Proposed Domestic Fire Safety (Wales) Measure

Explanatory Memorandum

This Explanatory Memorandum has been prepared by Ann Jones AM and is laid before the National Assembly for Wales.

Declaration on Legislative Competence

In my view the provisions of the Proposed Domestic Fire Safety (Wales) Measure, introduced by me on 8 July 2010 would be within the legislative competence of the National Assembly for Wales.

Ann Jones AM
Member in charge of the proposed Measure

8 July 2010

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Part 1: Background and Purpose of the proposed Measure

1. Introduction

1.1 In June 2007 Ann Jones AM won the ballot to bring forward a proposed Legislative Competence Order relating to Domestic Fire Safety. In October 2007 the National Assembly for Wales agreed that Ann Jones may lay a proposed Order, to give effect to the outline proposed Order provided in June 2007. Following scrutiny by the National Assembly for Wales and pre-legislative scrutiny by both Houses of Parliament, a revised Order, *The National Assembly for Wales (Legislative Competence) (Housing) (Fire Safety) Order 2010*[1] subsequently received Royal assent on 12 April 2010 and came into force the following day.

1.2 Ann Jones AM subsequently introduced the *proposed Domestic Fire Safety (Wales) Measure* before the National Assembly for Wales on 8 July 2010. Following scrutiny by Legislation Committee No. 1, the general principles of the proposed Measure were agreed by the Assembly in Plenary on 24 November 2010 and Stage 2 amendments to the proposed Measure were considered by Legislation Committee No. 1 in January 2011. [2]

1.3 The primary purpose of the proposed Measure is to introduce a requirement for the provision of automatic fire suppression systems in new residential premises in Wales.

1.4 This Explanatory Memorandum has been prepared and laid in accordance with Standing Orders 23.18 and 23.40. It sets out the background to the provisions in the Member proposed Domestic Fire Safety (Wales) Measure and explains the scope of the proposed Measure as amended at Stage 2 of the legislative process.[3]

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[1] OPSI, *The National Assembly for Wales (Legislative Competence) (Housing) (Fire Safety) Order 2010, SI 1210/2010*

[2] National Assembly for Wales, *Proposed Domestic Fire Safety (Wales) Measure*

[3] Information on Stage 2, including the transcript of proceedings, is available *here*.

2. Legislative Background

2.1 The current legislative framework for fire safety in new residential premises in Wales is provided by the *Building Regulations 2000* (as amended) made under the *Buildings Act 1984* together with volume 1 of the associated Approved Document B (Fire Safety)[4]. There is no current statutory requirement in the Building Regulations to provide automatic fire suppression systems in new residential premises, except in new high rise domestic buildings over 30 metres in height.

2.2 The constitutional context to this proposal is set out by the *Government of Wales Act 2006* (the 2006 Act). The 2006 Act provides a mechanism for enhancing the legislative powers of the National Assembly for Wales.

2.3 The National Assembly for Wales's Standing Orders provide for Assembly Measures to be introduced by backbench Assembly Members as well as the Welsh Government where the National Assembly has legislative competence in a policy area.

2.4 The principal power enabling the National Assembly to make a Measure in relation to Domestic Fire Safety is contained in Matter 11.1 of Schedule 5 to 2006 Act –

> *Matter 11.1*
>
> *The provision of automatic fire suppression systems in new residential premises.*
>
> *In this matter "new residential premises" means—*
> *(a) premises newly constructed for residential use;*
> *(b) premises newly converted to residential use;*
> *(c) premises converted to use as one or more new residences by subdivision of one or more existing residences; and*
> *(d) premises converted to use as one or more new residences by amalgamation of one or more existing residences.*

[4] *Building Regulations 2000* Approved Document B (Fire Safety) – Vol.1 Dwelling Houses (2006 Edition)

2.5 The power in Matter 11.1 was added to Schedule 5 to the 2006 Act by *The National Assembly for Wales (Legislative Competence) (Housing) (Fire Safety) Order 2010*, as brought forward by Ann Jones AM.

