

# Working towards a smoke-free Scotland

A report prepared for Philip Morris International

March 2018



# Contents

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|    |  |    |
|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
| 5. | Annex 3: Evidence on e-cigarettes                | 26 |
| 6. | Annex 4: Policy drivers of future smoking trends | 29 |

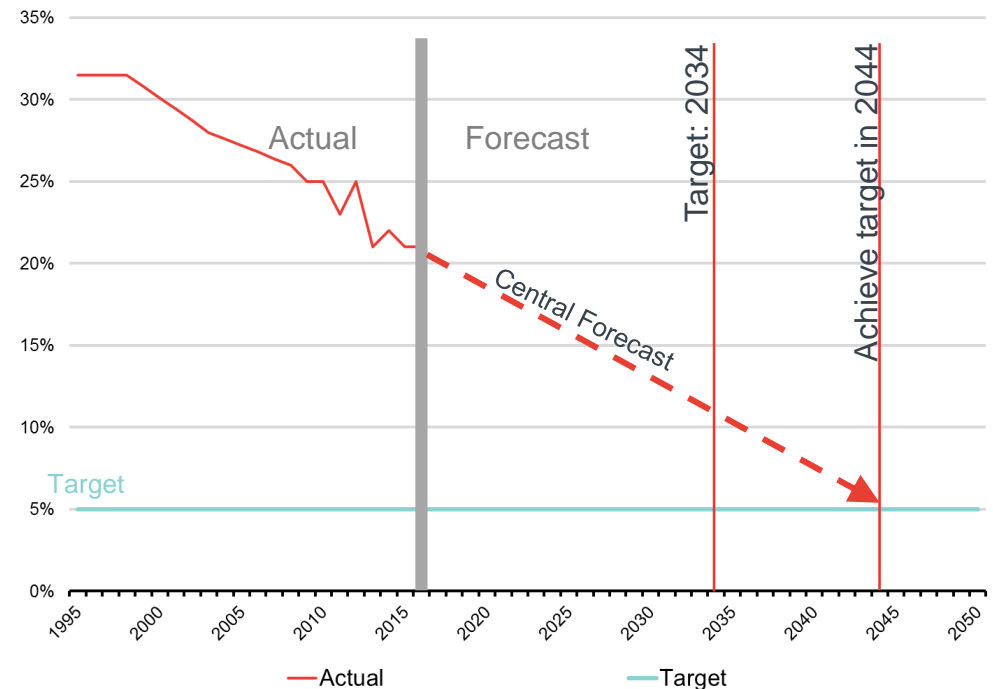
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|    |  |    |
|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
| 5. | Annex 3: Evidence on e-cigarettes                | 26 |
| 6. | Annex 4: Policy drivers of future smoking trends | 29 |

# Executive summary: Our central forecast estimates that the Government's smoke-free target will be met around 2044

- 1 Our central forecast is for the Government to meet its target - to reduce smoking prevalence to **5%** or below of Scotland's adult population - around **2044**. **This is 10 years later** than targeted in the last Tobacco Control Strategy, and is based on a continuation of current above-inflation excise increases and known regulatory interventions.
- 2 If smoking then continued to decline at this rate after 2044, smoking would reach **0%** in around **2053**.
- 3 Smoking is in long-run decline in Scotland, although two major surveys tell very different stories about the pace of decline in recent years.
- 4 **The growth of e-cigarette use is slowing down** in Scotland. The Scottish Health Survey showed **no increase** in usage between 2015 and 2016. This echoes a wider British trend identified by ASH.

## Smoking prevalence forecast for Scotland up to 2050



Source: Scottish Health Survey (2017) Frontier calculations.

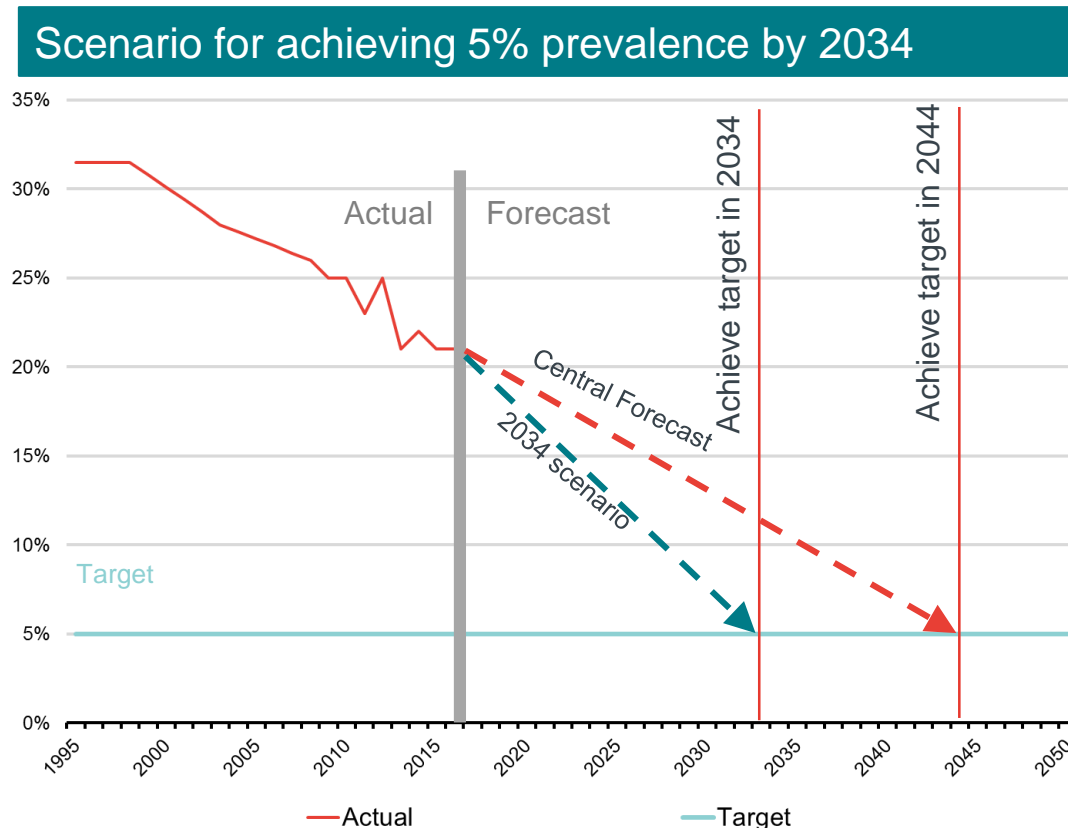
# Executive summary: Scotland could be smoke-free by 2034, but only if smoking prevalence starts to fall faster

**5** The Scottish Government's target of reducing smoking to below **5%** by 2034 **as measured by the Scottish Health Survey**, requires an acceleration in the observed declines in prevalence. Increasing uptake of e-cigarettes has not - so far at least - reduced smoking rates fast enough to give confidence that the 2034 target will be met.

**6** Meeting this 2034 target would require an additional **260,000** smokers to quit successfully over and above those we already expect to quit in our central forecast. This is equivalent to over **15,000 extra quitters** each year.

**7** This implies that changes are needed, such as:

- **Reversing the decline in smokers quitting through NHS Stop Smoking services**, which decreased to 6,000 in 2015 from a peak of 11,500 in 2012;
- **A rapid increase in the number of smokers switching** to e-cigarettes and other smoke-free alternatives, and/or
- **Finding other new and effective ways** to persuade smokers to quit permanently.



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|    |  |    |
|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
| 5. | Annex 3: Evidence on e-cigarettes                | 26 |
| 6. | Annex 4: Policy drivers of future smoking trends | 29 |

# Frontier were asked to investigate whether the Scottish Government target of reducing smoking to below 5% by 2034 will be met

Reducing smoking prevalence is an important public health objective for government. The Scottish Government has announced its ambition to reduce smoking to 5% or less of the adult population by 2034.

Philip Morris International (“PMI”) has a smoke-free vision. It has announced its ambition to help phase out cigarettes by providing less harmful smoke-free alternatives for adults who would otherwise still smoke. <sup>1</sup>

Philip Morris Limited, the UK affiliate of PMI, asked Frontier Economics to investigate when Scotland was likely to meet the 5% target based on current trends and known policy interventions including taxation, plain packaging and NHS Stop Smoking services.

They also asked us to consider the extent to which innovative smoke-free products can help achieve the target. This report summarises our analysis and our findings.

## 941,000

Number of smokers in Scotland in 2016

Source: Scottish Government (2017) ONS (2016)

## 717,000

The number of smokers who need to quit today to meet the ‘smoke-free generation’ target now

Source: Scottish Government (2017) ONS (2016)

### Our approach:

1

Analyse long-term trends in smoking prevalence in Scotland, including the impact of e-cigarettes

2

Forecast future prevalence and progress towards a ‘smoke-free’ goal

3

Consider future role of smoke-free products<sup>2</sup> and NHS Stop Smoking services

<sup>1</sup> PMI has stated that it believes that quitting is best but that switching to smoke-free alternatives is a better alternative than continuing to smoke.

<sup>2</sup> “Smoke-free products” refers to product categories such as e-cigarettes that do not contain tobacco, as well as other novel nicotine delivery systems that do not involve combustion of tobacco, for example, heated tobacco. See Annex 1.

# Smoking prevalence in Scotland has declined, and the Government has set itself a target of reducing it further, to 5%, by 2034

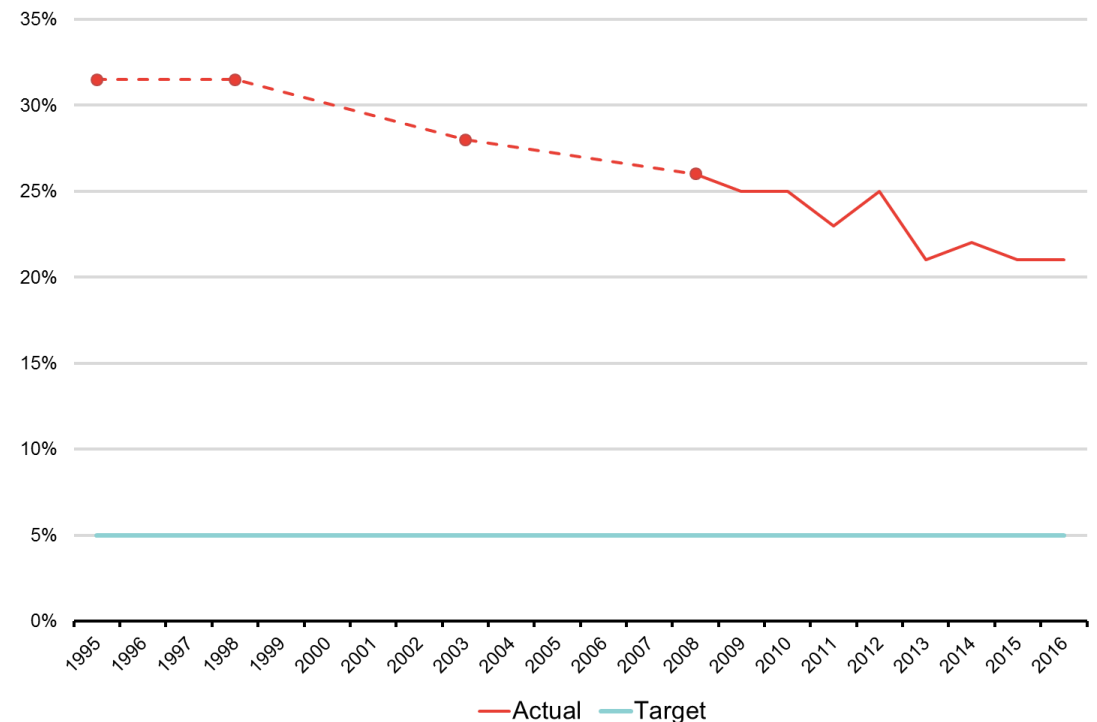
The Scottish Government has announced its ambition to reduce smoking in Scotland to 5% of the adult population by 2034.<sup>1</sup> This 5% target is in line with similar targets set by governments in England, Ireland and New Zealand.

