquids.

We believe regulatory measures should limit the ability of users to alter the generated aerosol and the ingredients used within them, as this may have implications for abuse liability. In contrast, pod-based systems offer the ability to ensure both the ingredients and the generated aerosol fall within pre-defined and regulated standards. As noted by the New Zealand Ministry of Health: "the best vaping device to quit smoking is a discreet pod or pen device[19]".

IN SUMMARY

If NGPs can more closely replicate (but not exceed) cigarette-like nicotine delivery, they should help facilitate greater adult smoker transitioning to harm reduced alternatives.

We believe nicotine strength optionality is integral to helping adult smokers transition to vaping, including nicotine-free products which provide a complete off-ramp.

We encourage regulators to examine the issue of 'uncapped' nicotine levels for vapes.

Unlike pod-based systems, open system vapes may have implications for abuse liability. Appropriate regulatory measures should be put in place to limit users' ability to alter the nicotine delivery and e-liquid ingredients (e.g. vitamin E acetate) used within them.

[18] O'Connell, G., Pritchard, J.D., Prue, C. et al. Intern Emerg Med (2019). https://doi.org/10.1007/s11739-019-02025-3

[19] https://vapingfacts.health.nz/vaping-to-quit-smoking/what-vape-should-i-get/

10

Something Better means something different. Flavours increase the chance of adult smokers transitioning from cigarettes to NGPs.

It's important to offer adult smokers enough choice in terms of NGPs to remain relevant and prevent smoking relapse, allowing adult smokers to significantly reduce - and eventually replace - cigarettes entirely.

Looking at the vape category specifically, a growing body of scientific research shows flavours play a critical role in attracting adult smokers to the vaping category[20]. This directly contributes to THR and declining smoking rates.

Flavourless - or limited flavoured - vapes constitute a bland and boring experience unlikely to prove attractive to adult smokers, as well as being detrimental to harm reduction.

In addition to tobacco and menthol flavours, we provide a wide range of flavour variants to cater to the wide preferences of adult smokers at various stages in their journeys to vaping. All our flavour-related marketing is undertaken with the understanding our goal is to offer adult smokers a compelling off-ramp from cigarette smoking.

For example, a common trend observed in many studies is for adult vapers to initiate vaping using tobacco flavours and then transition to other flavours.

This is particularly common among successful quitters. Flavours are more popular among frequent adult vapers, which is potentially important considering frequency of vape use is associated with replacing cigarettes.

The transition in the types of flavours used over time may reflect an initial need to find a product which recalls the taste of smoking (i.e. tobacco or menthol flavour) to ease the initial changeover. Subsequently, former smokers then transition to a contrasting flavour (e.g. fruit) to prevent the previous flavour from serving as a cue to resume smoking. A wide variety of flavours also helps prevent 'flavour fatigue' from setting in.

In summary, a wide range of flavours and nicotine strengths ensures adult smokers can find a product / flavour combination to fill their individual sensory gaps and help them permanently replace cigarettes.

While regulations on flavourings should set minimum category standards (i.e. quality requirements), all manufacturers should also be mindful in terms of how they name and market flavours. We believe any potential risk of youth being attracted to vaping can be sufficiently minimised by strictly prohibiting sales to this population, while ensuring industry advertising and labelling - including flavour names - does not appeal to youth.

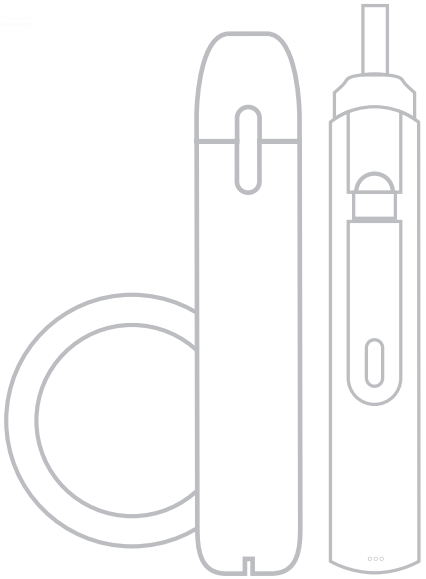
Continued...

