APPENDIX

SECTION 1 INTRODUCTION

1.2 What are ENDS?

Not all of these products look like conventional cigarettes. All ENDS have three basic components: a battery; an atomiser; and a fluid cartridge (Figure 1). The fluid used in ENDS usually contains propylene glycol and/or glycerol, nicotine, and flavourings (e.g. tobacco, menthol, fruit).

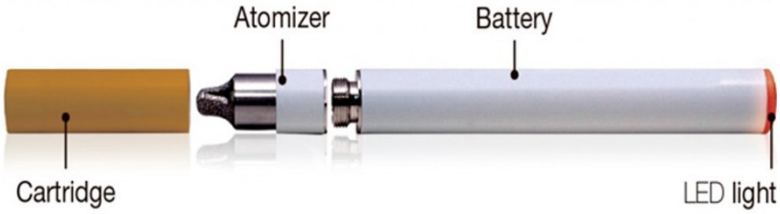

Figure 1 - The basic components of a first generation ENDS

Source: http://vaping360.com/archives/what-is-an-electronic-cigarette-the-beginners-guide/

The first generation ENDS (commonly called 'cigalikes') were invented in China in the early 2000s and were intended as a less harmful substitute for smoking conventional tobacco products.(1) Indeed, these ENDS were intended not only to simulate the feeling and action of smoking but also to physically resemble cigarettes. More recently, second and third generation ENDS have come onto the market (see examples in Figure 2). These generally do not resemble conventional cigarettes and the user can replace the fluid cartridge when it runs out, due to the open tank system, allowing them to vary the flavour of the vapour. In the case of third generation ENDS, users can also modify their device in order to customise its performance (so-called "mods" or "tanks").

Figure 2 - Second and third generation ENDS

Source: http://vaping.com/science/ENDS-summit-dr-lynne-dawkins

Other devices that are currently available in some test markets, such as the Marlboro iQOS (Figure 3) are a hybrid of ENDS and traditional tobacco products. Like ENDS, it has a battery and heating system, but instead of filling with a liquid, users plug in a modified cigarette that contains tobacco.

Figure 3 – Marlboro iQOS system.

Source: http://media.corporate-ir.net/media_files/IROL/14/146476/PM_AR_2014/images/iqos-sidebar-brands.png

Three central health benefits claimed for ENDS are that:

1. they are far less hazardous to health than combustible tobacco products;(2-8)
2. they are an effective means of stopping smoking, comparable to or more effective than other smoking cessation strategies;(2, 7, 8) and
3. smokers who also use ENDS ("dual users") reduce the number of cigarettes they smoke and that this is likely to be harm reducing.(7, 8)

Four central health concerns expressed for ENDS are that:

1. smokers who might otherwise have quit smoking, may continue smoking and vaping (dual-using) in the belief that their reduced smoking is significantly harm reducing;(9)
2. non-smokers (especially youth) who may have never used any nicotine product, may take up vaping in the belief that ENDS are risk-free;(10)

3. a proportion of non-smokers may commence smoking in addition to vaping (the so-called gateway effect)(11); and
4. The longer term health effects of use are unknown(12)

SECTION 2 LITERATURE REVIEW

2.1 Methods

We initially conducted a search of the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects, Medline, and PsycINFO for systematic and narrative reviews. Search terms were restricted to title and abstract only and included: [electronic cigarette? OR electronic ?nicotine delivery system? OR ENDS? OR vap*] AND [review OR meta?analy*]. Search results were limited to articles published from 2010 onwards. Articles published in a language other than English were excluded.

We then searched Medline and PsycINFO for any significant primary studies published in 2014 and 2015 that therefore would have not been included in any of the included reviews. Search terms were restricted to title and abstract only and included: [electronic cigarette? OR electronic ?nicotine delivery system? OR ENDS? OR vap*] AND [ban? or smokefree or smoke?free or cessation or harm reduction or policy or regulation or legislation or benefits or risks or youth or prevention or prevalence or cost? or health or tax?] NOT [ventilat*]. Articles published in a language other than English were excluded.

We also searched for relevant grey literature files, with particular emphasis on leading cancer control agencies and public health organizations including: the World Health Organization, the International Agency for Research on Cancer, the Union for International Cancer Control, the Framework Convention Alliance, and the World Lung Foundation.

2.2 Prevalence of ENDS use

Table 1 Recent[a] use of ENDS, among smokers[b] aged 14 years or older, by age and sex, 2013 (per cent)

Source: 2013 National Drug Strategy Household Survey

Sex	18–24	25–29	30–39	40–49	50–59	60–69	70+	14+	18+
Male	31.6	18.5	14.8	11.0	6.7	*7.2	*4.3	15.4	14.5
Female	21.6	17.7	13.6	10.2	13.5	7.2	*6.5	13.9	13.6
Persons	27.2	18.1	14.4	10.6	9.8	7.2	*5.3	14.8	14.1

* Estimate has a relative standard error of 25% to 50% and should be used with caution.

(a) Used in the previous 12 months.

(b) Smoked daily, weekly or less than weekly.

Table 2 Prevalence of ENDS ((both nicotine and non nicotine) stratified by demographics, Australia 2013

Source: Unpublished data from the Australian Institute of Health and Welfare. National Drug Strategy Household Survey, 2013 [computer file]. Canberra: Australian Data Archive, The Australian National University, 2015, cited in Greenhalgh, E Ch 18, Potential for harm reduction in tobacco control, in Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2015. To be available from http://www.tobaccoinaustralia.org.au/

Demographic variable		Used ENDS in last 12 months	Have used ENDS, but not in last 12 months
		% within each demo category	
All (14+ years)		3.2%	1.2%
Gender	Male	4.0%	1.5%
	Female	2.5%	1.0%
Age group	14-17 years	4.3%	1.7%
	18-24 years	7.3%	2.2%
	25-29 years	5.4%	2.5%
	30-39 years	3.8%	1.3%
	40-59 years	2.3%	0.8%
	60+ years	0.9%	0.6%
SEIFA	Low SES	3.9%	1.2%
	Mid SES	3.0%	1.2%
	High SES	2.6%	1.3%
State	NSW	2.8%	1.2%
	Victoria	2.9%	1.2%
	Queensland	3.7%	1.3%

Demographic variable		Used ENDS in last 12 months	Have used ENDS, but not in last 12 months
		% within each demo category	
	Western Australia	4.0%	1.4%
	South Australia	3.4%	1.0%
	Tasmania	3.5%	0.9%
	ACT	3.0%	0.5%
	Northern Territory	6.0%	2.8%
Smoking status	Daily smoker	15.3%	4.0%
	Weekly smoker	14.5%	4.2%
	Less than weekly smoker	10.7%	4.0%
	Ex-smoker	1.8%	1.3%
	Non-smoker (<100 cigs)	0.8%	0.5%
Current smoker (smoked in the past 12 months)	Yes	15.0%	4.0%
	No	1.0%	0.7%

*N = weighted by absolute person weights, so 'n' represents number within Australian population (of those who answered relevant questions)

SEIFA – Socio-Economic Indexes for Areas

SES – Socio-Economic Status

Correlation with smoking variables: Smoking tobacco is strongly correlated with ENDS use. Daily smokers, smokers who smoke more than 20 cigarettes per day, users of both factory-made cigarettes and roll-your-own tobacco, those who unsuccessfully attempted to reduce their consumption in the past 12 months, and those who unsuccessfully tried to quit in the last 12 months are most likely to be users of ENDS (see Tables 2 and 3)

With regard to quit smoking intentions, smokers who intend to quit in the next 30 days report the highest level of use at 21.7% (see Table 3), followed by those who plan to quit in the next 1 to 2 months (16.6%) and those who plan to quit in 3 months plus (14.4%). 12% of smokers not planning to quit have used ENDS in the past 12 months and 10.8% of smokers who already quit have used an ENDS in the past 12 months.

