

The image features a purple background with a grid of white dots and lines. Various scientific and technical icons are scattered throughout, including a microscope, a test tube, a beaker, a chemical structure, a gear, and a circuit board. The letters 'BAT' are prominently displayed in the center in a white, outlined, sans-serif font. To the right of the letters is a white graphic of three curved lines. Dimension lines with arrows and labels 'x', 'y', and 'z' are overlaid on the scene, indicating measurements for the text and the graphic.

BAT

Science & Innovation Report

2020–2021

Contents

Our Journey	02
Welcome by Dr David O'Reilly	03
Tobacco Harm Reduction	05
Research Priorities	07
Response to COVID-19	10
Our Science	12
Science Engagement	12
Vapour Products	13
Tobacco Heating Products	19
Modern Oral Products	25
Bridging Science	28
COVID-19	31
Vaccine Development	31
New Capabilities	33
New Sciences	33
Organigram Collaboration	36
Battery Lab	39
Sensory Science	41
People & Community	43
Diversity & Inclusion	43
Women in STEM	45
New Talent	48
International Opportunities	51
Community Relationships	54
Look to the Future	56
Summary by Dr David O'Reilly	56
References	59



Welcome by Dr David O'Reilly

Inspired by people

Powered by science

Delivered by BAT

Science is the driving force of today's society and scientists are forever pushing at the boundaries to discover solutions that will transform all of our lives. The pandemic showed us that science has never been more important to the way we live, work, and function. It protects us in ways that we sometimes overlook which is why, across the world, the work of scientists is being studied and celebrated with increased excitement.

As a business, we are also at that scientific forefront, demonstrating a relentless commitment to our core purpose – to build A Better Tomorrow™ for our consumers, society, employees, and shareholders. Despite the challenges we have all faced in these past months, our team has continued to focus on how science can move us towards that purpose and we invest over £350 million each year in R&D.

Through our dedication to science and diverse skills we undertake a broad range of activities, such as running COVID-19 testing for some of the local NHS services near our R&D headquarters, to generating new evidence about our products. This is the evidence that helps us to scientifically substantiate their role in tobacco harm reduction and, we hope, encourage and enable current smokers to stop smoking combustible cigarettes and completely switch to a reduced-risk[†] alternative.

“ I hope this thought-provoking report inspires you as much as it does me, and that you will join us on this journey of innovation. ”

Dr David O'Reilly
Director Scientific Research



* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Welcome by Dr David O'Reilly

Our biotech subsidiary is also continuing its pioneering work on a candidate vaccine for COVID-19, which we hope can help play a role in fighting this global pandemic and its after-effects. It forms part of our small but emerging vaccines portfolio and sits alongside our candidate Quadrivalent Influenza Vaccine (QIV), which is in Phase I.

In 2020, we also announced our plans to go Beyond Nicotine, providing adult consumers with products to stimulate their senses. This coincided with the launch of our first CBD vaping product.

This report outlines some of the major achievements BAT has delivered through science and innovation. By reflecting on them, we can better understand our future and share how we are moving into a bold new era of consumer products, cutting-edge science and next-level digital capabilities.

We are committed to making a step change in our New Category products performance and in our sustainability ambition. Reducing the health impact of our business is our principal focus and we are also committed to helping address climate change and protecting the environment.

We set ourselves a number of stretching targets that we are confident we can deliver and which will accelerate our purpose to deliver A Better Tomorrow™ for all our stakeholders, including:

2025

Eliminating unnecessary single-use plastic packaging and making all plastic packaging reusable, recyclable, or compostable by 2025

2030

Increasing our consumers of non-combustible products to 50 million by 2030

2030

Achieving carbon neutrality by 2030¹

“ This is just the start, as I know we want to deliver more transformative benefits, proving how relentless we are in our pursuit of excellence, and our commitment to ground-breaking science. ”

Do Lilly



¹ Based on Scope 1 and 2 carbon dioxide equivalent (CO₂e) emissions.

Tobacco Harm Reduction

A clear purpose that drives our research and innovation

Our purpose is to build A Better Tomorrow™ by reducing the health impact of our business. It's why we invest almost £350 million a year to find innovative new ways to contribute to Tobacco Harm Reduction, and aim to have 50 million consumers of our non-combustible products by 2030.

Our unique strategy is designed to capitalise on our vast innovation expertise, emerging evidence, and range of products, so they can be accessed by adult consumers and other interested stakeholders, such as scientists, investors, and public health bodies.

Firstly, we are committed to providing adult consumers with a wide range of enjoyable and less risky[†] products. Secondly, we make it clear that combustible cigarettes pose serious health risks. And, thirdly, we encourage those smokers who would otherwise continue to smoke, to switch completely to scientifically-substantiated, reduced-risk[†] alternatives.

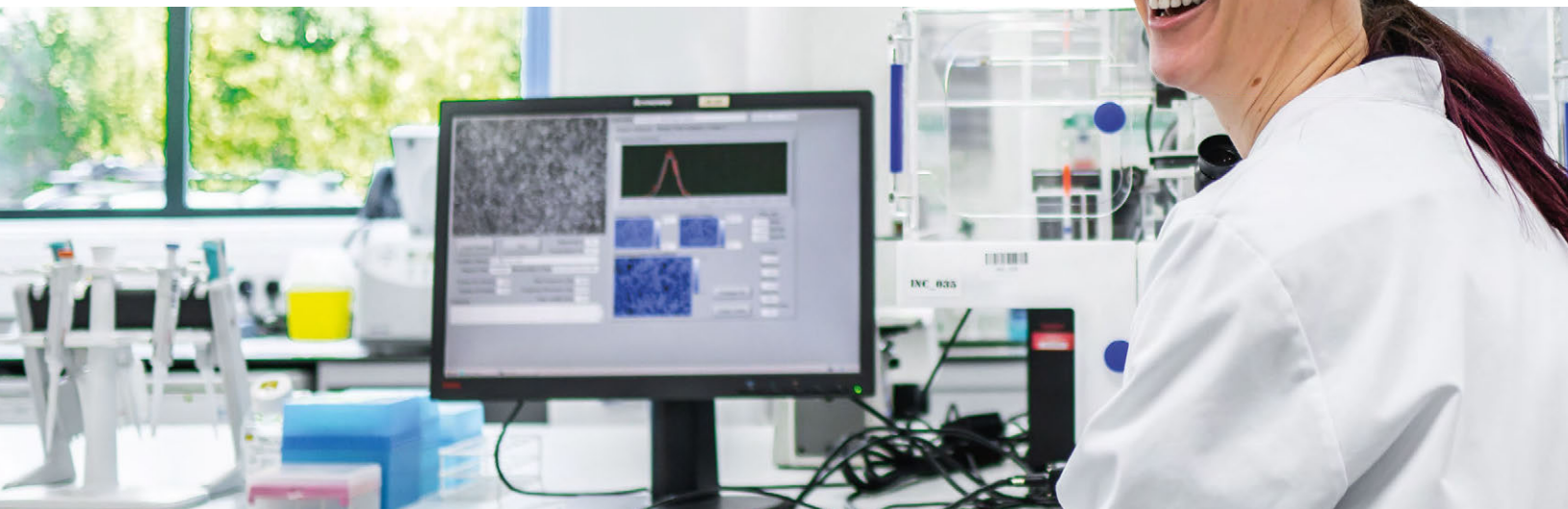
To further consumer choice, we have three New Categories – Vapour Products, Tobacco Heating Products and Modern Oral Products. All adhere to strict product quality standards, undergoing thousands of hours of testing before they reach the consumer.

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

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“ Our world-class and transparent science means consumers can understand and trust in the performance, quality and harm reduction potential of our products. ”

Dr David O'Reilly
Director, Scientific Research



Tobacco Harm Reduction

The scientific evidence



Vapour Products

There is growing consensus among many members of the public health community and academics about the role of vapour products as a reduced-risk[†] alternative to smoking. This is supported by a wealth of other evidence reviews, studies and reports throughout the world¹.

In the UK, for example, Public Health England has published a series of expert reviews of the latest evidence, drawing on peer-reviewed literature, surveys and other reports, concluding: “based on current knowledge, vaping is at least 95% less harmful than smoking”.



Tobacco Heating Products (THPs)

By heating tobacco rather than burning, THPs have the potential to be reduced risk* compared to smoking. Although most research has been conducted by the industry, an increasing number of independent reports are broadly aligned with our findings and support the role of THPs as a less risky[†] alternative.

And, in 2018, Public Health England, while highlighting the need for more research, found that “compared with cigarettes, heated tobacco products are likely to expose users and bystanders to lower levels of particulate matter, and harmful and potentially harmful compounds³.”

For example, a study commissioned by the UK Department of Health in 2017 found that people using THPs were exposed to around 50–90% less of the “harmful and potentially harmful” compounds compared with conventional cigarettes².

More long-term studies are needed which is why we launched our year-long clinical study to evaluate the reduced-risk potential of glo, our flagship THP. The six-month data show that smokers who switched exclusively to glo significantly reduced their exposure to some of the most harmful cigarette smoke toxicants, some to a level found in participants who had stopped smoking entirely⁴.



Modern Oral Products

A wealth of epidemiological evidence from Sweden over many decades shows that use of snus, a type of traditional oral tobacco, is substantially less risky than smoking. This has been confirmed by the US FDA which, in 2019, formally recognised that switching completely from cigarettes to a snus product can lower the risks of mouth cancer, heart disease, lung cancer, stroke, emphysema and chronic bronchitis⁵.

Our own research has shown that our Modern Oral Products have even fewer and lower levels of toxicants than observed in snus, and toxicological studies have shown that modern oral products have even lower impact on human cells than snus⁶.** We are confident that further research will support our belief that consumers of modern oral products will be exposed to even fewer toxicants than snus users and modern oral products can be expected to present lower risk than continued cigarette smoking.

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

**Comparison based on an assessment of smoke from a scientific standard reference cigarette (approximately 9 mg tar) and components released during use of a commercial snus (tobacco) pouch and a Velo (nicotine) pouch, in terms of the average of the nine harmful components WHO recommends to reduce in cigarette smoke.

Research Priorities

Our risk

assessment framework

We never stand still. We are always innovating, experimenting, and delivering new solutions. This is why our Research and Development is becoming even more important to the business, accelerating its pioneering approaches to scientific innovation.

Developing new products requires not just great skill, insights and expertise but commitment too. This commitment is particularly strong when it comes to our ability to develop effective next-generation products that can offer consumers enjoyable and less risky^{*†} alternatives to smoking.

Our mission to reduce tobacco harm continues to be at the core of our business. That is why our R&D teams are central to achieving our ambitions of reducing the health impact of our business.

Today, we operate in a broad spectrum of scientific fields including molecular biology, toxicology and chemistry, and it is that breadth of expertise which fuels the relentless innovation and learning that sets us apart as an industry leader.

Our scientists are constantly embracing new technologies, methodologies and consumer trends to push further at the scientific boundaries. Their robust and peer-reviewed science ensures that our reduced-risk products^{**†} (RRPs) provide greater choice to our consumers.

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Research Priorities

1,500

R&D specialists globally

Globally, we have more than 1,500 R&D specialists, many of whom are focused on research and development of New Category products. Our main R&D hub is based in Southampton in the

UK and is supported by R&D teams across the world. We use a wide range of analytical techniques, specialised laboratory technology and expertise to test our products and ensure they meet high quality standards. This is supplemented by collaborations with global external researchers who bring independent and specialist expertise and knowledge that augments and enhances our internal capabilities.

Assessment

Most of the harm associated with conventional cigarettes is caused by the toxicants in the smoke produced by the burning of tobacco. We are dedicated to the development and commercialisation of alternative tobacco and nicotine products that don't burn tobacco.

Our portfolio of non-combustible RRP^s* comprises three categories of products:

- Vapour products
- Tobacco Heating Products (THPs)
- Modern Oral Products, including tobacco-free nicotine pouches, and traditional oral products, including moist snuff and snus

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

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Our risk framework

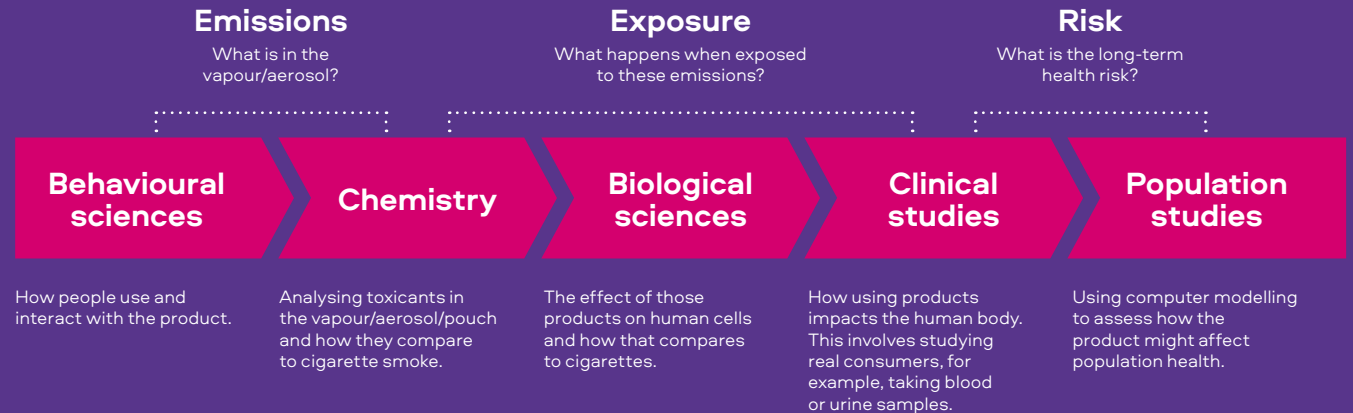
We use our own peer-reviewed scientific assessment framework to assess emissions, exposure and risk of our products, when compared to smoking cigarettes.

