

Title: Smoke Alarms in Private Rented Properties Impact Assessment No: RPC14-CLG-2266 Lead department or agency: Department for Communities and Local Government Other departments or agencies: n/a	Impact Assessment		
	Date: 27/10/2014		
	Stage: Final		
	Source of intervention: Domestic		
	Type of measure: Secondary Legislation		
Contact for enquiries: contactus@communities.gsi.gov.uk			
Summary: Intervention and Options			RPC Opinion: Green

Cost of Preferred (or more likely) Option			
Total Net Present Value	Business Net Present Value	Net cost to business per year (Equivalent Annual Net Cost to Business on 2009 prices)	In scope of One-In, Two-Out? Measure qualifies as
£494.24m	-£31.65m	£2.91m	Yes IN

What is the problem under consideration? Why is government intervention necessary?

The problem under consideration is that there are unnecessary fatalities and injuries from fire occurring in households which do not have a working smoke alarm installed. Successive Governments have made extensive use of non-regulatory approaches since 1987, including a series of highly effective public information campaigns such as “Fire Kills” and fire safety checks, which helped increase the proportion of private rented homes fitted with a working smoke alarm to 83% in 2012/13. However, private tenants remain less likely to be protected by a working smoke alarm than owner occupiers and social renters, the rate of annual increase in the installation of smoke alarms in the private rented sector has significantly slowed it only rose by 5% from 78% in 2006 to 83% in 2012/13. Given the diminishing returns from public information campaigns, it is therefore necessary to supplement them with regulations if we are to protect tenants of the small minority of private rented sector landlords who have proved resistant to non-regulatory approaches from preventable death or injury from fire.

What are the policy objectives and the intended effects?

The objective of the policy is to help prevent fire fatalities and injuries to private tenants by ensuring all private rented properties have a smoke alarm installed on each floor. This is in line with current Government Fire Safety advice to install at least one device on each floor in the home.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

1 – Do nothing - carry on with our current communications campaign and fire safety policy interventions
 2 - Regulate for the installation of smoke alarms on each floor of a privately rented home. Current non-regulatory policies have been unable to reach 9.6% of private rented sector properties, and 17% of private rented sector properties do not have a working smoke alarm. Consultation with Local Fire and Rescue Authorities and other industry representatives have led us to conclude that regulation is the only option to increase coverage of smoke alarms to all private rented properties. This view was supported by over 96% of landlords, agents and fire officials who responded to our discussion paper.¹

Will the policy be reviewed? It will be reviewed. If applicable, set review date: April 2017					
Does implementation go beyond minimum EU requirements?				NA	
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.		Micro No	< 20 No	Small No	Medium No
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)				Traded: NA	Non-traded: NA

¹ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review of Property Conditions in the Private Rented Sector 2 .pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review_of_Property_Conditions_in_the_Private_Rented_Sector_2_.pdf)

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible
SELECT SIGNATORY: Minister

Brandon Lewis

Date: 27/10/14

Summary: Analysis & Evidence

Policy Option 1

Description: Regulate for the installation of smoke alarms on each floor of a privately rented home

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	Present Value Base Year 2014	Time Period Years 10	Net Benefit (Present Value) (£m)		
			Low: 488.09	High: 500.39	Best Estimate: 494.24

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	21.2	9.8	106.3
High	28.4	10.4	118.6
Best Estimate	24.8	10.1	112.5

Description and scale of key monetised costs by 'main affected groups'

One off transition cost of £4.8m for all landlords (business) (1.4 million landlords) who will have to spend 15 minutes familiarising themselves with the policy. Further one off cost for landlords, who already have an alarm, having to purchase an additional alarm/s to comply with change in regulations (£7.2m-£14.4m). One off cost for landlords for the time spent installing alarms which were needed to comply with the change in the regulations (£4.9m). One off cost for tenants (non-business) buying batteries in properties which need additional alarms to comply with regulations (£4.3m). On-going average annual cost to landlords of £0.5m - £1.1m for purchasing alarms (total Present Value £5.1m - £10.2m), and £0.4m for the time spent installing alarms (total Present Value cost of £3.5m). Average annual cost of £8.9m to tenants from buying batteries each year at a Present Value cost of £76.5m.

Other key non-monetised costs by 'main affected groups'

A time cost for non-business (tenants) installing batteries would be so minor as to be de minimis.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low		70.8	606.7
High		70.8	606.7
Best Estimate	N/A	70.8	606.7

Description and scale of key monetised benefits by 'main affected groups'

Social benefit due to the policy resulting in an estimated 231 fewer fatalities and 5860 fewer injuries over 10 years.

Other key non-monetised benefits by 'main affected groups'

Other spill over benefits as a result of fewer fire incidents (damage to property, damage to other properties, loss of possessions to name a few).

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

Value of each life saved in 2015 is £1.77m based on Department for Transport webtag data book. The value of each injury avoided is £39,110 based on Department for Transport webtag data book. The value of each injury uses a weighted average to the cost of a serious injury (0.13) and a minor injury (0.87) based on the proportion of serious and minor injuries in properties with a 1 year alarm. For this policy to have a neutral Net Present Value the policy would need to prevent a total of 43 fatalities and 1086 injuries over the 10 years of the policy. No additional enforcement costs for local authorities are assumed. Discount rate of 3.5% used throughout.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of one in	Measure qualifies as
Costs: 2.9	Benefits: 0	Net: -2.9	Yes	IN

Background to Impact Assessment

The Department published a discussion document of February 2014 ¹ which sought views on how best to improve property conditions in the private rented sector. We received a number of responses to this document that helped inform the policy. A consultation Impact Assessment was not produced alongside the discussion document but we consider a Final Impact Assessment at this stage to be sufficient for the following reasons:

- (a) There were no policy proposals made within the discussion paper; the purpose of the document was to simply canvass opinion on various possible policy measures;
 - (b) There is already a market for smoke alarms so we know what the purchase costs of the alarms will be for landlords;
 - (c) Other costs to business impacts such as time and familiarisation costs have been made using assumptions from past Impact Assessments to ensure consistency²
 - (d) There is already good data on smoke-related deaths and injuries that enable us to calculate a social benefit from increasing the uptake of smoke alarms;
 - (e) Where assumptions need to be made – such as the proportion of smoke-related deaths that occur in private rented accommodation – no consultation would enable us to gather such information because this data is not recorded;
 - (f) We have carried out appropriate sensitivity analysis to capture any uncertainty;
 - (g) The Department has regularly pursued non-regulatory policies in an attempt to increase uptake such as Fire Kills campaigns. A regulatory solution is needed to help increase uptake further; and
 - (h) Given the estimated cost of this policy, it would be disproportionate and costly for the Department to commission further research in this area in an attempt to gather further data. It is questionable whether any data could be gathered given where assumptions have been made it is because the data is not recorded. Therefore, this would simply delay the implementation of a socially desirable policy with minimal additional benefit;
- [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review of Property Conditions in the Private Rented Sector 2 .pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review_of_Property_Conditions_in_the_Private_Rented_Sector_2.pdf)

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[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review of Property Conditions in the Private Rented Sector 2 .pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review_of_Property_Conditions_in_the_Private_Rented_Sector_2.pdf)

² We have used the same familiarisation time as we used in the 'Lettings Agents Fees' Impact Assessment.

Evidence Base (for summary sheets)

Problem under consideration and rationale for Government intervention

Successive Governments have significantly increased smoke alarm installation, and so reduced the number of fire deaths and injuries, largely through non-regulatory approaches. A combination of public information campaigns such as “Fire Kills”, funding for fire and rescue authorities to carry out just under 700,000 Home Fire Risk Checks (fitting smoke alarms and providing safety advice) each year, and changes to Building Regulations have seen smoke alarm ownership levels rise from 9% to 90% across all tenures, and fire deaths fall by 36% in England from 2000/01 to 2012/13³ (since 1992 Building Regulations have required that all new dwellings should have a hardwired smoke alarm on each floor of the home. The regulations also affect existing homes when they are subject to extensions and certain types of alteration).