Data from the Cancer Institute NSW's Tobacco Tracking Survey of adult smokers and recent quitters, show that 9% of survey participants (total *n*=1951) reported current use of ENDS, with 6% using them at least monthly.(13) ENDS users were more likely to be males, younger, and lighter smokers. Common reasons for using ENDS were 'to help me quit smoking' (34%), 'to cut down on the number of cigarettes I smoke' (26%), 'they are not as bad for your health as cigarettes' (17%), and 'so I can smoke in places where smoking cigarettes is not allowed' (13%). Of those who had quit or tried to quit in the past 12 months, 12% used ENDS to help them quit (vs. 26% for NRT, 15% for prescription medications).

Table 3 Prevalence of ENDS use (both nicotine and non nicotine) among current smokers age 18+ stratified by demographics and smoking variables, Australia 2013

Source: Unpublished data from the Australian Institute of Health and Welfare. National Drug Strategy Household Survey, 2013 [computer file]. Canberra: Australian Data Archive, The Australian National University, 2015, cited in Greenhalgh, E Ch 18, Potential for harm reduction in tobacco control, in Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2015. To be available from http://www.tobaccoinaustralia.org.au/

		Used ENDS in last 12 months	Have used ENDS but not in last 12 months
All current smokers aged 18+ years (includes those who smoked in the past 12 months)		% within each demo category	
		14.2%	3.9%
SEIFA	Low SES	15.0%	3.3%
	Mid SES	13.0%	4.1%
	High SES	15.2%	5.5%
State	NSW	13.6%	4.6%
	Victoria	12.4%	4.1%
	Queensland	15.8%	3.4%
	Western Australia	14.5%	4.2%
	South Australia	16.7%	1.6%
	Tasmania	14.6%	3.0%

	ACT	16.6%	3.4%
	Northern Territory	17.4%	5.7%
Type of tobacco smoked	FMC only	13.4%	3.6%
	RYO only	15.1%	2.9%
	FMC and RYO	18.7%	5.8%
	Neither FMC or RYO	10.3%	3.2%
Cigarettes per day	Less than 10	14.2%	3.8%
	10-20	13.7%	4.0%
	More than 20	16.3%	4.2%
Quit intentions	Have already given up	10.8%	3.1%
	Within 30 days	21.7%	3.6%
	Within 1-2 months	16.6%	3.9%
	Yes, but not within 3mths	14.4%	3.9%
	Not planning to quit	12.0%	4.1%
Attempted to quit in past 12 months	Did not attempt to quit	11.9%	4.4%
	Quit for 1+mnth	12.4%	2.5%
	Unsuccessfully tried to quit	20.9%	3.6%
Attempted to reduce consumption in past 12mths	Did not reduce consumption	13.2%	3.6%
	Reduced consumption	14.6%	4.3%
	Unsuccessfully reduced	21.0%	3.8%
Attempted to switch to lower tar/nicotine brand	Did not switch brands	13.9%	3.8%
	Successfully switched	20.2%	4.5%

	Unsuccessfully switched	21.9%	4.4%

*N = weighted by absolute person weights, n represents number within Australian population (of those who answered relevant questions)
FMC – Factory-Made Cigarettes
RYO – Roll-Your-Own

Data from the International Tobacco Control survey (ITC), a survey of a cohort of 1500 Australian adult smokers and former smokers, suggest that ENDS use prevalence increased between 2010 and 2013.(14) Among current and former smokers:

- levels of awareness of ENDS increased from 20.0% in 2010 to 64.8% in 2013;
- 19.7% had tried ENDS in 2013, compared to 2.2% in 2010;
- 6.6% were current users, this included any use of ENDS in 2013 ranging from daily use to less than monthly use, compared to 0.6% in 2010; and
- among the current users in 2013, 42.5% reported that their ENDS brand contained nicotine and 21.1.% reported not knowing if their brand contained nicotine.

Australia - vulnerable populations

According to Australian Institute of Health and Welfare data, smokers from more disadvantaged socioeconomic communities were slightly more likely to have ever used an ENDS in the last 12 months (3.9% compared to mid SES, 3.0%, and high SES, 2.6%). Differences in ENDS use are not as marked across SES groups as for smoking tobacco, and ever use outside of the last 12 months was consistent across all three SES groups.

Among current smokers, analysis by SES groups shows similar proportions of people from low and high SES having used ENDS within the past 12 months (15% and 15.2% respectively); mid SES current smokers had marginally lower use at 13%. ENDS use outside of the past 12 months was highest among high SES (5.5%) and lowest among low SES groups (3.3%). Given the low numbers and with data being available for one time point only, it is difficult to interpret this data, but it does not yet appear that there are major differences in the proportion of ENDS use across SES groups. However, as smoking prevalence is higher in low SES groups, the total number of people using ENDS is also likely to be higher in low SES groups.

Data on ENDS use among other vulnerable populations in Australia including mental health consumers, culturally and linguistically diverse communities, pregnant women, and Aboriginal and Torres Strait Islander people could not be located.

Data from surveys of Australian psycho-stimulant users and people who inject drugs suggest substantially higher prevalence of ENDS use among these populations.(15) (See Table 4) Frequency of use is low with a median of only 3 days use in the past 6 months among recent users. Given that recent ENDS users (in these two populations) were not less likely to have used tobacco compared to non-users, it appears that ENDS are being used primarily for recreational or experimental purposes, rather than as an alternative to tobacco or as a smoking cessation tool.(15)

Table 4 Prevalence of ENDS use among regular psycho-stimulant users and people who inject drugs, Australia 2014

ENDS	Ecstasy and Related Drugs Reporting System[1] (n=800)	Illicit Drug Reporting System[2] (n=898)
% ever used	51	25
% recent use	34	17
Median days recent use (previous 6 months)	3	3
Range of days used	1-180	n.a.

[1]Sindicich, N. & Burns, L. (2015). Australian Trends in Ecstasy and related Drug Markets 2014. Findings from the Ecstasy and Related Drugs Reporting System (EDRS). Australian Drug Trends Series No. 136. Sydney, National Drug and Alcohol Research Centre, UNSW Australia.

[2]Stafford, J. and Burns, L. (2015). Australian Drug Trends 2014. Findings from the Illicit Drug Reporting System (IDRS). Australian Drug Trend Series. No. 127. Sydney, National Drug and Alcohol Research Centre, UNSW Australia.

United Kingdom [UK]

According to the 2010 and 2013 ITC survey, ENDS awareness, trial and current use has also increased among current and former smokers in the UK:

- awareness of ENDS rose from 54.4% (2010) to 90.5% (2013) in the UK;
- 39.9% had tried ENDS in 2013, up from 9.6% in 2010;
- current ENDS use (ranging from daily to less than monthly) increased from 4.5% in 2010 to 18.8% in 2013; and
- 73.1% reported that their current brand contained nicotine and 9.0% reported not knowing if their current brand contained nicotine.