As part of this, our unique framework builds a comprehensive set of scientific evidence and a more holistic picture of our products. These stages are:

Our commitment

Our commitment goes beyond simply conducting the science, we believe it is as important to share it with the wider scientific community, which is why we publish details of our scientific research on Bat-Science.com and submit the results of our research to peer-reviewed scientific journals, irrespective of the findings.

To-date, we have published more than 110 papers and manuscripts. These include a series for Vype/Muse ePen – the most comprehensive dossier of scientific data published on a single vapour product to-date – as well as numerous papers on our flagship THP glo. We also contribute to debates around tobacco harm reduction at conferences and in publications and reports.



Our People

Jenni Hawke



Senior Scientist
New Sciences

Understanding our consumers is key

I'm passionate about science and my speciality of biomedical and biochemistry. I find my work fascinating – it's about people as much as concepts and exploring the science between consumer behaviour and products.

We have the opportunity to explore different fields and learn new approaches and techniques. Because as we grow, so does the company. This is why I moved into sensory science and then progressed to the New Sciences department. It gave me the opportunity to understand how people interact with and experience our products.

Often, people think of science as being a very rigid, academic, and cold process in which you move from one stage to the next in an ordered and predictable manner. But our science here – though still highly regimented and methodical – is innovative and we're encouraged to ask difficult questions in the hope of uncovering impactful solutions.

That's what our Beyond Nicotine and A Better Tomorrow™ landscape means. What we do in R&D allows the business to make better informed decisions. And I know that the science I do leads to something down the line – a product, a new business model, a step towards something new.

It's a great responsibility and a huge thrill to be so integral to the entire identity of a company – theorising, studying, analysing, perfecting and producing new pipelines.



Response to COVID-19

Fighting the battle against the COVID-19 virus

The way in which our company and employees responded to the health and wellbeing challenges created by the COVID-19 pandemic showcased the very best of what BAT represents.

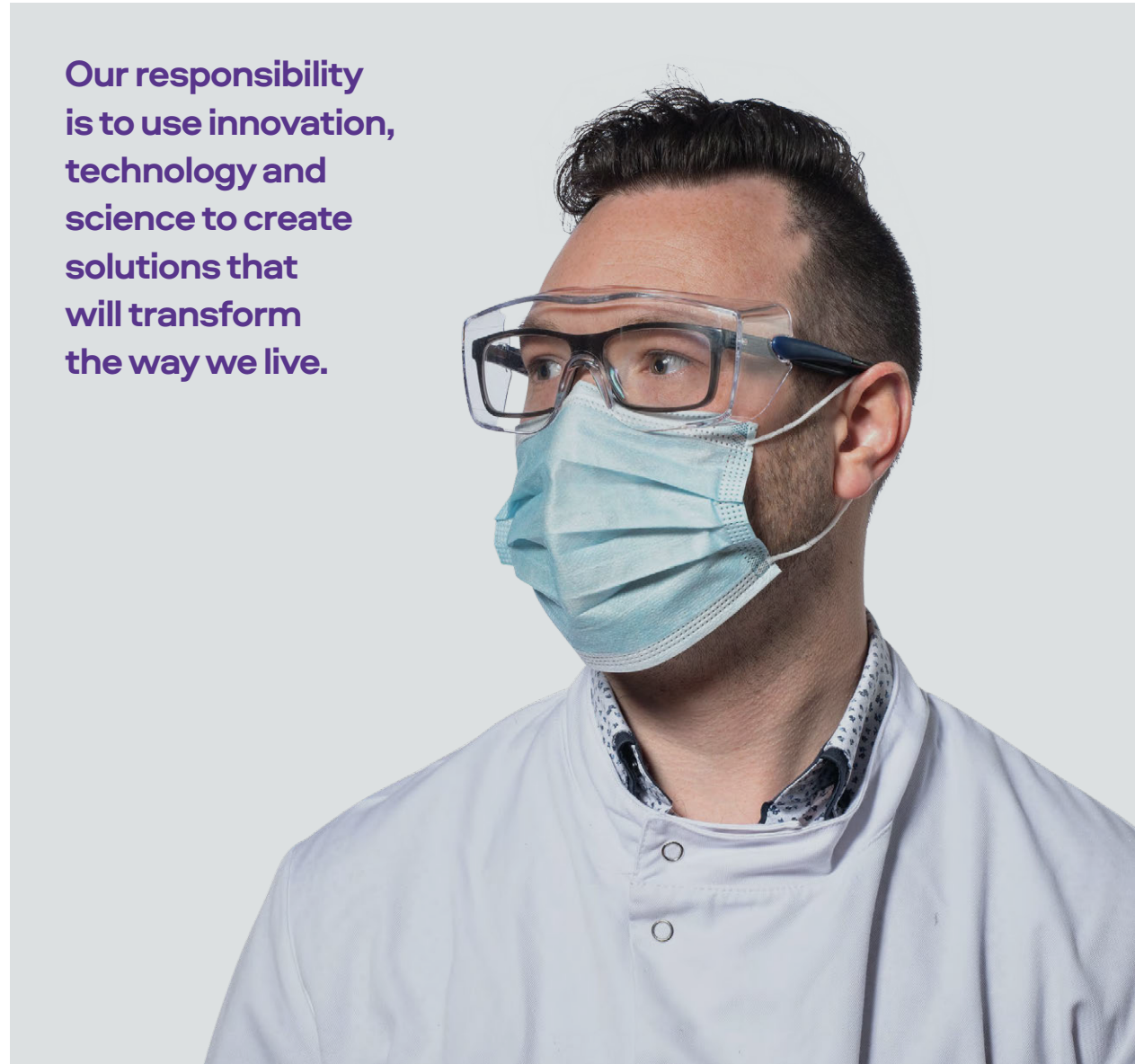
Our ability to act at speed – with a determined, collaborative work ethic, providing assistance to those in need, including our own staff, and ensuring that teams responded strategically throughout our global markets – set us apart during these difficult times.

Those responses go to the heart of what it means to create A Better Tomorrow™ for our consumers, employees, shareholders, and society.

Our responsibility is to use innovation, technology, and science to create solutions that will transform the way we live – which is why responding to COVID-19 was a priority.

Whether it is our effort to develop a potential vaccine candidate, using our 3D printers to make face shields for the NHS or loaning our specialist equipment to government testing centres in the UK, we continue to play an active role in the fight against the virus.

Our responsibility is to use innovation, technology and science to create solutions that will transform the way we live.



Response to COVID-19



We set up a COVID-19 testing laboratory at our R&D site in Southampton, UK

Local and national testing

In the early stages of the pandemic, we joined the COVID-19 Volunteer Testing Network to offer testing to frontline key workers based in the vicinity of our R&D centre in Southampton, UK. We set up a dedicated COVID-19 testing laboratory in less than 10 weeks and provided regular testing of staff at six local GP surgeries, an NHS dental practice, a hospice and a home care service.

We provided their staff with two tests per week and delivered results within 24 hours. Our biology team performed more than 3,500 COVID-19 swab tests.

We loaned the UK Government equipment from our R&D laboratory for use in COVID-19 testing centres and donated funds to secure the manufacture of 25,000 protective face shields. We also donated funds to local charities in Southampton to support the important work they are doing during this pandemic.

We set up a dedicated COVID-19 testing laboratory in less than 10 weeks and provided regular testing of staff at six local GP surgeries, an NHS dental practice, a hospice and a home care service.

Keeping our people safe and our business running efficiently

The health, safety and wellbeing of our people have been the top priority throughout the crisis. BAT's dedicated Crisis Management Teams (CMT) at a global, regional, and market level ensured we responded in effective, responsive, and agile ways. In addition, our strong digital infrastructure meant we have been more than able to manage the transition of our people working from home. We have also ensured that in our laboratories, which have remained open throughout, we had stringent practices in place to protect any employee coming on to a site. This enabled them to continue the research that needed to be conducted in the lab in a safe and secure environment. Our senior leadership teams were instrumental in making that happen, providing constant support, regular mentoring, and focused guidance on achievable work priorities.

In addition, in July 2020, we held a virtual 24-hour 'Stronger Together' event for our 55,000 colleagues around the world. We wanted to thank them for their extraordinary resilience throughout the COVID-19 pandemic and give them time to reconnect with colleagues in a relaxed and social setting in multiple time zones.

3,500

Amount of COVID-19 swab tests performed by our biology team

25,000

Number of protective face shields funded by BAT

Science Engagement

Sharing our science

Better conversations inspire better choices

Collaboration within the scientific community is more essential than ever in a world impacted by COVID-19. The extraordinary speed with which the scientific community was able to develop new treatments and vaccines was, in part, due to forging new partnerships, sharing data, collaboration and working together in new and empowering ways.

And this goes to the heart of the BAT philosophy of building A Better Tomorrow™. If we are to transform our business model and ensure that our New Category products reduce the health impact of our business, our teams must be open and collaborative.

Our industry-leading science is shared across a number of platforms so it can be widely accessed across our teams and partners. The more engagement we can create, the more informed our partners, stakeholders and society-at-large will be.

Our dedicated Science Communications team is focused on driving awareness, understanding and engagement with BAT's science across multiple audiences. By being open and transparent with our data, we believe we can meaningfully contribute to the debate on Tobacco Harm Reduction.

We independently validate the science behind our New Category products through external peer review and have long recognised the value of exposing our research to robust and rigorous challenge from the scientific community, as well as other stakeholders.

Our world-leading R&D team has worked tirelessly to build awareness and confidence in the science that underpins our New Category products.

That is why we were the first tobacco company to allow external visitors to tour our R&D facilities in Southampton, UK. Since 2011, when we first developed our science exhibition centre – R&D Live – we have welcomed more than 3,500 visitors to our research hub, from academics to consumer advocates.

We were also the first in our industry to launch a dedicated science website, Bat-Science.com, to ensure our research results, latest data and peer-reviewed journal articles are accessible to interested stakeholders. In addition, it contains presentations that our chemists, toxicologists and other scientists have made at global conferences.

Such scientific engagement is more important than ever. By continuing to produce world-class science we can help shape the conversation. And by communicating our science in a clear, engaging and informative way, we give ourselves the best possible opportunity to build A Better Tomorrow™.



3,500

Visitors welcomed to our research hub

2011

Science exhibition centre, R&D Live, launched

Vapour Products

Where the transformation began

As a business, we are not only transforming ourselves – we are also a part of a societal transformation being driven by new habits, tastes, and behaviours. It is a transformation that our world-class scientists, innovators and technologists understand. They are building on a heritage that has seen us become one of the most dynamic companies in terms of changing our portfolio and transforming our business. It is work that is being constantly adapted, refined, and perfected.



Vapour Products

5.7%

Adults in the UK who regularly vape

14.1%

Adult smokers in the UK in 2019



Vuse ePod

BAT is determined to be at the forefront of the way reduced risk products^{††} are developed. Our vapour products are already playing a major role in providing smokers with an alternative to cigarettes and that trend for switching from cigarettes to vaping products is accelerating. So, we are making even greater investments to ensure we can satisfy this growing interest, developing new innovations and pushing the technological boundaries to deliver for our adult consumers.

Organisations, such as Public Health England (PHE), are clear that vaping is likely to be much less risky than smoking traditional cigarettes when used as a complete substitute for continued cigarette smoking^{1,2}. According to the UK's Office for National Statistics (ONS), smoking levels among adults have dropped from 20% in 2010 to 14.1% in 2019, which means that the UK now has one of the lowest smoking incidences in Europe. Meanwhile, in 2019, 5.7% of adults were regular vapers³.

For those who would otherwise continue to smoke, completely switching to vaping, while not risk free, can reduce the risk associated with developing a smoking related disease. That is why we are continually innovating to offer consumers more choice, greater satisfaction, and improved features.

Vapour products

Vapour products are battery-powered devices that heat e-liquid to produce an inhalable aerosol, commonly known as vapour. Although e-liquid usually contains nicotine originally derived from tobacco, there is no tobacco in vapour products. The atomiser – the part that produces the vapour – typically consists of a tiny electric heater

For those who would otherwise continue to smoke, completely switching to vaping, while not risk free, can reduce the risk associated with developing a smoking related disease.

combined with a wick made from absorbent materials such as glass fibre, cotton or ceramic. E-liquid is drawn into the wick from a reservoir or tank and is then heated to form a vapour when the consumer puffs on the product.

Vapour products can be classified into either open or closed systems. Open systems offer a customised vaping experience – using a refillable tank, consumers are free to use a wide range of e-liquids. Many open systems also allow consumers to mix and match different atomisers, batteries, and power settings.

Closed systems work with disposable cartridges pre-filled with e-liquid, offering greater convenience for the consumer, and since the consumable and hardware are designed to work specifically together, the resulting optimised system can maximise performance and experience for the consumer. BAT's market-leading products within this format include the Vuse ePod and Vuse ePen3 – which are convenient, easy to use, and able to deliver high levels of quality and safety by ensuring the e-liquid is optimised and fully tested with the intended device.



BAT's latest vapour product, Vuse ePod2

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

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Vapour Products

Designed with purpose

The more popular vapour products have become, the more design-led the new products need to be, creating more ergonomically-pleasing shapes. Vuse is no exception to this with our dedicated team of in-house designers continuing to delight consumers with the recent ePod2 design upgrade.

Our commitment to fundamental science and precision engineering ensures BAT's vaping products are designed to address the common problems seen in many other products – such as dry-wicking, caused by a lack of e-liquid reaching the heater, leading to overheating and an unpleasant aftertaste.

Superior innovations Pure Tech

We have developed a game-changing alternative to the coil-and-wick system called Pure Tech. This uses an ultra-slim micro-engineered stainless-steel distiller plate that acts as both the heater and wick, optimising the aerosol process so that there is less risk of thermal breakdown in products. Laboratory tests show that Pure Tech vapour contains around 99% fewer and lower levels of certain toxicants compared to cigarette smoke⁴. Results from biological tests show that cells exposed to vapour from a Pure Tech device exhibit much lower responses or no response at all compared to cigarette smoke, strongly suggesting this technology can contribute to the reduced risk profile of our vapour products⁵.