Smoking prevalence in Scotland is in long-run decline, although based on the Scottish Health Survey, it has remained constant since 2013, and remains at over 1 in 5 adults (21%). By contrast, the ONS' Annual Population Survey (APS) records a decrease over the same period, from 21.5% to 17.7%, a sharper proportionate fall than England.<sup>2</sup>

In this report we have focused on the Scottish Health Survey data because it is the preferred measure of the Scottish Government, but we also note the contrasting results of the APS.

For the purposes of this analysis, we examine progress towards a smoking prevalence of 5% or less. We also consider when a 0% prevalence rate may be achieved. 0% prevalence could represent an alternative more ambitious definition of 'smoke-free' than 5%. However, we recognise that reducing smoking prevalence may become more difficult to achieve in practice, as some smokers may continue to smoke regardless of plausible policy changes.

## Smoking prevalence in Scotland (16+) 1995-2016



Source: Scottish Health Survey (2016), Frontier calculations.<sup>3</sup>

Note: Data is not available in the following years 1996-1997, 1999-2002, 2004-2007. In all cases we have assumed that a linear trend between the available data points. Data is only available for 16-64 age group in 1995 and 1998 we have converted this to 16+ prevalence using the observed relationship between 16+ and 16-64 in later years.

# 2034

## Target date for achieving the 5% target

<sup>1</sup> Scottish Government (2013).

<sup>2</sup> Annual Population Survey: Smoking habits in the UK and its constituent countries.

<sup>3</sup> We use The Scottish Health Survey as our primary prevalence measure as this is the basis for the national indicator. This is discussed further in Annex 2.



# E-cigarettes are an effective quitting aid and they may have contributed to the decline in prevalence in recent years

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Recent declines in smoking prevalence are likely to be partially due to the popularisation of e-cigarettes. This is because:

- E-cigarettes are an effective quitting aid, with 1.5 million ex-smokers in Great Britain having fully converted to e-cigarettes (ASH, 2017)<sup>1</sup> and use of e-cigarettes has increased significantly between 2012 and 2016 (ASH, 2017). ASH (2017) shows that the most common reason amongst dual tobacco and e-cigarette users to take up e-cigarettes is to *reduce tobacco consumption*. The most common reason for take-up of e-cigarettes amongst ex-smokers is to *give up smoking tobacco entirely*. An evidence review commissioned by PHE acknowledges that e-cigarettes may have contributed to the recent high quit rates in England (McNeill et al., 2018). Additional detail is provided in the Annex 3.
- The Scottish Health Survey indicates that e-cigarette usage is more common in Scotland than the UK as a whole (see Slide 11 for details) therefore without the popularisation of e-cigarettes recent declines in prevalence may have been slower or may not have materialised at all. However, quantifying the precise contribution of e-cigarettes to the observed decline in prevalence was beyond the scope of this report.

There is evidence that e-cigarettes are an effective aid to quitting conventional tobacco products:

- Combining evidence from two randomised controlled trials (RCTs) – the gold standard to evaluate effectiveness – shows that e-cigarettes can *more than double* the likelihood of long term smoking abstinence when compared with placebo e-cigarettes (Hartmann-Boyce et al., 2016). The authors acknowledge that there is a need for further research in this area.
- Survey evidence is more mixed:
  - Beard et al. (2016) show that increases in the aggregate prevalence of e-cigarette use by smokers has been associated with an increase of the success rate of quit attempts.
  - However, Pasquereau et al. (2017) find no evidence that tobacco users who also use e-cigarette users are more likely to quit smoking relative to tobacco users who do not use e-cigarettes.

There is evidence that use of e-cigarettes can be associated with increased quit attempts, though not all studies show this:

- Regular use of e-cigarettes has been shown to lead to *additional* quit attempts, which would not have been made if e-cigarettes did not exist (Brose et al., 2015).
- Evidence from some longitudinal studies show that those who smoke and use e-cigarettes regularly are more likely to make a subsequent quit attempt than those who smoke but do not use e-cigarettes (Pasquereau et al., 2017).
- Another study examining aggregate e-cigarette use and total quits attempts found no significant relationship between e-cigarette usage and quit attempts (Beard et al., 2016).

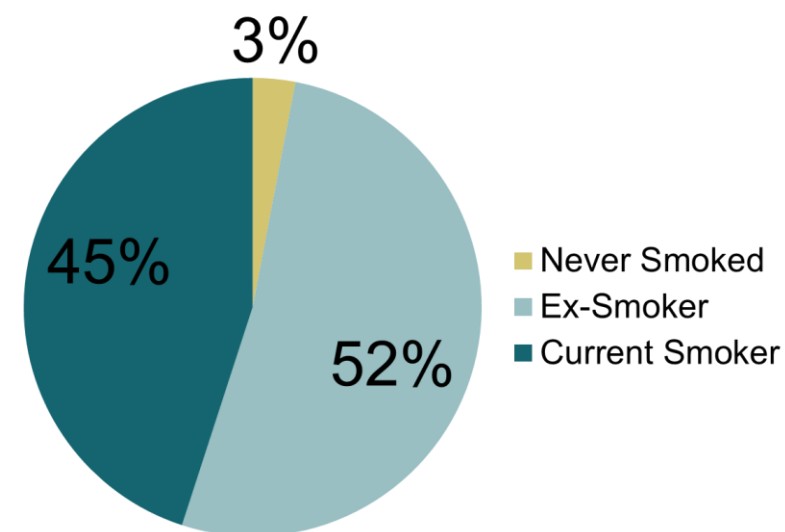
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<sup>1</sup><http://ash.org.uk/media-and-news/press-releases-media-and-news/large-national-survey-finds-2-9-million-people-now-vape-in-britain-for-the-first-time-over-half-no-longer-smoke/>

# E-cigarettes are almost exclusively used by current or former smokers, and a majority of 'vapers' have quit smoking completely

- The Scottish Health Survey (2017) reported that **7%** of adults in Scotland currently used e-cigarettes in 2016. This corresponded to **312,000** Scottish adults (16+) and is broadly consistent with ASH's (2017) estimate that **5.8%** of the adult population in Great Britain use e-cigarettes.
- While there is a lack of detailed data specific to Scotland, the ASH survey of e-cigarette users ('vapers') in Great Britain indicates that **97% are former or current smokers**.
- Only **3%** of e-cigarette users in GB have never smoked.
- While the number of new e-cigarette users in GB has been slowing, a higher proportion of e-cigarette users have **converted to sole use** (see data on next slide).
- In 2017, for the first time, **the majority of current e-cigarette users in GB are ex-smokers (52%)**. Over **1.5 million** current e-cigarette users in GB have stopped smoking entirely.
- If all 1.5 million GB e-cigarette users were still smoking instead, prevalence across GB would be approximately **3 percentage points higher**.<sup>1</sup> However we recognise that some of these smokers would have attempted to quit in any case, albeit with less success than using e-cigarettes.

## E-cigarette users by smoking status



Source: ASH (2017)

## 1.5 million

Smokers in Great Britain who have stopped smoking entirely by switching to e-cigarettes

<sup>1</sup>Population data taken from:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/tablea12principalprojectiongbsummary>.

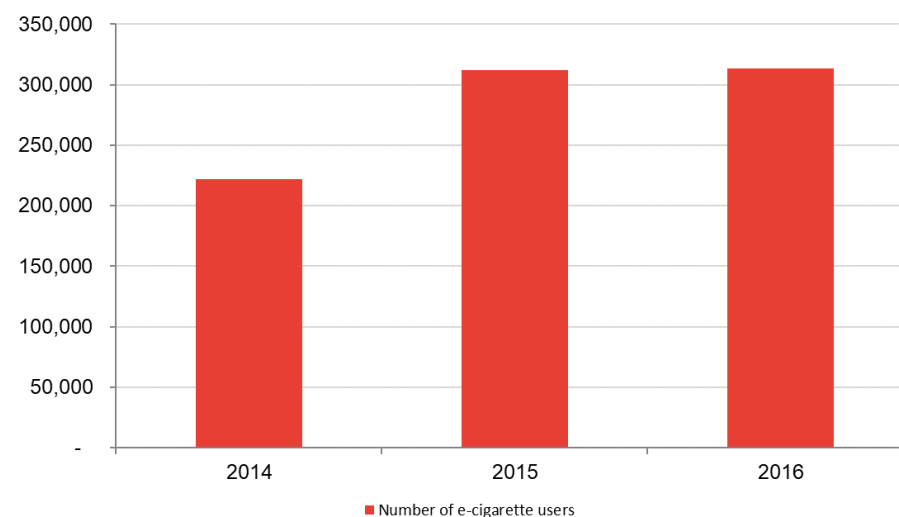
# E-cigarettes are popular among smokers but there are signs that the growth in vaping is slowing in Scotland similar to Great Britain

The growth of e-cigarette use is slowing down in Scotland. The Scottish Health Survey showed no increase in the proportion of adults using e-cigarettes between 2015 and 2016, having risen from 5% to 7% the previous year. Although the percentage of adults reporting that they had used e-cigarettes 'ever' did increase slightly.

This echoes a wider British trend identified previously. ASH (2017) data indicates that growth in e-cigarette use across GB is slowing too. ASH (2017) shows the trend in e-cigarette usage in GB since 2012. There has been rapid growth since 2012 when there were only 700,000 users in GB. Recently the **rate of increase** has **slowed** and has shown some signs of levelling off. In 2017 vaping grew by only 100,000.

- The majority of cigarette smokers (60%) in GB have tried e-cigarettes,<sup>1</sup> and the number of new users is slowing. This suggests the future impact of e-cigarettes on prevalence may be limited.
- ASH's annual survey of GB vapers suggests more smokers would try e-cigarettes (or try them again) if:
  - product satisfaction were higher;
  - price were lower; and
  - they were more confident about e-cigarettes' relative safety.<sup>2</sup>

## Number of e-cigarette users in Scotland 2014-16



## Annual growth in Scottish e-cigarette users

|      |                 |
|------|-----------------|
| 2015 | 90,200<br>(41%) |
| 2016 | 1,600<br>(1%)   |

Sources for all statistics above: Scottish Health Survey (2015, 2016, 2017)

# Our forecast suggests Scotland will not meet its target until 2044, which is 10 years later than planned

There has been a steady decline in the rate of smoking among adults in Scotland over the last 20 years. As a starting point in forecasting future prevalence, we simply projected forward a long-run trend based on the average decline over the whole period between 1995 and 2016.