A 2012 study based on survey samples of an online panel, found that ENDS trial among non-smokers in the UK was low, at around 0.5%.(16)

Comparison with Australia: Overall, awareness, trial and current use of ENDS is higher in the UK among current and former smokers than in Australia. In both countries, younger people were more likely to have tried ENDS, but fewer of the younger people who had trialled ENDS were current users. Interest in quitting was a strong predictor of greater awareness, trial, and use of ENDS in the UK but only predicted greater trial in Australia. Between 2010 and 2013, awareness, trial, and current use of ENDS increased markedly among adult current and former smokers in both Australia and the United Kingdom,

albeit reaching much higher absolute levels in the United Kingdom by 2013. Despite the differences in ENDS regulatory environments between the UK and Australia, there was no evidence of a difference in trend in the rate of increase in awareness, trial or current use of ENDS by current and former smokers between the two countries across the 3-year study.(14)

United States [US]

A cross-sectional survey representing a national probability sample of US adults was administered in 2010, 2011, 2012, and 2013 and found that there has been rapid growth in ever and current ENDS use over the 4-year period.(17) Use is highest among young adults and current cigarette smokers. The survey included both smokers and non-smokers and shows that:

- ever use of ENDS increased from 1.8% (2010) to 13.0% (2013), current use increased from 0.3% (2010) to 6.8% (2013) (current use included those who stated that they now use ENDS every day or some days)
- current use among young adults age 18–24 (14.2%) was higher than older adults age 25–44 (8.6%), 45–64 (5.5%), and 65+ (1.2%);
- daily smokers (30.3%) and non-daily smokers (34.1%) were the most likely to currently use ENDS, compared to former smokers (5.4%) and never smokers (1.4%); and
- 12.8% of current ENDS users are never smokers, 5.8% are long term (more than five years) former smokers, 67.4% are current smokers, and 14.1% are recent quitters (less than five years).

US: Youth Prevalence Data

The 2014 National Youth Tobacco Survey, published by the Centers for Disease Control and Prevention and the U.S. Food and Drug Administration's Center for Tobacco Products, shows that:

- current ENDS use (use on at least 1 day in the past 30 days) among high school students increased from 4.5% in 2013 to 13.4% in 2014(18);
- among middle school students, current ENDS use more than tripled from 1.1% in 2013 to 3.9% in 2014; and
- current ENDS use among high- and middle-school students has surpassed current use of every other tobacco product overall, including conventional cigarettes (9.2% of all high-school students and 2.5% of middle-school students).

Comparison with Australia: Trialling and current use of ENDS appears to be higher in the US than in Australia. This may be due to the different regulatory environment in the US for ENDS (See the country regulation review section of this paper). As prevalence is measured quite differently, direct comparisons are somewhat problematic. However, in

the US current ENDS use (defined as use on at least some days) among daily smokers is reported as 30.3%, whereas in Australia only 15.3% of daily smokers reporting having used an ENDS in the last 12 months (2013 data). Dual use of both ENDS and cigarettes is then common in the US. ENDS use among US youth also appears to be much higher than in Australia. But again, as prevalence is measured and reported differently direct comparisons are challenging.

Canada

According to data from the 2013 Canadian Tobacco, Alcohol and Drugs Survey (CTADS), which includes non-smokers as well as current and former smokers:

- 9% of all Canadians age 15 and older reported having ever tried an ENDS;(19)
- 2% of all Canadians age 15 and older reported having used an ENDS in the past 30 days;
- ever-use of ENDS was 37.3% among current smokers, compared to 3.6% among non-smokers;
- past 30-day use was 9.6% among current smokers and 0.5% among non-smokers;
- prevalence of ENDS use is highest among young people with one in five youth (aged 15-19) and young adults (aged 20-24) ever having tried an ENDS; and
- 25% of ENDS users reported that the last ENDS they had used contained nicotine, and nearly 20% of users did not know if there was nicotine in their last ENDS.

Comparison with Australia: Data on trialling and current use of ENDS among smokers appear to be comparable to Australia. Again, similar to Australia, young people were more likely to have trialled ENDS. ENDS containing nicotine cannot be legally sold at retail in Canada, as is the case in Australia (See section 3 for more details).Trial and current use among Canadian non-smokers is low, just as it is in the UK.

New Zealand

Data from a biennial face-to-face in-house survey of New Zealand adults aged 15 years or over, show that in 2014:

- ever-use and current use (defined as at least once a month) of ENDS were 13.1% and 0.8% (there were only 31 current users of cigarettes among the 2594 survey participants);
- ever-use was very common among current smokers at 49.9% compared with an ever-use rate of 8.4% among ex-smokers and 3.4% among never smokers;
- a higher rate of current ENDS use was reported by current tobacco smokers (dual use of ENDS and cigarettes) at 4% with only 0.1% of ex-smokers and non-smokers reporting current use;
- the most common reason reported for trying ENDS was curiosity at 57.1%, followed by quit smoking completely at 31.3%; and

- 17.8% of current ENDS users could not name the brand they used.

Comparison with Australia: Compared with US, UK, Australia and Canada, New Zealand has a high rate of ever use (or trialling) of ENDS, but this has not resulted in high levels of current use. As has been reported in the other countries, young adults were more likely to have trialled ENDS. ENDS are regulated similarly in New Zealand as in Australia, but New Zealand has not yet adopted some tobacco control policies, such as plain packaging. New Zealand has also had other polices such as tobacco retail display bans and on-pack graphic health warnings in place for less time than Australia.

2.3 International ENDS market

BAT (the tobacco company with the largest market share in Australia) was the first international tobacco company to launch a cigalike disposable tobacco product, Vype. (See Figure 4 for a summary of BAT ENDS product development in the UK.)

Figure 4 BAT UK ENDS development

Source: Euromonitor International

The best available data on the ENDS retail market come from the US. One such study examined Nielsen national market scanner data to assess sales volume, market share and growth in 2012 and 2013 at convenience stores, drug stores, grocery stores, and mass merchandisers.(20) The researchers found:

- ENDS sales more than doubled between 2012 and 2013, from $273.6 million to $636.2 million
- Growth was strongest in convenience stores
- Blu eCigs quickly became the best-selling brand and in 2013 constituted nearly half (44.1%) of overall sales
- Unflavoured and menthol ENDS dominated the market

- Disposable ENDS sales increased by 216.4%, a much faster rate than multi-unit packs and cartridge refills

The study did not include online retailer data or data from specialised "vaping" shops, so therefore underestimates total sales volume.

As of April 2015, the top four mainstream ENDS brands in the U.S. are owned by tobacco companies following JTI's agreement to purchase the Florida-based ENDS firm, Logic.

The popularity of open "tank" systems appears to be overtaking the cigalike ENDS. According to Wells Fargo Securities, open system vaporizers now contribute more than $1.5 billion to the overall electronic vaporizer market in the U.S., with cigalike electronic cigarettes accounting for $1 billion. In the US, the combined electronic vaporizer market is estimated at $2.5 billion. Open system vaporizers are suggested to be a lower-cost vaping option, with the weekly spend for an open system user estimated to be 30% less than that of a cigalike user.(21) The tobacco industry stake in the open tank system ENDS market is currently small.