However, despite these improvements, private renters remain less likely to have a working smoke alarm than owner occupiers and social renters⁴. In 2012-13, 83% of private renters had at least one working smoke alarm compared with 88% of owner occupiers, 89% of local authority tenants and 92% of housing association tenants. 9.6% of private tenants did not have any form of smoke alarm in their home⁵.

The probability of dying or being injured in a property with a smoke alarm is significantly less than in a property without a smoke alarm (details discussed below). Therefore, increasing the percentage of private rented homes with a smoke alarm on each floor of the home would help to reduce the number of preventable fire deaths and injuries to private tenants (advice from the Fire Service (<http://www.fireservice.co.uk/safety/smoke-alarms>) states that smoke alarms should be installed at least on every floor to maximise their effectiveness). In 2013-14, there were 213 deaths and 6,400 injuries in the home as a result of fire. The majority of fire deaths and injuries are preventable. Nearly 40% of deaths occur in properties without a working smoke alarm.

We believe there will be diminishing returns from public information campaigns as had happened in other rented tenures (chart 1 on the next page shows this for housing association renters). It is therefore necessary to supplement these non-regulatory approaches with regulations if we are to protect tenants from the small minority of private rented sector landlords who have proved resistant to the non-regulatory approaches employed since 1987. The Chief Fire Officers Association has advised the government that they consider the main barrier to further take-up of smoke alarms is identifying and gaining access to the small percentage of homes without them, with limited scope for further uptake through funding or communications. If Government does not intervene in this way, we project that the percentage of private rented homes without a working smoke alarm will plateau at 10% from 2017. This is in line with the experience of Housing Association properties as set out below.

Regulations are seen as the only way forward to force the 17% of private rented sector properties who do not have a working smoke alarm to ensure there is an adequate level of protection for tenants from preventable death or injury from fire.

Annex A provides information of DCLG discussion paper issued in February on improvement conditions in Private Rented Sector.

Policy objective

The objective of the policy is to increase the number of private rented homes which have a fire alarm installed to reduce the number of fire fatalities and injuries amongst private tenants. Just one sensibly positioned working smoke alarm in a property will significantly improve the safety of tenants, and installing at least one device on each floor in the home can further reduce preventable deaths and injuries from fire. The rationale for this policy is based on, advice from the Fire Service (<http://www.fireservice.co.uk/safety/smoke-alarms>) which states that a smoke alarm should be installed

³ DCLG fire statistics, table 5.b: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313578/FSGB_2012-13_Time_Series_Tables_1a_-_16.xlsx

⁴ English Housing Survey, Fire and Fire Safety 2012-13: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335757/EHS_Fire_and_Fire_Safety_2012-13.pdf

⁵ English Housing Survey, Fire and Fire Safety 2012-13: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335757/EHS_Fire_and_Fire_Safety_2012-13.pdf

at least on every floor of a property to maximise their effectiveness. This is predicated upon the assumption that sleeping or wakeful individuals with average hearing, within an average size property would be roused by the volume of sound from a detector on the same floor as them.

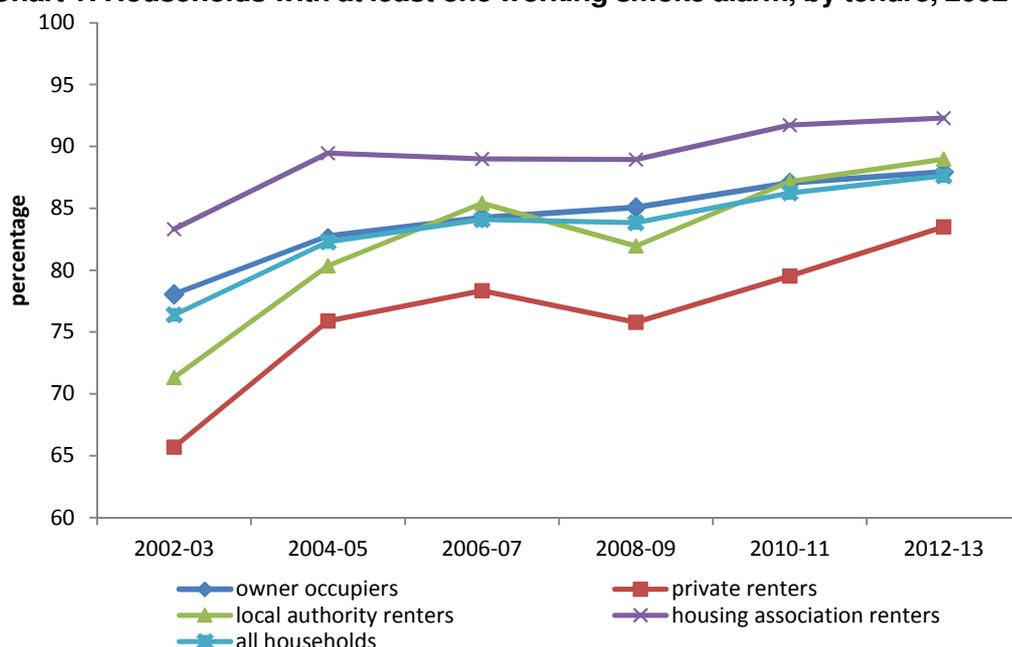
We do not know what the additional benefit of having an alarm per floor relative to one alarm per dwelling because this data is not recorded. It would also be disproportionate to attempt to collect this data in the future specifically to inform this policy and would significantly delay the implementation of a socially desirable policy. However, we have undertaken sensitivity analysis and identified the relevant switching value which identifies the additional benefit that is needed to ensure the policy is Net Present Value positive. For this policy to have a neutral Net Present Value the policy would need to prevent a total of 41 fatalities and 1030 injuries over the 10 years of the policy. This is significantly less than the 231 fewer fatalities and 5860 fewer injuries over 10 years that we are forecasting.

Description of options considered (including do nothing):

1 - Do nothing – continuation with our current communications campaign and fire safety policy interventions:

This option would see the continuation of current non-regulatory measures aimed at promoting the installation of smoke alarms in all properties. Under this option, we forecast that a proportion of private rented properties would continue to not have a smoke alarm installed. This is based on observed trends in Housing Association properties which have higher levels of installation rates compared to the private rented sector. In this sector, smoke alarm installation rates appear to have peaked around 90% suggesting there will also be some individuals who are unlikely to change their behaviour as a result of non-regulatory solutions.

Chart 1: Households with at least one working smoke alarm, by tenure, 2002-03 to 2012-13



Source: taken from English Housing Survey HS Fire and fire safety 2012-13: figures and annex tables (<https://www.gov.uk/government/statistics/english-housing-survey-2012-to-2013-fire-and-fire-safety-report>)

Given the private rented sector tends to lag the performance of Housing Associations in smoke alarm installation rates, we have assumed that in our counterfactual assessment, private rented sector installation rates of smoke alarms in the private rented sector continue to rise with current trends driven by a range of non-regulatory policies but peak at 90% which is broadly in line with Housing Association properties.⁶

⁶ The precise installation rate of Housing Association properties is slightly higher than 90% but we have conservatively assumed 90% based on the quality of private rented accommodation being lower than other tenures.

2 - Regulate for the installation of smoke alarms on each floor of a privately rented home:

This option would require a working smoke alarm to be installed on each floor of all private rented properties. Evidence suggests that 19% of fatalities from fire in properties had a battery powered smoke alarm was present, but the smoke alarm failed. There are various reasons why smoke alarms did not work in these incidences, but the most common reason is that smoke did not reach the alarm, which is one of the reasons why the preferred option requires a smoke alarm is installed on every floor of a property⁷. The regulation will also introduce powers for local authorities to install smoke alarms in private rented sector properties, and give them the power to retrospectively recover the installation costs from the landlord, as well as be able to fine the landlord. This option would mean that smoke alarms would be installed in hard-to-reach properties whose owners have been the most resistant to current non-regulatory measures. Research at the start of the campaign showed that whilst smoke alarms didn't stop fires they limited the spread and subsequent damage due the earlier warning to the occupier, allowing them to either extinguish the fire in its incipient stages or call the Fire Service earlier but crucially allowed the occupiers to move to safe environment.

