The following are extracts taken from a 2014 Public Health England(PHE) publication which outline and are a guide to the benefits for and against the use of Electronic Cigarettes.

Electronic cigarettes (also known as e-cigarettes or electronic nicotine delivery systems (ENDS)) typically comprise of a re-chargeable lithium ion battery and a battery powered atomiser which produces vapour by heating a solution of nicotine. Drawing air through the e-cigarette triggers the heater to create vapour which contains nicotine and is inhaled by a smoker the same way as smoke from conventional cigarettes.

Producing nicotine vapour from a solution rather than by burning tobacco means that electronic cigarette vapour is free from almost all of the many toxic chemicals that accompany nicotine in cigarette smoke. Not all electronic cigarettes include nicotine; some simply produce vapour for inhalation. As nicotine is the addictive substance in tobacco cigarettes, nicotine delivery from ENDS is essential if these products are to be effective for smoking cessation or harm reduction.

The principal addictive component of tobacco smoke is nicotine. However, aside from minor and transient adverse effects at the point of absorption, nicotine is not a significant health hazard. Nicotine does not cause serious adverse health effects.

Cigarettes deliver nicotine in conjunction with a wide range of carcinogens and other toxins contained in tar, including nitrosamines, acetone, acetylene, DDT, lead, radioactive polonium, hydrogen cyanide, methanol, arsenic and cadmium, and vapour phase toxins such as carbon monoxide.

In contrast, electronic cigarettes do not burn tobacco, so any toxins in vapour arise either from constituents and contaminants of the nicotine solution, and products of heating to generate vapour. The principal component other than nicotine is usually propylene glycol, which is not known to have adverse effects on the lung but has not to our knowledge been tested in models that approximate the repeated inhalation, sustained over many years, that electronic cigarettes involve.

PHE are aware of two cases of lipoid pneumonia attributed to inhalation of electronic cigarette vapour. Despite some manufacturers' claims that electronic cigarettes are harmless there is some evidence that electronic cigarettes contain toxic substances, including small amounts of formaldehyde and acetaldehyde, which are carcinogenic to humans and that in some cases vapour contains traces of carcinogenic nitrosamines, and some toxic metals such as cadmium, nickel and lead. Although levels of these substances are much lower than those in conventional cigarettes, regular exposure over many years is likely to present some degree of health hazard, though the magnitude of this effect is difficult to estimate.

Electronic cigarettes offer nicotine delivery in a format that mimics smoking, have a socially acceptable non-medical image which enables users to retain their smoker identity but without the risk of smoke.

These are relatively inexpensive (start-up costs can be high, but running costs much lower than smoking), and despite (to date) nicotine delivery that is low relative to cigarettes, have

proved popular with the current minority of smokers who use them. Consumer support for the product is evident from the user sites that a brief internet search on electronic cigarettes or vaping generates.

Electronic cigarettes emerged on the UK market at around the time of the 2007 Royal College of Physicians report, which advocated making alternative sources of medicinal nicotine available to smokers as a competitive and non-medical alternative to tobacco. The rapid uptake of electronic cigarettes since then, despite uncertainties over their purity and performance, demonstrates that many smokers welcome the availability of choice in nicotine products, and if provided with products that are attractive, affordable and easily available, will use them either in conjunction with, or in the longer term instead of, tobacco cigarettes.

Electronic cigarettes also appeal to smokers by mimicking the sensation and appearance of smoking a cigarette, and by their market positioning as lifestyle rather than medical products.

As use of electronic cigarettes is a relatively recent phenomenon and evidence to date is scarce, there are still some major concerns about these products, however, potential hazards of electronic cigarettes relate primarily to the purity of nicotine emissions, and the effects of long-term exposure to vapour.

Notwithstanding this the hazards associated with use of products currently on the market is likely to be extremely low, and certainly much lower than smoking. Electronic cigarettes do not produce smoke so the well-documented effects of passive exposure of others to cigarette smoke are clearly not relevant.

Exposure of non-smokers to electronic cigarette vapour poses a concern, though laboratory work suggests that electronic cigarette use in an enclosed space exposes others to nicotine at levels about one tenth generated by a cigarette, but little else. The health risks of passive exposure to electronic cigarette vapour are also likely to be extremely low.

There have been some suggestions that among non-smokers, electronic cigarettes might be used as a gateway to smoking and promote smoking uptake and nicotine addiction, particularly among children and young people. However, to date there is no data supporting this claim.

It has been suggested that there is a risk of sustained dual use among smokers who might otherwise have quit smoking completely, representing missed opportunities to achieve complete cessation. Some argue that use of electronic cigarettes, which to a degree resembles cigarette smoking, in places where smoking is currently prohibited might re-normalize smoking and undermine tobacco control efforts. However, although similar in appearance, even cigalike products are easily distinguishable, both in appearance and smell, from tobacco cigarettes. Therefore, use of electronic cigarettes in smoke free places is more likely to lead to normalisation of nicotine devices than to smoking, and hence potential benefit as a support to existing smoke-free policies.