[20]Harm Reduction Journal. https://harmreductionjournal.biomedcentral.com/articles/10.1186/s12954-018-0238-6

10

We assess all flavours added to our portfolio through our comprehensive scientific assessment framework (See Section 8). We also recognise regulating flavours is a complex task. To maximise the public health benefit on a population level, it's necessary to achieve a delicate balance: ensuring the continued availability of flavour varieties for adult smokers, while reducing the likelihood marketing those flavours attracts vulnerable populations such as youth and never smokers.

We believe prohibiting the manufacturing, marketing, and / or sale of flavours will likely result in unintended, adverse public health consequences. In respect to vaping, for instance, this includes deterring adult smokers from transitioning, causing former smokers to relapse and / or indirectly encouraging potentially dangerous 'DIY' flavour-making - which can't be controlled from a toxicological or risk perspective.



IN SUMMARY

Scientific research suggests a wide choice of vape flavours increases the chance of adult smokers transitioning from cigarettes to vaping, resulting in potential public health benefits.

The transition in the types of vape flavours used over time may reflect the need to find a product that recalls smoking (i.e. tobacco or menthol flavour) to ease the initial transition. Subsequently, former smokers transition to a contrasting flavour (e.g. fruit) to prevent the previous flavour from serving as a cue to resume cigarettes.

To maximise the public health benefit on a population level, it's necessary to ensure the continued availability of flavour varieties for adult smokers while reducing the likelihood of on-ramping vulnerable populations into regular use.

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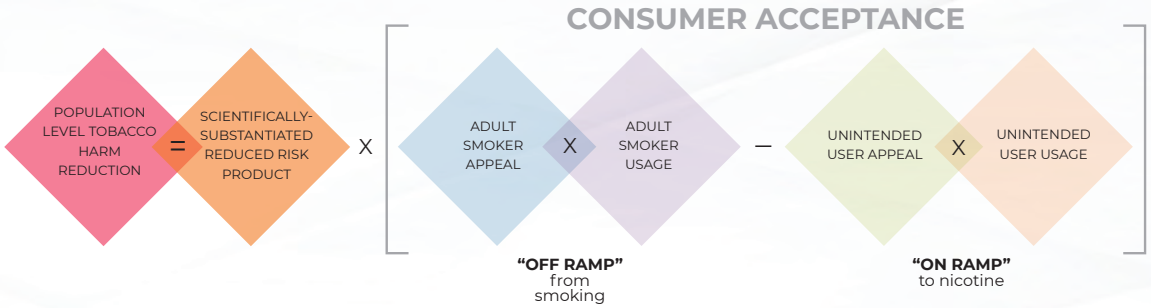
NGPs should be targeted at - and only used by - adult smokers who would otherwise continue to smoke.



As discussed in Section 7, we believe understanding the balance between off and on-ramping is critical to ensuring population harm reduction. It's necessary to demonstrate that the introduction of a new NGP product does not shift the balance towards on-ramping. Critical to combating unintended use and on-ramping is understanding how many unintended users - including youth - may be attracted by a new NGP proposition.

Continued...

11

These elements form part of our comprehensive scientific assessment framework, where specific behavioural studies are required to address off and potential on-ramping rates. For our products currently in market, a series of behavioural surveys are being conducted. For new products, a series of pre-market perception and behavioural studies will be undertaken, alongside long-term post-marketing surveillance, to examine and analyse how on and off-ramping rates evolve over a longer period.

These types of studies are a specific requirement of a Pre-Market Tobacco Product Application in the USA, while some European countries (e.g. Germany and Greece) also require them as part of market pre-authorisation for tobacco-based NGPs.