99%

Fewer and lower levels of certain toxicants in Pure Tech vapour compared to cigarette smoke*

80

Chemistry tests carried out on our Vuse vapour products

Our vapour products undergo thousands of hours of testing before they reach our consumers

* These products are not risk free and are addictive.



Vapour Products

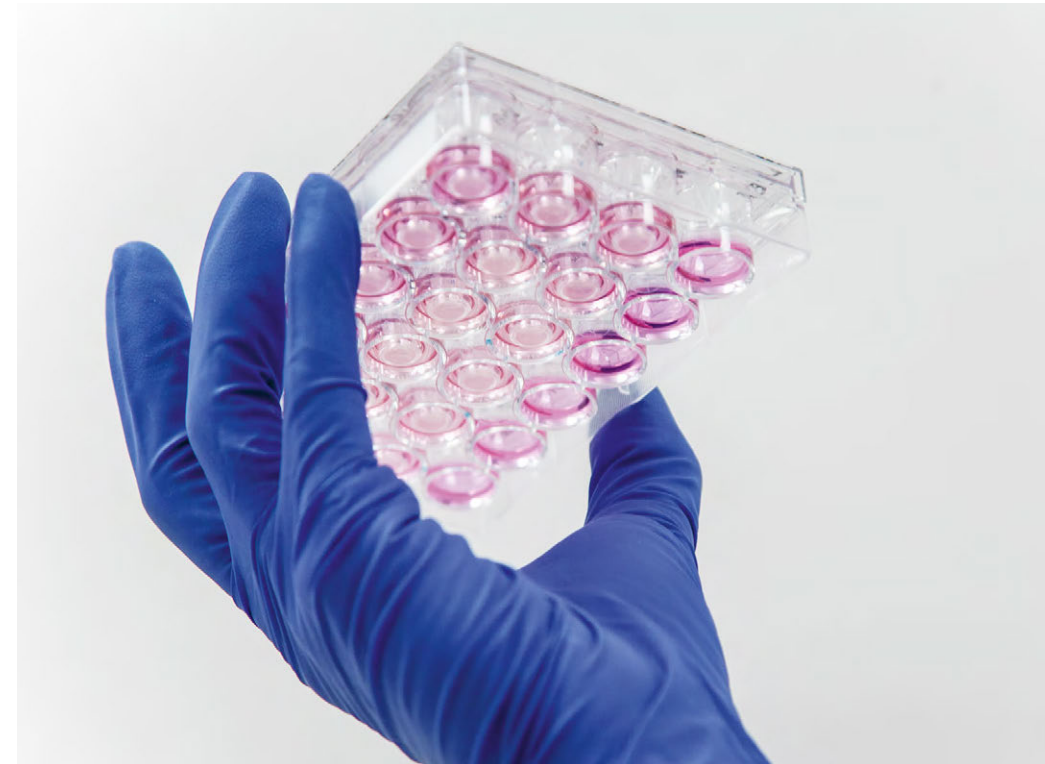
E-liquids – nicotine salts

Nicotine salts occur naturally in tobacco when nicotine reacts with tobacco acids. Consequently, the burning of tobacco and the aerosolisation of nicotine salts is part of the cigarette smoking experience. In an effort to make vaping more acceptable to cigarette smokers, our scientists are constantly experimenting to try to replicate the smoking experience, but without the high levels of toxicants created by combustion. Our application of nicotine salts in Vuse vPro liquids and our continued research into optimisation of those formulations is part of a continued R&D effort to make vaping more acceptable to smokers⁶.

Flavour technologies

Flavour is a key driver of vapour product satisfaction for both existing vapers and smokers entering the category. To deliver the most authentic tobacco experience possible we have pioneered the use of biomimetic technology in our e-liquids, analysing the volatile components associated with the aroma of cured leaf and synthetically copying that flavour into an e-liquid. More recently we have expanded the use of this technique into replicating the aroma profiles of naturally sourced mints with the aim of offering our consumers an unrivalled portfolio of authentic, differentiated mint flavours.

Our responsibility is to always carefully and thoroughly evaluate, understand, and mitigate potential risks associated with our products through a comprehensive, evidence generation plan.



Our vapour devices and e-liquids are designed to work together to maximise performance

Vapour Products

We use a peer-reviewed risk assessment framework to test our products



Evolving regulation

Regulation of vapour products is still developing and can vary according to jurisdiction. More comprehensive, evidence-based oversight of this rapidly evolving sector is needed. BAT's scientists are generating good quality science to inform and enrich the dialogue.

The importance of robust, evidence-based regulation is highlighted by recent vaping incidents in the US. These were investigated by the US Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) which suggested the problem – officially called “e-cigarette or vaping use-associated lung injury” (EVALI) – arose due to the effects of illicit e-liquids containing tetrahydrocannabinol (THC; the main psychoactive substance in cannabis) and/or the additive vitamin E acetate.⁷

Despite these events, the weight of evidence shows that, while addictive and not risk free, vaping carries a fraction of the risk of smoking, and that smokers should consider switching completely to vaping if they are otherwise going to continue smoking. The US episode highlights the potential hazards of e-liquids that contain untested ingredients. Our responsibility is to always carefully and thoroughly evaluate, understand, and mitigate potential risks associated with our products through a comprehensive, evidence generation plan. This is why we want to work with public health authorities to educate consumers in the potential risks and advantages of vaping products.

Our stewardship

With consumer safety and satisfaction at the forefront of everything we do, product stewardship is paramount at BAT. Our multidisciplinary teams of scientists ensure our products meet high quality standards, whether that's the battery, device materials, e-liquid ingredients or vapour contents. We use a peer-reviewed risk assessment framework to analyse how existing adult consumers use vapour products, what is in the vapour, how the vapour impacts human cells in the lab, how the vapour affects the body in clinical studies, and what impact the products could have on the vaping adult population.

For example, we have conducted 27 behavioural tests using a puffing analyser to help us understand how existing adult vapers use vapour products, enabling us to produce vapour in as realistic and consistent a way as possible. We have also conducted over 80 chemistry tests to identify harmful or potentially harmful substances.

In addition, we have analysed how DNA might be affected by vapour through the use of 3D tissue models and concluded that our vapour products have little or no biological effect, whereas cells exposed to cigarette smoke exhibit many responses relevant to disease development.

We have also conducted clinical studies to help us understand the impact of our vapour products on consumers, monitoring participants' urine, blood and breath samples.⁸ Through these tests we showed that those who switched completely from smoking cigarettes to vaping reduced their exposure to all 14 of the biomarkers for harmful chemicals that were analysed in the study. In most cases, the reduction was comparable to the levels expected if they had quit smoking altogether.

As vapour products are relatively new and still being analysed in long-term epidemiological studies, we have developed a validated computer modelling approach to help predict the potential impact of our products at a population level. Early results indicate that Vuse/Vype ePen use is likely to help reduce cigarette smoking prevalence and/or to increase smokers' likelihood of switching to an alternative to smoking. There are also potential wider benefits, including lower exposure to bystanders and the environment.

It's this kind of rigorous approach to stewardship that has resulted in one of the world's most comprehensive set of published scientific results on a single vapour product and the development of vapour products with reduced risk potential that are considered by an increasing number of smokers as an important alternative to cigarettes.

Our People

Dr. James K Ebajemito



Scientist
Clinical Research

The more diverse your skills, the better your solutions

The culture at BAT inspires us to do great work because it encourages us to be bold, to see things in more diverse ways, to always think of how the science can help us find solutions and make decisions.

My speciality of neuroscience and clinical research has the capacity to drive change. The more we understand the behaviours and desires of global populations, the greater our ability to create less risky ways of meeting those desires.

I run clinical studies at BAT to assess the impact of our products on people and it's incredibly inspiring to work within a company that gives a scientist like me the flexibility to design new projects. And to be an essential element of a cross-functional collaboration that enables different viewpoints and disciplines to come together to solve issues in more innovative and creative ways. The more diversity of thought you can have, the better your solutions and – especially from our point of view – the better the product.

No matter your seniority within BAT – and I'm still climbing the ranks – you feel that you are a crucial piece of the puzzle here, and that you have something to offer.



Tobacco Heating Products

Extraordinary advances in our research

Innovation propels our ambition to build A Better Tomorrow™. Our world-leading scientific endeavours have contributed to the development of our Tobacco Heating Products (THPs) – devices that heat tobacco to generate an aerosol with an authentic tobacco taste.



Tobacco Heating Products



Our flagship THP, glo

This innovative product comprises two main functional parts. First, an electronic handheld device that contains a lithium-ion battery which powers a heating chamber. Second, a specially designed rod containing homogenised tobacco, called a Neostik, which is inserted into the device.

Everything has been designed so that nicotine and flavour are released through precision heating. The device is, in effect, a mini-oven designed to the highest specifications of thermophysical science.

The burning of a normal cigarette can reach over 900°C but the Neostik in our original glo device reaches around 245°C. This is sufficient to release nicotine, glycerol and flavourings via evaporation and distillation, but not high enough for combustion.

glo hyper heats tobacco without burning it

Our Tobacco Heating Products are extensively tested in our laboratories in Southampton, UK



900°C

A normal cigarette can reach over 900°C when tobacco burns. This combustion is responsible for many of the toxicants created



245°C

The Neostik in our original glo device reaches around 245°C



Tobacco Heating Products

200

Chemical tests conducted

75

Biological tests conducted

90–95%

The glo aerosol contains around 90–95% less toxicants than cigarette smoke



Because glo doesn't burn tobacco, there is no ash or burned smell and the Neostik remains intact after use. Moreover, its reduced risk potential is underscored by the fact that glo produces significantly lower concentrations of the toxic substances found in cigarette smoke¹. Smart electronics mean that the heating process continually extracts the best flavour from the Neostik.

Laboratory studies

So far, we have conducted almost 200 chemical and 75 biological tests on THPs which have shown that the toxic compounds produced by burning tobacco either can't be detected or are significantly reduced in glo products. While glo is not risk free and nicotine is addictive, the aerosol contains considerably fewer and lower levels of certain toxic substances compared to cigarette smoke, and has a significantly reduced impact in various toxicology tests².

Our month-long *in vitro* laboratory switching study exposed human cells to cigarette smoke and recorded the impact on inflammatory biological markers. We then made these cells 'quit smoking' by stopping their exposure to smoke. Remarkably, when we exposed the cells to glo emissions instead, we saw similar reductions in the levels of inflammatory biological markers as when the cells 'quit smoking' altogether, demonstrating glo's reduced-risk potential³.



Furthermore, our social consideration studies have shown that using glo causes minimal teeth, skin, cloth and wallpaper staining compared to cigarette smoke^{4,5}. And, owing to its enclosed design and lower operating temperatures, the tobacco stick doesn't smoulder between puffs so has negligible impact on surrounding air and other people in the vicinity⁶. In fact, when used indoors, glo produces less than 5% of the particulates associated with cigarettes and meets World Health Organization standards for outdoor air⁶.

Short-term clinical studies

To help us understand the impact of glo on the human body, we have also conducted 46 clinical tests. These involve monitoring hundreds of real consumers whilst they use our products, measuring chemicals in urine, blood and breath samples, and comparing them to those from smokers.

46

Clinical tests conducted

5%

When used indoors, glo produces less than 5% of the particulates associated with cigarette smoke



Tobacco Heating Products



Several short-term studies have shown that cigarette smokers who switch exclusively to glo for five days are exposed to substantially fewer cigarette smoke toxicants – in many cases to similar levels of exposure as smokers who quit entirely for the same period.* As consumers in different markets can vary in terms of both behaviour and genetic variability, we have carried out similar studies in both Japan⁷ and in the UK⁸.

Longer-term clinical studies

We are conducting our first year-long randomised study in the UK to see what impact switching entirely from cigarettes to glo in a real-world setting will have on markers of smoking-related disease development in the long term^{9,10}.

During the study, participants visit one of four clinics each month for samples of blood and urine and other physiological measurements, and to complete health-related questionnaires. Their blood is also tested for signs of exposure to cigarette smoke so that we can measure whether participants have complied with the trial protocol, which helps to ensure data analysis is more accurate.

The results from the 180-day timepoint have shown that switching completely to glo resulted in statistically significant changes across a range of biomarkers of exposure (BoE), and health indicators, known as biomarkers of potential harm (BoPH), compared

* glo is not risk free and is addictive.



to continuing to smoke¹¹. Based on the toxicants measured, glo users showed a significant reduction in a biomarker for lung cancer risk (NNAL), a significant reduction in white blood cell count, an inflammatory marker associated with cardiovascular disease (CVD), cancer, and chronic obstructive pulmonary disease (COPD), and reductions across other markers. This is the first real-world evidence that demonstrates the potential reduction in health risks from exclusive use of glo compared with smoking. Full results, which will inform our population modelling, are expected later in 2021.

“We designed this study to explore the potential of glo when used by people going about their every-day lives, so the importance of the results we have achieved cannot be underestimated”, says Nathan Gale, a senior clinical scientist who led the study. “To show a significant favourable change in all of these measures over a 6-month period provides further scientific substantiation of the harm reduction potential of glo and how it supports our ambition to build A Better Tomorrow™ by reducing the health impact of our business.”

The Japanese experience with THPs

Since launching in Japan in December 2016, glo products have helped reshape tobacco use there. By the end of 2019, around a quarter of Japanese tobacco users were using THPs and about half were using them exclusively – a remarkable consumer shift in such a short time¹².

“We designed this study to explore the potential of glo when used by people going about their every-day lives, so the importance of the results we have achieved cannot be underestimated.”

Nathan Gale
Senior Clinical Scientist



Tobacco Heating Products



This evidence comes from a cross-sectional survey in Japan to examine the impact that the availability of THPs there has had on tobacco and nicotine product use.