3. Purpose and intended effect of the legislation

General Introduction

3.1 The proposed *Domestic Fire Safety (Wales) Measure* introduces a new duty that when building work in Wales to which the proposed Measure applies is carried out, each new residence created must be provided with an automatic fire suppression system that operates effectively and complies with regulations to be made by the Welsh Ministers. A failure to meet this new duty would be treated as equivalent to a breach of building regulations and subject to enforcement action that is modelled on the action that would apply to such a breach under the *Building Act 1984*. This is necessary in order to make it as easy as possible for the arrangements for enforcing the proposed Measure to be combined with those for enforcing the Building Regulations, so as to avoid wasteful duplication. The provisions for enforcing this proposed Measure are set out in Schedules 1 and 2.[5]

3.2 The proposed Measure only applies to the construction of one or more new residences, the conversion of a building, or part of a building, to use as a residence, or the subdivision or amalgamation of one or more existing residences. It does not require the retro-fitting of automatic fire suppression systems in existing properties. The definition of a residence includes dwelling-houses, flats, care homes, residential schools or colleges and student halls of residence. The proposed Measure also applies to the creation of new houses in multiple occupation and common areas such as stairways in buildings containing more than one new residence. The requirements of the proposed Measure will apply to any new residence once it is completed and occupied, even if the whole development is not complete at that stage, for example a single flat in a block of flats.

[5] Schedules 1 and 2 were inserted by amendment at Stage 2 of the legislative process.

The Policy Context

3.3 The Welsh Government of the First Assembly established a Community Fire Safety Working Group. The remit of the Group was to examine the scope for widespread adoption in Wales of Hard Wired Smoke Detectors in Social Housing; the installation of domestic sprinkler systems and their extension to other multiple occupational public buildings and to examine options for managing and controlling the incidence of arson. The Group's report *Wired for Safety*[6] was published in October 2001 and recommended that the National Assembly should amend its Development Quality Requirements so that all new social housing in Wales should have domestic sprinkler systems installed during construction. It also recommended that the National Assembly should look to enforce a requirement for sprinklers in new schools, student halls of residence, nurses' homes and residential care premises, including nursing homes and sheltered accommodation.

3.4 These recommendations have not been implemented in full, although the Welsh Government has provided funding for a range of initiatives as part of its community fire safety policy. This includes funding hard-wired smoke detectors in social housing and funding the Fire and Rescue Service to purchase over 153,000 smoke detectors and other fire safe equipment for use with vulnerable householders. In April 2007 the Welsh Government also established a £12m, three year, school sprinkler programme, aimed at providing sprinklers in schools considered as vulnerable and at risk to arson. This initiative complements the Education Department's Schools Building Improvement Capital Grant, which now makes it a requirement for all new build and significant school refurbishments to have a sprinkler system fitted.

England

3.5 There is no current requirement to fit automatic fire suppression systems in residential premises in England, except in new high rise domestic buildings over 30 metres in height. A Private Members' Bill, the *Buildings Regulations (Amendment) Bill*[7], was

[6] Community Fire Safety Working Group, Wired for Safety, October 2001
[7] House of Lords, *Building Regulations (Amendment) Bill [HL] 2009-10*

introduced to the House of Lords by Lord Harrison in November 2009. This Bill sought to amend the Building Regulations for England and Wales to make it a requirement for automatic fire suppression systems to be installed in all new residential premises. The Bill reached the report stage in the House of Lords in March 2010, but because of the dissolution of Parliament in April 2010 made no further progress. It was subsequently revised and on 22 October 2010 received its Second Reading in the House of Lords as the *Building Regulations (Review) Bill*[8]. The revised Bill requires a review of and impact assessment for the amendment of the *Building Regulations 2000* with regard to the installation of automatic fire suppression systems in new residential premises and extends to England and Wales.

Scotland

3.6 The Scottish Building Regulations were amended in 2005 to introduce a requirement for automatic life safety fire suppression systems to be installed in new high rise domestic buildings over 18 metres in height, residential care buildings, sheltered housing complexes and enclosed shopping centres[9]. The Regulations were further modified to require the provision of automatic fire suppression systems in all new school buildings with effect from October 2010.