⁷ Table 2.8: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313590/Fire_statistics_Great_Britain_2012-13__final_version_.pdf

Monetised and non-monetised costs and benefits of each option (including administrative burden):

Assumptions

There is good data available on the purchase costs of smoke alarms as well as smoke-related deaths and injuries which have enabled us to give a robust estimate of the likely cost to business and wider social benefit of the proposed policy. However, with all appraisals, there needs to be some assumptions made given we are forecasting potential impacts up to ten years into the future. This section sets out the key assumptions we have made and our justification.

Assumption one: Growth in households

The number of private rented properties has increased from 13.9% of all dwellings in 2008 to 18% of all dwellings in 2012/13. In order to robustly appraise the impact of this policy we need to forecast the projected increase in private rented properties over the appraisal period. To do this we have estimated the number of private rented dwellings in 2012⁸ (4,286,000) and increased it by 39,780 homes each year.

The increase of 39,780 homes continues throughout the policy and is based on data⁹ which shows that properties in the private rented sector account for 18% of total households. The 18% proportion has been multiplied to the average annual projected household formation projections for England, of 221,000¹⁰. The household formation projections is used as a proxy for future housing demand, and used by Local Planning Authorities as a basis for creating local plans for housing. However, house building has not exceeded this level for over 30 years.

In addition, because existing regulations for new build property already mandates that there must be a smoke alarm installed for every floor of a new property, it is only existing private rented sector properties, or properties converted from other tenures e.g. owner occupied which will be affected by the regulations. There will be a one-off cost associated with bringing existing stock to the new standard, plus on-going cost from the flow of properties into the private rented sector which are not new build. As there is not good information about the source of additional private rented sector properties – and it would be hugely disproportionate to commission research in this area relative to the scale of impacts - this assessment assumes that all the growth identified above (39,780) are properties transferred from other tenures i.e. existing stock, rather than new build. We have assumed this in order to provide a conservative estimate with respect to calculating installation costs.

Assumption two: Growth in smoke alarms

As explained above, in the counterfactual scenario we forecast that a proportion of private rented properties with a smoke alarm would continue to rise by 1.5 percentage points in line with English Housing Survey data on average annual increases from 2002/03 to 2012/13 but it will peak at 90%. This is based on observed trends in Housing Association properties which have higher levels of installation rates than compared to the private rented sector. Given the private rented sector tends to lag the performance of Housing Associations in smoke alarm installation rates, we have assumed that in our counterfactual assessment, private rented sector installation rates of smoke alarms in the private rented sector continue to rise with current trends driven by a range of non-regulatory policies but peak at 90% broadly in line with Housing Association. The growth in the number of properties requiring a smoke alarm installed each year of the policy is likely to be an overestimate. This is because homes converting from other tenures to a private rented sector property and new build private rented sector properties are covered by building regulations which require a smoke alarm installed on each floor of a property. This means that our on-going annual costs of the number of alarms purchased and installed, along with the number of batteries purchased by tenants, are likely to be an overestimate.

Assumption three: Converting total smoke deaths and injuries into a smoke deaths and injuries in private rented properties

Data on smoke-related deaths and injuries is not broken down by tenure so we do not know the proportion of these deaths and injuries which happen in the private rented sector. However, this total

⁸ Dwelling Stock Estimates:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/285001/Dwelling_Stock_Estimates_2013_England.pdf

⁹ English Housing Survey

¹⁰ Household Interim Projections, 2011 to 2021, England:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/190229/Stats_Release_2011FINALDRAFTv3.pdf

data is broken down into the number of smoke-related deaths and injuries that happen in a home with a smoke alarm and those that happen without a smoke alarm. Therefore, we need to make an estimate of how many deaths and injuries happen in the private rented sector which would enable us to calculate a probability of being killed or injured from smoke in a private rented property with and without an alarm.

A simple assumption would be to assume that 18% of smoke-related deaths and injuries occur in private rented accommodation with 18% being the share of private rented houses. However, the quality of the private rented housing stock is much lower than other tenures and so is unlikely to give an accurate estimate. Our favoured approach is to use data from the English Housing Survey Fire and Safety 2012-13 which suggests that 'of dwellings that had a higher risk of fire, 29% were in the private rented sector, despite only 18% of the total stock being private rented'.¹¹ Therefore, we have assumed that 29% of smoke-related deaths and injuries occur in the private rented sector. Given actual data is not collected in this area this represents the best assumption given data availability.

Assumption four: quantifying the reduced probability of death and injury from an increase in smoke alarms

As data is collected on the number of smoke-related deaths and injuries which occur in homes with a smoke alarm and in homes without a smoke alarm, we can use this information to estimate reduced likelihood of dying from a fire/smoke as a result of installing a smoke alarm. For example, the average annual number of smoke-related deaths in dwellings with alarms over the period 2006 to 2014 was 169 while for those without alarms it was 108. For injuries the figures were 5,708 and 2,669 respectively.¹² As per assumption three, these figures can be adjusted for the private rented sector by multiplying them by 29%. This gives 49 deaths in dwellings with alarms and 31 in dwellings without alarms. For injuries the figures are 1,655 and 774 respectively. We know that there are 4.1m private rented sector dwellings and that 17% of these properties do not have a working smoke alarm. Therefore, dividing the above deaths and injuries by the number of private rented sector properties with and without an alarm gives the probabilities of dying or being injured from smoke in a private rented sector property with and without an alarm.

Therefore, estimating the benefit of more smoke alarms essentially involves switching from the probability of dying or being injured in a dwelling without an alarm to the probability of dying or being injured by smoke in a dwelling with an alarm. This reduced probability results in fewer deaths and injuries which can be multiplied by the value of prevented fatality and injury (discussed later).

However, one uncertainty around this is that some properties have more than one smoke alarm. Therefore, there is some uncertainty around the additional benefit of installing a smoke alarm on every floor compared to a single alarm in a property. But evidence suggests that the most common reason for battery powered alarms failing is because fire did not reach the alarm¹³. We therefore believe that installing an alarm on each floor of a property would reduce the probability of death and injury in the preferred option. To account for this uncertainty we have carried out extensive sensitivity test and optimism bias adjustments. We have also identified an appropriate 'switching value' to understand the point at which this policy ceases to have a neutral Net Present Value. We estimate that for the policy to have a neutral Net Present Value the policy will need to prevent a total of 43 fatalities and 1086 injuries over the 10 years of the policy.

Assumption five: Time costs for landlords to install an alarm

An assumption has to be made regarding the time taken to install a smoke alarm in a property. There is clear uncertainty with this and it is likely to vary. In the absence of any data on this and given proportionality, we have assumed it takes 15 minutes to install an alarm. We believe this is a conservative assumption as standard powered alarms require two simple screws to install it.

Assumption six: Time costs for landlords to familiarise themselves with legislation

An assumption has to be made regarding the time taken to familiarise themselves with the legislation. There is clear uncertainty with this and it is likely to vary. In the absence of any data on this and given proportionality, we have assumed it takes 15 minutes to read and understand the legislation.

Assumption seven: Tenants replace batteries if they need replacing

¹¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335757/EHS_Fire_and_Fire_Safety_2012-13.pdf p29

¹² 2012/13 Fire Statistics (<https://www.gov.uk/government/statistics/fire-statistics-great-britain-2012-to-2013>)

¹³ Table 2.8: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313590/Fire_statistics_Great_Britain_2012-13__final_version_.pdf

The initial cost of installing a smoke alarm falls on the landlord. However, future costs in respect of replacing batteries (and the time taken to replace them) fall on tenants. This has been accounted for in the analysis in terms of a cost to tenant but does not represent a cost to business. As it is only batteries being replaced and not the installation of the alarm itself, we have assumed a much lower annual time cost of 5 minutes. However, the batteries of each alarm needs to be replaced in order for them to be effective (and therefore generate the potential welfare benefits being estimated). We have assumed this happens in the majority of instances but have adjusted the benefits through optimism bias adjustments to account for the potential behavioural element of non-replacement and/or incorrect installation (see assumption below).