A significant portion of ENDS business appears to be conducted on the internet, although it is difficult to ascertain the exact volume, but is estimated to be as much as 30–50% of total ENDS sold.(22) A study examining the availability and type of ENDS online found that(22):

- there are more than 460 brands and 7700 flavours of ENDS available online for purchase;
- a comparison of two online searches for these brands in August 2012 and January 2014 found the number of brands increased by 10.5 per month and 242 new flavours emerged;
- older brands were more likely than newer brands to anchor themselves to conventional cigarettes; and
- newer websites were more likely to offer eGos and mods (tank style ENDS), which allow users to manipulate nicotine content or add other ingredients.

2.4 Health effects of use and second-hand exposure to ENDS

Propylene glycol or glycerol and their by-products

Propylene glycol (PG) or glycerol, commonly used in ENDS as stabilising compounds, are known to irritate the upper airway and to dry out mucous membranes and eyes but have not been shown to have cytotoxic effects.(12) PG can form propylene oxide, classed as a Group 2B carcinogen (*possibly carcinogenic to humans*) by the International Agency for Research on Cancer (IARC), when heated and vaporised.(23) There is also a growing body of evidence that formaldehyde, a Group 1 carcinogen (*carcinogenic to humans*), (24) can be formed in the vaporisation process.(23, 25-27)There is, however, some debate as to whether ENDS have the potential to generate significant formaldehyde exposure under normal user puffing conditions. (28-31)

Burstyn, in a comparison of the exposure to aerosols and liquids through ENDS use and occupational safety standards funded by the Consumer Advocates for Smoke-free Alternatives Association, concludes that of all known contaminants found in ENDS aerosols and liquids, only PG and glycerol specifically deserve attention, and even then only on a precautionary basis.(32) However, Grana et al note that such comparisons may be unwarranted because threshold limit values used in occupational settings are not suitable for assessing health effects for population-level exposures.(23) Moreover, it is noteworthy that there were less than ten studies contributing the data summarised in the Burstyn review and that a few results of potential concern (e.g. high formaldehyde, ethylene glycol, acrolein) were ruled out on the basis that they were not representative, or were not found in other studies, or that there appeared to have been some misuse of the product.

PG has been classified by the USA Food and Drug Administration (FDA) as safe for use in mist generators, commonly used for theatrical effect.(33) There is evidence, however, that acute exposure to such mists may reduce lung function, although this evidence comes from just one study in a small sample of healthy adults.(9) Indeed, Dow Chemicals, a major manufacturer of PG, advises that inhalation of PG should be avoided.(34) While it must be acknowledged that the comparison between PG in mist generators and ENDS is somewhat irrelevant due to the very different patterns of exposure, it nonetheless highlights the potential long-term effects of inhalation of PG.(9, 33) Daily vapers take some 200 inhalations per day (equivalent to 73,000 inhalations per year).(35) Few people would be exposed to such levels of PG through other means. Currently available data are not sufficient to determine the safety of these compounds for long-term, regular users of ENDS.(12)

Nicotine

Nicotine is included in most ENDS, including some marketed as not containing nicotine.(36) The amount of nicotine has been shown to vary considerably, both across different ENDS products and in the same product.(9, 12) Further, the amount declared on product labelling has been found to differ from the measured amount by up to 50%.(9) While data from smoking machines suggest that ENDS deliver less nicotine per puff than conventional cigarettes, studies with ENDS users suggest that experience plays a significant role in the amount of nicotine absorbed.(37) More experienced users can achieve similar nicotine and/or cotinine concentrations as those found after use of conventional cigarettes.

Nicotine is rated as a schedule 7 poison in Australia except when in tobacco products or in approved therapeutic products.(38) To put this into perspective, this is the same classification as strychnine, cyanide, and arsenical pesticides. These classifications are based largely around the low estimates of the acute dose causing lethal toxicity in mammals. Nicotine is poisonous if ingested, inhaled, or absorbed through the skin or eyes at high levels in its pure form.(39) That said, the risks of acute life threatening nicotine toxicity are low except if there is deliberate or accidental oral ingestion of the ENDS fluid. However, it should be noted that small children are at particular risk of

accidental exposure due to the lack of child-resistant containers and the often bright and attractive packaging that could appeal to children.

Nicotine specifically for smoking cessation purposes, when prepared as required by Australian law, must be approved by the TGA for sale in Australia. Notably, products approved by the TGA for sale in Australia for this purpose are slow release preparations absorbed through the user's skin or lining of the mouth, and also have other risk mitigations, e.g. consumer medical information and appropriate packaging. The risk profile of these products has been shown to be low.

The specific health effects of nicotine have been difficult to ascertain due to the many other harmful chemicals found in conventional cigarettes.(39) There are a great many potentially serious risks from long-term nicotine exposure raised by animal and mechanistic studies but human data that are not confounded by a smoking history are largely lacking. Nonetheless, nicotine is known to affect heart rate and blood flow and may be a risk factor for diabetes.(4, 39)

The 2014 US Surgeon General's report concluded that:(40)

1. The evidence is sufficient to infer that at high-enough doses nicotine has acute toxicity.
2. The evidence is sufficient to infer that nicotine activates multiple biological pathways through which smoking increases risk for disease.
3. The evidence is sufficient to infer that nicotine exposure during fetal development, a critical window for brain development, has lasting adverse consequences for brain development.
4. The evidence is sufficient to infer that nicotine adversely affects maternal and fetal health during pregnancy, contributing to multiple adverse outcomes such as preterm delivery and stillbirth.
5. The evidence is suggestive that nicotine exposure during adolescence, a critical window for brain development, may have lasting adverse consequences for brain development.
6. The evidence is inadequate to infer the presence or absence of a causal relationship between exposure to nicotine and risk for cancer.

Nicotine is not currently considered to be a direct carcinogen by leading cancer agencies, although it is thought to be a tumour promoter.(41) Recent laboratory research results indicate that nicotine induces genomic variations, promotes instability potentially mediated by oxidative stress, implicating nicotine in carcinogenesis, and establishes MUC genes as potential targets (MUC genes provide instructions for making proteins called mucins which make up mucus in the body).(42) That said, a large longitudinal study of Swedish male construction workers found that exclusive users of snus (smokeless tobacco) had similar increased risks of cancer-specific death (from all cancers combined) to exclusive smokers, suggesting that nicotine may play a role in cancer causation; potential confounding variables in the study render this evidence equivocal however.(43) As a result of studies such as this there have been recent calls for further investigation of the role of nicotine in cancer causation(41) and the IARC has identified nicotine as a high priority for review.(44)

Any potential health effects are made more salient due to nicotine being highly addictive.(45) A review by Evans and Hoffman identified two studies that examined the potential addictiveness of ENDS compared to conventional cigarettes.(46) Both studies concluded that ENDS may have a lower addiction potential than conventional cigarettes, although there were significant selection biases evident in the design of the studies. On the other hand, a review by Palazzolo found that it was unclear whether ENDS decrease or increase addiction.(47)

Flavourings

Flavourings are often added to ENDS cartridges but they are often not listed on packaging other than in general terms like "artificial flavours".(33) The US Flavor and Extract Manufacturers Association (FEMA) has advised that none of the major safety assessment programs for flavourings evaluate the use of such flavourings as inhalants and has advised ENDS manufacturers and marketers that marketing the flavourings used in their products as approved by FEMA is misleading.(48) Moreover, a study by Tierney et al notes that many of the flavour chemicals are aldehydes, which have been associated with respiratory irritation.(49) They conclude that regulatory limits should be considered, as should ingredient labelling. Current evidence suggests that some flavourings may be cytotoxic but that they appear to have no effect on particle number of size distribution, which is important when considering the potential health effects of the particulate matter generated by ENDS (discussed further below).(23) Based on the findings of the literature review, no data were available on the short- or long-term health effects of inhalation of these flavourings.