We adjusted this simple trend forecast to account for the estimated impact on smoking prevalence of interventions by the Government which are known or likely in the coming years:

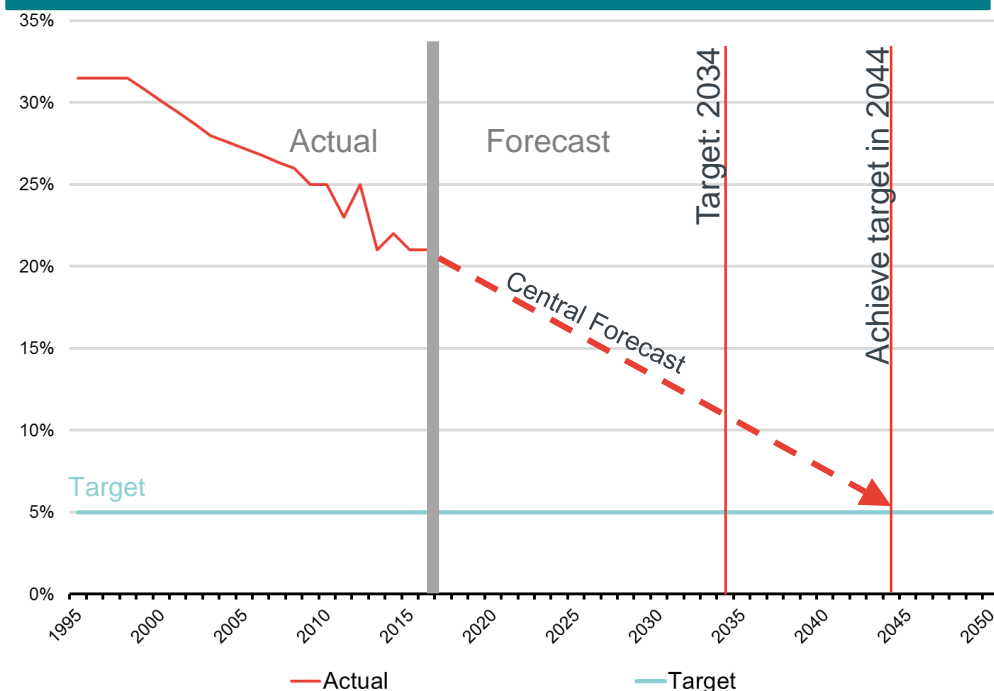
- Changes in excise duties on tobacco products;
- Standardised packaging / the EU Tobacco Products Directive;
- Use of publicly-funded smoking cessation services.

We undertook a review of the literature and policy impact assessments to generate our best estimates of how these policies would affect future prevalence relative to the simple extrapolation of past trends (using government estimates where possible).

Our central projection is shown in the chart to the right. We estimate that Scotland will achieve **5% prevalence by 2044**.<sup>1</sup> If prevalence then continued to decline at the same rate after 2044, smoking would reach 0% in around **2054**. In reality, we recognise that there will probably be increasing difficulty in reducing prevalence to 0%.

Our projections are based on the Scottish Health Survey as it forms the basis of the Scottish Government's National Indicator.<sup>2</sup> The Annual Population Survey (APS) also measures smoking prevalence in Scotland.<sup>3</sup> The APS and Scottish Health Survey reported very similar prevalence figures in 2013. APS prevalence data has declined faster since then. If we use a combined Scottish Health Survey (1995-2009) and APS (2010-2016) series as the basis for our projections the overall picture is similar. Specifically we estimate that Scotland will achieve **5% prevalence by 2038**.

## Smoking prevalence forecast for Scotland up to 2050



Source: Scottish Health Survey. Frontier calculations.

Note: Achieving a prevalence rate of 0% is based on a straight line trend projection. In reality, we recognise that there will be increasing difficulty in reducing prevalence as the prevalence figure falls towards zero, though we note recent trends continue to show relatively linear falls in prevalence from well over 25%.

## 2044

Date by which prevalence of 5% will be achieved

## 2054

Date by which prevalence of 0% may be achieved if prevalence continues to fall at the same rate

<sup>1</sup>Recent academic evidence (focused on the UK) also suggests that Scotland will fail to meet its smokfree target (Hunt et al., 2017).

<sup>2</sup><http://www.gov.scot/About/Performance/scotPerforms/indicator/smoking>

<sup>3</sup>See Annex 2 for further details.

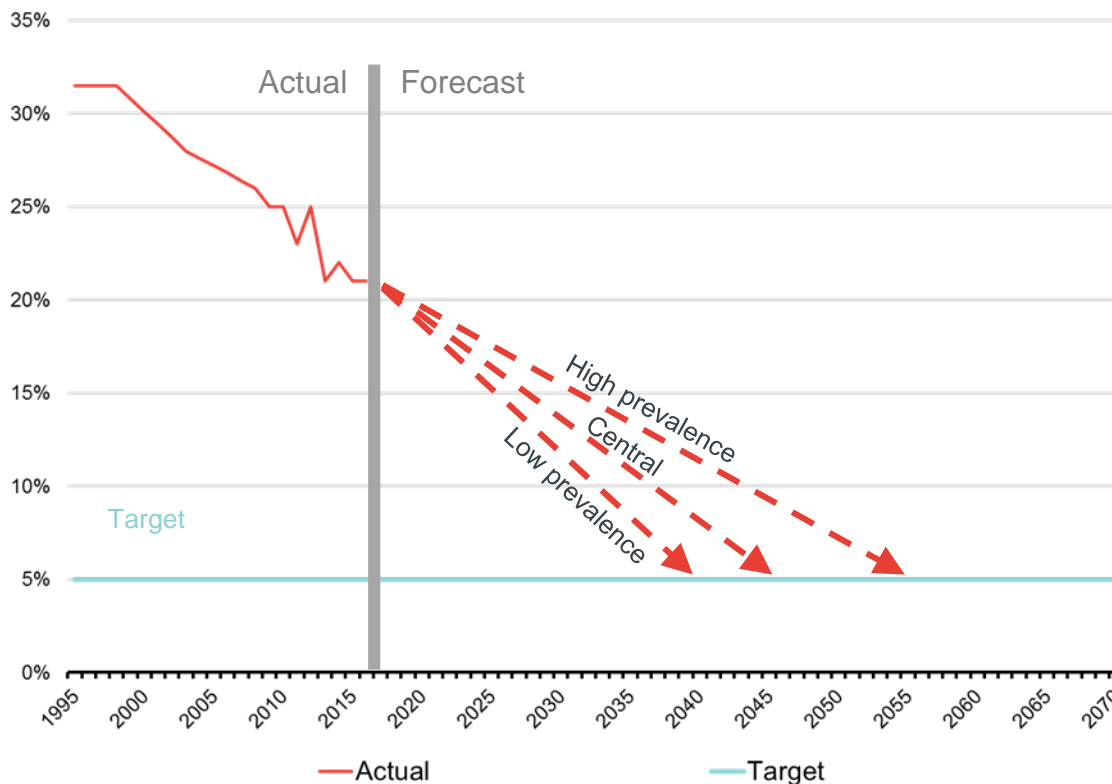
# We have tested how our prevalence forecast changes under alternative policy impact assumptions

While our central forecast is based (where possible) on how the Government estimates these policy drivers will impact prevalence, there is of course considerable uncertainty on the relationship between these policies and prevalence, and how the policies themselves will change in future years.

We therefore model low and high prevalence scenarios for each policy. These are combined in the chart on the right to give overall low and high prevalence scenarios.

It is also important to note that there are a variety of other factors which we have not explicitly included an adjustment for within our model, that may alter prevalence relative to trend in the future. Therefore, it is possible to achieve the 5% target even sooner than indicated by our low prevalence scenario if for example there are major societal changes, new government policies or greater switching to e-cigarettes and other smoke-free products.

Prevalence forecast 2016-70 – sensitivity analysis



Source: Scottish Health Survey. Frontier calculations..

Note: Scenario assumptions are detailed in Annex 4.

| Forecast scenario:        | Low  | Central | High |
|---------------------------|------|---------|------|
| Achieve 5% prevalence by: | 2039 | 2044    | 2055 |
| Achieve 0% prevalence by: | 2048 | 2054    | 2067 |

# If Scotland is to be smoke-free by 2034, we would need an additional 260,000 people to quit smoking...

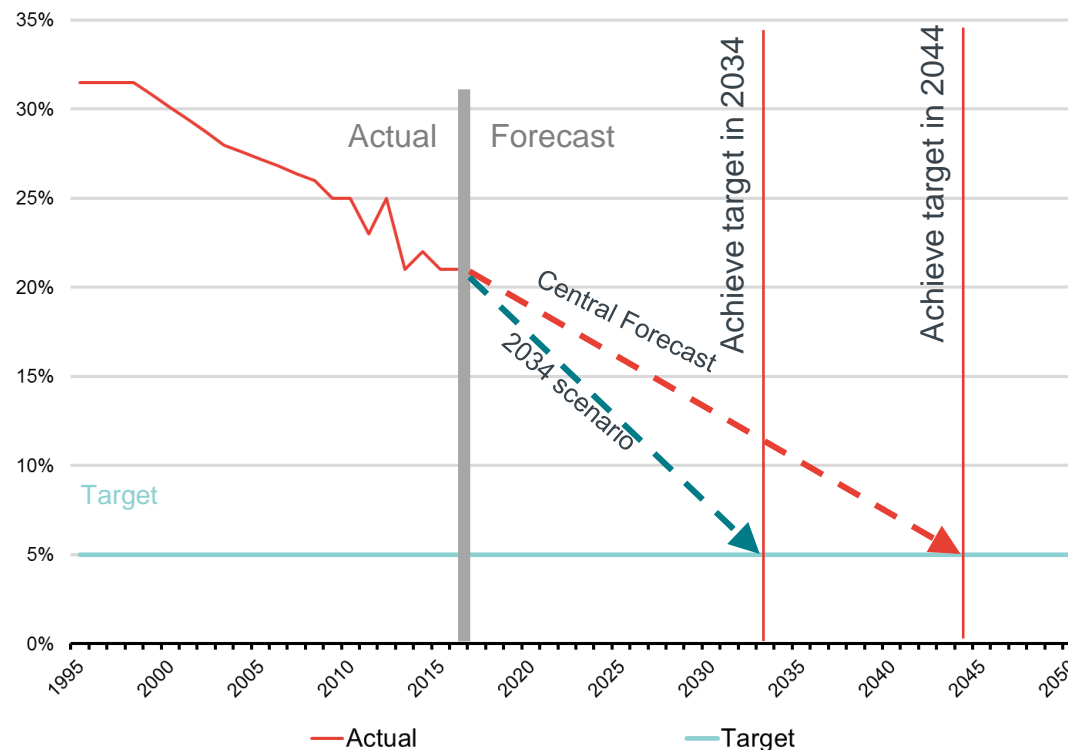
Our central forecast is that prevalence may be reduced to 5% by 2044. As noted, this assumes that the future rate of decline returns to the long run average observed since 1995, adjusted to account for the impact of interventions which are known or likely in the coming years.

Reducing prevalence to below 5% by 2034 requires **260,000 more smokers to quit between 2018 and 2034** than our central forecast.<sup>1</sup>

This is a very large gap. It implies that a total of 36,000<sup>2</sup> smokers must quit each year. The average annual net reduction observed over the last five years was less than 14,000.

Closing that gap would likely require something additional, unless existing measures prove more effective in reducing smoking rates than they have to date.

## Scenario for achieving 5% prevalence by 2034



Source: Scottish Health Survey (2017), Frontier calculations

# 260,000

Additional smokers required to quit by 2034 compared with our central scenario, to reach the 5% target in Scotland by that year

<sup>1</sup> As we are using self-reported data to measure prevalence our definition of a quit is based on someone stating that they do not smoke cigarettes at all nowadays.

<sup>2</sup> This figure takes into account projected rises in the Scottish population between 2018 and 2034



# ...which would need quit attempts to become more successful

The future impact on prevalence of e-cigarettes and novel smokeless products will depend on helping smokers quit. 70% of Scottish smokers would like to quit and 81% have made an attempt to quit in the past.<sup>1</sup>

Data from England shows that around 30% of smokers attempt to quit each year. Absent Scottish data for **annual** quit attempts, we have used English data as a reasonable proxy.