Assumption eight: optimism bias levels

For purchase costs we have not applied optimism bias because there is a market for smoke alarms and we therefore know the exact purchase costs. However, optimism bias has been applied extensively in our benefit calculations. One assumption is in relation to the behavioural element discussed above and the possibility that tenants do not replace batteries and / or there is also the possibility that the devices are installed incorrectly. Evidence suggests that 19% of fatalities from fire in properties had a battery powered smoke alarm was present, but the smoke alarm failed. There are various reasons why smoke alarms did not work in these incidences, but the most common reason is that smoke did not reach the alarm, which is one of the reasons why the preferred option requires a smoke alarm is installed on every floor of a property¹⁴. As a result of this we have reduced the number of fatalities and injuries prevented as a result by 19%.

Assumption nine: non enforcement costs

The estimates of the number of fire deaths and injuries the regulations could prevent each year are dependent upon landlord compliance and on tenants regularly testing and buying new batteries. To help achieve this, we plan to introduce powers for councils to enforce the new requirements by allowing councils (when contacted by tenants) to install the smoke alarm and recover their full costs from the landlord who had not complied. The landlord would also face a fine.

Assumption ten: type of alarm purchased

We have assumed that all landlords will purchase 1 year battery alarms throughout the analysis of this impact assessment. Landlords could purchase 10 sealed battery alarms, or at a higher cost, a hardwired alarm but this would require the alarm to be fitted by a qualified electrician. Because this policy is aimed at the small proportion of private properties which are reluctant to purchase a smoke alarm, we feel it is more likely they will purchase the cheaper 1 year battery powered alarm. In addition, 1 year battery alarms are the most common type of smoke alarm installed in all tenure of properties¹⁵. As assumption seven notes, 1 year alarms will need their batteries replaced annually, at a cost to the tenant.

Do nothing - carry on with the current communications campaign

In the “do nothing” option we would continue with the current non-regulatory approach of trying to increase the number of homes which have a smoke alarm installed. The costs associated with the “do nothing” approach will be the baseline against which the preferred option is compared.

Under the “do nothing” option there would continue to be fatalities and injuries in private rented sector properties which do, as well as do not, have a working smoke alarm installed. Other costs in the do nothing include annual costs for landlords, who choose to purchase smoke alarms, of purchasing smoke alarms and the time cost for landlords to install the alarms. There will also be non-business costs for tenants who will purchase batteries annually and a time cost for tenants replacing the batteries in the smoke alarms.

¹⁴ Table 2.8: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313590/Fire_statistics_Great_Britain_2012-13_final_version_.pdf

¹⁵ 43% of all properties have a 1 year battery powered alarm installed in 2012/13: Figure 1.9, 2012/13 Fire Statistics (<https://www.gov.uk/government/statistics/fire-statistics-great-britain-2012-to-2013>)

We estimate that in 2015 there will be 4,405,340 private rented sector properties, which uses the number of private rented dwellings in 2012¹⁶ (4,286,000) and increases it by 39,780 homes in each year over the appraisal period. An explanation of this assumption is given above.

We further assume that, in the absence of regulations, the proportion of dwellings without a working smoke alarm would decrease by 1.5 percentage points per year to 10% and then be capped at that level from 2017 (the rationale for these assumptions is explained above). We have applied this cap to be conservative, so that we are not overestimating the costs of the do nothing option to lower the costs in the preferred option. The cap also recognises that we expect there to be a plateau in the reduction in the proportion of properties that do not have a smoke alarm, as consultations with fire officials suggest some properties will never install a smoke alarm in the absence of regulation (also see assumption above).

Table 1A in the annex shows the profile of private rented sector properties and the number with and without a smoke alarm in the do nothing option. The number of deaths and injuries are calculated using changes in the probabilities of dying or being injured from smoke as a result of the growth in uptake of smoke alarms from current policy measures (the details of this calculation are explained above). In the 10 years of this policy we estimate there to be a total of 770 fatalities and 24,162 injuries as a result of fires in private rented sector properties. A full explanation of the methodology used to reach these figures is given after table 1A in the annex.

With the growth in uptake of smoke alarms in the counterfactual, there will be a cost for landlords buying a smoke alarm in each year of the “do nothing” option; this will only apply to the additional properties who install a smoke alarm. Online research suggests that a range for the cost per alarm should be used as there is a wide variation in the cost of a one year smoke alarm. We have used a range of the cost per alarm ranging from £5 to £10 per alarm.

There will also be a time cost for landlords installing the alarms. We have assumed it will take a landlord 15 minutes to install each alarm. The Annual Survey of Hours and Earnings (ASHE) 2013 median hourly wage for estate agents (£13.68) is used as a suitable proxy for landlord’s cost of time. This has been uplifted by a factor of 1.3 to account for non-wage labour costs as suggested by the Her Majesty’s Treasury Green Book. Table 1 presents the average and total costs for landlords for buying and the time cost for installing an alarm. A full table is presented in table 2A and 3A in the annex.

Table 1 – Ten-year total and annual average cost for landlords for buying and installing alarms

Year	Ten-year total	Annual average	Total Present Value
Additional homes with alarm	533k	53k	N/A
Cost of purchasing an alarm	£5 - £10	£5 - £10	N/A
Total cost of purchasing alarm	£2.7m - £5.3m	£0.3m - £0.5m	£2.4m - £4.8m
Time cost of installing alarm	£3.42	£3.42	N/A
Total time cost of installing alarm	£1.8m	£0.2m	£1.6m

¹⁶ Dwelling Stock Estimates:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/285001/Dwelling_Stock_Estimates_2013_England.pdf

There will also be an annual cost for tenants (non-business) of purchasing batteries for their smoke alarms per year. The tenant will need to purchase one 9 volt battery per alarm and departmental research informs us to use a cost per battery of £3 is a conservative estimate. The number of tenants who have to buy batteries is derived from the number of properties which have a smoke alarm in the previous year. The total an average costs for tenants are presented in table 2. A full table is presented in table 5A in the annex.

Table 2 – Ten year total cost for Tenants purchasing batteries

Year	Ten-year total	Annual average	Total Present Value
Private rented sector dwellings with smoke alarm	41.1m	4.11m	N/A
Cost of purchasing batteries	£3.00	£3.00	N/A
Total cost of purchasing batteries	£123.2m	£12.3m	£105.8m

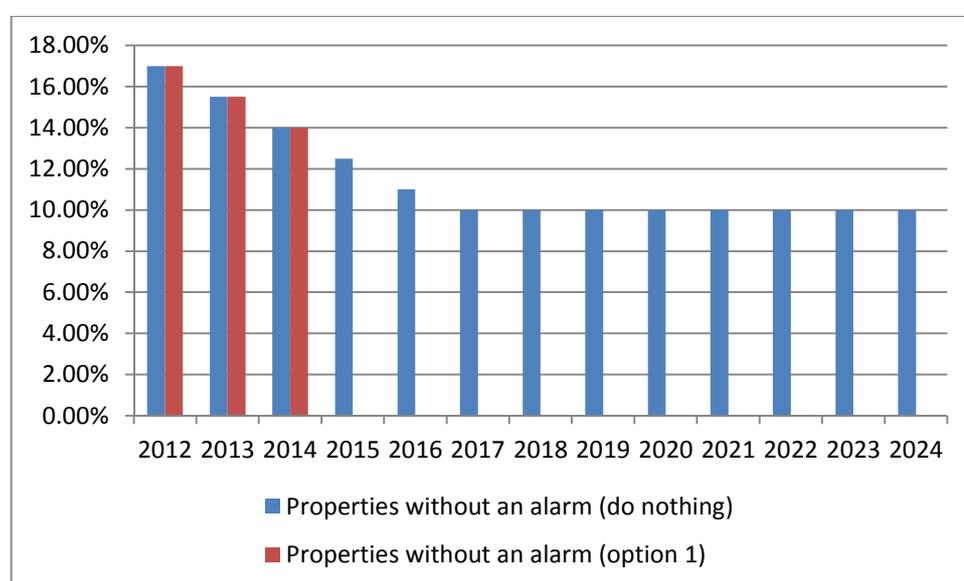
There will also be a time cost for tenants installing the batteries. We expect to take a maximum of 5 minutes and believe this to be a conservative time. To proxy the hourly wage rate of a tenant we have used the same hourly wage rate which was used for a landlord (£13.68). This gives a total cost under the do nothing of £46.3 million over 10 years and a total Present Value cost of £39.7 million. Because of the uncertainty surrounding the wage rate we should use for a tenant we are going to use this as a non-monetised cost to tenants (non-business).