“With nicotine products regulated as pharmaceuticals and vaping products effectively banned, glo struck a perfect chord” says scientist Jason Adamson, who led a cross-sectional survey in Japan. “It is technologically easy to use and offers tobacco consumers a much more considerate way to use tobacco with no lit end and far less impact on surroundings.”

Indeed, users in the survey reported less teeth staining, bad breath, odour on clothes and in the home, and improvements in wheezing and coughing compared to when they smoked cigarettes. Furthermore, there is little evidence that THPs act as a gateway to cigarettes, suggesting that new and innovative products like glo can lead to a change in tobacco use behaviour without increasing the initiation rate of tobacco consumption in never and former smokers.

100+

R&D experts helped design and develop glo



Induction heating

Our new glo pro, hyper, and hyper+ models feature induction heating, which enables devices to reach their operating temperatures faster, making them more efficient and enjoyable for consumers to use.

The system also requires fewer components susceptible to temperature degradation, enabling the use of a wider range of temperatures but still substantially lower than temperatures needed for combustion. This helps to increase and unlock a broader range of sensory experiences.

By accurately controlling this more-powerful heating system, we can produce a much faster and more precise device that offers consumers more flexibility while still tightly controlling temperature and avoiding combustion.



Our People

Emma Cheung

Pre-Clinical Scientist
Biological Efficacy

Driving the Company into new areas

As biologists at BAT, we're expected to challenge the science, to ask uncomfortable questions, to develop new products that satisfy changing consumer tastes, to be at the cutting edge of biological science. And, with that work, we push the Company into new areas and help to develop new products.

On the face of it, our Biological Efficacy team is comprised of a group of biologists testing products on cell models. We have moved into understanding the entire consumer experience and how science can learn from that experience, contribute to it and, ultimately, offer consumers a choice of high-quality products.

Our work is about what impact we can have on the way the Company does business. If people are to have confidence in our products, then they need to understand the science – and that science needs to explore all facets of a product. It is why being a biologist here feels so important. We are given the opportunity to explore, test and measure, with the goal of building A Better Tomorrow™.



Modern Oral Products

Creating an alternative

future



Our scientists provide the inspiration and driving force behind our mission to develop some of the best alternative nicotine products on the market. We have a clear purpose to build A Better Tomorrow™ by reducing the health impact of our business. Among other things, this entails our commitment to providing adult consumers with a wide range of enjoyable and less risky*† products.

To meet evolving consumer preferences and desires, we need to continue to diversify our product line. This is why significant resources are being devoted to providing adult consumers with the new or improved innovations developed by our world-class teams.

5%

Sweden now has the lowest male smoking incidence in Europe, and oral products are widely used there

30+

Years of studies have shown snus is less risky than smoking

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Modern Oral Products

Smokeless products vs cigarettes

Our own studies into smokeless tobacco products (STPs) show that the toxicants present in STPs are at levels much lower than in cigarette smoke and that STPs, while addictive and not risk free, are likely to be less risky^{**} for consumers who switch completely.

External and internal evidence so far suggest that exclusive use of STPs instead of smoking cigarettes poses lower risks of smoking-related diseases¹. Moreover, many smokers find STPs to be a satisfying alternative to cigarette smoking.

Assessing harm reduction: Snus and the Swedish experience

The Swedish experience with snus is a useful case study of Tobacco Harm Reduction with epidemiological data that is relevant and we believe transferable to our increasingly popular oral products.

Snus is a traditional smokeless tobacco product that is placed between the lip and gums and held in the mouth for around 30 minutes, during which time it slowly releases nicotine; nothing is inhaled. It has been available in Sweden for 200 years, and, although popularity waned when cigarettes became available, it enjoyed a resurgence there in the 1970s. Although Sweden now has the highest consumption of smokeless tobacco per capita in the world, Swedish men have Europe's lowest death rate attributable to tobacco and the lowest incidence of lung cancer and other tobacco-related diseases of nearly every country in the developed world.

For example, in 2020, age-standardised lung cancer incidence for men was estimated to be 17.2 per 100,000 in Sweden compared to 35.2 per 100,000 in the UK. Oropharyngeal (throat) cancer incidence was 3.9 versus 4.1 per 100,000, respectively². Furthermore, Sweden now

has the lowest male smoking prevalence in Europe, with smoking prevalence of just 5% among Swedish men compared with the EU average of over 25%.

“Although smokeless does not mean harmless, the epidemiological evidence is irrefutable: Snus use is considerably less toxic than cigarette smoking and a less risky alternative for those who enjoy nicotine,” says Dr Aaron Williams, Group Head of Modified Risk Tobacco Product Science and Senior Vice President of Scientific & Regulatory Affairs, Designate.

Having studied the scientific evidence, the UK Royal College of Physicians has concluded that using nicotine-containing smokeless products is substantially less risky than smoking cigarettes³. In addition, it says they are not associated with respiratory diseases, such as lung cancer and chronic obstructive pulmonary disease, are less likely to cause cardiovascular disease, and could be used as part of an approach to reduce the projected harm caused by tobacco.

Modern Oral Products

Our aim is to reimagine the snus experience with a range of innovative products that are likely to have a broader appeal to smokers.

Our modern oral products (MOPs), under our Velo brand, are pouches which contain high purity nicotine, water and other high-quality ingredients, including cellulose fibres, flavouring and sweeteners. Consumers place the disposable pouch between their gum and upper lip, typically for around 30 minutes, during which nicotine and flavours are released and the nicotine is absorbed through the oral mucosa.



* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Modern Oral Products

“**Snus use is considerably less toxic than cigarette smoking and a less risky alternative for those who enjoy nicotine.**”

Dr Aaron Williams
Group Head of MRTTP Science, Senior Vice President of Scientific & Regulatory Affairs, Reynolds, Designate



In some countries, our MOPs include “white tobacco”, a major innovation in smokeless tobacco. A unique, environmentally friendly production process carefully refines brown tobacco, reducing the levels of heavy metals and other toxic constituents.

Recent Velo data

Laboratory chemical studies for Velo (without tobacco) show it produces even lower levels of toxicants than snus and substantially lower levels than cigarette smoke. Meanwhile, toxicology tests assessing the biological effects of Velo on human cells, compared to snus and cigarette, show it has little effect relative to snus and cigarettes^{4, 5}.

On the basis of our evidence and informed by the evidence regarding snus, switching completely to MOPs can be expected to reduce the risk of smoking-related disease when compared to continued smoking. That is why we are investing so much in refining and improving these innovative products. This is part of our commitment to providing adult consumers with a wide range of enjoyable and less risky[†] products.

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Our scientists continue to add to the evidence base to further support our range of Modern Oral Products



Bridging Science

How we apply our science to new product innovation



We use the innovative ‘bridging’ process to demonstrate if some of our most important science and evidence can be applied across a category of products.

Science is constantly emerging and evolving, so we must continue to undertake new research. This research is vital as we engineer improvements to our existing products and develop new products to meet consumer preferences. Bridging allows us to determine whether the robust historical scientific evidence regarding a specific product can be applied to a newer version of that product. We are applying this bridging approach to our evolving New Category portfolio of products – our vaping, tobacco heating and modern oral products.

Vapour products

Traditionally, epidemiological studies regarding the health risks associated with a product can take two or three decades. While long-term epidemiological studies are not yet available for vapour products, several public health bodies have studied the best available evidence regarding these products and have concluded that they are around 95% less harmful than conventional cigarettes^{1,2}.

This conclusion is generally consistent with our own large body of scientific evidence comparing the use of our vapour products to smoking cigarettes³. These data clearly show our vapour products, while addictive and not risk free, produce far fewer and lower levels of toxicants than cigarettes.[†] Based on the weight of evidence, the health risks associated with smoking can be expected to be reduced for those smokers that switch completely to a vapour product.

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Bridging Science

“By allowing bridging on a case-by-case basis for new versions of proposed reduced-risk products, regulators can be assured about their risk profile while ensuring they can be brought to market quickly.”

Dr Aaron Williams

Group Head of MRTP Science, Senior Vice President of Scientific & Regulatory Affairs, Reynolds, Designate

It can take as long as five years to complete comprehensive product testing by which time we could be working on the fifth or sixth generation of an original product.

The solution is bridging. With this approach, the attributes of a new product are shown to be at least equivalent to a previously approved one. In practice, when a brand-new product is developed, an entire set of assessment studies is produced. These tests will take years to complete and become our Reference Dataset. When an improved version of that same product is

developed – i.e. a new flavoured e-liquid or reshaped mouthpiece – we compare the impact of those changes on the Reference Dataset. As Aaron says: “We devise a set of tests to answer those questions and, if the new product performs the same or better as the original Reference Dataset in any areas, we can bridge those data. In other words, it is sufficient to use the findings from the original dossier rather than conducting those particular tests all over again.”

The bridging approach is common in pharmaceutical and other industries. The US Food and Drug Administration (FDA) has stated it will accept bridging data in Pre-Market Tobacco Product Applications (PMTA) for vapour product e-liquids. “By allowing bridging on a case-by-case basis for new versions of proposed reduced-risk products, regulators can be assured about their risk profile while ensuring they can be brought to market quickly,” says Aaron.

Tobacco Heating Products

Our tobacco heating products (THPs) are continually evolving thanks to advances in battery and heating technologies. We use the bridging process to determine whether the scientific data and evidence gathered on our early versions of the product can be applied to the newer editions.

Although most research has been conducted by the industry, an increasing number of independent reports are broadly aligned with our findings and support the role of THPs as an alternative to cigarettes. For example, a study commissioned by the UK Department of Health in 2017 found that people using THPs were exposed to around 50–90% less of the “harmful and

≤90%

The UK Department of Health found that people using THPs were exposed to up to 90% less harmful compounds compared with cigarettes.

potentially harmful” compounds compared with conventional cigarettes⁴.

More long-term studies are needed which is why we conducted our year-long clinical study to evaluate the reduced-risk potential of glo, our flagship THP.

Modern Oral Products

Our modern oral products (MOPs) are slightly different, as the bridging for them is based on epidemiological data provided by the ‘Swedish experience’ of snus, a traditional smokeless product that has been in use for over 200 years. During the early 20th century, snus fell out of favour in Sweden due to the popularity of cigarettes. This trend began to reverse in the late 1970s and today Swedish men have Europe’s lowest lung cancer prevalence/incidence and death rate attributable to tobacco. Aaron says: “Chemical and toxicological studies show that our modern oral products have even lower toxicity and would be expected to be even less harmful than snus when compared to cigarettes. As the usage pattern of these products is roughly the same as snus in terms of pouches per day, we have concluded that our modern oral products may have equivalent or be able to offer even greater reduction in risk relative to continued cigarette smoking.”



VUSE

Our People

Jesse Thissen



Statistician II
Data Sciences

We deliver the gold-standard that inspires better decisions

The data world in which I sit drives BAT's innovation because our rigorous methodologies assess which product or approach has the greatest efficacy. We see trends, changes, and growth opportunities at the earliest stages which makes my role within the organisation far more exciting than my title implies!

Anything data related that's for regulatory consumption or for publication comes through us but our group has also been heavily involved in predictive modelling.

So, for instance, we have assessed how many life years lost could be potentially avoided if cigarette smokers who would otherwise continue to smoke shifted to our less risky products, or we forecast emissions of our most innovative products.

BAT's decision-makers need the latest and most conclusive evidence if we're going to have the greatest impact on the market and serve our consumers more completely. Data is the gold-standard upon which we rely and it's also essential in presenting evidence-based materials to combat potential misinformation.

The more products we launch, the greater the responsibility of data teams such as mine to provide the evidence throughout the lifecycle of a product.



Vaccine Development

How we're using plants to develop medicines

Science and technology are often cited as the future of our business and some of the most exciting advances are already happening.

Our rapid response to the COVID-19 pandemic is just the latest example of how our in-house scientific expertise are helping build A Better Tomorrow™.

We are developing novel candidate vaccines using our unique plant-based technology. Through new methods for growing and extracting biopharmaceuticals from plants, we can potentially develop millions of doses

a week, perfectly suited to the current healthcare crisis, as well as rapid-response options for potential future pandemics.

Finding alternative uses for plants is down to the extraordinary scientific expertise at our Kentucky BioProcessing unit (KBP), which specialises in the production of plant-expressed proteins.



Vaccine Development

“Moving into human trials is a significant milestone. It is our unique plant-based vaccine technology, which acts as a fast, efficient host for the production of antigens for a variety of diseases, that has enabled us to make progress in our response to the urgent global need for safe and effective treatments and vaccines.”

Dr David O'Reilly
Director, Scientific Research

Potential advantages of our plant-based approach and platform technology

Tobacco is a model plant, which means the genomes of several varieties have been closely studied and sequenced. The plants grow rapidly, in a highly controlled indoor environment, and can function as bioreactors to produce high yields of biopharmaceuticals – at speed. Because there are no known human pathogens in these plants, protein contamination is unlikely. The vaccine system developed by KBP also has the

potential to be stable at room temperature, a significant advantage for healthcare systems and public health networks worldwide.

Developing a seasonal flu vaccine

We have been working on developing a seasonal flu vaccine for a number of years which is now in Phase I clinical trial. Using our proprietary, fast-growing plant-based technology, we have developed the ability to create doses in just weeks following identification of a pathogen. That means when new strains of flu are identified, our technology can be used to rapidly develop an antigen that is targeted towards that particular strain(s), potentially shortening the time from identification to production to allow for a more accurate characterisation of the forthcoming flu variant(s).

The fight against COVID-19

Our plant-based expertise came to the fore at the outbreak of SARS-CoV-2. Immediately, we identified the potential role for a plant-based vaccine and, using the published SARS-CoV-2 sequence, started to develop an antigen that could be used in pre-clinical and possibly into human studies. In pre-clinical studies, our scientists were able to show an immune response was stimulated after a single dose of our vaccine candidate, together with a boost response after a second dose. Based on these data and following approval of our Investigational New Drug application by the FDA, we have progressed into Phase I clinical trials to assess the safety and efficacy

in healthy volunteers. If the clinical trials are successful, we aim to progress into a Phase II study, subject to regulatory approval.