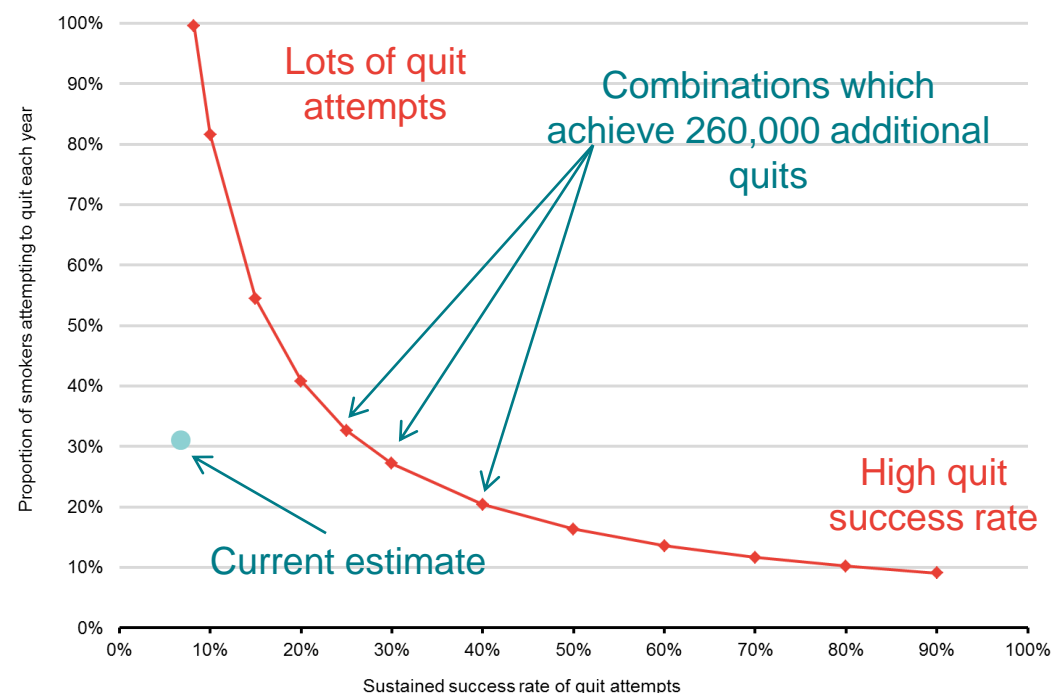
In England, approximately:

- 15-25% of quit attempts are successful in the short-term, using a variety of methods and quitting aids (or unaided).<sup>2</sup>
- Sustained quit success (6-12 months) using a variety of methods and quitting aids (or unaided) is lower, around 7%.<sup>3</sup>

Successfully reducing prevalence to 5% in Scotland requires **260,000 more smokers quitting** each year. This could be achieved by either:

- **Higher quit success rate:** It would require a **sustained quit success rate of around 27%** (assuming 30% of smokers attempt to quit each year - as currently is the case in England).
- **Higher quit success rate and more quit attempts:** The chart to the right shows how the 260,000 additional quits could be reached through different combinations of both more quit attempts and higher success rates:
  - If the number of attempts rises to 50% of smokers, the sustained success rate needs to be 16% (over double the current average rate).

## Quit attempts and success rates to meet 2034 target



**Note:** Estimate of current proportion of smokers attempting to quit each year is from the Smoking Toolkit Study (2017). Estimates of sustained success rate of quit attempts is based on aids used in most recent quit attempt also from the Smoking Toolkit Study (2017). The long term success rate of each aid (except e-cigarettes) is based on West & Owen (2012). The long term success rate of e-cigarettes is based on Hartmann-Boyce et al., 2016

Our analysis is population-wide. We show in Annex 2 that prevalence varies significantly according to deprivation. In reality a segmented approach (by income and other characteristics) is likely to be needed to achieve a 5% prevalence rate.

<sup>1</sup> Scottish Health Survey (2017).

<sup>2</sup> Smoking Toolkit Study (2017). Survey methodology does not allow us to identify duration of quit success

<sup>3</sup> Frontier calculations using West & Owen (2012), Hartmann-Boyce et al., (2016) and Smoking Toolkit Survey (2017).

# NHS Stop Smoking services are an effective aid to smokers quitting. Greater use of them could assist in reducing smoking prevalence

NHS Stop Smoking services could help some of the 260,000 smokers quit. The NHS reports 4-week success rates for quit attempts of 49%. Although some of these quitters will return to smoking, we estimate that the 1-year quit success rate is around 12.3%.<sup>1</sup>

Our forecasts for expected future smoking prevalence include the impact of NHS Stop Smoking services, with our central forecast assuming that the number of quits remains constant at recent levels of around 6,000 per year. However, greater use of NHS Stop Smoking services could help to deliver a smoke-free Scotland:

- **Return to 2007-15 average (1.3x current levels):** If participation in NHS Stop Smoking services returns to the average observed between 2007 and 2015, this would achieve around 29,000 *additional* quits by 2034.
- **Return to 2012 peak usage (1.9x current levels):** If participation returned to its peak level of 2012, achieving around 11,500 quits per year, this would deliver around 94,000 *additional* quits by 2034.
- **Expand to 1.8 times 2012 peak usage (over 3.4x current levels):** If participation in NHS Stop Smoking services were increased to achieve around 21,300 quits per year (i.e. 1.8 times the 2012 peak), this would deliver an *additional* 260,000 quits by 2034. This would require a very significant expansion of cessation services, suggesting that expansion of NHS Stop Smoking services alone will not be enough to achieve a smoke-free generation by 2034 (see also Slide 31 for further analysis of this).

| Smoking Cessation Services quits, per year | Equivalent to   | Additional quits relative to central forecast, per year | Total additional quits 2018 to 2034 |
|--|-----------------|---|-------------------------------------|
| 6,000                                      | 2015 level      | 0   | 0                                   |
| 7,700                                      | 2007-15 average | 1,700   | ~29,000                             |
| 11,500                                     | 2012 peak       | 5,500   | ~94,000                             |
| 21,300                                     | 1.85 x peak     | 15,300  | ~260,000                            |

<sup>1</sup> West & Owen (2012) report that out of 100 individuals who quit for 4 weeks, 30 will succeed in quitting for 4 weeks, 30 will succeed in quitting for 12 months, and around 21 will succeed in quitting for life. We convert 4-week success rates reported by NHS Digital to long term success rates using a factor of 0.25. These quit rates differ from the long term estimates (of approximately 7%) presented on the previous page as they refer specifically to NHS Stop Smoking Services quit rates rather than an average across all quit attempts.



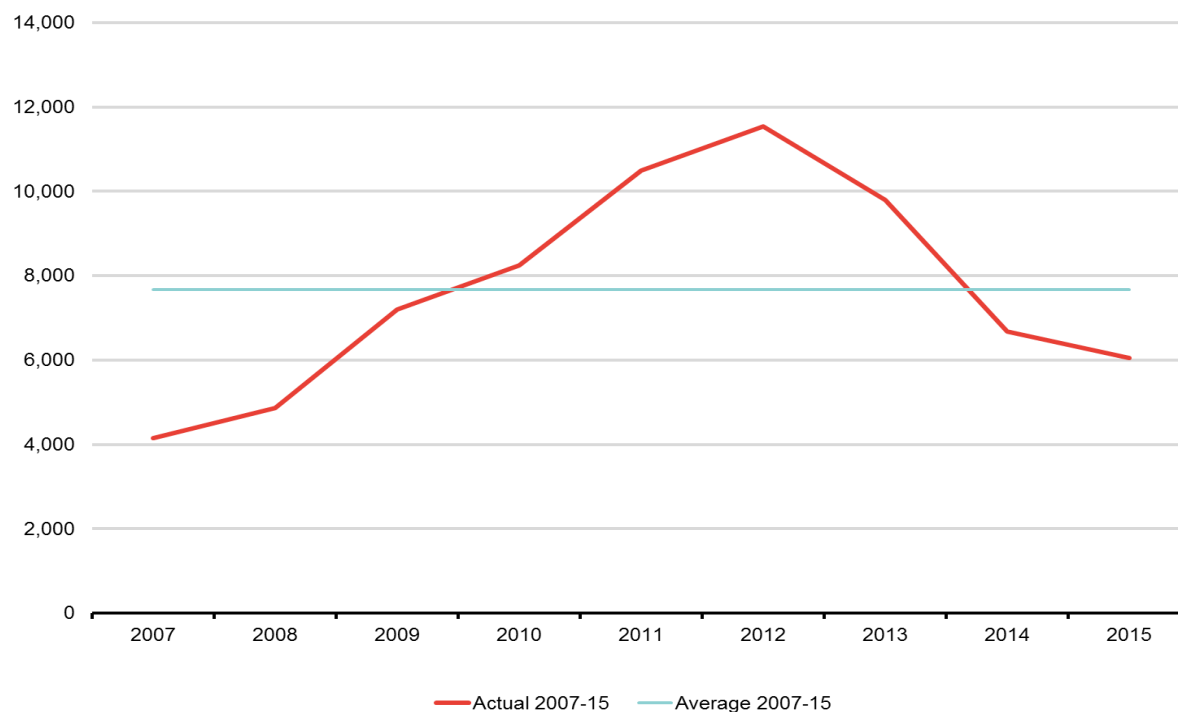
# But the number of successful quits using NHS Stop Smoking services has declined in recent years

NHS Stop Smoking services participation has declined in recent years, both in absolute terms and as a percentage of all smokers. This casts doubt on the likelihood that NHS Stop Smoking services alone can deliver a smoke-free Scotland within the Government's targeted timeframe.

Successful quits peaked at around 11,500 in 2012 but fell to around 6,000 in 2015. The average for 2007 to 2015 was approximately 7,700 quits per year.<sup>3</sup>

Helping 260,000 smokers quit is a challenge for which there is unlikely to be any single solution, and so it is probable that use of NHS Stop Smoking Services will not be enough in isolation.

## Successful quits using NHS Stop Smoking Services, Scotland 2007-15



Source: NHS Digital (2017), Frontier analysis.

## Percentage of all smokers who quit using smoking cessation services

|      |      |
|------|------|
| 2011 | 1%   |
| 2015 | 0.6% |

Source: NHS Digital (2017), Frontier analysis.

<sup>1</sup> NHS Digital (2017).

<sup>2</sup> We convert 4-week success rates reported by NHS Digital to 1-year success rates using a factor of 0.25, following a conservative application of West & Owen (2012).

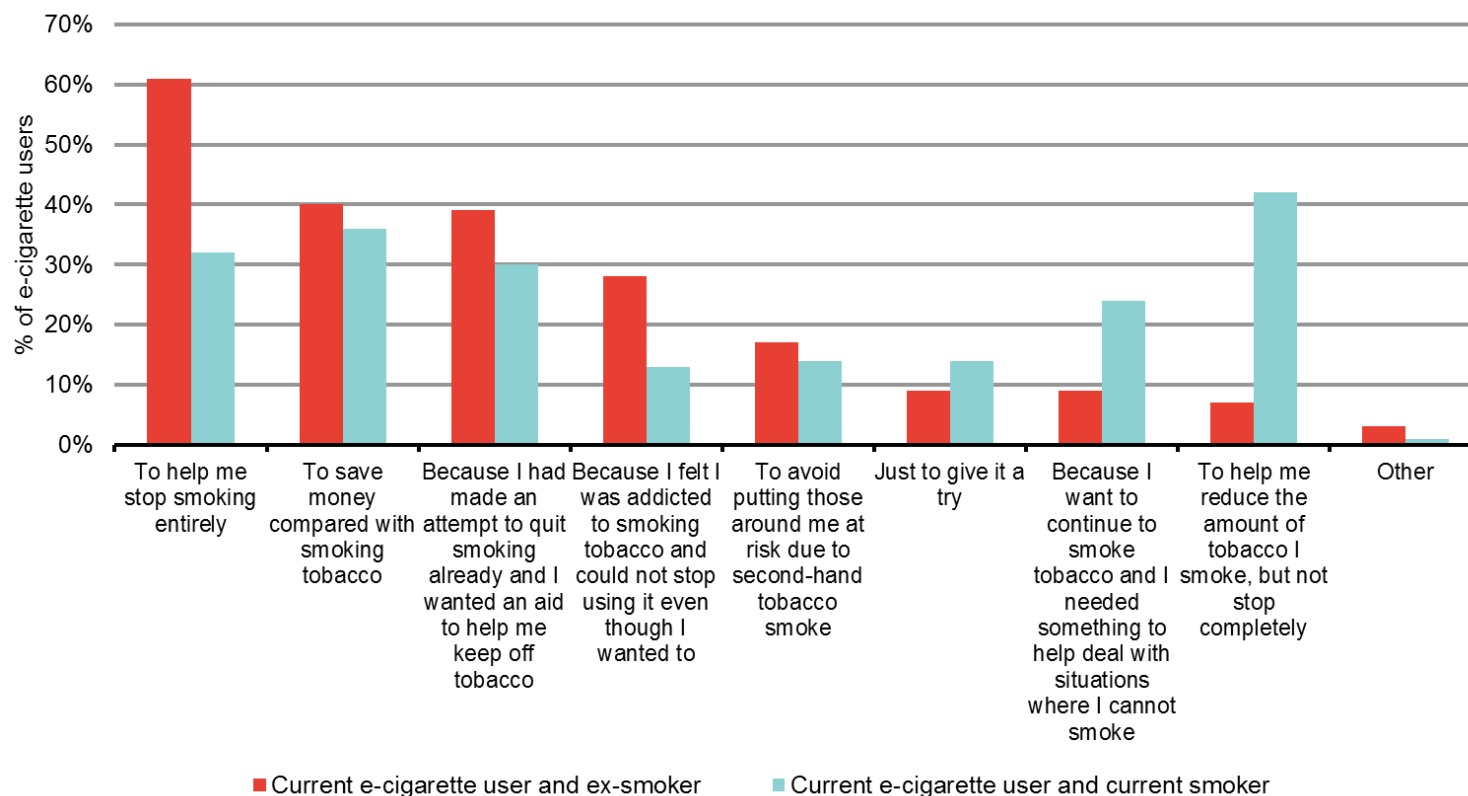
<sup>3</sup> All figures are based upon 1-year quit success rates, using Frontier estimates.