Under the do nothing we estimate a total present value cost to business ranging from £4.0 million to £6.4 million. And we estimate the total present value cost to non-business (tenants) to be £104.4 million, if the estimated non-monetised cost to tenants is included (time cost for installing batteries) the total Present Value cost to non-business would be £144.1 million.

Option 2 - Regulate the use of smoke alarms on every floor

Option 2 would mandate the installation of smoke alarms on every floor of all private rented sector properties. From 2015 every private rented sector property in England will be required to have a smoke alarm fitted on each floor of the property. The table below presents the difference in the proportion of properties that do not have a smoke alarm installed.

Chart 2 – Proportion of private properties without a working an alarm



The chart shows that when the regulation comes into force in 2015 all private rented properties would be expected to have a smoke alarm installed.

One off familiarisation cost to business

We estimate that all landlords will need to become familiar with the changes in the regulation irrespective if their properties already had an alarm. The 1.4 million landlords¹⁷ will require 15 minutes to familiarise themselves with the regulation. We have used the median hourly wage for estate agents (£13.68) as a proxy for landlord's cost of time, which has been uplifted by a factor of 1.3 to account for non-wage labour costs as suggested by the Her Majesty's Treasury Green Book. This results in a one off cost to business of £4.8 million in 2015.

One off cost to business

As this policy will require landlords to install an alarm on each floor of their property, some landlords will need to purchase additional alarms to comply with the change in regulations. Bespoke DCLG analysis of the English Housing Survey give us a good indication of how many private rented sector properties

¹⁷ Information taken from the Impact Assessment "Transparency of letting agent's fees". Evidence from the DCLG Private Landlords survey 2010 indicates that our figure of 1.4 million landlords is slight overestimate, so we will keep this figure to be conservative: <https://www.gov.uk/government/statistics/private-landlords-survey-2010>

need to buy additional alarms to comply with the change in the regulations. Table 3 shows a matrix of private rented properties by number of floors and the number of alarms they have.

Table 3 - Number of smoke alarms and number of floors in the private rented sector

		Number of smoke alarms			
		0	1	2	3
Number of floors	1	204	841	323	114
	2	198	603	1,036	332
	3	19	24	63	147
	4	*	*	*	17
	total	1,469	1,425	610	3,504

We can then calculate how many alarms need to be purchased where a property does not have an alarm in each floor of their property. For homes with more than 4 floors we have assumed a total of 4.5 alarms are required in a home. This means that a total of 1,440,473 alarms will need to be purchased by landlords to comply with the change in regulations. Using a cost per alarm ranging from £5 to £10 results in a one off cost of buying an additional alarm ranging from £7.2 million to £14.4 million. There will also be a time cost for landlords installing these alarms. We have assumed it will take 15 minutes to install each alarm and have used an hourly wage rate of £13.68 has been used for a landlord. This results in a one off cost to business of £4.9 million.

Annual costs to business

As with the “do nothing” option there will be a cost to landlords of purchasing smoke alarms. In option 1 we expect that in 2015 all private rented sector properties will have a smoke alarm installed, this means there will be an additional 650,958¹⁸ properties which will need at least one smoke alarm purchased and installed in 2015. The cost depends on how many alarms each property will need to have installed, the English Housing Survey revealed that 43% of private rented sector properties are single storey properties and 57% are two storey properties in 2012. This means that 57% of properties will need to purchase two smoke alarms. We have used a cost for each alarm ranging from £5 to £10. In 2015 the 650,958 properties which will need to have an alarm purchased for results in a cost in 2015 for landlords of £5.1 million to £10.2 million. In every year from 2016, 39,780 private rented sector properties will purchase a smoke alarm, of those 22,675 will need to purchase two smoke alarms per property. The total cost for landlords purchasing smoke alarms over 10 years ranges from £7.9 million to £15.8 million, at a present value cost of £7.5 million to £15.0 million.

There will also be a time cost to landlords of installing smoke alarms. We estimate it will take 15 minutes to install each alarm; this means 57% of private rented sector properties will have to install two alarms per property. An hourly wage rate of £13.68 has been used which gives a total time cost to landlords of £3.5 million in 2015. The total cost over 10 years is £5.4 million, at a present value cost of £5.1 million.

Under the do nothing the total cost to business was an estimated £4.5m - £7.1 million, this means the additional cost to business of option 1 ranges from £8.9 million to £14.1 million at a total present value cost ranging from £8.6 million to £13.7 million.

One off costs to tenants

We previously calculated that 1,440,473 alarms will need to be purchased for landlords to comply with the change in the regulation. This will require tenants to make a one off purchase of batteries for the additional alarm. The cost of a set of batteries is estimated to cost £3 per pack, this gives a one off cost to tenants of £4.3 million. Online research has informed us that some newly purchased smoke alarms come with a battery already installed in the alarm. But we have no understanding of what proportion of alarms come with batteries installed, so we are going to continue to assume that all alarms will need batteries purchased by tenants to be conservative. The time taken for tenants to install batteries would be so minor as to be de minimis.

Annual costs to tenants

There will be an annual cost for tenants of buying batteries each year and a time cost of tenants installing batteries. As with the do nothing the cost is based on the number of properties which had a smoke alarm in the previous year. Again, 57% of properties will need to purchase two sets of batteries as these properties will have a smoke alarm on each floor. In 2015 this results in 2.5 million properties needing to purchase two sets of batteries, while 1.9 million properties will need to purchase one set of batteries per property. Online research suggests the cost of one battery is £3; this gives a cost in 2015 of £17.7 million. The total cost of tenants to buy batteries over 10 years is £211.2 million at a present value cost of £180.9 million. Given the cost of buying batteries in the do nothing was £121.7 million over 10 years, the additional cost of the preferred option is £89.5 million at a present value cost of £76.5 million. The time taken for tenants to install batteries would be so minor as to be de minimis.

¹⁸ For the analysis of option 1 we have used the high proportion of private rented sector properties to be conservative with the costs.

Benefits

There will be social benefits from the lower number of fatalities and injuries because of this option. We estimate there will be 518 fatalities and 17,512 injuries over 10 years in private rented sector properties. Annex 2 provides a breakdown of the calculations.

To quantify the benefits of fewer fatalities and injuries we have used the Department for Transport's (DfT) guidance to value the monetary benefit of saving a life and avoiding an injury as a result of a fire. The actual data is provided in DfT's Webtag databook¹⁹. In 2015 the benefit of saving one life is quantified to be £1,796,126, this is calculated by taking the DfT value of life in 2010, of £1,632,892, and converting it into 2014 figures by using the Gross Domestic Product deflator in the DfT webtag databook. In line with DfT guidance the 2014 value of life has been uplifted for all of the following years by using the average annual growth of real Gross Domestic Product per person taken from DfT's webtag databook.

The monetary benefit of not having an injury from a fire is £39,763, which is also taken from the DfT webtag databook. This is based on a weighted average of the cost of serious injury and a light injury. The weightings are based on internal calculations of fire statistics which showed that in homes with a 1 year alarm 13% of incidents were minor injuries and 87% were light injuries²⁰. This gives a value of injury of £39,110 in 2014 prices. The prices were scaled up from 2010 by using the Gross Domestic Product deflator from the webtag databook. From 2014 the value of an injury is increased yearly by the forecast for the annual average growth of real Gross Domestic Product per person from the webtag databook. We have discounted the benefits of fewer fatalities and injuries by 3.5% as per Green Book guidance.