Particulate matter

Nicotine in ENDS is delivered by creating an aerosol of ultrafine particles, with the number of and size distribution of particles similar to that in conventional tobacco products. (23) Particle delivery appears dependent on the level of nicotine in the e-liquid. While it is unclear what effect ultrafine particles in ENDS aerosols have on health, frequent, low-level exposure to fine and ultrafine particles from tobacco smoke or air pollution has been shown to contribute to inflammation and increased risk of cardiovascular and respiratory morbidity and mortality.

Other chemicals

Other harmful chemicals have been detected in ENDS, although mostly at trace levels.(4, 50) Of particular concern are tobacco-specific nitrosamines (TSNAs) and diethylene glycol (DEG).(2, 9) TSNAs have long been known to be carcinogenic,(51) while DEG is toxic and has been responsible for numerous mass poisonings around the world.(52) Cahn et al contend that neither chemical has been detected at large enough levels or consistently enough to warrant significant concern regarding ENDS.(2) They conclude that the amount of TSNAs detected in ENDS is comparable to that found in conventional nicotine replacement therapies (and between 500 to 1400 times less than that found in conventional cigarettes). Similarly, DEG was detected in only one cartridge out of 18

tested, with no other study detecting it. Drummond and Upson, on the other hand, point out that the levels of carcinogens and toxins, including TSNAs, typically exceeded the amount measured in FDA-approved nicotine inhalers.(9)

2.5 Cessation and reducing consumption of conventional tobacco products

Risk of dependence for inhaled nicotine aerosols

The high potential dependence risk associated with the inhalation of nicotine aerosols compared with NRT products is an important issue. Some ENDS have been shown to have a similar nicotine absorption profile to conventional cigarettes (i.e. very rapid absorption and a subsequent rapid fall) in experienced users.(53, 54) The rapid onset and offset of nicotine is key to the development of dependence.(55) This is very different to the profile of NRT products, which are generally absorbed slowly,(56) meaning that they have low potential for long-term dependence and therefore can assist with a move to a non-dependent non-smoking state.(57)

Smoking cessation

In addition to the systematic reviews highlighted in the discussion paper, we identified four significant primary studies published in five papers not included in the reviews.

Biener and Hargraves conducted a longitudinal study of a sample of US smokers in 2011-2012.(39) They found that daily users of ENDS were six times as likely as non-users to report that they quit smoking, with no such relationship evident for intermittent users. Indeed, intermittent users significantly decreased their belief that they would have quit smoking in one year.

The authors concluded that daily use of ENDS was associated with smoking cessation but noted that only 51% of those contacted at baseline completed the follow-up survey, creating the possibility of important attribution biases. Further, we note that intensive users represented the highest proportion (63%) whose readiness to quit *decreased* between baseline and follow-up. In the light of these features of the study, the results may be regarded as equivocal regarding the possibility that ENDS use may lead to reduced motivation to quit smoking.

The English Smokers Toolkit Study is a continuing study of English smokers that commenced gathering data from July 2009. Three reports have been published from the study on the associations between smoking cessation and ENDS use, the first of which reported on pooled cross-sectional self-reported data obtained from adult smokers between July 2009 and February 2014.(40) This study found that ENDS users were more likely to be abstinent from smoking than either those using NRT bought over-the-counter or those who used no aid on their last quit attempt. However, as this study was cross-sectional it cannot be used to infer causality between method of cessation used and outcome. The authors emphasise this stating that it “was not possible to assess all factors that may have been associated with the self-selection of treatment and we

cannot rule out the possibility that an unmeasured confounding factor is responsible for the finding". This study was excluded from the Cochrane review as it was a cross sectional study.

Two later papers from the same study provide stronger evidence about longer term use of ENDS and cessation.(41, 42) Both papers report on the same study that followed up smokers for 12 months who made a quit attempt. These two papers were able to differentiate between casual, occasional, and very light ENDS users and intensive (daily) users.

The first paper found that there was no evidence that daily ENDS use per se is superior in cessation to either non-daily use or to non-ENDS use.(41) Moreover, the study demonstrated that by far the most common outcome for daily ENDS users after one year of follow-up was continuing dual use (cigarettes and vaping): 91.9% of daily vapers at baseline were either dual using at follow-up or had gone back to smoking. Several limitations of the study should be noted. The follow up rate was 43%, resulting in small sample sizes for some analyses. Respondents who were followed-up differed from those not followed-up on some demographic variables, specifically age and gender, potentially reducing the generalizability to younger and female smokers (however, key smoking characteristics and ENDS use were not associated with follow-up). Also, those initiating ENDS use during the follow-up period were included with baseline non-users. Any short-term use of ENDS around baseline and uptake during follow-up will therefore have led to an underestimation of their effects on quit attempts and cessation. Additionally, the baseline sample by including only smokers would have excluded any recent ex-smokers who had used ENDS and successfully quit, thus potentially biasing the sample in favour of 'treatment failures'.

The second paper (42) reported on differences in cessation outcomes between users of different types of ENDS: "cigalikes" (first generation ENDS) and "tank" systems (second and third generation ENDS). The study found that daily and non-daily cigalike users and non-daily tank users were less likely to have quit smoking since baseline but that daily tank users were more likely to have quit, compared to no ENDS use at follow-up. This suggests that the type and frequency of use of ENDS may impact on quitting. However, the authors note that the study may have significantly over-sampled vapers (36% had used ENDS on a daily or less than daily basis in the last 12 months compared to 18% of the general smoking population). This brings the population generalisability of the study's results into question.

Borderud et al conducted a longitudinal study of cancer patients who smoke and were enrolled in an organised smoking cessation program.(43) Controlling for level of addiction, the study found that ENDS users were no more likely to have quit smoking than non-users. Further, using an intention-to-treat analysis, ENDS users were twice as likely to be smoking at the time of follow-up as non-users. Although the generalisability of these findings is limited, the study suggests that ENDS may not be useful for facilitating smoking cessation in cancer patients.

2.6 Marketing

In November 2013, Cancer Research UK published a comprehensive report and research study on the breadth and diversity of ENDS advertising in the UK.(58) ENDS ads are permitted in all forms of media in the UK including: on television, in print media, at point of sale, and online. An analysis of the advertising content and positioning found distinct marketing strategies for two consumer groups emerged: 1) the committed smoker who may be thinking about quitting and 2) the younger social smoker/ non-smoker (Figure 5) In addition the study found that there was extensive evidence of marketing aimed at stakeholders.