# Greater use of e-cigarettes and novel smokeless products could assist in delivering a smoke-free Scotland earlier...

E-cigarettes and other innovative smokeless products<sup>1</sup> could potentially support greater reductions in smoking. This could include entirely new products in categories such as heated tobacco or other novel nicotine delivery systems.

It could also include further reductions in prevalence as a result of existing products like e-cigarettes. As noted on Slide 9, evidence from Random Control Trials shows that e-cigarettes can more than double the likelihood of long term smoking abstinence when compared with placebo e-cigarettes.

## Reasons for using e-cigarettes in Great Britain



Source: ASH (2017)

<sup>1</sup> Examples of some of these products are contained in Annex 1.

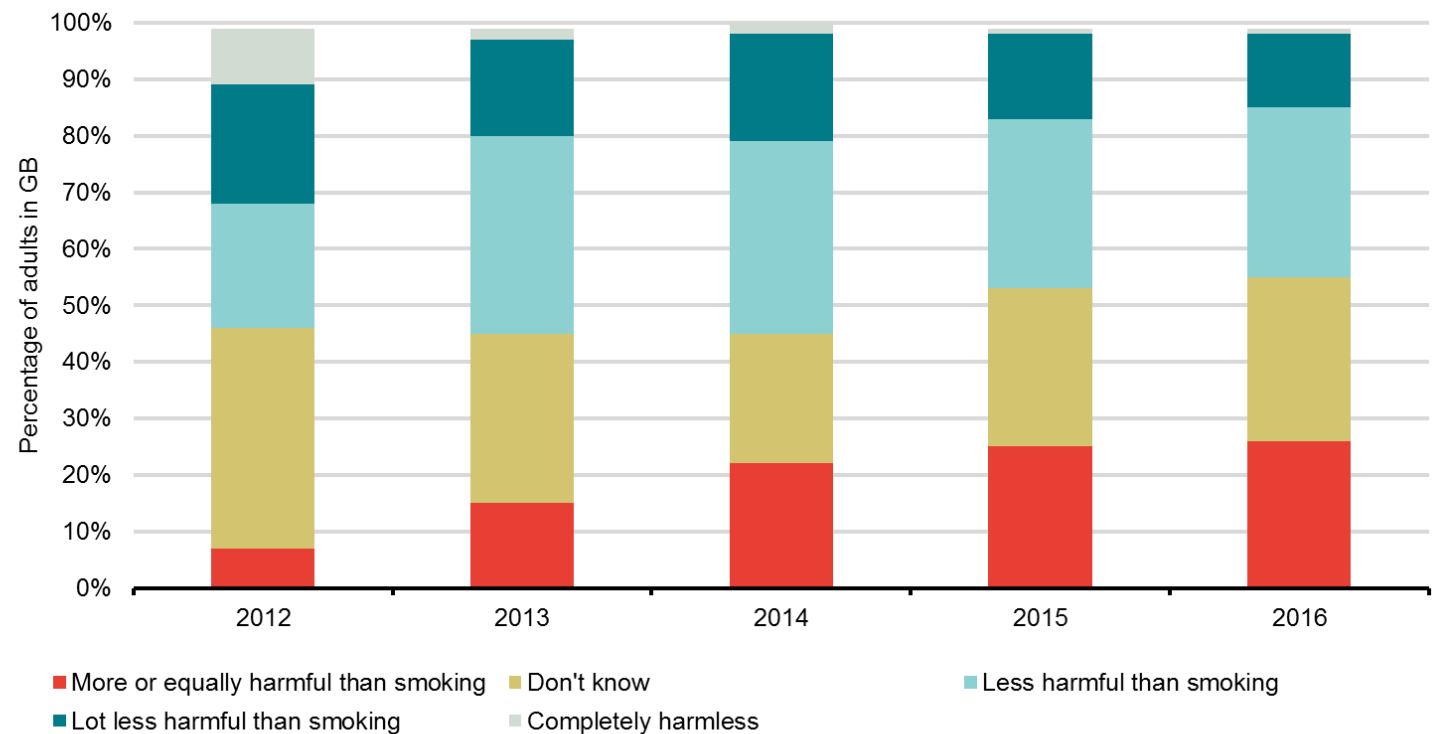
# ... although more work will need to be done to reassure the public about the relative safety of new products

While there is a lack of specific Scottish data, evidence from a GB survey indicates that people are misinformed about the relative health risks of e-cigarettes and conventional tobacco, which could hinder further take-up.

According to ASH (2017), currently only 13% of adults in Great Britain correctly identify that e-cigarettes are a lot less harmful than cigarettes. Over the last four years a growing proportion of the public fail to recognise that e-cigarettes are a lot less harmful than smoking (see chart).

This is despite Public Health England concluding that the best estimates show e-cigarettes are 95% less harmful to health than smoking cigarettes.<sup>1</sup>

## Public perception of harm from e-cigarettes in Great Britain



Source: ASH (2017)

Note: Figures do not always sum to 100% due to rounding

<sup>1</sup> McNeill et al. (2015 & 2018)

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|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
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# There are several types of non-combustible products currently available

## E-cigarettes

- E-cigarettes provide nicotine for inhalation in a vapour generated by heating a solution containing water, nicotine, propylene glycol, vegetable glycerine and some flavouring. RCP (2016) identify three categories:
  - *Cigalikes*: these were mostly disposable and similar in appearance to a conventional cigarette.
  - *Second generation e-cigarettes*: rechargeable with a more powerful battery and a refillable tank.
  - *Third generation e-cigarettes*: larger with more complex tank and two heating elements.

## Heated tobacco products

- In heated tobacco products processed tobacco is heated but not burned as temperatures are set below that of combustion. HMT (2017) outlined three broad types of heated tobacco products:
  - Processed tobacco heated directly to produce a vapour.
  - Processed tobacco designed to be heated in a vaporiser.
  - Devices that produce vapour from non-tobacco sources, where the vapour is then passed over tobacco

## Novel non-tobacco nicotine products

- RCP (2016) highlighted a number of new non-tobacco nicotine products which are in development:
  - Metered-dose inhaler: uses propellants to deliver small droplets of nicotine to the respiratory tract. Similar in size and shape to a conventional cigarette. Consists of a small pressurised container with an aerosol containing nicotine, propylene glycol and a propellant.
  - Nicotine Salt Inhaler: a device in which a nicotine reacts with a weak organic acid to generate a respirable nicotine salt. These can be either electronic or non-electronic devices.

This list is not exhaustive and we expect new products to be developed over time.

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|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
| 5. | Annex 3: Evidence on e-cigarettes                | 26 |
| 6. | Annex 4: Policy drivers of future smoking trends | 29 |

# We use the Scottish Health Survey as our primary source of smoking prevalence data

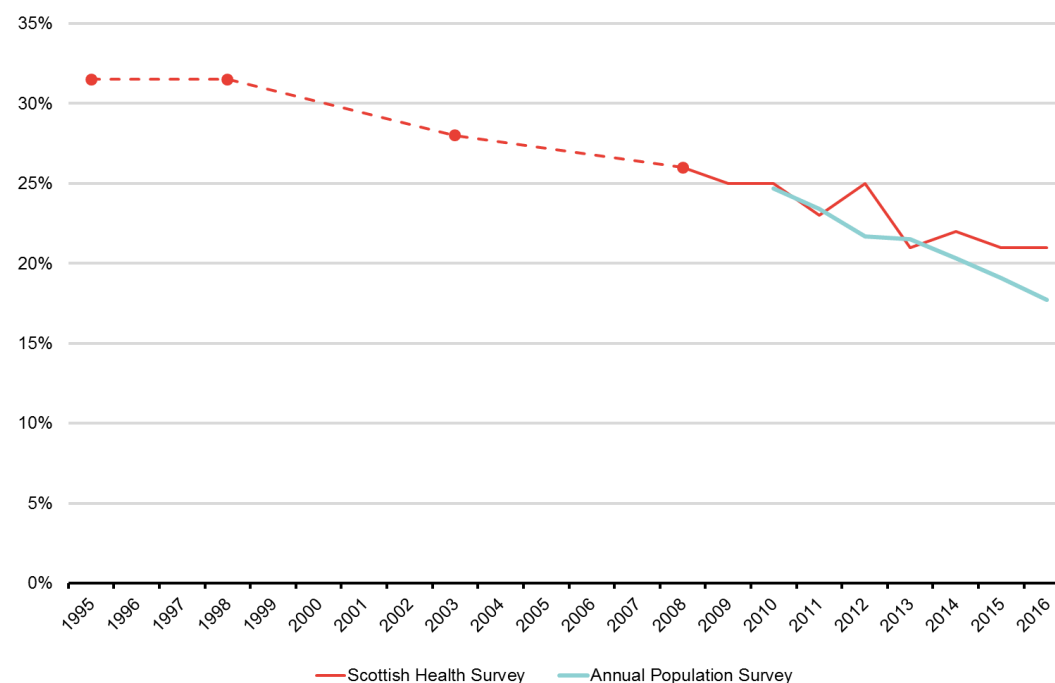
## Scottish Health Survey

- The Scottish Health survey provides a detailed picture of the health of the Scottish population.
- Smoking prevalence data is available over the period 1995 to 2015. However, no data is available in the following years: 1996-1997, 1999-2002, 2004-2007. In all cases we have assumed a straight line trend between points.
- In addition, data for all adults aged 16+ is not available in 1995 and 1998. However, 16-64 prevalence rates are available. We have estimated prevalence rates for the 16+ population in those years by examining the relationship between the 16+ rates and the 16-64 rates in later years.
- The sample size was 4,281 individuals in the 2016 wave. A respondent is classified as a smoker if they answer yes to: “Do you smoke cigarettes nowadays?”
- The Scottish Government’s smoking national indicator is based on the Scottish Health Survey. Progress towards the 5% target in 2034 will be assessed against this measure. <sup>1</sup>

## Annual Population Survey

- The Annual Population Survey also collects prevalence data for Scotland. It is a continuous household survey covering the UK collected by ONS.<sup>2</sup>
- Smoking prevalence data (for those aged 18+ in Scotland) is available over the period 2010 to 2016. Sample size of 27,830 Scottish individuals in the 2016 data.
- A respondent is classified as a smoker if they answer yes to: “Do you smoke cigarettes at all nowadays?”