A potential greater concern over the similarity in appearance between the use of electronic and tobacco cigarettes relates to advertising, sponsorship, celebrity endorsement and portrayals in film and other media. In this area there is considerable scope for promotion of nicotine use to young people, representing a significant concern. Advertising will be controlled in future by developments in regulation of these products and the Committee of Advertising Practice is currently consulting on restricting the advertising of

electronic cigarettes.

Although originally developed and marketed independently from the tobacco industry all of the four transnational tobacco companies now own at least one electronic cigarette product, or has competitor products in development. In addition to sharing the commercial gains from electronic cigarettes, the tobacco industry is no doubt eager to exploit opportunities for advertising and promotion that might increase either electronic or tobacco cigarette use, and also, by becoming involved in the production of alternatives to smoking, circumventing current restrictions on engagement in policy imposed by the Framework Convention on Tobacco Control (FCTC).

Given the ethical record of tobacco industry activity in promoting and defending smoked tobacco, this is an obvious and significant potential threat, but also one that needs to be addressed across the board as all nicotine suppliers are driven primarily by commercial rather than public health interests. While those commercial and public health interests largely coincide in the promotion and sale of electronic cigarettes to smokers, they do not in the non-smoking population. This is a key argument for regulation to prevent abuse of the electronic cigarette market.

The potential benefits of electronic cigarettes lie in their role as a reduced-hazard competitor for cigarettes. The great majority of the more than one million users of electronic cigarettes in the UK are current or former smokers. Most users use them to either replace cigarettes in places where smoking is prohibited or discouraged, to cut down on smoking, to reduce harm from smoking, or to quit smoking. As the nicotine delivery kinetics of electronic cigarettes improves with technological developments, these products may prove to be more effective than conventional Nicotine Replacement Therapy (NRT) as a tobacco substitute as their physical and behavioural characteristics replace many of the co-stimulatory factors that contribute to nicotine addiction.

Availability in convenience stores, competitive pricing, non-medical image and social acceptability also contribute significantly to use. Prevalence of use is similar between genders and socio-economic groups, though higher in younger than in older smokers. According to the Smoking Toolkit Study, use of electronic cigarettes is much more common among heaver smokers and ex-smokers, and more recent ex-smokers report use of electronic cigarettes in preference to conventional NRT. The increase in electronic cigarette use over recent years appears to reflect this, at least in part. This is particularly true of smokers attempting to quit, among whom electronic cigarettes are now the first choice.

In this group, increasing use of electronic cigarettes has been associated with reductions in numbers using NHS stop smoking support, or buying over-the-counter NRT, but there has also been an increase in the total number of smokers using any form of support to quit. **The net result appears to be an increase in the proportion of smokers who have quit within the past year.**

Evidence from clinical trials on the effectiveness of electronic cigarettes is limited, though results from observational and randomised trial data suggests that efficacy of first generation electronic cigarettes is similar to that of the transdermal NRT patches or the *Nicorette* NRT inhalator; findings that are consistent with the apparently low dose delivery and upper airway absorption of early generation products.

Electronic cigarettes are currently marketed in the UK under general product safety regulations which do not impose specific standards of purity or efficacy, and control advertising through voluntary codes of practice, which are now being reviewed, but deal with breaches reactively, in response to complaints, rather than proactively, through pre-screening.

In March 2014 the European Parliament and Council moved to end marketing under general product safety regulations under the terms of the new Tobacco Product Directive (TPD). Under this directive, advertising of nicotine-containing devices that are not licensed as medicines will be prohibited, products will be required to carry health warnings, meet purity and emissions standards that are yet to be defined, provide data on nicotine uptake, be subject to restrictions on total nicotine content, and suppliers will be required to bear full responsibility for quality and safety when used 'under normal or reasonably foreseeable conditions'.

Dates for enactment are yet to be specified, but legislation is expected to be required in member states by 2016, and full compliance by 2017.

It is thus likely that by this time next year, health professionals will be able to prescribe, and patients will be asking them for, prescriptions of novel nicotine products. Some of those are likely to be produced by tobacco companies or wholly funded subsidiaries.

Smoking kills and millions of smokers alive today will die prematurely from their smoking unless they quit. This burden falls predominantly on the most disadvantaged in society. Preventing this death and disability requires measures that help as many of today's smokers to quit as possible. The option of switching to electronic cigarettes as an alternative and much safer source of nicotine, as a personal lifestyle choice rather than medical service, has enormous potential to reach smokers currently refractory to existing approaches. The emergence of electronic cigarettes and the likely arrival of more effective nicotine-containing devices currently in development provides a radical alternative to tobacco, and evidence to date suggests that smokers are willing to use these products in substantial numbers.

Electronic cigarettes, and other nicotine devices, therefore offer vast potential health benefits, but maximising those benefits while minimising harms and risks to society requires appropriate regulation, careful monitoring, and risk management. However the opportunity to harness this potential into public health policy, complementing existing comprehensive tobacco control policies, should not be missed.