Marketing challenge	Alternate strategies		
Who	**Smokers**	**Non- smokers**	**Stakeholders**
Objective	Long-term sales through 'next generation' product, profit-maximisation	Long-term growth through 'next generation' product, profit maximisation	Respectability, distance from tobacco, part of the solution
What	Nicotine, dependence and loyalty, potential cessation aid, dual use (with cigarettes), cutting down	Lifestyle, 'must have' accessory	A lifeline for hardened smokers, harm reduction, public health gain
How	**Product:** safe nicotine, used anywhere **Price:** financial – cheaper than tobacco, psychological – no risk **Promotion:** press, trade press, TV, magazines, social media, sponsorships **Place:** everywhere tobacco is available, company websites, point of sale displays **Positioning:** socially acceptable smoking alternative, necessity	**Product:** innovations like shisha, flavours, lifestyle accessories **Price:** financial –'reassuringly expensive', psychological – cool as can be **Promotion:** lifestyle and celebrity **Positioning:** socially acceptable luxury	**Product**: harm reduction **Price:** financial – priceless, saving lives, psychological – it would be negligent to ignore this offering **Promotion:** health bodies/ experts, charities, politicians **Place:** regulated or unregulated/self-regulated space **Positioning:** reframe perceptions of nicotine use, alternative for those who can't or won't quit

Figure 5 Summary of ENDS marketing strategies

Source: Andrade, Hastings et al. (2013)(58)

Additional research that has examined the amount and nature of ENDS advertising in print, on television and online is primarily focused on the US market. Overall, these studies have found that ENDS marketing has increased in amount and total expenditure over time,(59) is more prevalent than for traditional tobacco products, is included in media channels accessible to youth,(60, 61) and includes content that positions ENDS as a safe or safer alternative to smoking.(62) In terms of the effect these ads may have on smokers, daily smokers had an increased urge to smoke cigarettes after viewing ENDS ads that included images of vaping when compared to smokers who viewed ENDS ads that did not contain vaping images. Former smokers who watched ENDS advertisements with vaping had less confidence that they could refrain from smoking tobacco cigarettes.(63) One systematic content analysis of ENDS website marketing found misleading information - ninety-five percent of the websites made explicit or implicit

health-related claims, 64% had a smoking cessation–related claim. Comparisons to cigarettes included claims that ENDS were cleaner (95%) and cheaper (93%). Eighty-eight percent stated that the product could be smoked anywhere and 71% mentioned using the product to circumvent clean air policies.(64) Several recent studies provide evidence that some ENDS companies are marketing ENDS as smoking cessation aids.(64-67)

Promotions for ENDS are not exclusively a recent phenomenon. A promotional story for Zero Style ENDS appeared in a free entertainment newspaper in Sydney when the product was launched in 2010 (Figure 6).

Figure 6 Promotional story in a Sydney free entertainment newspaper on the launch of Zero Style (2010)

Research from the Cancer Council Victoria assessing non-smokers, smokers, and former smokers' responses to ENDS television and online video advertisements (sourced from the UK and US) found that ENDS ads focusing on personal attributes of users were thought to be more glamorous and had increased appeal than ads focusing purely on product attributes.(68) Ads that included images of vaping reminded people of smoking more than ads that did not include such images. Smokers were most interested in trying the products after viewing the ads, while comparatively fewer former smokers and non-smokers were interested in trying products. However, the researchers concluded that there may be some danger in widespread promotion of ENDS given there was a small number of smokers reporting an urge to smoke after viewing the ads and some young non-smokers reported interest in trying the products after exposure to the ads. Examples of a personal attribute ad and a product attribute ad can be viewed here and here.

No comprehensive or published study has been undertaken of the extent or nature of online ENDS advertising aimed at the Australian market. However, as purchasing of

ENDS online appears to be common,(13) an example of an ENDS website, The Vaper Empire, that prices products for, and ships products to Australia is shown below (Figure 7). The Vaper Empire website suggests that a 25 cigarettes per-day smoker will need to spend $75.00 per month on e-liquids in comparison to $570 per month on cigarettes.

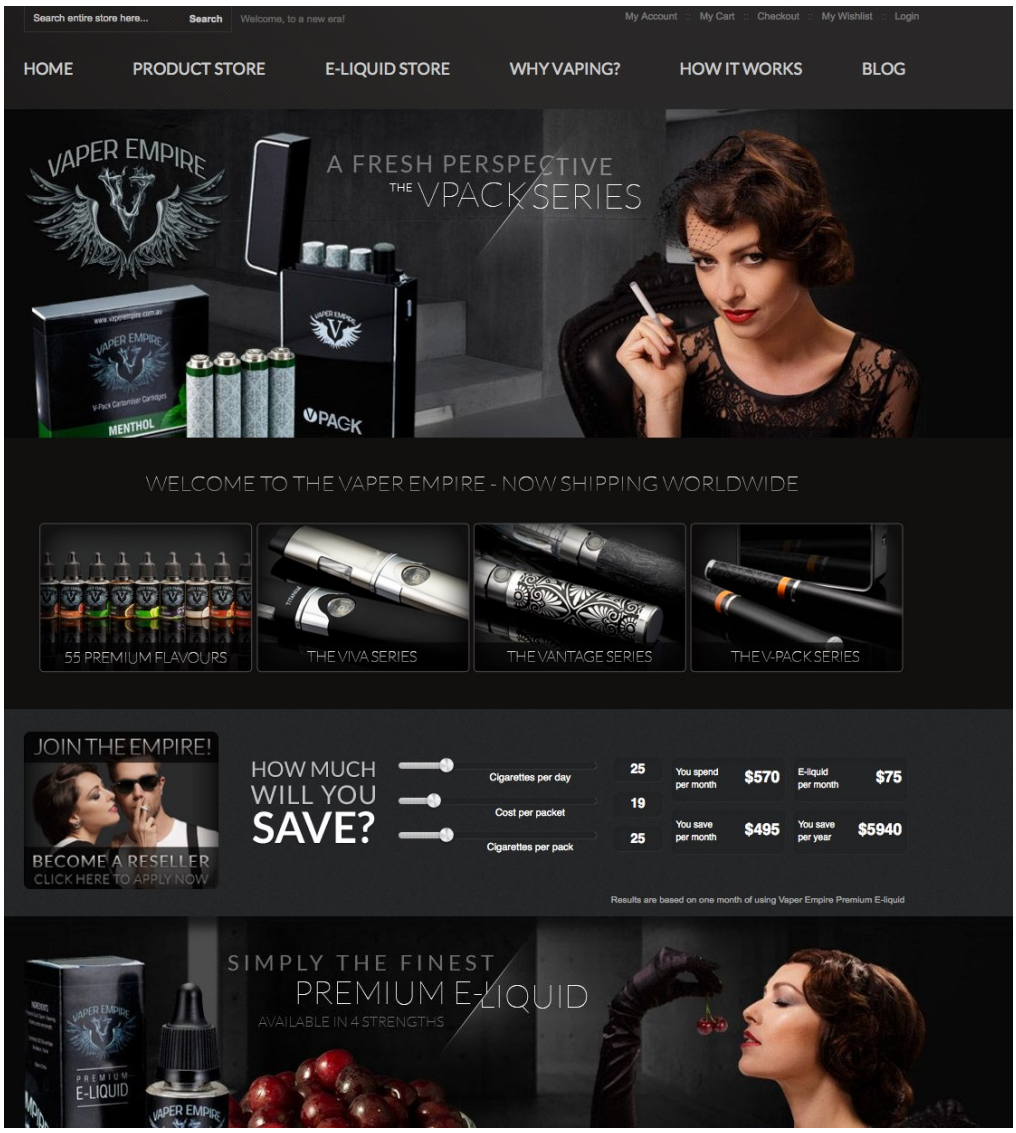

Figure 7 Vaper Empire online ENDS retailer

Source: http://www.vaperempire.com.au/

The online Australian vaping community, aussievapers.com, includes forums discussing and promoting a number of ENDS vendors, including those based in Australia and overseas. Vendors also post online shopping discount codes, special promotions, ads for new products and flavours, and giveaways.(69)