## Smoking prevalence in Scotland 1995-2016



Source: Scottish Health Survey, Annual Population Survey, Frontier calculations

## Approach

- We use prevalence data from the Scottish Health Survey to estimate our trends. This is because it forms the basis of the relevant national indicator and contains a relatively long series of data.
- APS data provides a useful cross check. APS prevalence data has declined faster than the Scottish Health Survey since 2013. This could be because of sampling differences and differences in the age population covered.

<sup>1</sup> <http://www.gov.scot/About/Performance/scotPerforms/indicator/smoking>

<sup>2</sup> ONS (2017 A)

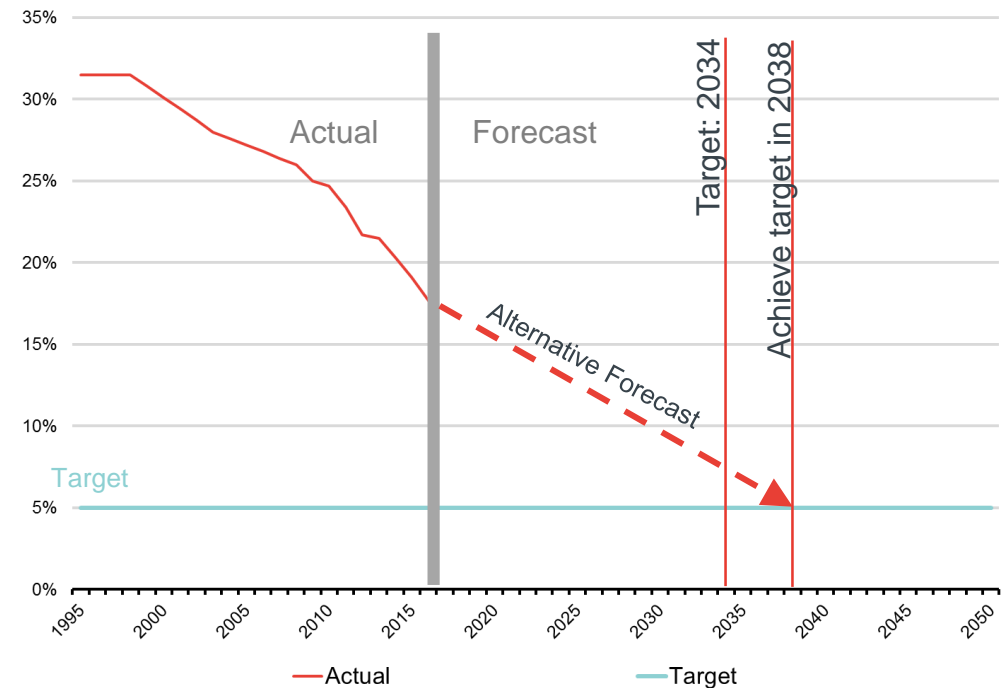
# An alternative measure of prevalence indicates that Scotland will be smoke-free in 2038

As an alternative scenario we have projected forward Scottish prevalence using a combination of Scottish Health Survey data (1995-2009) and APS data (2010-2016). Trends are based on projecting forward the combined data series from 1995-2016. The APS and the Scottish Health Survey both report very similar prevalence estimates in 2010 (24.7% and 25% respectively).

This alternative projection is shown in the chart to the right. The overall picture is quite similar. Using this combined data series we estimate that Scotland will achieve **5% prevalence by 2038**. This is faster than our central scenario but is still four years late relative to the Government's target. If prevalence then continued to decline at the same rate after 2038, smoking would reach 0% in around **2046**.

The remainder of the report focuses solely on the projections based entirely on the Scottish Health Survey.

## Alternative smoking prevalence forecast for Scotland up to 2050



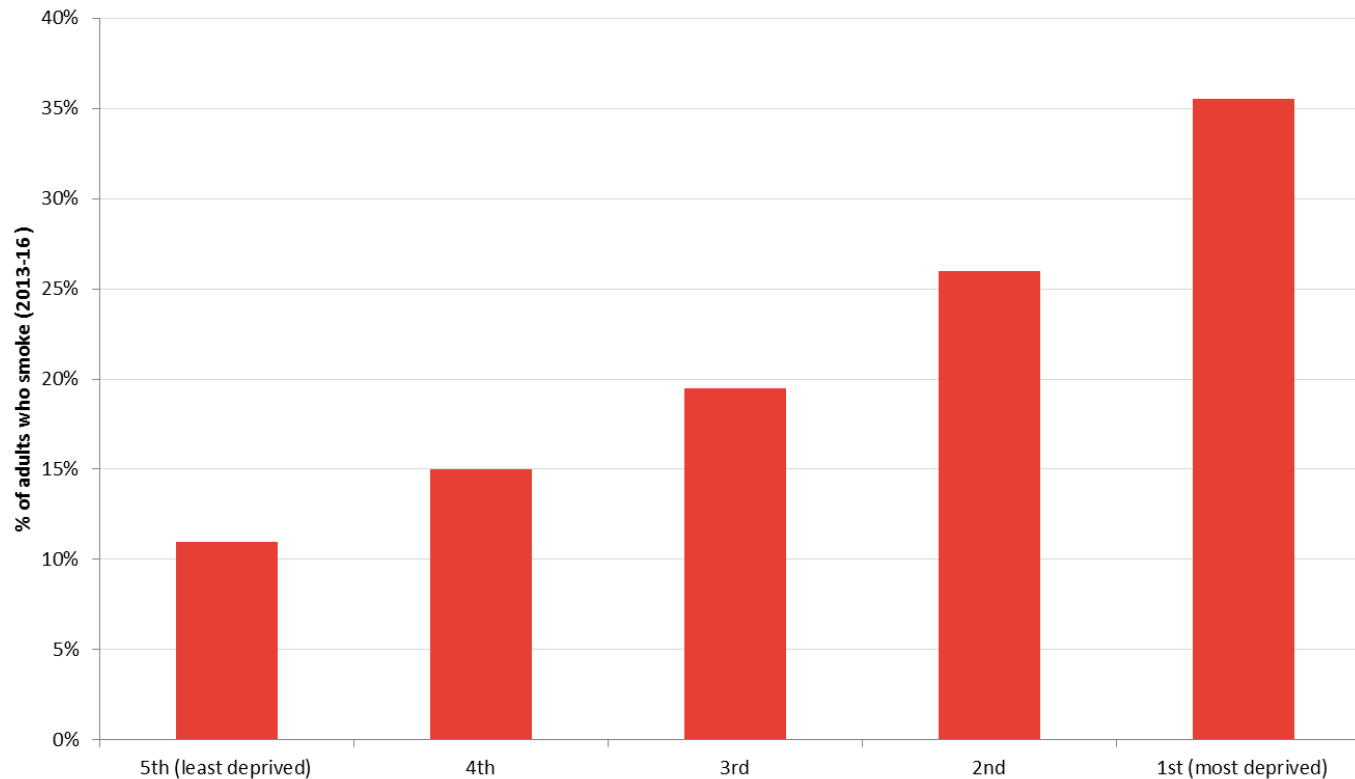
Source: Scottish Health Survey (1995-2009) & Annual Population Survey (2010-2016) Frontier calculations.

Note: Achieving a prevalence rate of 0% is based on a straight line trend projection. In reality, we recognise that there will be probably be increasing difficulty in reducing prevalence as the prevalence figure falls towards zero, though we note recent trends continue to show relatively linear falls in prevalence from well over 25%.



# People who live in less deprived areas in Scotland are less likely to smoke than those who live in more deprived areas

## Smoking Prevalence by Scottish Index of Multiple Deprivation



Source: Scottish Household Survey (2017). Average of male and female prevalence rates by deprivation quintile.

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|    |  |    |
|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
| 5. | Annex 3: Evidence on e-cigarettes                | 26 |
| 6. | Annex 4: Policy drivers of future smoking trends | 29 |

# Evidence suggests that e-cigarettes are significantly less harmful to health than tobacco

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## Impact on health for e-cigarette users

- Public Health England (PHE) published an independent review (McNeill et al, 2015) on the role and impact of e-cigarettes. Their review concluded that the best estimates show e-cigarettes are 95% less harmful to your health than normal cigarettes. This estimate drew principally on Nutt et al (2014) which used an international expert panel to estimate relative harm of e-cigarettes
- A separate report by the Royal College of Physicians (RCP, 2015) came to the same conclusion. They agreed that the hazard to health arising from long-term vapour inhalation from the e-cigarettes currently available is unlikely to exceed 5% of the harm from smoking tobacco. Also, the authors noted that technological developments and improved production standards could reduce the long-term hazard of e-cigarettes in the future
- Glasser et al (2017) conducted their own systematic review of evidence on e-cigarettes and found that e-cigarettes pose substantially less harm to smokers than cigarettes, while further research is needed to assess long-term effects.

## Impact on health from passive use of e-cigarettes

- McNeill et al (2015) considered the potential effects of passive vaping. Based on a review of existing evidence they concluded that e-cigarettes release negligible levels of nicotine into ambient air with no identified health risks to bystanders.
- Hess et al (2016) also undertook a systematic review of the literature on passive use of e-cigarettes and concluded that the current evidence shows the potential for health impacts from passive exposure to vapours from e-cigarettes, but that the risk is likely to be lower than from conventional cigarettes



*All the evidence suggests that the health risks posed by e-cigarettes are relatively small by comparison [with conventional cigarettes] but we must continue to study the long-term effects*

*McNeill et al. (2015)*

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# Public Health England's updated evidence review reaffirms the reduced risk of e-cigarettes and highlights their role in reducing prevalence

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In February 2018, PHE published an updated evidence review (McNeill et al., 2018), reaffirming the lower harm profile of e-cigarettes, and also summarising some of the emerging evidence on a newer category of smoke-free products, heated tobacco.

## E-cigarettes are likely to have contributed to recent declines in smoking prevalence

- *“In the first half of 2017, quit success rates in England were at their highest rates so far observed and for the first time, parity across different socio-economic groups was observed. It is plausible that e-cigarettes have contributed to this”<sup>1</sup>*
- *““While caution is needed with these figures, the evidence suggests that e-cigarettes have contributed tens of thousands of additional quitters in England.”<sup>2</sup>*

## Vaping poses only a small fraction of the risks of smoking

- *“...and switching completely from smoking to vaping conveys substantial health benefits over continued smoking. Based on current knowledge, stating that vaping is at least 95% less harmful than smoking remains a good way to communicate the large difference in relative risk unambiguously so that more smokers are encouraged to make the switch from smoking to vaping. It should be noted that this does not mean e-cigarettes are safe”<sup>3</sup>*

## Heated tobacco may also be considerably less harmful than smoking

- *“The available evidence suggests that heated tobacco products may be considerably less harmful than tobacco cigarettes and more harmful than e-cigarettes”<sup>4</sup>*

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<sup>1</sup> Page 16 <sup>2</sup> Page 16