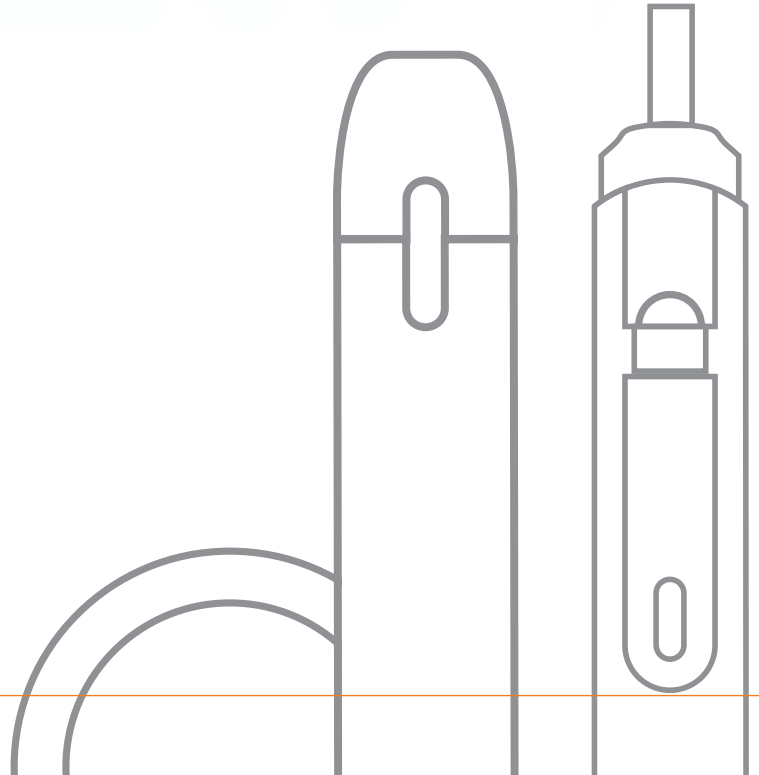
NGPs should be used by adult smokers and current adult NGP users only. We strongly support initiatives to prevent youth access to NGPs - including vapes - and efforts to ensure advertising reaches only intended adult audiences. As both a manufacturer and retailer of NGPs, we take our responsibilities in this respect very seriously.

Regarding vaping, in the USA for instance we have voluntarily developed and committed to a robust youth access prevention plan dedicated to the prevention of underage use of, and access to, blu products. These youth protection initiatives include online age-verification mechanisms, clear product labelling that states “not for sale to minors” and stringent marketing standards, among other policies and actions designed to combat youth vaping.

IN SUMMARY

It’s critical to assess and monitor whether our NGPs are being used by unintended consumers. Our analysis needs to be society-wide. This involves understanding the impact of our NGP portfolio on all factions of the population, including the impact on never smokers, ex-smokers and youth.

We are committed to conducting studies to address these populations, as well as initiating immediate remedial action if unintended consumers begin using our NGPs.