Purpose and intended effect

3.7 The purpose of providing automatic fire suppression systems in new residential premises is to reduce the incidence of death and injury from fires in newly created residences in Wales. A requirement to fit such systems in all new residential premises would be a preventative measure which would control fires and reduce their spread, so that people could get out of their homes in the event of a fire occurring. It would also reduce the number of burns injuries from fire and the risk to fire fighters who are called to deal with domestic fires. The proposed Measure does not require the installation of automatic fire suppression systems into existing residential premises, except where these

[8] House of Lords, *Building Regulations (Review) Bill [HL] 2010-11*
[9] Schedule 5, Building (Scotland) Regulations 2004 (as amended)

premises are subdivided or amalgamated to create one or more new residences.

3.8 Across Wales an average of 18 people lose their lives to fire in dwellings each year. About 80% of fire related deaths and injuries occur in the home.

3.9 In the year to September 2009, there were 12 deaths in accidental fires and 400 fire related injuries in dwellings in Wales. In addition there was one death and 87 fire related injuries from deliberate fires in dwellings in Wales[10].

3.10 The ubiquitous nature of the threat from fire is often overlooked as deaths and injuries occur sporadically and therefore do not have the same impact as a collective tragedy. This also affects people's views on the economic consequences of fire which are not viewed collectively.

3.11 Sprinklers have been incorporated in buildings for some considerable time and were originally seen and developed as a means of reducing fire losses to property and contents. Over recent years there has been a growing recognition of their use as a means of contributing to life safety which is now recognised in current guidance to the Building Regulations in both England & Wales and also in Scotland, although not as a requirement.[11]

3.12 Evidence gathered worldwide shows that while sprinklers are primarily intended to contain or control fires in a number of cases people in the room of origin of a fire have survived as a result of the effectiveness of the sprinkler system. There are no cases on record anywhere in the world, where multiple fire deaths have occurred in buildings with working sprinkler systems complying with the appropriate standard.

[10] Welsh Assembly Government, Statistical Directorate, Fire Statistics Monitor, Quarter 2 and 3 2009
[11] Department of Communities & Local Government, Approved Document B (Fire safety) – Volume 1: Dwelling houses (2006 Edition)

3.13 A report[12] published in the USA in February 2010 by the National Fire Protection Association concluded that in residential properties where wet pipe sprinklers are fitted:

- The death rate per fire is lower by an estimated 83 per cent;
- The average cost of property damage is $4,000, compared with $17,000 for a home without a sprinkler system (a 74 per cent reduction);
- 97 per cent of reported structure fires have flame damage confined to the room of origin (all types of sprinklers) compared to 76 per cent when no automatic extinguishing system is present.

3.14 The costs and savings associated with the proposed Measure are set out in detail in Section 8 of this Explanatory Memorandum.

3.15 In other parts of the world where the fitting of fire sprinkler systems has become a statutory requirement there have been dramatic reductions in the number of deaths caused by domestic fires. For example in the city of Vancouver where byelaws have been introduced, in 1972-1974 the number of deaths per 100,000 population was just under 7 per year. By the period 1992-1998 the number of deaths per 100,000 population had fallen to 0.6, as a result of the mandatory sprinkler regulations[13].

3.16 The most comprehensive study into the effectiveness of residential fire sprinklers to date was carried out by the Rural/Metro Fire Department, Scottsdale, Arizona. In June 1985, the City of Scottsdale passed an 'Ordinance' that required all new flatted and commercial structures built after 5 July 1985 to be fitted with a fire sprinkler system and all new single family residences built after 1 January 1986 to be able to accommodate fire sprinklers.

[12] National Fire Protection Association, U.S. experience with sprinklers and other automatic fire extinguishing equipment, February 2010
[13] Building Research Establishment, Effectiveness of sprinklers in residential premises, February 2004

3.17 In 1997 the Rural/Metro Fire Department, Scottsdale published Saving Lives, Saving Money: Automatic Fire Sprinklers: A 10 Year Study which analysed the impact of the Ordinance[14].