To make the antigen for our candidate vaccine, our scientists copied a portion of the genetic sequence of the coronavirus protein (SARS-CoV-2) – this is the substance which induces an immune response in the body and the production of antibodies. This sequence is then inserted into the plants for rapid multiplication. Once the plants are harvested, the antigen is then purified, chemically attached to a tobacco mosaic virus (TMV) scaffold and formulated into the final vaccine.

Dr David O'Reilly, Director, Scientific Research, said: “Moving into human trials is a significant milestone. It is our unique plant-based vaccine technology, which acts as a fast, efficient host for the production of antigens for a variety of diseases, that has enabled us to make progress in our response to the urgent global need for safe and effective treatments and vaccines.”

Tackling Ebola

BAT acquired KBP in 2014, and the company had already started working on a monoclonal antibody treatment for Ebola. In 2014/15, working with the California-based company Mapp BioPharmaceuticals, in partnership with the U.S. Biomedical Advanced Research and Development Authority (BARDA), we produced the only source of the Ebola treatment, ZMAPP™, using similar plant-based technology. ZMAPP™ has since been used as part of the global response to ongoing outbreaks of Ebola.

New Sciences

With our industry evolving so radically, we must successfully predict and identify future trends and disruptors. Developing these into rock-solid and worthwhile applications enables the delivery of A Better Tomorrow™ for consumers and creates a more sustainable business.

The New Sciences unit is at the cutting edge of consumer innovation, enabling BAT to predict and prepare for the future before others do. It also enables us to identify new opportunities and approaches Beyond Nicotine, providing the Company with foresight and inspiration. We are already a leader in new technologies, but with the market developing at such a rapid pace and with new innovations constantly being launched, we need to remain agile, competitive and smart. That is just part of the reason why we continue to invest in New Sciences and R&D, to expand or strengthen our portfolio and fuel our evolution into new and emerging areas.

“Our aim is to identify what potential consumers want, determine what barriers exist in meeting those desires and work out how we can overcome them with innovative solutions that also fit with our company commitments to sustainability and reducing the health impact of the business,” explains Dr Sharon Goodall, Group Head of New Sciences, and Group Head of Modified Risk Tobacco Product Science, Designate. “We incubate ideas to see if they make sense, turning a desire into an opportunity, assessing its viability, and going for it when the time is just right.”

How ‘New Sciences’ are shaping the future



New Sciences

“ We incubate ideas to see if they make sense, turning a desire into an opportunity, assessing its viability, and going for it when the time is just right. ”

Dr Sharon Goodall
Group Head of New Sciences



Understanding consumers

Our success revolves around understanding consumers better than our competitors. Using and adapting complex sets of data, insight capabilities, delving deeper into behaviours and preferences and integrating those into our early R&D.

For instance, we can build a more complete model of moods, behaviours, and rituals by combining contextual information with biometric data sets that map a number of responses. We utilise a complex ecosystem of technologies and approaches to map usage of our products, always seeking to improve consumer experience through better research.



Beyond Nicotine

Personalised wellbeing is one of our most exciting new projects, exploring how compounds, such as caffeine or cannabidiol (CBD) may provide a new sensory experience.

BAT's New Sciences team is rigorously investigating how different compounds might deliver on the promise of A Better Tomorrow™ – right down to the molecular level – to fully understand how we can provide a greater choice of enjoyable products. “Although enormously complex, it is crucial that everything we do in new product development is underpinned by rigorous science,” says Sharon. “Consumers will only choose new products that deliver pleasurable sensorial effects, which means focusing on quality and fulfilling our duty of care, not launching gimmicks.”



Plant biotechnology

Our biotechnology experts are using knowledge of plant and systems genetics to identify potential ways of enhancing the consumer experience. For instance, how different kinds of hemp or tobacco yields and crops could create different types of product through bioengineering. The aim is to control, through breeding, the compound production in a particular plant, ensuring a consistent yield that is right for the product.

New Sciences



Diversity is key

For the New Sciences team to help BAT grow its business and develop valuable new products, diversity of thought and approach is essential, especially with the evolving regulatory landscape. The more diverse the thinking we can harness, the more likely it is that we will develop solutions at speed, understanding trends, behaviours and desires in more complete ways.

A single product might require expert agricultural skills alongside electronic and electrical design engineering, behavioural science, heating technology, inhalation science, integrated electronics, new materials and fluid dynamics. As we develop our strategies for new categories, neuropharmacologists and cognitive behaviour scientists join with our chemists, molecular biologists and engineers to find solutions.

Ultimately, New Sciences could provide an important, science-based advantage in a fast-moving industry, which is constantly adapting and iterating, learning how to develop approaches and products in a better way. Always pushing the boundaries to ensure we remain both forward-thinking and directly in tune with our customers' ever-changing desires.



The more diverse the thinking we can harness, the more likely it is that we will develop solutions at speed, understanding trends, behaviours and desires in more complete ways.



Organigram Collaboration

Forming world-class collaborations



This year BAT took a significant step forward in the expansion of our Beyond Nicotine ambition by forming a strategic R&D collaboration with Canadian firm, Organigram. The deal, announced in March 2021, is focused on research and product development of next generation adult cannabis products, with a near-term focus on cannabidiol (CBD).

Organigram has a proven track record of consumer-led innovation and developing high quality adult-use recreational and medical cannabis products, which are legally available in Canada. By leveraging Organigram's first-hand experience, BAT aims to deepen its understanding of this rapidly expanding and evolving area.

"This announcement underscores our commitment to accelerating our transformation and building A Better Tomorrow," says Dr David O'Reilly, Director Scientific Research. "Our multi-category, consumer-centric approach, which is key to our transformation, aims to provide choice and meet the evolving needs of adult consumers. This choice includes going beyond tobacco and nicotine into new and exciting areas of product innovation."

Organigram Collaboration

“We believe this collaboration has significant potential to enhance our Beyond Nicotine ambition, allowing us to combine our world-class expertise while enabling scientists from both BAT and Organigram to work closely together and share information real-time.”

Dr David O'Reilly
Director Scientific Research

“We believe this collaboration has significant potential to enhance our Beyond Nicotine ambition, allowing us to combine our world-class expertise while enabling scientists from both BAT and Organigram to work closely together and share information real-time. We know that in R&D this is how you make real breakthroughs and accelerate progress.”

Through the collaboration, BAT will gain access to cutting-edge R&D technologies, product innovation and cannabis expertise, complementing our extensive plant-based expertise and development capabilities.

A Centre of Excellence is being established at Organigram's facility in New Brunswick, Canada. Both BAT and Organigram will contribute scientists, researchers, and product developers to work together to develop technologies, IP and know-how for use in new, potentially disruptive products. As part of the deal, BAT became the largest shareholder in Organigram, having acquired a 19.9% equity stake in the business.

Our collaboration with Organigram will accelerate our ambition to go Beyond Nicotine. It builds upon the pilot launch of our first CBD vaping product, Vuse CBD Zone, which is taking place in Manchester, UK, from January 2021. This latest innovation allowed us, for the first time, to offer adult consumers a range of high-quality CBD vaping products from our trusted, global brand, Vuse.

This new range, currently available in three e-liquid flavours: mint, mango, and berry; and two strengths – 50mg and 100mg, offers adult consumers sensorial enjoyment, as Vuse CBD Zone caters to a variety of moods and moments in busy lifestyles.

It has been developed using the company's global vaping expertise, world-class science, product stewardship, and robust supply chain sourcing. It reflects our ambition to explore and broaden our portfolio Beyond Nicotine as we continue to drive a step-change in our New Categories business.

BAT is the first truly global vaping company to launch a CBD vaping product, and this new entry into the exciting and growing CBD category shows continued progress in our ongoing A Better Tomorrow™ transformation journey.



ORGANIGRAM

Our People

Carlista Moore Condé



Group Head

Designate, New Sciences

We have a chance to disrupt the business – and to do so at speed

With over 22 years as a consumer packaged goods leader who's lived on three continents, I know the value of leading disruption vs. being a victim of it. What's most thrilling for me is that New Sciences is at the forefront of our transformation into a consumer-centric, multi-category company. Our Beyond Nicotine ambition is not just about expanding our portfolio, it is a core component of realising our A Better Tomorrow™ purpose.

Within BAT, we have been building the core scientific foundations for our Beyond Nicotine portfolio for many years. We already possess extensive expertise in plant and bio-sciences and understand the effects of many organic compounds

on human physiology, which form the basis for our understanding and expertise in this category. Now, as we build upon these strong foundations and accelerate new scientific and research outcomes, we realise that we are far better positioned to win in the Beyond Nicotine space than anyone probably imagined. We quickly transitioned from learning to delivering actionable insights at an incredible pace.

However, we know, that because our work is unique and novel, we must be forward-looking – in our thinking, methods, and approaches, and continue to be guided by our purpose of delivering A Better Tomorrow™. Our success and ability to deliver delightful next generation product and brand experiences depend on it. This is a challenge that the New Sciences function has accepted and is very excited about. We're doing things differently, disrupting the business and doing so at speed.



Battery Lab

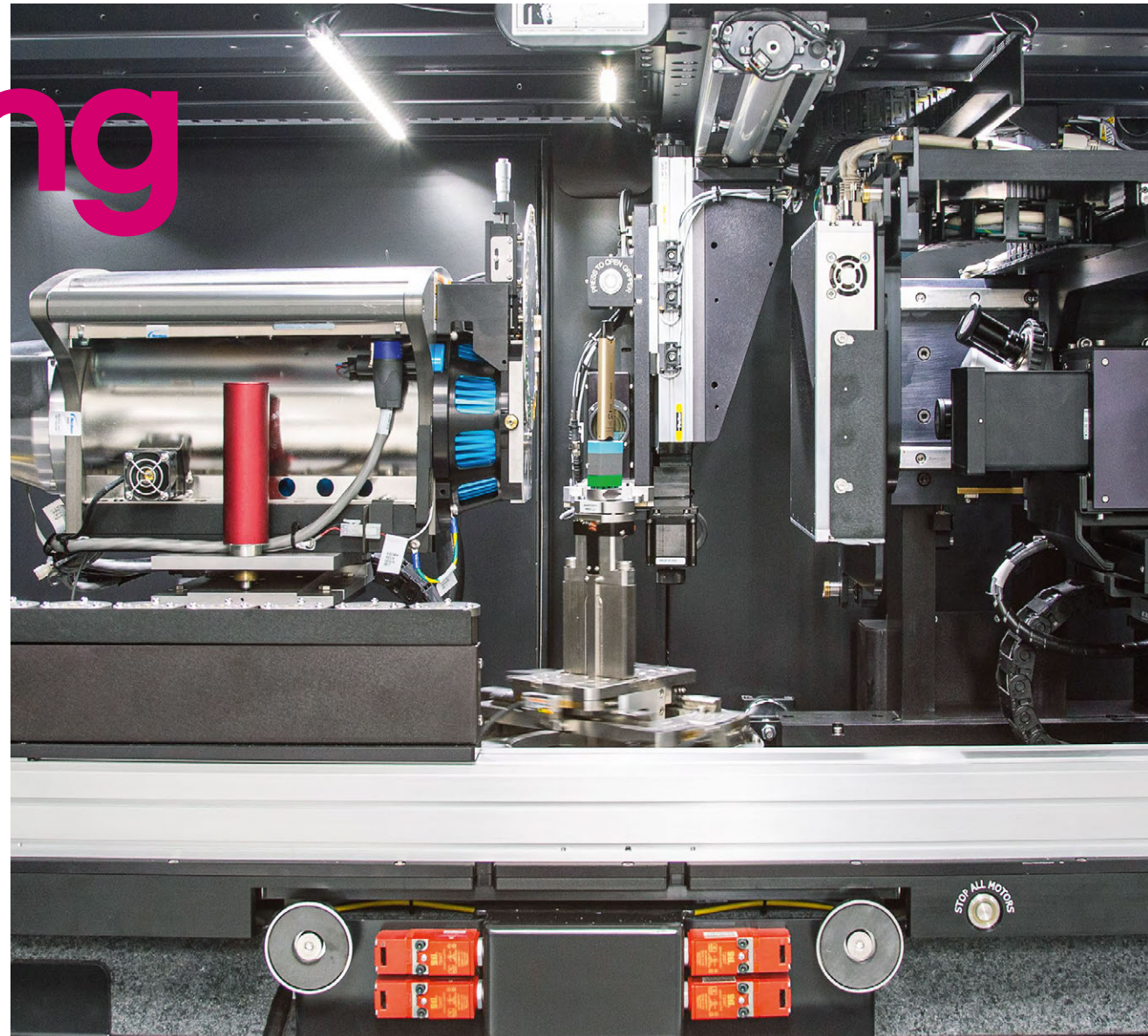
A pioneering laboratory shaping our future

Our state-of-the-art innovation hub is revolutionising the way rechargeable devices are designed, developed, and tested.

As scientific pioneers, our passion for innovation enables us to develop new products that satisfy consumer preferences. We are constantly improving, adapting, and discovering new solutions – behaviours that will help us deliver on our company purpose.

One aspect of this ambitious pursuit is in our transformative work on the rechargeable lithium-ion batteries that power our New Category products.

Our ePod vapour product being tested in our Battery Laboratory in Southampton, UK



Battery Lab

Contemporary lithium-ion batteries are incredibly powerful and require significant scientific expertise to ensure they are safe and effective.

Because these batteries – which are widely used in consumer products – are chemically reactive, they are potentially hazardous unless carefully designed and manufactured. They must be carefully controlled, well understood, and manufactured to high standards. That means all of our products must exceed regulatory requirements for design, manufacture, and operation. Not only do we perform rigorous performance tests within our own specialist laboratories, but our suppliers must also adhere to detailed specifications and exacting standards.