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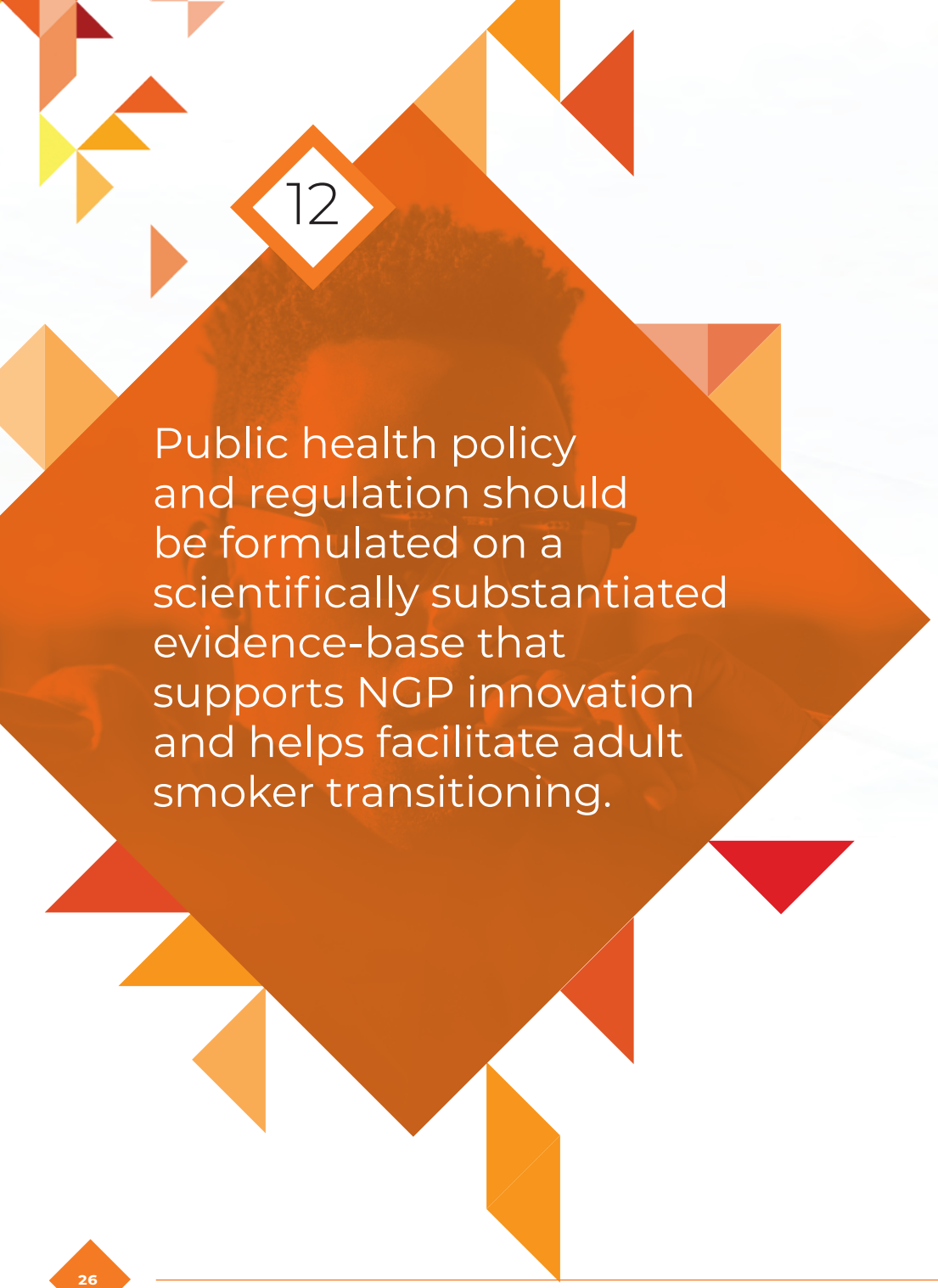


Public health policy and regulation should be formulated on a scientifically substantiated evidence-base that supports NGP innovation and helps facilitate adult smoker transitioning.

Almost two decades after 'Clearing the Smoke' was published, global public health bodies remain divided. Supporters of THR acknowledge it's the combustion of tobacco and inhaling smoke that causes most harm, whereas opponents consider the issue simply to be tobacco. There is also a wide and far-reaching opinion that equates the harm of tobacco with nicotine.

As a key player in the NGP space, our goal must be to minimise the emotional argument while strengthening the scientific one. This can only be achieved through robust scientific studies and regular, impactful engagement around our scientific results.

It's important we communicate the scientific evidence that nicotine is not the main driver of smoking-related diseases. Recent consumer studies have reported large numbers of adult smokers aren't even willing to try NGPs owing to various myths and misconceptions, believing NGPs to be just as harmful as - or even more harmful than - smoking. We need to ensure adult smokers can make an informed choice.

Public health bodies in the UK (e.g. Public Health England and the UK Royal College of Physicians) and USA (e.g. FDA) are among the strongest advocates of THR. The FDA are the only regulatory body in the world with a defined process for the submission of scientific evidence to demonstrate a particular NGP is less harmful than cigarettes. However, both have concerns the commercialisation of NGPs might also increase the number of nicotine users in society.