3.18 The Scottsdale study included a review of 109 fires that occurred in sprinklered structures, 44 of those being residential structures. In more than 90 percent of these incidents, one or two sprinkler heads controlled the fires, and the average amount of water used to suppress each fire was 209 gallons compared to 3,290 gallons estimated for manual suppression in residential properties. It was considered that 8 lives were saved over the period as a direct result of the installation of fire sprinkler systems, 4 of these in residential properties, and that up to $25.4m was saved based on the total potential loss due to fire in sprinklered residential properties.

3.19 Fire sprinklers are only activated when the temperature in the room in which a fire is burning exceeds the preset temperature of the sprinkler head - nominally 68 degrees centigrade. Sprinklers operate as individual heat sensors - meaning that water is only released in the area where there is a fire. Often, in a room with two sprinkler heads only one actually operates. The amount of water used by a sprinkler system is far less than that used by the fire service because the fire is tackled at a very early stage. Fire fighters are on average likely to arrive at least 10 minutes after a fire has started meaning that more water is required and the risk to a fire fighter's life is much greater. Data collected over 30 years suggest that the chances of a sprinkler head malfunctioning are estimated to be extremely remote, perhaps no more than 1 in 16 million.

[14] Saving Lives, Saving Money Automatic Fire Sprinklers A 10 Year Study, Scottsdale, Arizona, 1997

4. Consultation

4.1 A separate consultation exercise for the proposed Measure as introduced was not carried out by the Member in charge. However the Assembly's Legislation Committee No. 1 issued a general 'call for evidence' at Stage 1 of the legislative process and invited written submissions from interested parties to inform their consideration of the proposed Measure between July and September 2010 and subsequently took oral evidence in September and October 2010. The Committee decided to support the general principles of the proposed Measure and was content that it was an appropriate legislative vehicle and provided an effective and timely way forward.[15]

4.2 The *National Assembly for Wales (Legislative Competence) (Housing) (Fire Safety) Order 2010* was also subject to scrutiny by the National Assembly for Wales and by both Houses of Parliament. The Assembly's Proposed Domestic Fire Safety LCO Committee (now dissolved) carried out a written consultation on the proposed LCO in 2008[16]. The Committee's report includes a summary of the consultation responses.[17] The consultation and subsequent scrutiny of the proposed LCO examined many of the policy and implementation issues that are also relevant to the proposed Measure.

4.3 The Welsh Affairs Select Committee also issued a call for evidence on the proposed LCO in October 2009[18]. The Committee's report summarises the evidence collected. [19]

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[15] National Assembly for Wales, *Legislation Committee No. 1: Proposed Domestic Fire Safety (Wales) Measure: Stage 1 Committee Report, November 2010*
[16] National Assembly for Wales, Proposed Domestic Fire Safety LCO Committee
[17] National Assembly for Wales, *Proposed Domestic Fire Safety LCO Committee, National Assembly for Wales (Legislative Competence) (No.7) Order 2008*, Committee Report, June 2008
[18] House of Commons, Welsh Affairs Committee Press Notice, *Pre-Legislative Scrutiny of the Proposed Legislative Competence Order in Council on Housing relating to Domestic Fire Safety*, October 2009
[19] Welsh Affairs Committee, *Proposed National Assembly for Wales (Legislative Competence) (Housing) Order 2009, relating to Domestic Fire Safety*, December 2009

5. Power to Make Subordinate Legislation

5.1 The proposed Measure contains powers for Welsh Ministers to implement and set out the detail required to support the principles contained in the proposed Measure. This chapter provides details of each provision to make subordinate legislation within the proposed Measure and the procedure to be used in each case. These powers allow the Welsh Ministers to, for example prescribe the requirements of the automatic fire suppression systems, add to or amend the definition of "residence" and to make minor technical amendments. This approach avoids the need to bring forward a further proposed Measure to amend or deal with these issues.