SECTION 3 SITUATION ANALYSIS

3.3 ENDS policy - situation analysis for other jurisdictions - country case studies

Canada

The current ENDS regulatory situation in Canada is very similar to Australia in that ENDS containing nicotine have not been approved for sale. In Canada, ENDS containing nicotine are regulated as drugs and drug delivery devices under the *Food and Drugs Act.* As is the case in Australia, non- nicotine ENDS that do not make health claims are legal for sale with certain exceptions (e.g. Nova Scotia has banned the sale of ENDS to minors [youth under 19]). Despite ENDS containing nicotine not being approved for sale, ENDS are widely available for sale in Canada, including both nicotine and non-nicotine containing ENDS.(53)

In March 2015, a Parliamentary report on ENDS was released by the House of Commons Standing Committee on Health. (54) The Committee heard from a panel of expert witnesses ranging from health organisations, medical professionals, academics, lawyers, ENDS manufacturers and retailers and government agencies. While all witnesses agreed that better regulation of ENDS is needed, how best to regulate these products was contested. Frameworks suggested include regulating ENDS as:

1) tobacco products, under the federal *Tobacco Act;*

2) therapeutic products;

3) consumer products; or

4) a new legislative framework created specifically for ENDS.

- The majority of witnesses who spoke about how electronic cigarettes should be regulated expressed the opinion that none of the existing frameworks (tobacco products, therapeutic products, or consumer products) were suitable;
- nicotine in ENDS is neither a medicine nor a tobacco products and therefore requires its own regulatory framework;
- tobacco regulation was designed to only discourage use, this is not the case with ENDS; and
- ENDS should not require a prescription as this is disproportionate to the product risk profile and will be detrimental to innovation.

The report identifies 14 recommendations, including changes with respect to how ENDS are regulated relative to other tobacco and nicotine products, a series of potential measures with respect to product standards, market and sale, as well as the need for increased research in Canada. The government of Canada has not yet responded to this report but is expected to table a comprehensive response to the report.

Several Canadian provinces, namely Ontario, British Columbia, Nova Scotia and Quebec, have already begun to develop policies for the sale, marketing and use of both nicotine and non-nicotine- ENDS. As of 31 May 2015, the Canadian province of Nova Scotia prohibited the sale of ENDS to persons under 19 years of age, restricted promotions and marketing, and banned using ENDS in workplaces and public places where smoking is

also banned by provincial legislation. Some Canadian municipalities, including Vancouver, have also enacted their own bylaws and prohibit ENDS use in public places including restaurants and bars.

European Union

In February 2014, the European Parliament approved a revised EU Tobacco Products Directive (TPD).(55) The new Directive entered into force in May 2014, with a transition period of two years to allow the 28 Member States to bring national legislation into line with the revised Directive.(56) This means that most of the new regulations will come into effect in the first half of 2016. The focus of the TPD is on standardising ENDS across the EU and improving consumer information and enhancing monitoring of the market.

The revised Directive included a number of regulations that were designed to ensure equal treatment across the EU for ENDS containing nicotine; products that do not contain nicotine are **not** covered by the Directive. The stated primary goal of the regulations is to improve product safety and monitoring of the burgeoning ENDS market. Additionally, the regulations will not apply to medicinal ENDS or medical devices, but will cover all consumer ENDS sold on the EU market. Regulations on flavours, age limits for purchase and advertising that does not have cross border effects are left to individual member states. Monitoring and reporting on all developments relating to ENDS – including market and health-related developments – has been built into the Directive.

Specifically the TPD requires:

- mandatory text health warnings on ENDS packs:
    - "This product contains nicotine which is a highly addictive substance. It is not recommended for use by non- smokers." or
    - "This product contains nicotine which is a highly addictive substance."
- no promotional elements on ENDS packs;
- inclusion of instructions on their use, information on addictiveness and toxicity, a list of all substances contained in the product and information on nicotine content;
- child and tamper-proof containers, cartridges and tanks and protection against leakage;
- with the exception of nicotine, only ingredients that do not pose a risk to human health in heated or unheated form are permitted;
- a maximum nicotine concentration level for ENDS of 20 mg/ml; and maximum volume of liquid containing nicotine in refill containers not exceeding 10 ml and of 2 ml in cartridges or tanks and disposable electronic cigarettes or in single use cartridges; and
- delivery of nicotine dose at consistent levels under normal conditions of use.

Additionally, ENDS manufacturers will be required to:

- notify Member States before placing new products on the market. This includes information on the manufacturer, the ingredients used and emissions, nicotine dose and uptake, product and production process, and a declaration that the

manufacturer takes full responsibility for the quality and safety of the product under normal use;
- report annually to Member States on the sales volumes of the products, types of users, and their preferences and trends; and
- comply with specific rules on advertising, including existing rules that apply to conventional tobacco products on cross-border advertising and promotion.

United Kingdom

Currently in the UK ENDS are regulated as general consumer products, which mean they are generally readily available for sale and there are no restrictions on their nicotine content.(57) Once the EU TPD comes into effect in May 2016, ENDS containing up to 20mg/ml of nicotine will come under the TPD. Above that level, or if manufacturers and importers decide to opt into medicines regulation, such products will require authorisation by the Medicines and Healthcare Products Regulatory Agency (MHRA) as over the counter medicines in the same way as nicotine replacement therapy. Currently in the UK, any nicotine product that claims or implies that it can treat nicotine addiction is considered to be a medicinal product and is therefore subject to regulation by the MHRA. Products, including those with and without nicotine, which do not make these claims, can be freely sold.

On 12 September 2014, Kind Consumer, a healthcare research and development company, announced that it had been granted marketing authorisation from the MHRA for a novel nicotine inhaler. The product called Voke, was developed with the company's partner, Nicoventures, a wholly-owned subsidiary of British American Tobacco [BAT]. It is not yet available for sale but according to February 2015 media reports, "BAT has reached the second stage of its bid to bring the device to market, after being awarded a variation to its license from the UK Medicines and Healthcare products regulatory agency." (58)

The company website states that: "Unlike traditional ENDS, Voke does not require elevation in temperature to heat a nicotine formulation to vapour. Voke works on a pressurised system that atomises a nicotine formulation into fine droplets, capable of lung absorption. It comes in a refill pack containing one stick. Each stick provides a dose of approximately 0.43mg, and is able to be refilled 20 times." The product is shaped and coloured like a typical, traditional cigarette. (See figure 8 and 9.)