Following a review of the scientific evidence, Public Health England concluded in 2015 that vaping is at least 95% less harmful than smoking cigarettes. It reaffirmed this position in 2018[21] with a further comment that vaping poses only a fraction of the harms smoking does, and that smokers should be encouraged to vape. The 2018 report also indicated the potential of heated tobacco as a reduced risk product, albeit not to the same extent as tobacco-free vapes.

Some other countries have regulation in place that invokes a 'precautionary principle' prohibiting the sale of NGPs, while still allowing the sale of cigarettes. Some of these restrictions are based on concerns NGPs may act as 'gateway' products for youth to start using nicotine and tobacco. Part of our scientific assessment approach addresses this potential issue, ensuring our products are responsibly marketed to - and used by - adult smokers only.

We believe regulatory regimes and excise frameworks should be commensurate with the risk profiles of NGPs compared to cigarettes, and their potential to reduce smoking-related harm.

Continued...

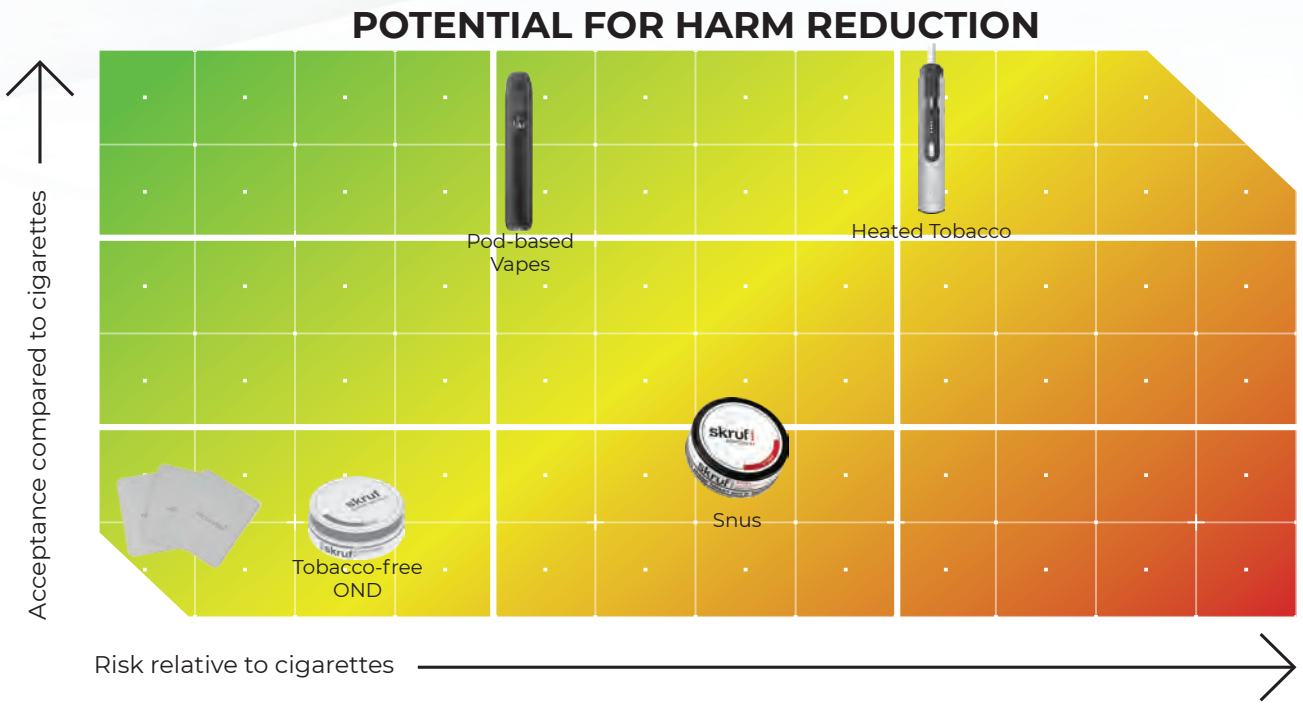
[21] www.gov.uk/government/news/phe-publishes-independent-expert-e-cigarettes-evidence-review