“We have invested in advanced analytical tools to identify, develop and deploy class-leading batteries to power our devices.”

Rob Gruar
Battery Development Manager at BAT

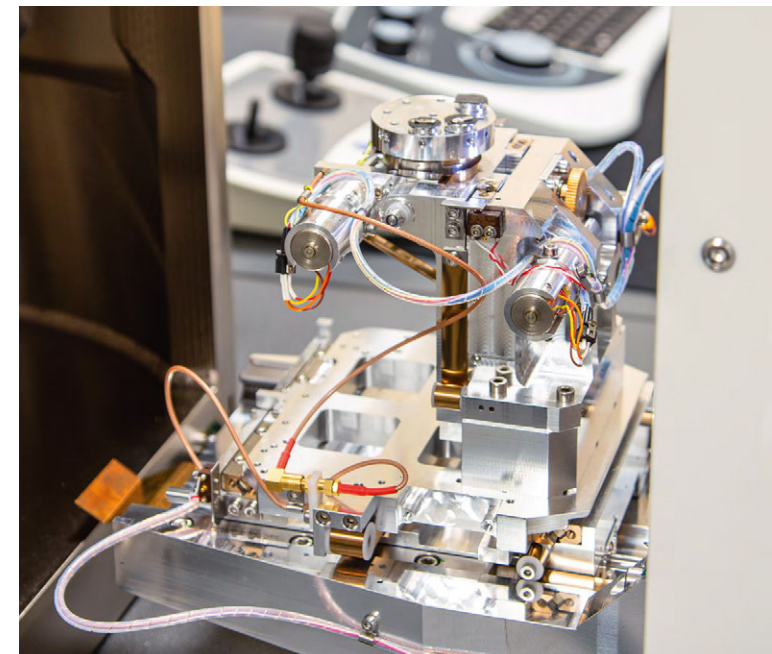
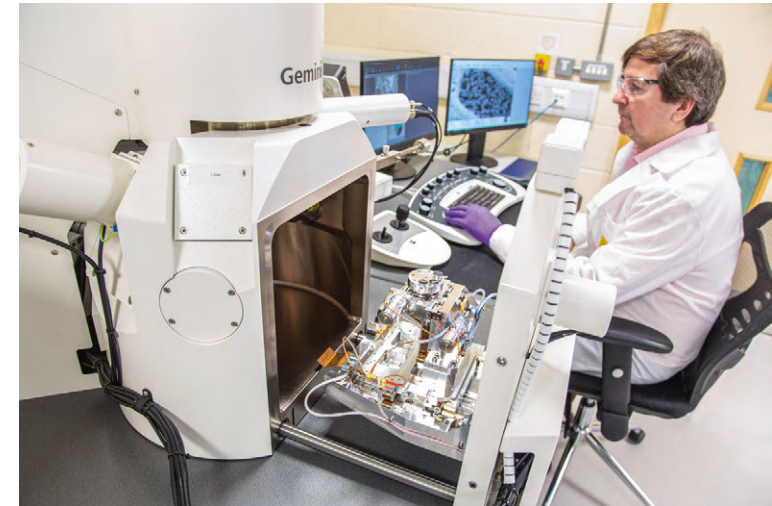
We have invested in the development of sophisticated battery testing instrumentation and techniques ensuring the safety of all enabled devices that make it to our consumers. We have also invested in advanced analytical tools such as Accelerated Rate Calorimeters (ARC) to study the reversible reactions that occur within a battery to understand how to safely control the device.

“We have invested in advanced analytical tools to identify, develop and deploy class-leading batteries to power our devices,” says Rob Gruar, Battery Development Manager at BAT.

Adopting the latest technology

Alongside BAT’s investments in battery testing capabilities, analytical instrumentation including a CT scanner and Scanning Electron Microscope (SEM) provide us with the capability to understand the performance of batteries from the atomic length scale through to a full battery. By viewing the mechanical, chemical, and electrochemical elements of battery design in such detail, we can boost performance, spot potential problems at an early stage, enhance safety features and help develop next-generation products at speed – always innovating and always improving.

We have invested in the development of sophisticated battery testing instrumentation



Sensory Capabilities

Using the senses to drive innovation

With technology evolving so rapidly, and consumer preferences changing constantly, timely testing of our New Category products ensures we remain at the cutting edge.

Our state-of-the-art sensory facility, ExSense, represents the best of our business. Based in our global R&D centre in Southampton, UK, this purpose-designed hub was created to allow us to generate robust sensory insights that can fuel and improve our product pipeline.

Sensory and technical analysis teams measure, analyse, and interpret sensory responses to our products by training volunteers to assess products through sight, smell, taste, touch and hearing. This helps us understand how the sensory experience of consumers drives interaction with our products. Sensory science brings R&D closer to our consumers and enables us to incorporate feedback into the early stages of product development. That allows us to continually adjust, refine and perfect prototypes so that our products match consumers' preferences and desires.



In-house sensory suite

ExSense includes three controlled testing environments where teams of experts can control parameters such as light, temperature, noise and airflow. This allows testing to be conducted in a standardised way to provide robust sensory insights. We can then translate these insights into actionable information to drive development throughout the product lifecycle.

The unit helps us to understand and evaluate the market in multiple ways so that we can:

- Identify what works well before further investment is made
- Focus on the key sensory parameters that drive consumer appeal
- Demonstrate how various product parameters can influence perception and how that translates to the product experience
- Explore new sensory methodologies and concepts
- Combine sensory and consumer data using machine learning tools to predict consumer liking

Our People

Dr Elaine Round



Vice President of Vapour, Oral, & New Actives Submissions
Scientific & Regulatory Affairs, Reynolds

The more we can learn from each other, the greater our chance of success

The best careers are those which take unusual turns, evolving over time so that you are continually learning and exposed to new perspectives and disciplines. I'm a perfect example of that – a geneticist and molecular biologist by training, I now work in regulatory affairs, having enjoyed a variety of scientific education and outreach roles, together with time spent conducting clinical research, interacting with study participants and getting to grips with the data.

From my perspective, we are at the cutting-edge of science and, as an industry, constantly looking for new ways to support Tobacco Harm Reduction.

We need a variety of minds and people from multiple backgrounds, who have that same outside-in view of the tobacco industry that I once had. People who think in different ways and have different skills.

I fervently believe in Tobacco Harm Reduction and in inspiring those changes which I believe will have a transformational effect by reducing the health impact of our business. That's why 13 years ago I joined the tobacco industry, fuelled by a passion to make a difference. It's a passion shared by so many people within the Company, whose enthusiasm for the science is matched by their desire to drive change within this industry.

This is a wonderful place to be a scientist – where our perspectives, shared passion for learning, and solving problems using fresh approaches unite us in a common goal.



Diversity & Inclusion

Greater diversity helps us find new solutions, faster



The more diverse we are as a business, the greater our ability to meet consumer needs and provide multiple solutions to pressing challenges.

BAT has always taken pride in the way diversity and inclusivity shape our global culture, attract new talent, and foster a great sense of pride amongst our 55,000 employees. Our Diversity and Inclusion initiatives are important because we know they will make us a more innovative, creative and responsive business, as well as being the right thing to do.

That means expanding skillsets and backgrounds, offering alternative points of view so that we can better understand the preferences, behaviours and habits of different markets, genders and societies – always inspired by leaders with a wide range of perspectives.

In 2020, we launched our new ethos – to be bold, fast, empowered, responsible and diverse in order to create a future-fit culture. Developed and driven by employees, that ethos will help us to achieve our ambition of building A Better Tomorrow™ and reducing the health impact of our business by offering a wide range of less risky*† products.

There is still much to do but we are proud that, for instance, there are 139 nationalities at management level within our Group and 58% of our graduate intake in 2020 was female. Currently, 38% of managerial roles are held by women and 33% of our Board are women – many of whom will have benefited from our extensive mentoring programme.

139

Nationalities at management level

38%

Of managerial roles are held by women

33%

Of our Board are women



*Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Diversity & Inclusion

David Kim, Group Head of Talent, Organisation Effectiveness & Inclusion, says: “We have long understood that our diverse people are at the heart of our business and our success. They are our competitive advantage and the reason why we continue, more than a century on, to lead our industry and its transformation. While we have made considerable progress in fostering a diverse and inclusive workforce, we know there is more to be done.”

Championing women at BAT

In 2019, we launched our Women in STEM (Science, Technology, Engineering and Maths) initiative. Using external partnerships and internal learning and development platforms, the initiative aims to attract, develop and retain more women across our R&D operations and Information & Digital Technology (IDT) functions.

“We have long understood that our diverse people are at the heart of our business and our success. They are our competitive advantage and the reason why we continue, more than a century on, to lead our industry and its transformation.”

David Kim
Group Head of Talent, Organisation Effectiveness & Inclusion

In the UK, we have joined WISE, an organisation that enables people in business, industry and education to increase the participation, contribution and success of women in STEM roles through knowledge-sharing, networking events, training and webinars. These types of partnerships will help female employees widen their networks and interact with peers from other companies, enabling BAT to champion the achievements of its female scientists.

BAT’s Women in Leadership accelerates the performance and potential of female talent through enhancing leadership behaviours to support career progression, unlocking full potential earlier in careers and strengthening networking.

Parents@BAT

We have a range of benefits to help new parents throughout the world balance their home and work lives during the first year of parenthood. We offer a minimum of 16 weeks’ fully paid leave for new mothers and adoptive parents, with BAT supplementing statutory pay where required. A return to work guarantee means all new mothers who are on maternity leave (or parents who are on adoption leave) for 12 months or less will be able to return to their previous job, or a suitable alternative, wherever reasonably practicable.

All new parents can also request flexible working arrangements following their return to work during the first year of the child’s birth or arrival.

16

Weeks’ (minimum) fully paid leave for new mothers and adoptive parents



B United

B United is a self-governing global network of lesbian, gay, bi, trans, questioning and other (LGBTQ+) employees that encourages employees to be themselves, to share experiences, offers mentoring, and encourages people to seek counselling if needed. This scheme, operating throughout the world, perfectly illustrates BAT’s empowering approach to inclusivity, and informs company-wide policy.

BAT trades with, and has hubs in hundreds of countries, some of which still criminalise LGBTQ+ relationships, so providing anonymity and a safe space, as well as promoting BAT’s diverse values, is crucial.

Women in STEM

Why STEM is so important to our core purpose



It is the application of Science, Technology, Engineering and Mathematics (STEM) that enables BAT to be one of the world's most innovative companies. In particular, the growing number and achievements of our women in STEM roles has fuelled our global leadership and inspires interest in these critical areas.

To accelerate our purpose of building A Better Tomorrow™, we are placing greater emphasis on our women-led STEM teams, renowned for their skill, determination and problem-solving. For a consumer company to thrive, it must reflect the people, and world, outside – harnessing new skills that challenge internal thinking. “Diversity is a key part of our ethos,” says Dr David O’Reilly, Director, Scientific Research at BAT. “A good mix of experience, skills and thoughts is what helps us to innovate and make better decisions, and women in STEM is a key part of this pipeline.”

Digital technology fuels transformation

Digital technology is spearheading our company transformation. Marina Bellini, Director, Digital and Information, is at the forefront of this change and strongly believes that diverse teams unlock new ways of thinking, leading to more innovative ideas.

Women in STEM



“We have done a lot of work to support people’s career growth at BAT, eliminate unconscious bias and truly open up opportunities for women and people of all backgrounds.”

Marina Bellini

Chief Information and Digital Officer

“Digital innovation and technology play a crucial role in fuelling our transformation, allowing us to be a simpler, stronger, and faster company,” says Marina. “We are applying state-of-the-art technologies across our entire value chain to drive results. Technology and digital is also connecting us to our consumers and employees in new ways, enhancing our capabilities and insights to bring innovative products to market, changing our culture and how we work as a company.”

“We have done a lot of work to support people’s career growth at BAT, eliminate unconscious bias and truly open up opportunities for women and people of all backgrounds.”

We are placing greater emphasis on our women-led STEM teams

Innovation and new-to-world products

Marina Trani spent 25 years working on a range of innovation categories before joining BAT. Marina, who was Group Head of New Categories R&D from 2013 to May 2021, explains what motivated her to make the move to BAT. “I was intrigued by how significant the business, consumer and technical challenges were in this sector. I saw a lot of room to make an impact through innovation and new-to-world products.”

“I joined in 2013 to form an R&D group and product pipeline solely aimed at creating viable alternatives to smoking and the harm reduction mission associated with these products strongly resonated with me. Seven years later and we now have a comprehensive product portfolio, a rapidly growing business in the New Category space and a thriving R&D team with super bright and capable technical leaders.”

Marina says she has been fortunate to help shape her part of the organisation and further boost diversity. “I was able to bring in and develop great talent across genders, nationalities and experiences,” she says. “In very technical functions, women are sometimes under-represented. However, in R&D, we have some phenomenal women who show terrific leadership and drive their complex programmes forward with clarity and passion.”



Women in STEM



“The science here is unlike anything I have ever experienced, in terms of rigour and detail.”

Dr Mimi Kim
Senior Director Social & Behavioural Science Group

Spotlight on the US

Dr Mimi Kim, PhD, is Senior Director in the Social & Behavioural Science group, Scientific and Regulatory Affairs, Reynolds, having achieved a successful career in academia. She believes moving to the company has helped to unleash her scientific skills in an entirely new way. She says: “The science here is unlike anything I have ever experienced, in terms of rigour and detail. From a scientific perspective, there are so many ways you can answer a research question, so to have a team with diverse backgrounds and expertise is very valuable, it provides a broader understanding of any issue. Both as an academic researcher and now working for Reynolds, my goal has always been to disseminate sound science to inform important questions of public health. I get to do that every day, and that is very fulfilling.”

“If you really want to have an impact on reducing the harm from tobacco products, this is the industry that has the best expertise and is most engaged.”