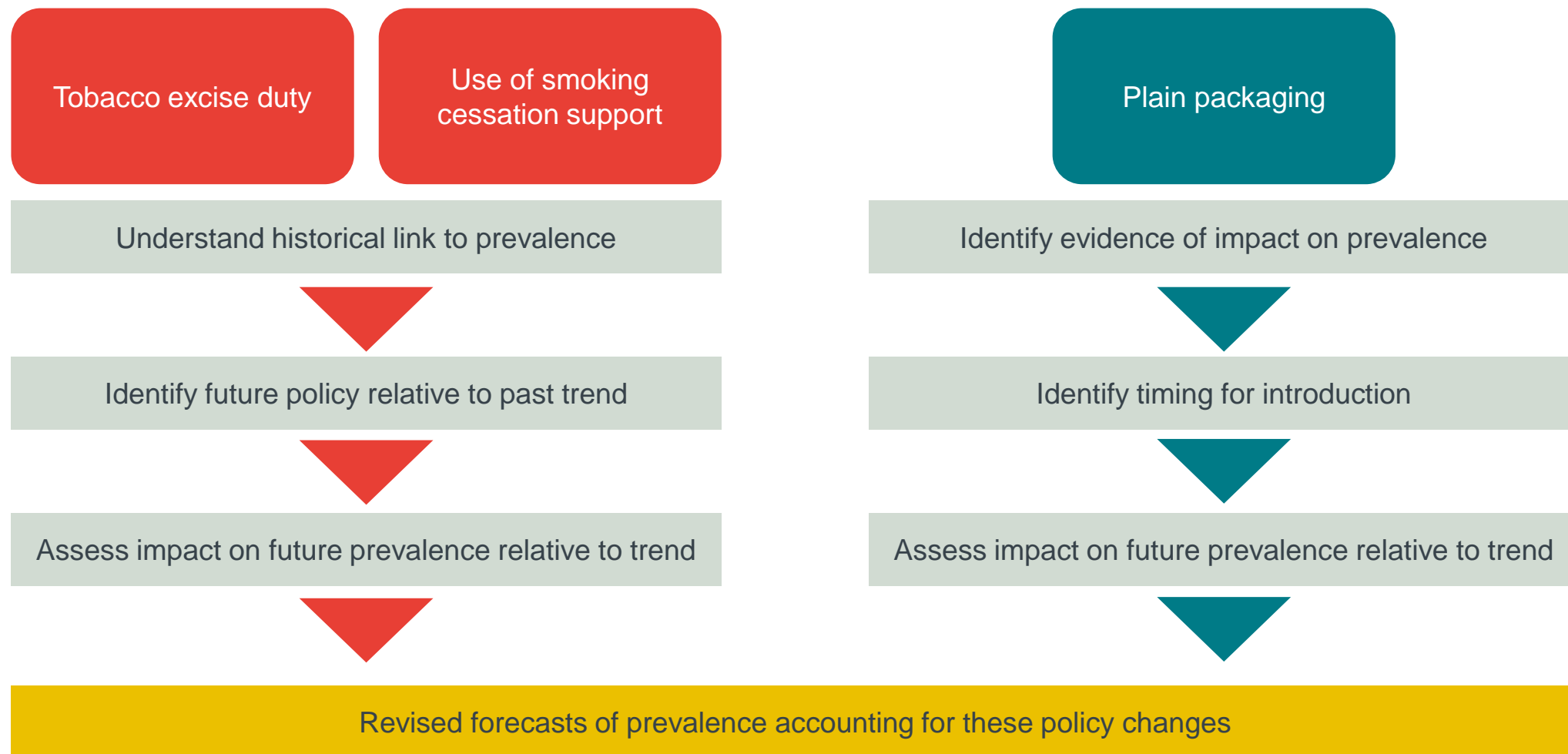
<sup>3</sup> Page 20 <sup>4</sup> Page 24

<sup>5</sup> Page 22

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|    |  |    |
|----|--|----|
| 1. | Executive Summary                                | 3  |
| 2. | Overview of analysis                             | 6  |
| 3. | Annex 1: Novel smokeless products                | 20 |
| 4. | Annex 2: Evidence on past smoking prevalence     | 22 |
| 5. | Annex 3: Evidence on e-cigarettes                | 26 |
| 6. | Annex 4: Policy drivers of future smoking trends | 29 |

# We assess the extent to which existing policy – in three areas – is likely to influence the long-run trend in smoking prevalence



# Excise duty: we model above-inflation rises, in line with recent historical trends

Hypothesis: excise duty has been increasing in real terms in the UK. These increases lead to higher prices. We expect tobacco excise duties to continue to rise faster than inflation.

## Evidence:

- We want to estimate whether future taxes on cigarettes are likely to grow faster or slower than previous trends. This will allow us to estimate deviations from the straight line prevalence trend (which already factors in the historical impact of taxes).
- Our modelling approach is outlined in detail on the following slide.
- Since 2011 excise duty on cigarettes has been rising by RPI plus 2%.<sup>1</sup> This is higher than the long run average and is planned to continue until at least 2020.<sup>2</sup>

## Modelling scenarios:

- Our central scenario assumes that excise duty will continue to rise by RPI plus 2% for the entire forecast period in Scotland. This corresponds with a real growth rate of 4.05% per year of total tax.<sup>3</sup> Relative to the entire period this represents a slight increase in the growth rate of total tax (VAT and excise duty).
- We use two illustrative scenarios to test the sensitivity of this central assumption. We assume, with announced policy, RPI+2% until 2020, but then allow for slightly faster or slower growth in excise duties. Our low prevalence scenario assumes 4.55% overall growth rates of total tax per year. Our high prevalence scenario assumes 3.55% overall growth rates of total tax per year.

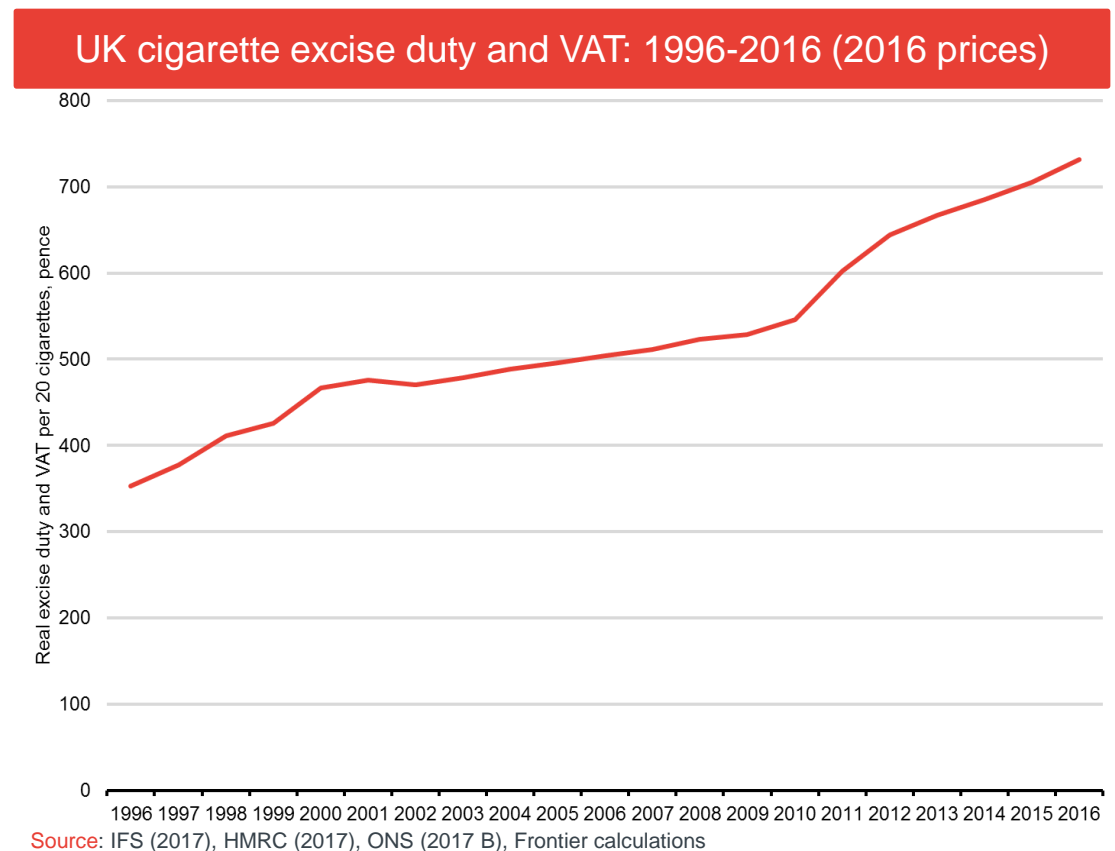
## Impact on prevalence by 2025:

- Central scenarios: prevalence 0.4 percentage points lower than long-run trend.
- Low prevalence scenario: prevalence 0.7 percentage points lower than long-run trend.
- High prevalence scenario: prevalence 0.03 percentage points higher than long-run trend.

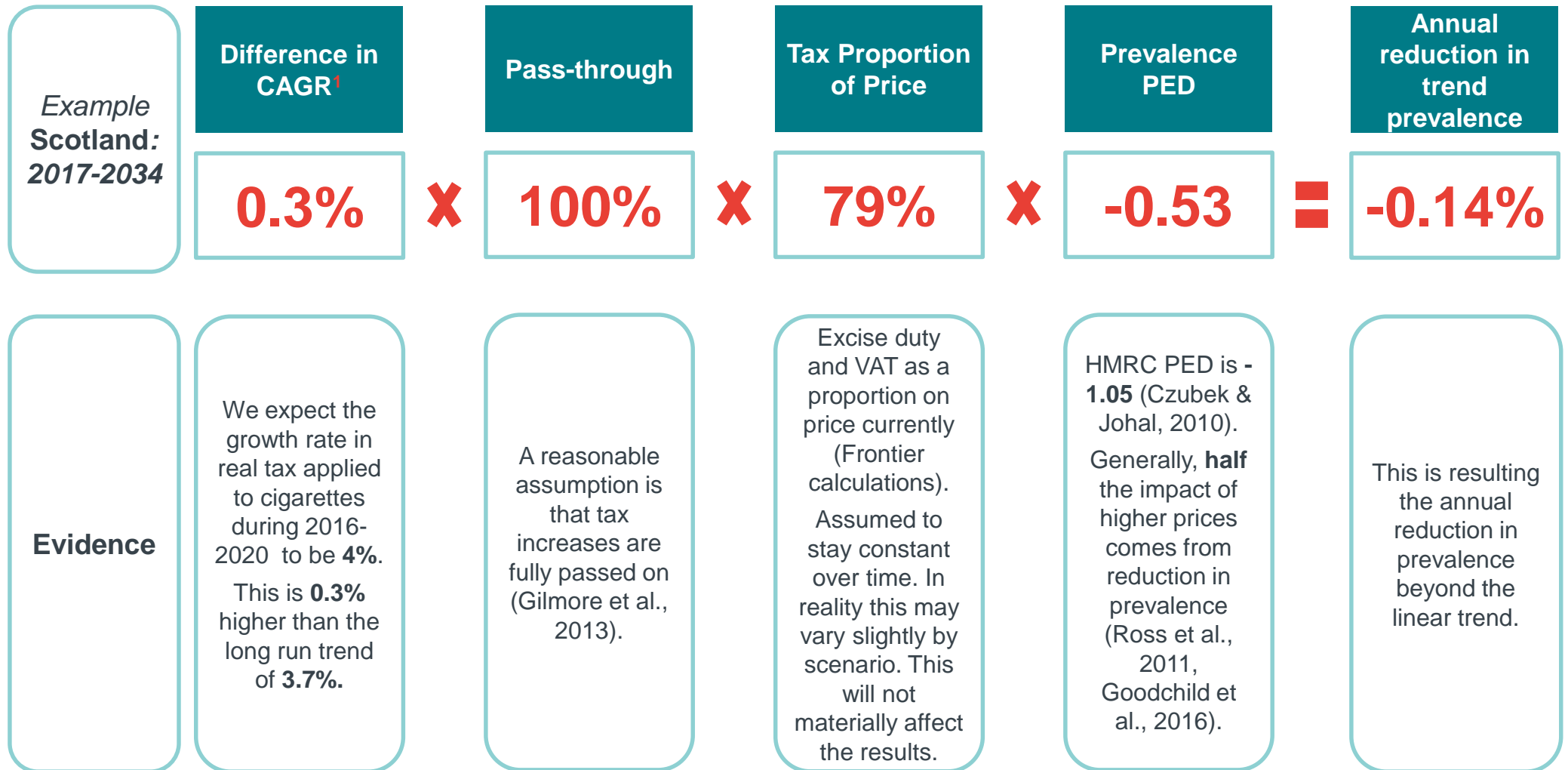
<sup>1</sup> Except in 2012 when there was a one-off increase of RPI plus 5%. This refers to cigarettes only. Roll-your-own tobacco has been sometimes subject to higher rates of excise growth.