12

Figure 7 outlines the products in our NGP portfolio, and their potential for tobacco harm reduction based on their relative risk compared to cigarettes and likely acceptability by current adult smokers. Those products with the lowest relative risk profile combined with highest adult smoker acceptability would fall into the green zone. Those products which either do not exhibit significant reductions in risk compared to cigarettes, or which adult smokers find least appealing, would fall in the red zone.

It's our belief that, as part of the total fiscal burden calculation, the positions of the products on such a schematic should be taken into consideration.

Figure 7: Matrix of product acceptance and relative risk compared to cigarettes. The most effective harm reduction product is one which mimics behavioural aspects of smoking and nicotine delivery alongside a low risk profile relative to cigarettes (this would fall in the top left-hand corner of the matrix). Vapes currently represent the closest realisation of this concept, and therefore the most promising reduced harm alternative to cigarettes.



IN SUMMARY

The concept of THR remains a contentious issue, with some public health bodies recognising it and others opposing it.

Nicotine has been wrongly demonised alongside tobacco, with the two seen as indistinguishable in terms of harm.

Governments and public health bodies around the world have a clear responsibility to provide accurate and consistent messaging to ensure adult smokers make informed decisions about potentially harm reduced NGPs.

Part of our scientific assessment approach addresses the issue of NGPs acting as 'gateway' products for vulnerable populations to start using nicotine and tobacco, ensuring our products are marketed responsibly to - and used by - adult smokers and current adult NGP users only.

Elements of the level of regulation and taxation of NGPs should correspond to the harm reduction potential that's present to encourage less harmful consumption.

13

Imperial Brands has designed a multi-category NGP portfolio with strong brands, underpinned by best-in-class science, that allows adult smokers, who would otherwise continue to smoke, to define their own journey to non-smoking and enjoy nicotine on their terms.

Consumer research over the last decade has taught us every adult smoker has their own relationship with smoking, and there are a vast range of reasons why people smoke cigarettes.

Despite increasing public health pressure, around 1.5 billion people will still likely smoke in 2025[22]. In terms of population level harm reduction, not enough adult smokers who desire something better are transitioning quickly enough. Our aim is to accelerate this process. Simultaneously, we need to guide - and not preach - to adult smokers and offer them NGP options at a rate they are comfortable with.

The power of our NGP propositions stems from optionality: we offer a wide variety of NGPs that range from those akin to cigarettes in their characteristics (heated tobacco products) through to products that deliver nicotine in very different ways (tobacco-free oral nicotine delivery, or OND).

Each product in our portfolio has its own unique risk profile, and it's likely some of the characteristics of our tobacco-free OND products may, for instance, represent an extreme departure from cigarettes for many adult smokers. This would make it hard for them to transition directly - at least initially. As a company, we believe vaping currently offers the optimum balance between harm reduction potential and product acceptance. They therefore represent our current primary NGP focus. Nevertheless, our ambition is to provide the widest range of smoking alternatives, ensuring all adult smoker preferences are catered for.

Imperial Brands is committed to providing every adult smoker with Something Better in the form of NGPs that provide nicotine on their terms and, ultimately, contributing to a potentially positive impact on the future health of the global population.

IN SUMMARY

Our wide portfolio of scientifically supported NGPs offer adult smokers a range of potentially harm reduced options, allowing them to continue enjoying nicotine on their terms.

We believe vaping currently offers the optimum balance between risk reduction and product acceptance.

Imperial Brands is committed to providing every adult smoker with Something Better to positively impact THR on a global scale.

[22] www.who.int/tobacco/en/atlas38.pdf

01

There are more than a billion smokers in the world. Smoking is a cause of serious diseases and a significant number of preventable deaths.