Given the reduced probability of dying or being injured by smoke in a property with a smoke alarm relative to one without, then with option 1 the higher uptake of smoke alarms results in fewer fatalities and injuries compared to the do nothing option. A further optimism bias has been applied to reduce the number of fatalities and injuries when comparing option 1 to the do nothing. Fire statistics²¹ suggests that 19% of fatalities from fire in properties had a 1-year battery smoke alarm was present, but the smoke alarm failed to operate for a wide range of reasons. As a result of this we have reduced the number of fatalities and injuries prevented as a result of option 1 by 19%. This additional optimism bias result in a total of 231 fatalities avoided and 5860 injuries avoided as a result of option 1 compared to the do nothing. When multiplying the DfT value of life and injury from the webtag databook results in a total benefit to society of reduced fatalities and injuries of £708.3 million over 10 years, at a present value benefit of £606.7 million when using a 3.5% discount value. If we followed Department for Health's methodology of discounting at 1.5% the present value benefit would total £661.6 million. The summary pages discount at 3.5% so that we are conservative.

Sensitivity Analysis

The analysis undertaken is driven by English Housing Survey data which estimates that 17% of private rented sector properties do not have a working smoke alarm. English Housing Survey data also reveals that 9.6%, of homes do not have an alarm in their property, therefore this sensitivity will use this proportion throughout the 10 years of the policy of the do nothing option and in the years leading up to the policy under option 1. Using the same probabilities of fatality and injury as we have throughout the impact assessment, regulating for the installation of smoke alarms on every floor of a property will lead to 219 fewer fatalities and 5610 fewer injuries. Using the same figures as in the impact assessment would result in total present value benefit of £577.3 million over 10 years. The total Present Value costs under this sensitivity would range from £104 million to £115.7 million, which is slightly lower than the total Present Value costs in the main evidence base of the impact assessment. But the overall Net Present Value falls to £467.47 million over 10 years. The equivalent annual net cost to business under this

¹⁹ <https://www.gov.uk/transport-analysis-guidance-webtag>

²⁰ Fire Statistics 2013/12:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313590/Fire_statistics_Great_Britain_2012-13_final_version_.pdf

²¹ Fire Statistics 2013/12:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313590/Fire_statistics_Great_Britain_2012-13_final_version_.pdf

sensitivity is £2.8 million in 2009 prices, the same Equivalent Annual Net Cost to Business as what is listed in the summary page.

We have also carried out a further sensitivity on the optimism bias which was used to lower the probability of death and injuries in two storey properties which will now have higher safety levels as a result of having an alarm on each floor. In the main body of the impact assessment we have reduced the probability of death and injury in two storey homes by 25%. If we reduce the probability of death and injury by 50% (we used 25% in the main analysis) this results in 300 fewer deaths and 8217 fewer injuries. Using the DfT webttag data book figures for savings from deaths and injuries avoided this leads to a total present value benefit of £811.7 million over 10 years. The total costs would remain the same as the analysis used in the cost and benefits in the main body of the impact assessment (PV cost £104.1 million - £114.8 million) giving a greater Net Present Value of £702.28 million. Again the Equivalent Annual Net Cost to Business does not change from that listed on the summary page; this is because we have only altered the number of fatalities and injuries.

Rationale and evidence that justify the level of analysis used in the Impact Assessment (proportionality approach);

The analysis used throughout the evidence base makes use of a wide range of data sources which are referenced throughout the analysis, and these data sources drive most of our assumptions. Because the equivalent cost to business is £2.8 million per year we did not think it would be proportionate to undertake primary research to verify some of the optimism biases we have used, especially as it is unclear whether carrying out this research would be feasible and value for money.

Risks and assumptions;

Direct costs and benefits to business calculations (following one in two out methodology);

The equivalent annual direct cost to business is £2.8 million, in 2009 prices. This is based on landlords having to purchase a smoke alarm for each floor of a property (£5-£10 per alarm) and the time taken for them to install each alarm.

Summary table of costs to business

	Description of one off costs	PV cost (millions)
One off cost	Familiarisation cost	£4.8
	Landlords buying additional alarms to comply	£10.8
	Landlords time of fitting additional alarms	£4.9
On-going costs	Buying alarms	£7.6
	Time cost of installing alarms	£3.5
Total cost		£31.7

Dividing the Present Value cost to business (£31.7) by the annuity rate²² results in an Equivalent Annual Net Cost to Business of £3.7 million in 2014 prices. Using the Gross Domestic Product deflator²³ we get an Equivalent Annual Net Cost to Business of £3.3 million in 2009 prices. Dividing this by the discount factor of 1.15²⁴ gives a 2010 base year cost to business of £2.9 million.

Small and Micro Business Assessment

Wider impacts (consider the impacts of your proposals, the questions on pages 16 to 18 of the Impact Assessment Toolkit are useful prompts. Document any relevant impact here and by attaching any relevant specific impact analysis (e.g. Small and Medium-sized Enterprise and equalities) in the annexes to this template)

This legislation has not exempted small and micro businesses because small and micro businesses account for a large proportion of the private rented sector landlords. Data suggests that 74% of all landlords (cannot disaggregate if these are in the private rented sector) own one property and 95% of all landlords own between 1 and 4 properties²⁵. While this data does not inform us how many employees these landlords have, if any, it is highly likely that they will either be a small or micro business. Therefore exempting small and micro businesses would result in the policy failing to meet its objectives of reducing avoidable fatalities and injuries from fires. With a significant proportion of the landlords affected likely to be small and micro businesses we estimate that the impact on each landlord should be quite minimal. We estimate the midpoint cost of compliance for a landlord with one property ranging from £10.90 to £21.80.

Data from the Office for National Statistics²⁶ reveals that there are 42,305 businesses in England involved in 'renting and operating of own or leased real estate', which does not disaggregate for the different types of tenure a landlord can offer (private rented, social rented). But this data suggests that 87% of overall landlords are small and micro businesses, again showing that if small and micro businesses were exempt a large proportion of the benefits of this policy would not be achieved.

Summary and preferred option with description of implementation plan.

The preferred option is to regulate for the installation of smoke alarms on each floor of all private rented sector properties. The intention is to bring forward regulations in early 2015 these will be subject to the affirmative procedure and will require the approval of both Houses of Parliament. The estimates of the number of fire deaths and injuries the regulations could prevent each year are dependent upon landlord compliance and on tenants regularly testing and buying new batteries. To help achieve this, we plan to introduce powers for councils to enforce the new requirements by allowing councils (when contacted by tenants) to install the smoke alarm and recover their full costs from the landlord who had not complied. The landlord would also face a fine. We will be engaging with Local Authorities on cost recovery and undertake a new Burden Assessment.

²² 10 year policy at a 3.5% discount rate. Annuity rate = 8.61

²³ Divide by 1.11. GDP deflator:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/362193/GDP_Deflators_Qtrly_National_Accounts_September_2014_update.xls

²⁴ $1.035^{(2014-2010)}$

²⁵ Private Landlord Survey 2010: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7249/2010380.pdf

²⁶ UK Business: Activity, Size and Location, 2013: <http://www.ons.gov.uk/ons/rel/bus-register/uk-business/2013/rft---table-1.xls>

Annex 1 – Number of properties in the do nothing

Table 1A – Number of properties over course of policy in the do nothing

Year	Years of the policy										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total number of private rented sector properties	4,365,560	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
% of private rented properties without smoke alarm	14.00%	12.50%	11.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Number of properties without an alarm	611,178	550,668	488,963	448,490	452,468	456,446	460,424	464,402	468,380	472,358	476,336
Number of properties with an alarm	3,754,382	3,854,673	3,956,157	4,036,410	4,072,212	4,108,014	4,143,816	4,179,618	4,215,420	4,251,222	4,287,024
Number of additional properties with an alarm		100,291	101,484	80,253	35,802	35,802	35,802	35,802	35,802	35,802	35,802

It is anticipated that the proportion of private rented sector properties which do not have a smoke alarm installed will slowly decrease as building regulations require all new build properties to have a smoke alarm installed. English Housing Survey data reveals that 17% of private rented sector properties did not have a working smoke alarm in 2012; also from 2002 until 2012 the English Housing Survey suggests that the number private rented sector properties which do not have a smoke alarm installed has decreased at an annual rate of 1.5% per year. Increasing the 2012 proportion of properties which do not have a smoke alarm (17%) by 1.5 percentage points in 2013 and 2014 results in the proportion of properties not having an alarm in 2015 being 12.5%. The 1.5 percentage point annual decrease in properties which do not have an alarm continues through the policy. However, we have capped the minimum proportion of properties which do not have a smoke alarm at 10% of properties, which comes into effect from 2017. We have applied this cap to be conservative, so that we are not overestimating the costs of the do nothing option to lower the costs in the preferred option. The cap is also to recognise the fact that we expect there to be a plateau in the reduction in the proportion of properties that do not have a smoke alarm, as consultations with fire officials suggest some properties will never install a smoke alarm in the absence of regulation.