<sup>2</sup> <https://www.gov.uk/government/speeches/chancellor-george-osbornes-budget-2014-speech>

<sup>3</sup> Based on recent real growth rates when the RPI plus 2% policy was in place.



# Excise duty: our modelling involves calculating the impact of an above-trend increase in price



<sup>1</sup> CAGR = Compound Annual Growth Rate



# NHS Stop Smoking services: we model future use based upon recent trends

Hypothesis: publicly-funded NHS Stop Smoking services help people to quit smoking; if take-up declines, this will increase smoking prevalence relative to the long-run trend.

## Evidence:

- Use of NHS smoking cessation services has declined since 2012. The reasons for this are unclear, but may include greater use of e-cigarettes.<sup>1</sup>
- Future spending on smoking cessation services is unknown.

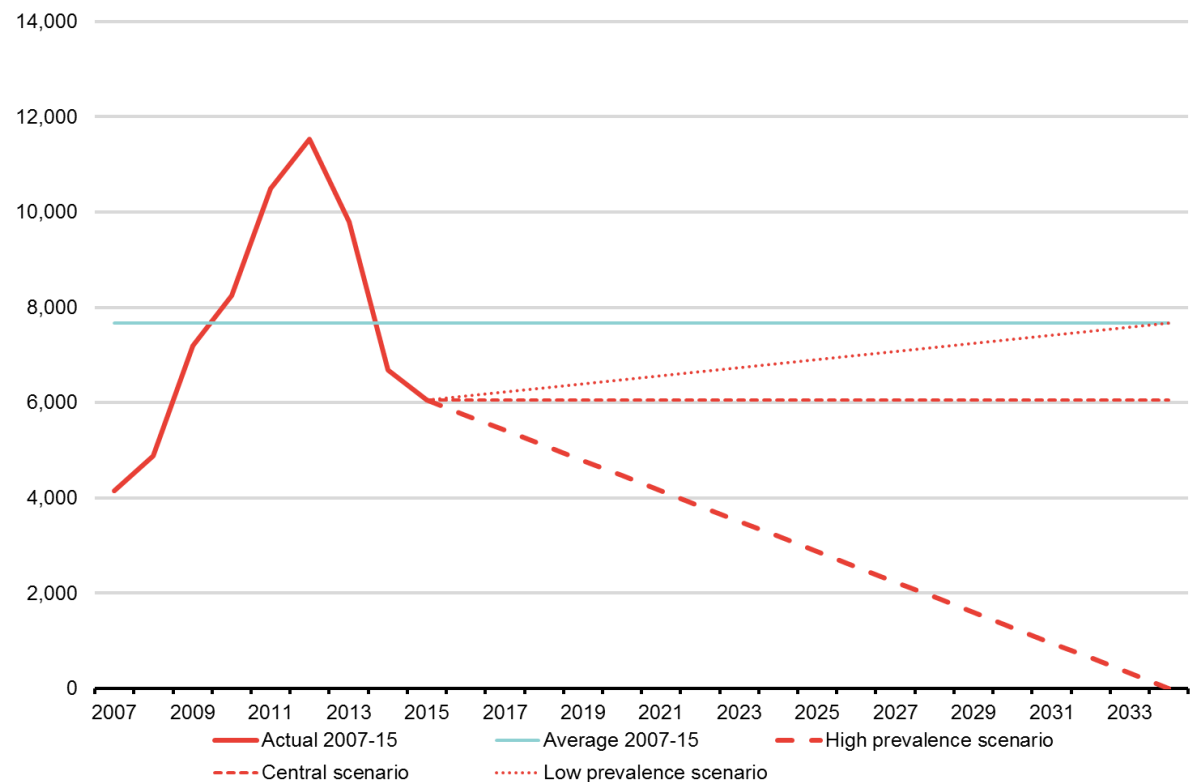
## Modelling scenarios:

- We have modelled three scenarios for future use:
  - High prevalence scenario:** Use declines falling to zero by 2034.
  - Central scenario:** Use plateaus at 2015 levels (~6,000 successful quits).
  - Low prevalence scenario:** Use increases back towards the average 2007-15 level, by 2034.

## Impact on prevalence by 2034:

- High prevalence scenario: prevalence 1.9 percentage points higher than long-run trend.
- Central scenario: prevalence 0.6 percentage points higher than long-run trend.
- Low prevalence scenario: prevalence 0.3 percentage points higher than long-run trend.

## Successful quits using Smoking Cessation Services, Scotland 2007-2034



Source: ISD Scotland, Frontier analysis.

Note: We convert 4-week success rates reported by NHS Digital to 1-year success rates using a factor of 0.25, following a conservative application of West & Owen (2012).

<sup>1</sup> ISD Scotland (2016)

# Standardised packaging and the EU Tobacco Products Directive: we account for a one-off reduction in smoking prevalence spread over five years, as anticipated by the Government, as well as the possibility of zero impact

Hypothesis: in line with Government estimates, the introduction of standardised tobacco packaging and the EU Tobacco Products Directive will lead to reduced demand for tobacco and thereby reduce prevalence relative to the long-run trend.

## Evidence:

- Standardised packaging has been introduced in Australia, France, Hungary, Ireland, Norway, and the UK. In Scotland, branded manufacturing ceased in May 2016, and branded retail ceased in May 2017.
- Evidence on the impact of standardised packaging is limited, but since the policy is not the focus of this report, our central scenario assumes the impact anticipated by the Government is correct, while acknowledging other outcomes are possible, including zero impact, as reflected in the scenarios described below.
- The EU Tobacco Products Directive (TPD) introduced a range of regulations on packaging and labelling, ingredients used in products, and widened the scope of previous regulations to cover new products. The impact of TPD packaging and labelling regulations overlap significantly with the impact of standardised packaging. Like standardised packaging, the EU TPD in the UK was phased in between May 2016 and May 2017. The EU TPD Impact Assessment estimated that it would lead to **a reduction in tobacco consumption of 1.7-2.6% over five years**.
- The UK Plain Packaging Impact Assessment (DH IA) assessed the **combined impact** of standardised packaging and the EU TPD, suggesting **a reduction in tobacco consumption of 5.7% over five years**.<sup>1</sup> For our central scenario, we decided to follow the UK Impact Assessment calculations, adjusted for more recent prevalence data. This leads us to estimate a one-off 1.1 percentage point impact on prevalence.

## Modelling scenarios:

- High prevalence scenario: 0 percentage point reduction in prevalence relative to the long-run trend by 2034.
- Central scenario: 1.1 percentage point reduction in prevalence relative to the long-run trend by 2034.
- Low prevalence scenario: 3.0 percentage point reduction in prevalence relative to the long-run trend by 2034.

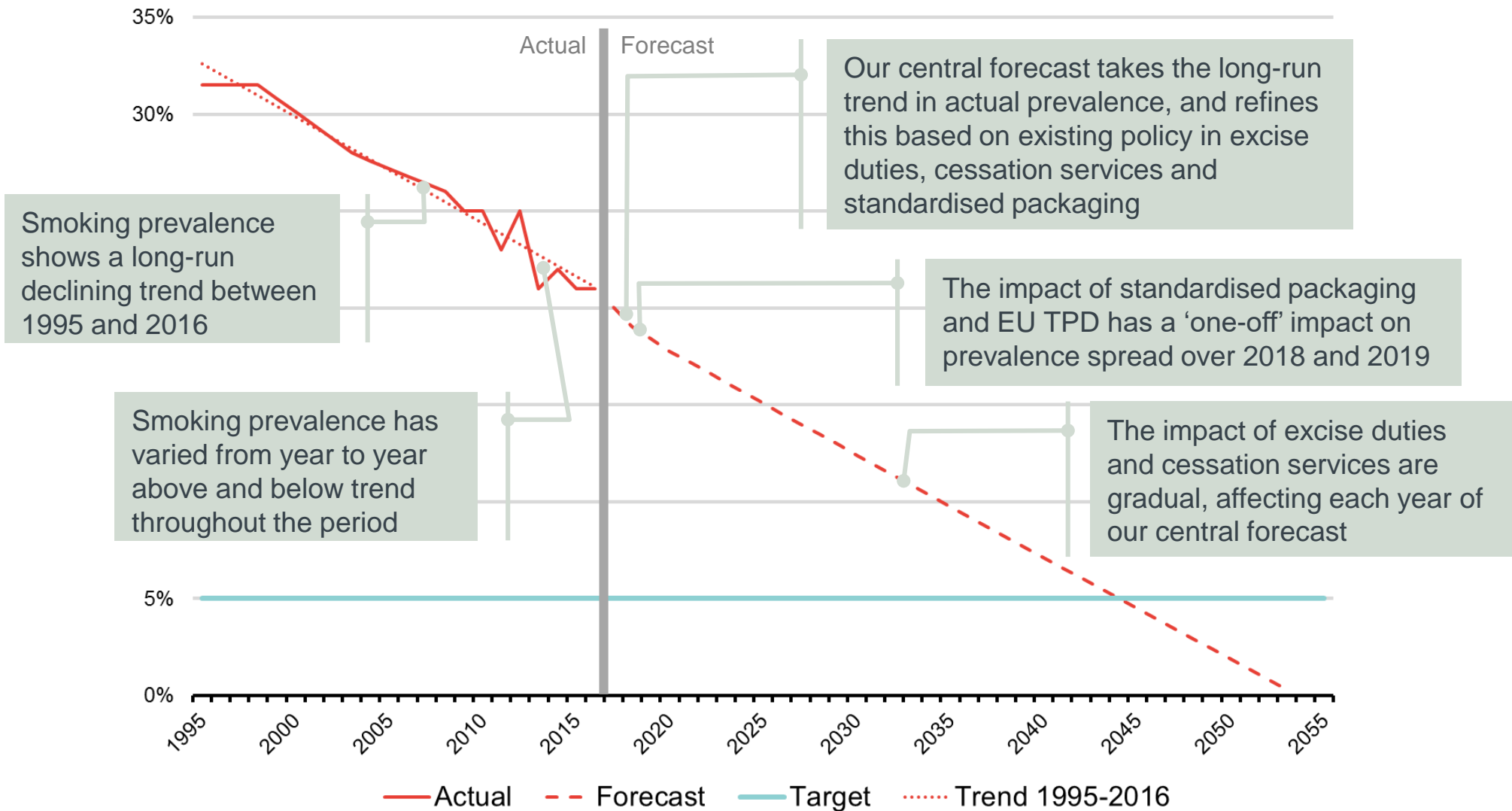
*Additional note on calculations:* The Department of Health (2015) Impact Assessment is based upon the following proportionate (rather than percentage point) impacts upon prevalence:

- 1.90% impact of EU TPD over 5 years;
- 4.80% impact of standardised packaging over 2 years; and
- an overlap of 1.00% between these two figures (see paragraphs 219 and 372 of the DH IA).

In line with the DH IA, we assume that one-fifth of the impact of EU TPD (0.38%) is already observed in our latest (2016) prevalence figures (see paragraph 221 of the DH IA), but that the remainder of the EU TPD impact and all of the standardised packaging impact is observed from 2017 onwards. We multiply the remaining 5.32% by the latest prevalence figure, 21%, to estimate the remaining future impact at 1.1 percentage points.

<sup>1</sup><https://www.gov.uk/government/publications/impact-assessment-opinion-standardised-packaging-of-tobacco-products-final>  
and [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/403493/Impact\\_assessment.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403493/Impact_assessment.pdf)

# Our central forecast builds upon long-run smoking prevalence trends, adjusted for existing policy in three areas



Source: Scottish Health Survey (2017), Frontier calculations.

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