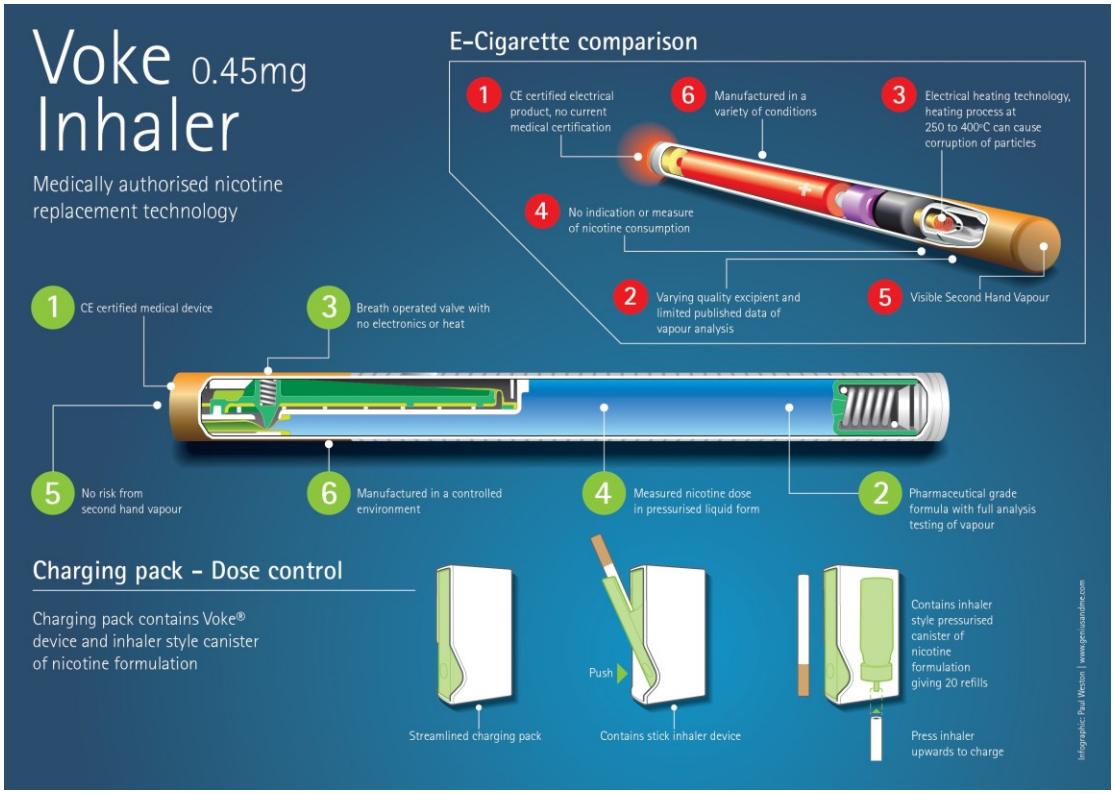

Figure 8 . The Voke inhaler, developed by the British American subsidiary, Nicoventures

Source: http://www.kindconsumer.com/products/voke-inhaler-technology

Figure 9 The Voke inhaler, developed by the British American subsidiary, Nicoventures

Source: http://www.kindconsumer.com/products/voke-inhaler-technology

Advertising

ENDS advertising is permitted in the UK, including on television.(59) The Committee on Advertising Practice (CAP) has published rules on the advertising of electronic cigarettes to cover the interim period until the TPD comes into effect:

- Ads must not be likely to appeal to people under 18;
- People shown using ENDS must not be nor seem to be under 25;
- Ads must not be directed at people under 18 through the selection of media or the context in which they appear;
- Ads must not encourage non-smokers or non-nicotine users to use ENDS; and
- Ads must make clear that the product is an ENDS and not a tobacco product.

At least four ENDS television ads and an ENDS poster have been banned for violating these rules by appearing to glamorise smoking and encouraging use among former smokers.(60-62)

Sales to minors

In England and Wales, it is no longer legal to sell ENDS to people under age 18 as of 1 October 2015.(63)

Smoke-free laws

ENDS are not included in smoke-free laws. However, several national coffee shop, restaurant, and pub chains have banned indoor ENDS use. Museums and public transport have also banned indoor ENDS use.(64)

United States

Compared to Australia, there is currently very little regulation of ENDS in the US. The Food and Drug Agency (FDA) Center for Drug Evaluation and Research (CDER) only has the authority to regulate the sale or use of ENDS that are marketed for therapeutic purposes. The FDA has issued a proposed rule that would extend the agency's tobacco authority to cover additional products that meet the legal definition of a tobacco product, such as ENDS. All public comments regarding the proposed rule were to be submitted to the FDA by 8 August 2014. A final decision on this proposed rule has not yet been announced.

Should ENDS be deemed to fall under FDA tobacco regulatory authority then the following regulations will apply to manufacturers and retailers of ENDS:

- register with FDA and report product and ingredient listings;
- only market new tobacco products after FDA review;

- only make claims of reduced risk if FDA confirms that scientific evidence supports the claim and that marketing the product will benefit public health as a whole;
- not distribute free samples;
- minimum age and identification restrictions to prevent sales to underage youth (although several states already ban the sale of ENDS to minors);
- requirements to include health warnings; and
- prohibition of vending machine sales, unless in a facility that never admits youth.

In a completely separate process to this proposed rule change, the FDA has held three public workshops and a written consultation process to gather scientific information and stimulate discussion among scientists about ENDS.(65) The final of these workshops was held in June 2015 and to date no report has been issued.

Smoke-free laws

A number of US states and local-level jurisdictions include ENDS in smoke-free laws.(66) At the federal level, the U.S. Department of Transportation has stated that it interprets the federal regulations that prohibit smoking on airplanes to apply to ENDS.

Sales to minors

A number of US states (e.g. California) ban the sale of ENDS to minors under age 18.(67)

Taxation

In the United States, only Minnesota imposes an excise tax on ENDS.(68) In October 2012, the US state of Minnesota, Department of Revenue clarified its position that the state's tobacco products tax applies to electronic smoking devices. Electronic smoking devices that contain nicotine constitute tobacco products under the assumption that all nicotine is derived from tobacco. Products containing nicotine that are not derived from tobacco are exempt from the tax. However, the burden is on the taxpayer to prove this to the Department.(67)

New Zealand

In New Zealand, Nicotine free ENDS may be sold and advertised provided they do not make any therapeutic claims. (69) Medsafe, the national medicines authority, must approve any ENDS making health claims. It is illegal to sell an ENDS in New Zealand that contains nicotine. It is also illegal to sell an ENDS (with or without nicotine) that claims to help smokers quit.

ENDS are categorised depending on how they are presented for sale, including the intended use claimed for the product by the supplier and whether this use has a therapeutic purpose as defined in the *Medicines Act 1981*.(70)

- ENDS are **medicine**s when they are supplied for use as an aid to smoking cessation and with one or more cartridges;
- ENDS are **medicines** when supplied with one or more cartridges containing nicotine even if they are not represented as aids to smoking cessation;

- ENDS are **medical devices** when they are supplied for use as an aid to smoking cessation and without cartridges; and
- ENDS are **not** therapeutic products when they are supplied as a 'gadget' that consumers may choose to use as a social prop or as an item that is to be used interchangeably with cigarettes.(71)

Therapeutic purposes include(70):

- Supports or aids smoking cessation;
- Remedy against/ helps alleviate nicotine addiction or the symptoms of nicotine addiction;
- Helps you quit smoking/ smoke less; and
- Reduce your nicotine intake.

Sales to minors

ENDS that look like a tobacco product (or a smoker's pipe) cannot be sold to a person under 18 years old.

Brazil

In 2009, Brazil, through the National Health Surveillance Agency, ANVISA, prohibited the sale, import, and advertising of all electronic smoking devices.(72) Primary reasons given for banning ENDS included a lack of evidence they assist people in quitting smoking and that they mimic tobacco products. Survey data of smokers from 2012/13 shows that awareness of ENDS in Brazil is relatively low, in comparison to Australia, at 37%, and only 8% of smokers have ever trialled an ENDS.(73)

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