We estimate that in 2015 there will be 24 fatalities and 585 injuries from fires in properties which do not have a smoke alarm. The 24 deaths in 2015 are calculated by multiplying the number of dwellings which do not have an alarm in England (550,668 in 2015) by the probability of death in private rented sector

properties without an alarm (0.004%). The probability of death is derived by dividing the number of fire deaths in properties without an alarm in England (31¹) by the number of private sector properties without a smoke alarm (728,620²). The number of fatalities from fires in properties without an alarm in England is derived by taking the average annual number of fatalities when an alarm absent (125.5³), which is GB data which has been converted into an England figure by using Office for National Statistics population splits⁴, and this is then multiplied by the percentage of dwellings with significantly higher than average fire risk that are in the private rented sector (29%⁵). This methodology is continued through the 10 years of the policy. Over the 10 years of the policy we estimate there to be 204 deaths in the do nothing, averaging 20 in each year, in private rented sector properties without a smoke alarm.

The estimated 585 injuries from fires in 2015 are calculated by multiplying the number of dwellings which do not have an alarm in England (550,668 in 2015) by the probability of injury in private rented sector properties without an alarm (0.106%). The probability of injury is derived by dividing the number of fire injuries in properties without an alarm in England (774⁶) by the number of private rented sector properties without a smoke alarm (728,620⁷). The number of fire injuries in dwellings without an alarm in England is taken by taking the average annual number of fatalities when an alarm absent (3085⁸), which is GB data is converted into an England figure by using Office for National Statistics population splits⁹, and this is then multiplied by the percentage of dwellings with significantly higher than average fire risk that are in the private rented sector (29%¹⁰). This methodology is continued through the 10 years of the policy. Over the 10 years of the policy we estimate there to be 5035 injuries in the do nothing, averaging 503 in each year, in private rented sector properties without a smoke alarm.

We estimate that in 2015 there will be 53 fatalities and 1794 injuries in private rented properties which do have a smoke alarm. The total number of fatalities and injuries are higher in properties with an alarm because the majority of private rented sector homes have alarms. The 53 deaths in 2015 are calculated by multiplying the number of dwellings which have an alarm in England (3,854,673 in 2015) by the probability of death in private rented sector properties with an alarm (0.001%). The probability of death is derived by dividing the number of fire deaths in properties with an alarm in England (49¹¹) by the number of private rented sector properties with a smoke alarm (3,557,380¹²). The number of fire deaths in dwellings with an alarm in England is derived by taking the average annual¹³ number of fatalities when an alarm is present (195.2¹⁴), this GB data is converted into an England figure by using Office for National Statistics

¹ The number of deaths in private rented sector properties without an alarm (31) is taken by multiplying the average annual number of deaths in England (converted from GB to England using population estimates) by the percentage of dwellings with significantly higher than average risk of fire that are in the private rented sector (29%)

² Private sector properties makes up 17% of total housing stock, taken from English Housing Survey

³ 2012/13 Fire Statistics (<https://www.gov.uk/government/statistics/fire-statistics-great-britain-2012-to-2013>)

⁴ Using Office for National Statistics data means multiply the GB figure by 0.87

⁵ Taken from the English Housing Survey

⁶ The number of fatalities in private rented sector properties without an alarm (31) is taken by multiplying the average annual number of deaths in England (converted from GB to England using population estimates) by the percentage of dwellings with significantly higher than average risk of fire that are in the private rented sector (29%)

⁷ Taken as 17% of the private rented stock, taken from English Housing Survey

⁸ 2012/13 Fire Statistics (<https://www.gov.uk/government/statistics/fire-statistics-great-britain-2012-to-2013>)

⁹ Using Office for National Statistics data means multiply the GB figure by 0.87

¹⁰ Taken from the English Housing Survey

¹¹ The number of deaths in private rented sector properties without an alarm (31) is taken by multiplying the average annual number of deaths in England (converted from GB to England using population estimates) by the percentage of dwellings with significantly higher than average risk of fire [risk of fire is different to risk of death/injury – need to look at casualties per fire etc] that are in the private rented sector (29%)

¹² 83% of the private rented stock, taken from English Housing Survey – should be 90.6%

¹³ Average taken from 2006 to 2012

¹⁴ 2012/13 Fire Statistics (<https://www.gov.uk/government/statistics/fire-statistics-great-britain-2012-to-2013>)

population splits¹⁵, and this is then multiplied by the percentage of dwellings with significantly higher than average fire risk that are in the private rented sector (29%¹⁶). This methodology is continued through the 10 years of the do nothing. Over the 10 years of the policy we estimate there to be 566 deaths in the do nothing, averaging 57 in each year, in private rented sector properties with a smoke alarm.

The injuries in 2015 are calculated by multiplying the number of dwellings which do have an alarm in England (3,854,673 in 2015) by the probability of injury in private rented sector properties with an alarm (0.047%). The probability of injury is derived from dividing by the number of fire injuries in properties with an alarm in England (1655¹⁷) by the number of private rented sector properties with a smoke alarm (3,557,380¹⁸). The number of fire injuries in dwellings with an alarm in England is derived by taking the average annual¹⁹ number of injuries when an alarm present (6598²⁰), which has been converted from Great Britain figures into an England figure by using Office for National Statistics population splits²¹, and this is then multiplied by the percentage of dwellings with significantly higher than average fire risk that are in the private rented sector (29%²²). This methodology is continued through the 10 years of the policy. Over the 10 years of the policy we estimate there to be 19,128 injuries in the do nothing, averaging 1913 in each year, in private rented sector properties with a smoke alarm.

Table 2A – Cost to business of buying alarms and time cost for installing alarms – low – do nothing

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Change in number of homes with alarm	100,291	101,484	80,253	35,802	35,802	35,802	35,802	35,802	35,802	35,802
Cost per alarm	£5.00	£5.00	£5.00	£5.00	£5.00	£5.00	£5.00	£5.00	£5.00	£5.00

¹⁵ Using Office for National Statistics data means multiply the GB figure by 0.87

¹⁶ Taken from the English Housing Survey

¹⁷ The number of deaths in private rented sector properties without an alarm (31) is taken by multiplying the average annual number of deaths in England (converted from GB to England using population estimates) by the percentage of dwellings with significantly higher than average risk of fire that are in the private rented sector (29%)

¹⁸ Taken as 17% of the private rented stock, taken from English Housing Survey

¹⁹ Average taken from 2006 to 2012

²⁰ 2012/13 Fire Statistics (<https://www.gov.uk/government/statistics/fire-statistics-great-britain-2012-to-2013>)

²¹ Using Office for National Statistics data means multiply the GB figure by 0.87

²² Taken from the English Housing Survey

Total cost of purchasing alarm	£501,455	£507,421	£401,266	£179,010						
Time cost of installing alarm	£3.42	£3.42	£3.42	£3.42	£3.42	£3.42	£3.42	£3.42	£3.42	£3.42
Total time cost of installing alarm	£342,995	£347,076	£274,466	£122,443						

Year	Total	Average	Total Present Value
Change in number of homes with alarm	532,642	53,264	N/A
Cost per alarm	£5.00	£5.00	£5.00
Total cost of purchasing alarm	£2.7	£0.3	£2.4
Time cost of installing alarm	£3.42	£3.42	N/A

Total time cost of installing alarm

£1.8

£0.2

£1.6

Table 3A – Cost to business of buying alarms and time cost for installing alarms – high – do nothing