02

Aligned with the concept of Tobacco Harm Reduction (THR), there's scientific consensus it's not nicotine but rather the Harmful and Potentially Harmful Constituents (HPHCs) found in tobacco smoke that cause, or potentially cause, smoking-related diseases.

03

Current tobacco control policies and licensed Nicotine Replacement Therapies (NRTs) are not helping enough adult smokers transition to less harmful alternatives quickly and efficiently enough.

04

Advancements in science and technology now allow us to offer adult smokers better alternatives to smoking cigarettes.

05

We offer a broad portfolio of high quality, scientifically supported NGPs. They demonstrate varying harm reduction potential, but our research suggests all are likely to be less harmful relative to cigarettes.

06

The THR equation demonstrates the importance of balancing individual risk reduction and product acceptance among current adult smokers who would otherwise continue to smoke.

07

We've modified the THR equation to consider recent public health concerns around NGPs acting as a potential 'gateway' to nicotine use and smoking for never smokers, vulnerable populations and youth.

08

As a responsible manufacturer, we scientifically substantiate the harm reduction potential of our NGPs using state-of-the-art assessment techniques while continually assessing our products to ensure they are of the highest quality in terms of manufacture, engineering and ingredients.

09

It's essential NGPs deliver nicotine in a similar way to cigarettes to help facilitate adult smoker transitioning. The popularity of vaping suggests replicating elements like the behaviours and ritual cues of smoking cigarettes are also important.

10

Something Better means something different. Flavours increase the chance of adult smokers transitioning from cigarettes to NGPs.

11

NGPs should only be targeted at - and only used by - adult smokers who would otherwise continue to smoke.

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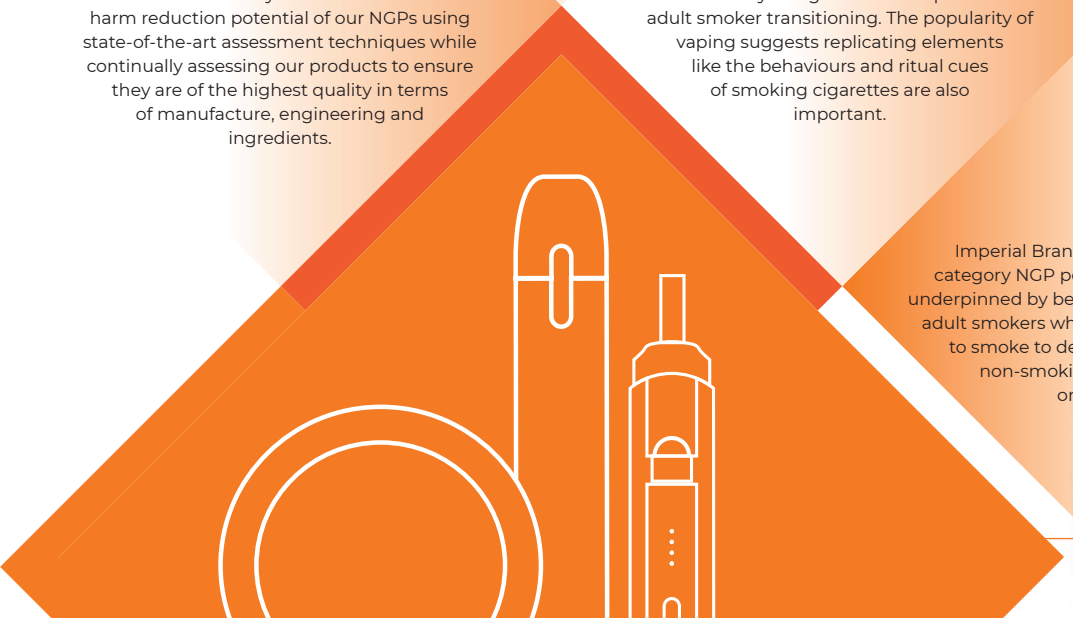

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