Dr Kimberly Frost-Pineda
Director Behavioural Research Group

Dr Kimberly Frost-Pineda, PhD, MPH, CPH, is Director in the Behavioural Research Group, Reynolds – an opportunity she took to apply her public health expertise and tobacco industry experience after observing scientific engagement of Reynolds scientists with the FDA. She says: “If you really want to have an impact on reducing the harm from tobacco products, this is the industry that has the best expertise and is most engaged. To find those solutions, it is super important to have diversity that goes beyond gender, age, race and ethnicity. It is about having diverse ways of thinking. When you have a group of scientists who come together, you want people from different backgrounds, who grew up differently, who think about things differently. When you have that you have the best chance of succeeding in the future because you’re able to bring all those ideas to the table.”



New Talent

To be the best,
we must recruit
and retain

the
best

Our ambition is to develop the next generation of scientific leaders who can continue to push boundaries, develop transformational innovation, who inspire and enable us to reduce the health impact of our business.

Our industry is changing rapidly. To stay at the forefront, we must think fast and act with confidence. In order to continue our scientific leadership, we must recruit those who think differently, always strive to do better, and whose curiosity and determination drive an infectious work ethic to find new solutions.

It's the people who work at BAT that make it such a forward-thinking and inspirational company, dedicated to our core purpose of building A Better Tomorrow™.

New Talent

As competition for the most talented people intensifies, we continue to build a strong and differentiated reputation as an employer devoted to developing the next generation of leaders. They bring new knowledge and approaches to our company and particularly our industry-leading New Categories.

Of course, they must be high performers, but just as crucial is their personal story – we deliberately focus on bringing in people with diverse backgrounds. Of ethnicity, gender, skills, education, and geography. Individuals with pharma backgrounds and those from retail, food and fast-moving consumer goods. The more diverse our talent, the stronger our BAT culture will be and the better the solutions that we bring to market.

We are also passionate about developing talent from within, stretching and supporting the high performing managers who will lead the delivery of our strategy. Our global talent strategy aims to create a legacy of leaders so we place significant emphasis on creating a mentoring culture, as we believe training and development should take place as close as possible to the work being done.

40

Different nationalities represented in our R&D community



If you're interested in a career at BAT, visit careers.bat.com



We are passionate about developing the next generation of leaders

A global talent pool

We are proud of the external recognition we receive each year for our standing as a leading employer worldwide. In February 2021, we were recognised for the fourth consecutive year by the Top Employers Institute – one of just 16 companies to receive the honour.

This global accolade reflects our commitment to nurturing and furthering the careers of our 55,000 employees worldwide, offering new opportunities for personal growth.

Placement and graduate schemes

The global R&D community is made up of around 1,500 people, representing 40 different nationalities, and we are always looking for the next generation of talented scientists.

For more than 20 years, we've run a distinguished industrial placement scheme in which around 10 exceptional undergraduates are chosen from hundreds of applicants, to work within R&D for a year as part of their degree. Many return to the Company for full-time roles, often through our Global Graduate Programme.

Ambitious young scientists also have the chance to join our Global Internship Programme. For up to six months, our paid interns demonstrate their skills to R&D staff members whose advice helps them to learn how science can be translated into business solutions, whilst developing their critical thinking and entrepreneurial skills.

If you're interested in a career at BAT, visit careers.bat.com

Our People

Benjamin Taylor

**Developer**

New Categories Discovery

Design innovation means being the best

For somebody with a design and innovation background like me, this is a rare opportunity – to work for an industry that had been doing the same thing for 100 years and is now shifting its focus. We are adapting to new realities and desires, learning new processes, being adventurous, experimental, tackling new problems, and finding innovative solutions. We are doing all this with design and the user experience right at the centre.

I work on the upfront innovation side of Tobacco Heating Products, particularly on induction technology. Our ambition is to disrupt the status quo and develop products that push at the boundaries. To do that we have restructured our approach to design and engineering so that in our small and agile teams, filled with different talents, we are able to use new technology – such as that found in the actual heating element of the product – in highly innovative ways.

BAT is driven to be the market leader and we feed off that because we want to be the first, to push harder, to be better, to do something no one else has, and we're lucky to have the resources to realise those ambitions.



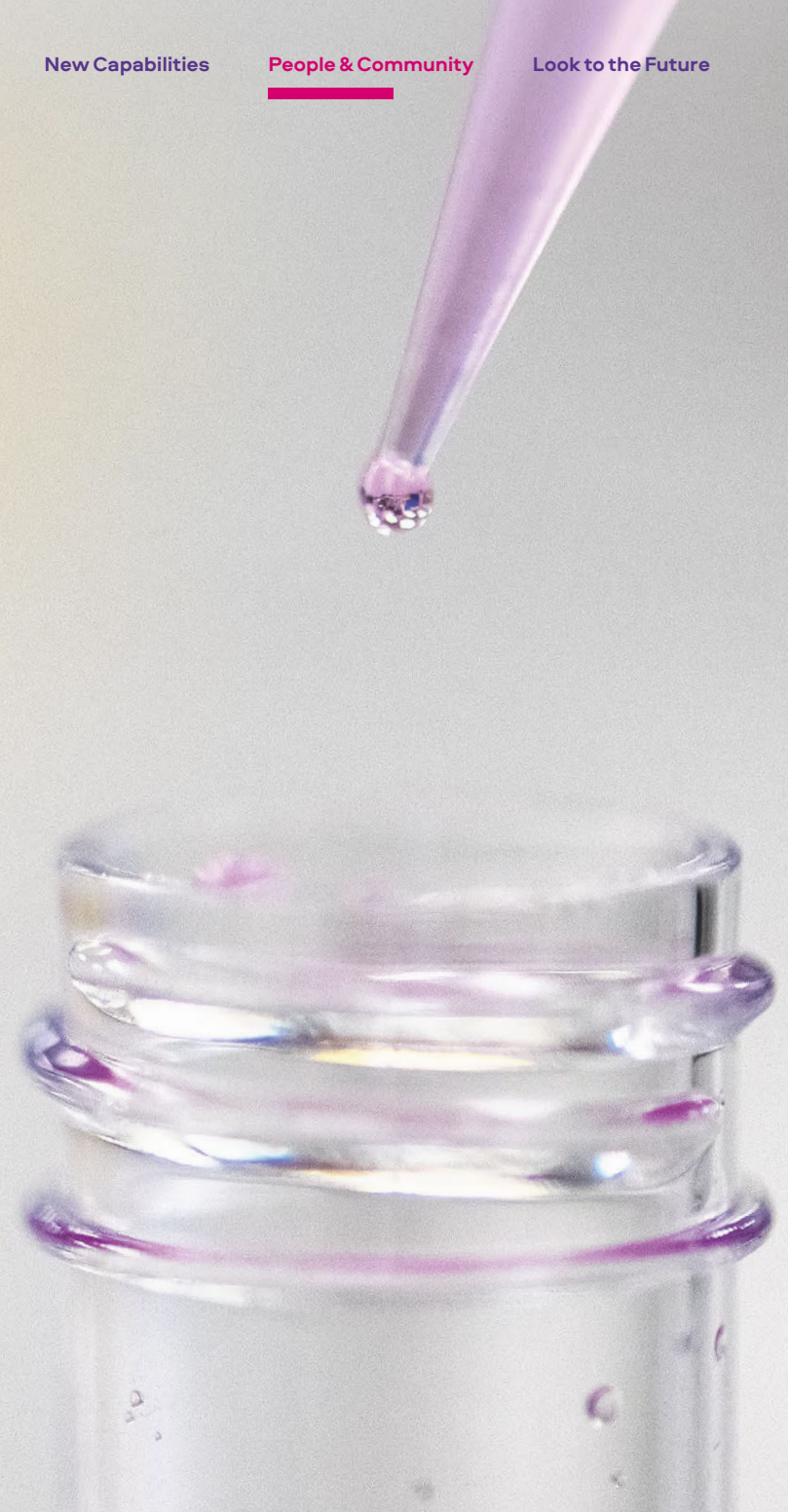
International Opportunities

Learning with and from each other

Packing up your belongings and moving nearly 4,000 miles across the world might sound like a daunting challenge, but for two of our tenacious scientists it was the opportunity of a lifetime.

At BAT, we believe the more we invest in our employees, the greater our return. One way of doing this is through our International Assignee Programme, which provides short and long-term opportunities for senior leaders and more junior talent to move to one of our many locations around the world.

The programme deploys our best talent to locations where key capabilities and knowledge may not be locally available. It's also an opportunity for people to experience new cultures and ways of working that benefit them personally and professionally and shape our future business success.



International Opportunities



Dr Sharon Goodall, Group Head of New Sciences and Group Head of MRTP Designate

With a military background that had seen her deployed in both Iraq and Afghanistan, Dr Sharon Goodall was no stranger to heading overseas. But BAT's Group Head of New Sciences admits even she was surprised by the speed with which her 18-month transfer to Reynolds, our US subsidiary, in Winston-Salem, North Carolina, took place.

"It all began with Group Head of New Categories R&D asking me in June 2018 if I wanted an opportunity," Sharon says. "By September, my husband, daughter, dog and I were all living in North Carolina."

Prior to her move, Sharon had been heading up Tobacco Heating Product (THP) development for BAT in the UK. For the Reynolds R&D team, she combined this with the aim of continuing to transfer THP product knowledge as part of an ongoing regulatory submission to the FDA and strengthening links between the two organisations.

““ They are such welcoming people and the Reynolds R&D team is also technically phenomenal. They were also willing to listen to new approaches and were open to extensive collaboration. ””

Dr Sharon Goodall
Group Head of New Sciences
and Group Head of MRTP Designate

"I had been at BAT for almost 10 years and I wanted to try something different, so this was a great opportunity to be offered," she says. "I also wanted to get to know the teams at Reynolds a lot better and be part of a truly integrated Global R&D."

Having spent the last decade building strong foundations within her BAT stakeholder group, one of Sharon's biggest challenges was developing a brand new set of relationships with her new colleagues at Reynolds, but she shouldn't have been concerned as everyone was very welcoming and helped her and her family settle into work and life.

"They are such welcoming people and the Reynolds R&D team is also technically phenomenal. The regulatory pressures they are under means that they have a great depth and breadth to their technical understanding. They were also willing to listen to new approaches and were open to extensive collaboration."

"One of the things I hope to maintain within myself is the robust resilience they have at Reynolds," she says. "Due to the presence and rigour of the FDA, they are in a continual pursuit of excellence in everything they do. They are very technically curious people so my time at Reynolds was a real exercise for the brain and I loved it. Plus, the friendships and the extension of the BAT family has been hugely beneficial."

International Opportunities

Dr Summer Hanna, Principal Science Manager

Dr Summer Hanna, Principal Science Manager in Sharon's New Sciences team, has a PhD in chemistry and a strong background in R&D and US regulatory affairs. She and two colleagues were the first scientists to be given the opportunity to move from the US to the UK as part of the International Assignee Programme. The trio started work at BAT's R&D site in April 2019 and will be in Southampton for three years.

"I was impressed by the effort BAT made to make me feel at home, even shipping my two dogs, Deacon and Watson," Summer says. "BAT also sorted out all the visa paperwork for my husband so that he could develop his career in the UK, which resulted in an opportunity for him to work on the Oxford-AstraZeneca COVID-19 vaccine. It made my choice to move abroad easier knowing BAT also supports your family through the experience."

Summer's role in the New Sciences department involves looking for both potential new business opportunities, Beyond Nicotine, and the long-term science programmes needed to support BAT's rapid evolution. "I get to work on the cutting edge of BAT's next generation of products," Summer says. "I also get to share my knowledge of working in the highly regulated environment of the US and so I feel like I'm able to add real value to the business here."

One highlight of Summer's International Assignment was working on the Product Development Collaboration (PDC) with Organigram, a leader in the field of high-quality adult-use recreational and medical cannabis products, which are legally available in Canada. This collaboration

focuses on research and product development activities, with an initial focus on cannabidiol (CBD). "I was part of the core team who helped to create our PDC in Canada. It was great to work with two other Reynolds IAs in Finance and Marketing, along with our Centre colleagues, to create a whole new way of working for BAT in our Beyond Nicotine space. Having the opportunity to directly influence the future of BAT through this collaboration has been one of the biggest learning opportunities of my career. It has been just one of the many examples of the personal and professional growth you gain by taking on an International Assignment at BAT."

Another key aspect of the International Assignee programme is to further strengthen relationships, expand expertise and share experience across our global business. "I already knew some BAT employees in Southampton, which was really helpful, and some of my colleagues have become like extended family," Summer says. "It's been such a unique chance to gain fresh ideas, discover new ways of working and get exposed to alternative perspectives."

“ I get to work on the cutting edge of BAT's next generation of products. ”

Dr Summer Hanna
Principal Science Manager



Community Relationships

By empowering communities, we become empowered

The significant global issues faced during the COVID-19 pandemic have shown how crucial community-based support initiatives are and will continue to be. At work, we are renowned for our expertise, collaboration and innovative solutions – and those are the same qualities we demonstrate outside of our day-to-day work in laboratories and offices.

Our purpose of building A Better Tomorrow™ extends beyond the pioneering scientific work that drives our business ambitions.

Which is why our partnerships with local communities matter so much. They empower us and we hope our involvement does the same for them. We aim to be more than a good neighbour and feel immense pride and honour in being a source of guidance and inspiration.

Businesses need to be good neighbours and that means we need to be integral partners within the communities in which we operate. It's essential to what we represent as a business and demonstrates our commitment to helping society.

Community Relationships

For instance, in the UK we have initiated and supported a series of projects designed to help people who live in and around our R&D site in Southampton. One of these is establishing the Centenary Legacy Fund which sees charitable donations distributed amongst local community projects.