5.2 Section 1(4) (c) of the proposed Measure provides for Welsh Ministers to make regulations to prescribe the requirements of the automatic fire suppression systems that must be provided. Such regulations would specify the technical standards of such a system.

Procedure: These Regulations will be of a technical nature and may relate to the relevant applicable British or European Standard. As such they may require amendment at relatively short notice to ensure continuing compliance. As such it is considered appropriate that they are subject to annulment (i.e. subject to the **negative** procedure). By virtue of section 6(d) a requirement to consult prior to the making of the regulations is imposed on the Welsh Ministers.

5.3 Section 3(2)(b) provides for Welsh Ministers to make regulations to prescribe the information that must be provided to demonstrate that the work to be carried out will comply with the requirements of Section 1(4) of the proposed Measure. Section 3(1) enables the Welsh Ministers to make regulations prescribing the fee to accompany the information. Where, in the opinion of the local authority, the information does not demonstrate that the requirements contained in section 1 have been met, any disagreement as to this opinion may be referred to the Welsh Ministers for determination. Section 3(5) enables the Welsh Ministers to make regulations prescribing a fee to accompany the referral.

Procedure: The technical nature of the information to be supplied in accordance with the requirements of these regulations renders them appropriate to be subject to annulment (I.e. made under the negative procedure). By virtue of section 6(d) a requirement to consult prior to the making of the regulations is imposed on the Welsh Ministers. As fees may require frequent updating it is appropriate that regulations prescribing fee be subject to annulment.

5.4 Section 4(2) provides for the Welsh Ministers to add to or amend the definition of what a "residence" means in Section 4(1) of the proposed Measure. This is limited to adding a class of residence or amending the description of an existing class, and does not extend to removing a class of residence.

Procedure: The underlying principle of the proposed Measure is that new residences should be provided with an automatic fire suppression system. An amendment to widen the definition of "residence" would have resource implications for the construction industry and others. Consequently it is considered appropriate that any order made pursuant to this power cannot be made unless a draft of the order has been laid before, and approved by resolution of, the Assembly (i.e. subject to the affirmative procedure).

5.5 Section 5(1) provides orders that make transitional, transitory, consequential, saving, incidental and other provisions that Welsh Ministers may think are necessary or appropriate.

Procedure: Orders which amend, repeal or otherwise modify any Assembly Measure, Act of the Assembly or Act of Parliament in accordance with established convention would be required to be laid in draft before the Assembly and approved by resolution of the Assembly (I.e. the affirmative procedure would apply). Orders amending subordinate legislation only would be subject to annulment (i.e. the negative procedure would apply).

5.6 Section 7 sets out commencement provisions. Unless provided for in section7 (1) and (2), the provisions of the proposed Measure come into force on such day as the Welsh Ministers may, by order, appoint.

Procedure: In accordance with established convention, no procedure applies to the making of a commencement order.

6. Territorial Application

This proposed Measure will apply in relation to Wales.

Part 2: Regulatory Impact Assessment

7.1 The options considered are:

Option 1: Do nothing
Option 2: Voluntary arrangement
Option 3: Introduce a proposed Measure

Option 1: Do nothing

7.1 The first option is to continue with the existing arrangements where there is no legal or voluntary compulsion for the installation of automatic fire suppression systems in new residences.

Option 2: Voluntary arrangement to encourage the installation of automatic fire suppression systems

7.2 It is assumed that if a voluntary arrangement was made, there would be some commitment to educating and promoting the public as to the benefits of automatic fire suppression systems.

Option 3: Introduce a proposed Measure

7.3. Introduce a requirement for all new residences to install an automatic fire suppression system meeting standards and regulations stipulated by Welsh Ministers.

7.4 It is considered that a statutory requirement to install automatic fire suppression systems in new residences in Wales is the most effective way of achieving the purpose of reducing the incidence of death and injury from fires in newly created residences in Wales. Doing nothing or a voluntary arrangement would not achieve this.