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Change in number of homes with alarm	100,291	101,484	80,253	35,802	35,802	35,802	35,802	35,802	35,802	35,802
Cost per alarm	£10.00	£10.00	£10.00	£10.00	£10.00	£10.00	£10.00	£10.00	£10.00	£10.00
Total cost of purchasing alarm	£1,002,909	£1,014,843	£802,532	£358,020						

Year	Total	Average	Total Present Value
Change in number of homes with alarm	532,642	53,264	N/A
Cost per alarm	£10.00	£10.00	£5.00
Total cost of purchasing alarm	£5.3	£0.5	£4.8

Table 4A – Cost to tenants of purchasing batteries – do nothing

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
private rented sector dwellings with smoke alarm	3,946,466	3,982,427	4,018,388	4,054,350	4,090,311	4,126,272	4,162,233	4,198,194	4,234,155	4,270,116	4,306,077
Cost of purchasing batteries	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00
Total cost of purchasing batteries	£11,839,399	£11,947,282	£12,055,165	£12,163,049	£12,270,932	£12,378,816	£12,486,699	£12,594,582	£12,702,466	£12,810,349	

Year	Total	Average	Total Present Value
private rented sector dwellings with smoke alarm	41,082,913	4,108,291	N/A
Cost of purchasing batteries	£3.00	£3.00	N/A
Total cost of purchasing batteries	£123.2	£12.3	£105.8

Annex 2 – Calculating the number of fatalities and injuries in option 1

This calculation is made up of two components. The first component of the calculation is for the 57%²³ of private rented sector properties which are two storey properties which will have a smoke alarm on each floor. The probability of a fatality in these properties is estimated to be 0.00103%. The methodology for calculating the probability of death is the same as with the do nothing, with one exception. The probability of fatalities occurring here needs to account for the fact that an alarm will be fitted on each floor of two store property, which would be expected to increase the safety and reduce the probability of a fatality. To be conservative we have reduced the probability of a fatality by 25%. While we do not know if installing a smoke alarm on each floor reduces the probability by 25%, we do not believe that this is something which we would be able to quantify in a consultation exercise. Over the 10 years of the policy we estimate that there will be 258 fatalities (average of 26 per year) in the 2 storey properties. In the one storey properties we have applied the same probability of a fatality as we did in the do nothing (0.0013%). The total number of fatalities in one storey homes totals 260 over 10 years, at an annual average of 26 per year. Summing the fatalities in one and two storey homes leads to a total of 518 fatalities over 10 years.

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Number of private rented sector properties	4,365,560	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
Percentage of private rented sector dwellings without smoke alarm	14.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
private rented sector dwellings without smoke alarm	611,178	0	0	0	0	0	0	0	0	0	0
private rented sector dwellings with smoke alarm	3,754,382	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
Number of 1 storey dwellings (43%) with smoke	1,614,384	1,894,296	1,911,402	1,928,507	1,945,612	1,962,718	1,979,823	1,996,929	2,014,034	2,031,139	2,048,245

²³ English Housing Survey 2012/13

Probability of deaths in private rented sector given there is an alarm per dwelling	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%
Number of fatalities	21	25	25	25	26	27	27						
Number of 2 storey dwellings (57%) with smoke	2,139,998	2,511,044	2,533,718	2,556,393	2,579,068	2,601,742	2,624,417	2,647,091	2,669,766	2,692,441	2,715,115		
Probability of deaths in private rented sector given there is an alarm per dwelling	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%
Optimism bias	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Prob of death	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%
Number of fatalities	21	25	25	25	25	26	26	26	26	26	26	27	27
Total	50	50	50	51	51	52	52	52	53	53	53	54	54

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Number of private rented sector properties	4,365,560	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
Percentage of private rented sector dwellings without smoke alarm	14.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

private rented sector dwellings without smoke alarm	611,178	0	0	0	0	0	0	0	0	0	0	0	0
private rented sector dwellings with smoke alarm	3,754,382	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360		
Number of 1 storey dwellings (43%) with smoke	1,614,384	1,894,296	1,911,402	1,928,507	1,945,612	1,962,718	1,979,823	1,996,929	2,014,034	2,031,139	2,048,245		
Probability of deaths in private rented sector given there is an alarm per dwelling	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%
Number of fatalities	21	25	25	25	26	26	26	26	27	27	27	27	27
Number of 2 storey dwellings (57%) with smoke	2,139,998	2,511,044	2,533,718	2,556,393	2,579,068	2,601,742	2,624,417	2,647,091	2,669,766	2,692,441	2,715,115		
Probability of deaths in private rented sector given there is an alarm per dwelling	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%	0.0013%
Optimism bias	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Prob of death	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%	0.00099%
Number of fatalities	21	25	25	25	26	26	26	26	26	27	27	27	27
Total		50	50	51	51	52	52	52	53	53	54	54	54

We estimate there will be 1683 injuries in 2015 in private rented sector properties. As with the methodology for calculating the number of fatalities this calculation first calculates the injuries in 2 storey properties, and then calculates the injuries in 1 storey properties. In the 57% of two storey properties the probability of injury is estimated to be 0.0445%. As with the probability for fatalities this has been reduced by 25% to account for a smoke alarm being fitted on each floor which will reduce the probability of injury. Over the 10 years of the policy we estimate that there will be 8,731 injuries (average of 873 per year) in 2 storey properties. In the one storey properties we have applied the same probability of an injury as we did in the do nothing (0.0445%). The total number of injuries in one storey homes totals 8,782 over 10 years, at an annual average of 878 per year. Summing the injuries in one and two storey homes leads to a total of 17,512 injuries over 10 years.

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Number of private rented sector properties	4,365,560	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
Percentage of private rented sector dwellings without smoke alarm	14.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
private rented sector dwellings without smoke alarm	611,178	0	0	0	0	0	0	0	0	0	0
private rented sector dwellings with smoke alarm	3,754,382	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
Number of 1 storey dwellings (43%) with smoke	1,614,384	1,894,296	1,911,402	1,928,507	1,945,612	1,962,718	1,979,823	1,996,929	2,014,034	2,031,139	2,048,245
Probability of injuries in private rented sector given there is an alarm per dwelling	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%
Number of injuries	719	844	851	859	867	874	882	890	897	905	912

Number of 2 storey dwellings (57%) with smoke Probability of injuries in private rented sector given there is an alarm per dwelling	2,139,998	2,511,044	2,533,718	2,556,393	2,579,068	2,601,742	2,624,417	2,647,091	2,669,766	2,692,441	2,715,115
Optimism bias	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%
Prob of injuries	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Number of injuries	715	839	847	854	862	869	877	884	892	900	907
Total	1,683	1,698	1,713	1,728	1,744	1,759	1,774	1,789	1,804	1,820	1,835
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Number of private rented sector properties	4,365,560	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360
Percentage of private rented sector dwellings without smoke alarm	14.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
private rented sector dwellings without smoke alarm	611,178	0	0	0	0	0	0	0	0	0	0
private rented sector dwellings with smoke alarm	3,754,382	4,405,340	4,445,120	4,484,900	4,524,680	4,564,460	4,604,240	4,644,020	4,683,800	4,723,580	4,763,360

Number of 1 storey dwellings (43%) with smoke Probability of injuries in private rented sector given there is an alarm per dwelling	1,614,384	1,894,296	1,911,402	1,928,507	1,945,612	1,962,718	1,979,823	1,996,929	2,014,034	2,031,139	2,048,245
	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%
Number of injuries	719	844	851	859	867	874	882	890	897	905	912
Number of 2 storey dwellings (57%) with smoke Probability of injuries in private rented sector given there is an alarm per dwelling	2,139,998	2,511,044	2,533,718	2,556,393	2,579,068	2,601,742	2,624,417	2,647,091	2,669,766	2,692,441	2,715,115
	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%	0.0445%
	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Optimism bias Prob of injuries	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%	0.03341%
Number of injuries	715	839	847	854	862	869	877	884	892	900	907
Total		1,683	1,698	1,713	1,728	1,744	1,759	1,774	1,789	1,804	1,820