Perhaps even more significant has been the operation to supply coronavirus tests to local front-line and key workers when the COVID-19 pandemic struck. Our Science team in Southampton joined forces with COVID-19 Testing Network Limited, a national NGO initiative, and together, we offered free testing to front-line workers. In just 10 weeks, we had set up a specialist COVID-19 testing laboratory in Southampton.

We also provided the UK Government with one of our specialist machines to support the national testing programme and our 3D printing facilities produced protective visor braces. We also donated over £50,000 to 3P Innovation for the manufacture of face shields.



Reynolds

In the US, our Reynolds American colleagues not only consider community outreach as an historic element of their organisation’s sustainable business practices, but also as a means of living our ethos by empowering communities through charitable giving and volunteering.

Reynolds American’s commitment to community was on display in 2020 during the height of the COVID-19 pandemic. The organisation’s Foundation donated to local community relief funds and its operations teams helped produce hand sanitiser and provide other forms of PPE locally.

During this time, they also joined the call for social justice nationwide by pledging to financially support organisations that combat racism and inequality in US communities. Reynolds American committed \$3 million to support this cause over the next three years.

The Reynolds American team is also a partner with the United Way, which supports a network of local human service organisations across the US. Each year, our colleagues’ personal donations to the United Way are matched dollar-for-dollar by the Reynolds American Foundation. Despite the 2020 fundraising campaign being entirely virtual, the team surpassed the previous year’s amount raising \$1.3 million.

The Reynolds team are passionate about supporting local communities

Our R&D hub in Southampton, UK

Summary by Dr David O'Reilly

Making significant strides as we build A Better Tomorrow™

Science has always been the driving force in society. It improves lives, helps people, and can inspire and enable future generations to push boundaries. Indeed, the COVID-19 pandemic has shown the very best of science, how fundamental it is to all of us, and how determined and pioneering individuals and companies can provide transformative solutions, particularly when they work together.

As a company, science and innovation are our inspiration, and the speed, energy and activity in these areas are moving our industry into pioneering new areas. We want to use this growing momentum to accelerate the pace at which we share our research and perspectives on Tobacco Harm Reduction, and help adult smokers, who would otherwise continue to smoke, make informed choices when it comes to switching to less risky alternatives.*†

We recognise the harm caused by tobacco and we are on a journey to rapidly transform ourselves by reducing the health impact of the business and, ultimately, build A Better Tomorrow™. We're sharing our progress and focusing on innovation, consumer choice, and actively participating in the global Tobacco Harm Reduction debate.

* Based on the weight of evidence and assuming a complete switch from cigarette smoking. These products are not risk free and are addictive.

† Our products as sold in the US, including Vuse, Velo, Grizzly, Kodiak, and Camel Snus, are subject to FDA regulation and no reduced-risk claims will be made as to these products without agency clearance.

Summary by Dr David O'Reilly

But change is a constant and there is always more to be done. We will continue to be the driving force behind world-class science in the New Category space, investing in our people and facilities to accelerate progress. We will continue to push forward using technology and disruptive innovations that can make a positive difference to peoples' lives. And we will continue to seek new opportunities for our business and consumers, boldly entering new product spaces.

While 2020 was a tough year for us all, our employees achieved great things. The launch in January 2021 of our first CBD vaping product was a significant milestone for us on our Beyond Nicotine journey. I'm proud of the way our team has embraced this new and exciting product space. We are the first truly global company to launch a CBD vaping product, a great example of the BAT ethos in action – being bold, fast, responsible, diverse and empowered. It was developed using our company's global vaping expertise, world-class science, product stewardship, and robust supply chain sourcing, and it represents the first big step on our journey Beyond Nicotine.

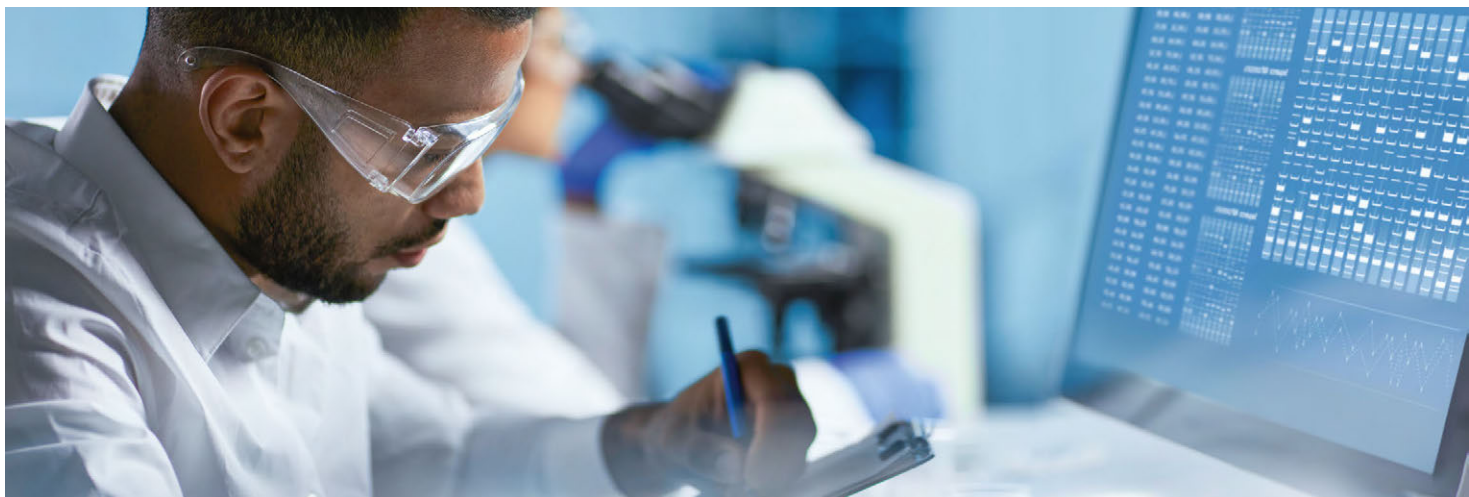
Our biotech subsidiary's COVID-19 candidate vaccine is another significant milestone. Our experts in Kentucky, US, have had two major achievements by progressing into clinical trials with candidate vaccines for both seasonal flu (Quadrivalent Influenza) and COVID-19. There's still a long way to go but our progress is significant.

I have long said how valuable it is to have an inspired culture of curious, agile and forward-thinking people, and that's a source of genuine differentiation for BAT. This feels more important to me than ever. I am so proud of our diverse community of experts, with myriad skills, perspectives and expertise, whose scientific research is powering our technology and product innovation. The more we can achieve, the faster we can truly make a difference to Tobacco Harm Reduction on a global scale.

As you reach the end of this report, I hope you feel inspired, curious, and perhaps even had your perceptions challenged as you understand more about our scientific research, our values, and our people. We are committed to our purpose of building A Better Tomorrow™, and I am confident that our powerful combination of expertise, determination and innovation will continue to fuel that exciting journey for many years to come.

“ We recognise the harm caused by tobacco and we are on a journey to rapidly transform ourselves by reducing the health impact of the business and, ultimately, build A Better Tomorrow™. We're sharing our progress and focusing on innovation, consumer choice, and actively participating in the global Tobacco Harm Reduction debate. ”

Do Reilly



Forward-Looking Statements

This is a report by British American Tobacco p.l.c.; associate companies are excluded.

References to 'British American Tobacco', 'BAT', 'we', 'us' and 'our' when denoting opinion refer to British American Tobacco p.l.c. (the Company, and together with its subsidiaries, the 'Group'), and when denoting tobacco business activity refer to Group operating companies, collectively or individually as the case may be.

This report contains certain forward-looking statements, including "forward-looking" statements made within the meaning of the US Private Securities Litigation Reform Act of 1995. These statements are often, but not always, made through the use of words or phrases such as "believe," "anticipate," "could," "may," "would," "should," "intend," "plan," "potential," "predict," "will," "expect," "estimate," "project," "positioned," "strategy," "outlook," "target" and similar expressions. These include statements regarding our intentions, beliefs or current expectations reflecting knowledge and information available at the time of preparation, and concerning our results of operations, financial condition, liquidity, prospects, growth, strategies and the economic and business circumstances occurring from time to time in the countries and markets in which the Company operates, including the projected future financial and operating impacts of the COVID-19 pandemic.

All such forward-looking statements involve estimates and assumptions that are subject to risks, uncertainties and other factors. It is believed that the expectations reflected in this report are reasonable but they may be affected by a wide range of variables that could cause actual results to differ materially from those currently anticipated.

Among the key factors that could cause actual results to differ materially from those projected in the forward-looking statements are uncertainties related to the following: the impact of adverse domestic or international legislation and regulation; the inability to develop, commercialise and deliver the Group's New Categories strategy; the impact of significant increases or structural changes in tobacco, nicotine and New Categories-related taxes; changes or differences in domestic or international economic or political conditions; the impact of serious injury, illness or death in the workplace; adverse decisions by domestic or international regulatory bodies; and the inability to lead the development and roll-out of BAT innovations (New Category products and combustibles), including as a result of unsuccessful research and development or a failure to develop robust scientific risk assessment frameworks.

The forward-looking statements reflect knowledge and information available at the date of preparation of these materials, and the Company undertakes no obligation to update or revise these forward-looking statements, whether as a result of new information, future events or otherwise. Readers are cautioned not to place undue reliance on such forward-looking statements.

The material in this report is provided for the purpose of giving information about the Company to stakeholders only and is not intended for general consumers. The Company, its directors, officers, employees, agents or advisers do not accept or assume responsibility to any other person to whom this material is shown or into whose hands it may come and any such responsibility or liability is expressly disclaimed. The material in this Report is not provided for product advertising, promotional or marketing purposes. This material does not constitute and should not be construed as constituting an offer to sell, or a solicitation of an offer to buy, any of our products. Our products are sold only in compliance with the laws of the particular jurisdictions in which they are sold.

Additional information concerning these and other factors can be found in BAT's filings with the US Securities and Exchange Commission ("SEC"), including the Annual Report on Form 20-F and Current Reports on Form 6-K, which may be obtained free of charge at the SEC's website, <http://www.sec.gov>.

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Pages 05–06

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Vapour Products

Pages 13–17

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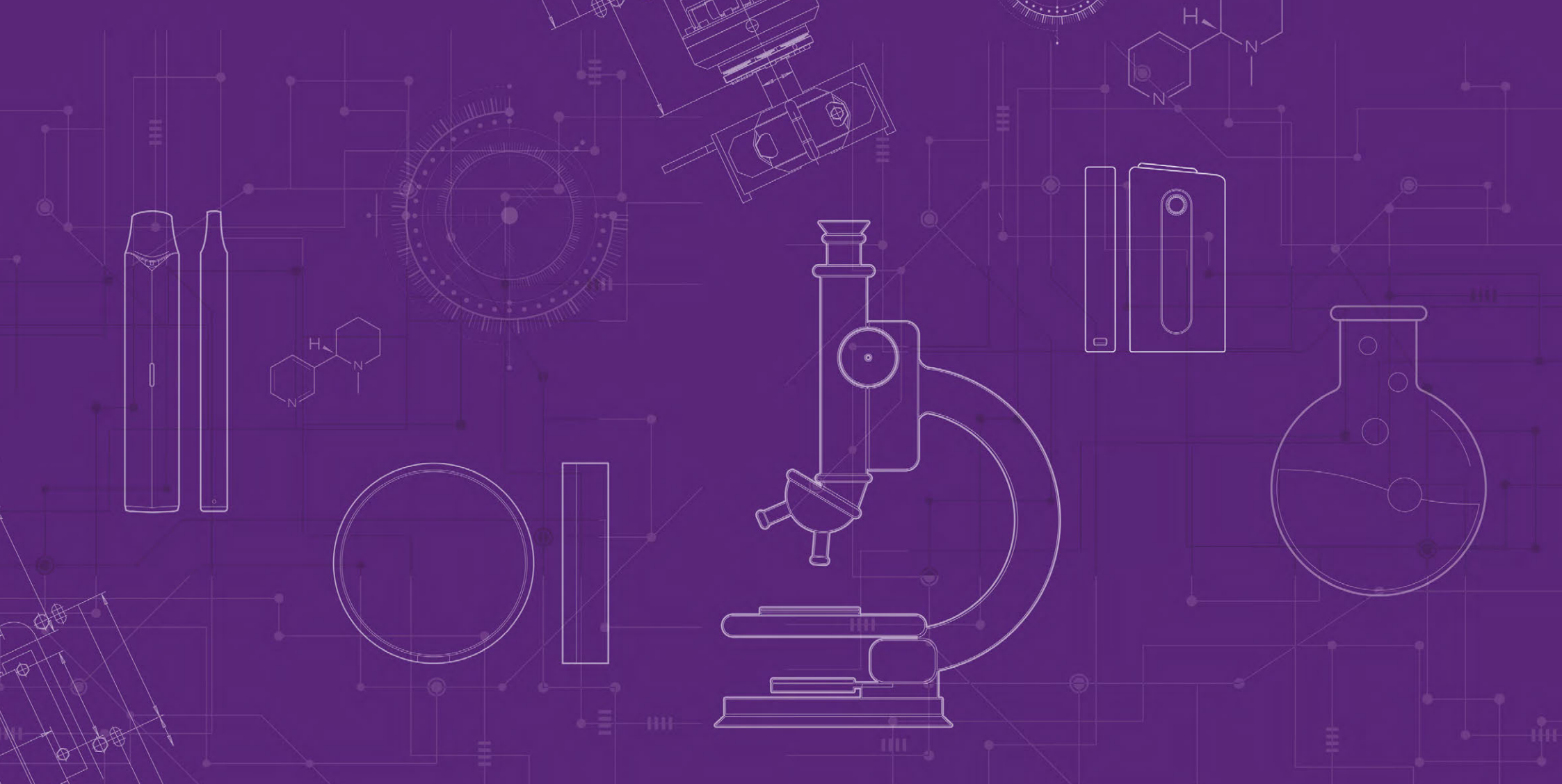
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