8 Estimate of Costs

Estimate of Costs: Option 1 – do nothing – continue with existing arrangements.

8.1 The first option is to continue with the existing arrangements where there is no legal or voluntary compulsion for the installation of automatic fire suppression systems in new residences. In this instance none of the costs, or benefits, of the stipulations made in the proposed Measure would be realised. **Current costs of fires in domestic properties per year are around 18 lives, 500 injuries, around £40 million in terms of economic cost of injuries and fatalities, £20 million, property loss, £8 million in fire and rescue service costs and other costs in terms of water usage, rehousing and other impacts on fire victims.** More research is required to establish the actual cost of treating the injuries of fire victims. Long term treatment for these injuries will be very expensive, such as where burns victims are forced to undergo protracted surgery also the psychological trauma often experienced by fire victims should be taken into account.

8.2 The main benefits that would not accrue are in terms of: lives saved; injuries prevented; property loss saving; rehousing costs; fire brigade cost saving; insurance premium saving; and environment impact reduction. The costs not incurred are: installation; augmentation of water supplies; annual inspection and maintenance.

Estimate of Costs: Option 2 – Voluntary arrangement

8.3 It is assumed that if a voluntary arrangement was made, there would be some commitment to educating and promoting the public as to the benefits of automatic fire suppression systems. As this proposed Measure is not suggesting this as a preferred route a system of promotion and education has not been designed and costed.

8.4 Therefore, the costs of this option would be dependent on the amount of proactive publicity and the additional costs of installation would mostly fall on house builders or those carrying out conversion work and be reflected in land, property and rental prices. The total cost would be dependent on the physical number of new builds and conversions that chose to incorporate automatic fire suppression systems into their properties. Costs

for installation would hold as set out in this Explanatory Memorandum. There would be no spending for local authorities in relation to inspecting and enforcement of regulations. The benefits would be smaller than option 3 as not all new residences would be fitted with automatic fire suppression systems.

Estimate of Costs: Option 3 – Introduce a proposed Measure

8.5 To ensure flexibility to respond to new technologies the standards relating to automatic fire suppression systems and definitions of residences covered in the proposed Measure are subject to change by Welsh Ministers. Details can be seen in 5.2 and 5.4 of this Explanatory Memorandum. The costings in this section are based on current industry standards.

8.6 The majority of costs associated with the provisions of the proposed Measure will initially fall on those building new or converting the usage of existing properties to residential use. This cost could fall on the purchaser of the property in terms of higher value of housing or on the owner of land, in terms of reduced value of land value if the installation costs are not matched by an increase in the value of sprinklered housing.

8.7 The main costs will be the capital cost of installation of automatic fire suppression systems in these properties. Another possible associated cost could be the augmentation of the water supplies. However most of the installations will be in new housing developments, where the provision of a mains water supply for domestic use will be provided in any case, so the additional cost for the fire suppression system should be relatively small. **Installation would cost between £10 million and £17 million per year, based on an estimate of 10,000 new residences per annum. However much of these costs could be recouped over the lifetime of the system through increased property values, increased rent or reflected in lower land values**. **Costs of installation are also likely to fall over time.** While maintenance of the systems is not part of the proposed Measure itself, there are on-going maintenance costs, which are likely to fall on the occupier or landlord of the property. These would be **zero for the first year, in the region of £250,000 for the second year, £500,000 for the third and so on.**

8.8 There will be additional costs for the Welsh Government and local authorities in terms of administering and enforcing the proposed Measure. These would be dependent on standards and regulations, although it is expected that these costs will be minimal.

8.9 The main benefits will be in terms of lives saved, injuries avoided, property protected, increase in property resale value, rehousing costs averted, reduced fire brigade costs, environmental benefits and other savings.

8.10 The proposed Measure will impact mostly on the domestic dwelling stock as there are far more of these built. The information on other types of residences is limited as are the numbers being built.

8.11 It is considered that a statutory requirement to install automatic fire suppression systems in new residences in Wales is the most effective way of achieving the purpose of reducing the incidence of death and injury from fires in newly created residences in Wales. Doing nothing or a voluntary arrangement would not achieve this.

Summary of costs of automatic fire suppression systems in domestic dwellings

8.12 It is difficult to provide exact estimates for the cost of installing an automatic fire suppression system itself; this cost will be influenced by the size of the property affecting the number of sprinkler heads required and length of piping, assuming the systems installed will be water-based. The cost will also be influenced by the number of properties in a development having such systems installed. International experience shows that over time the installation costs are likely to fall, for example, the use of plastic PVC pipes has considerably lowered the piping costs. For existing properties that are converted the cost may be greater as pipes have to be run into the existing building structure.

8.13 Estimates of these costs vary from under £1,000 to over £2,500 per property, although design trade-offs and other savings may recoup some or all of these costs. Whilst maintenance is not

covered by this proposed Measure the annual maintenance costs could be from £20 to £100 per annum.[20]

8.14 Costs are likely to be lower in new-builds for a number of reasons. By installing the system as part of the design and building process installation costs are reduced. If the automatic fire suppression system is included as part of the design, then trade-offs could be made which "*in some circumstances the savings achieved via trade-offs can result in a more cost effective design.*"[21] Such trade-offs could for example, be the negation of a need for alternative fire protection measures. According to a Fire Sprinkler Association (FSA) report, "*it is now common in the United States for building to be cheaper to construct using fire sprinklers than conventional fire safety measures.*"[22] If a number of buildings are being constructed at the same time there will be possible economies in terms of purchasing and installing equipment. Also, if the water supply were to need to be augmented then the per-dwelling cost will be cheaper the more properties that are being constructed.

8.15 The Chief Fire Officers Association backed up this issue in their evidence to the LCO Committee.

> "The cost of system installation and maintenance is continually reducing with advance in technology. Further reductions can be anticipated if the domestic market expands."[23]

8.16 It has been highlighted that one of the factors that could impact on the cost of installation is the availability of a suitable supply of water. Wales does benefit from being one of the best supplied areas in the UK in terms of water supply. Dwr Cymru stated in their evidence to the Committee considering the Proposed Domestic Fire Safety LCO, on 25 April 2008, "the costs of providing a water supply with the necessary flow and pressure at each sprinkler head, additional to those for the domestic

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[20] British Automatic Sprinkler Association, Use and Benefits of Incorporating Sprinklers in Buildings and Structures, January 2006
Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, Table 4.3, February 2010
[21] British Automatic Sprinkler Association, Use and Benefits of Incorporating Sprinklers in Buildings and Structures, Jan 2006 - p25 para 9.2
[22] FSA – An appraisal of the ODPM-BRE report, '*Effectiveness of sprinklers in residential premises'*, P20
[23] Proposed Domestic Fire Safety LCO Committee Paper DFS(3)-03-08 (p1), submission from Chris Enness Chief Fire Officers Association

supply, should not be underestimated". However, as the supply of water for domestic use is a requirement on Dwr Cymru such costs are not assumed to have a significant impact in Wales.

8.17 Estimates of costs of fitting an automatic fire suppression system that have fed into this analysis are as follows:

- A recent report for the Department for Communities and Local Government[24], February 2010, looking at cost benefit analysis of building options in the Thames Gateway came up with the following estimates. Installation of sprinklers in a **house £1,500, flat £750**.[25]

- The Explanatory Notes accompanying the Fire Sprinklers in Residential Premises (Scotland) Bill[26] in 2003 estimated that a sheltered home would cost **£800** and a house in multiple occupancy would be **around £1,500**.

- The Deputy Chief Fire Officer Chris Enness, Chief Fire Officers Association, stated that it is reasonable to estimate that it would cost **£1,500** to install a system in a new affordable home.

- The cost for most new homes is estimated to be about 1% to 2% of the total cost of construction.[27] This is equivalent to the current monthly fluctuation in house prices.

- Community Housing Cymru Housing Association provided an example of a pilot project installing sprinkler systems into nine new bungalows. The cost per dwelling was over £5,100 per bungalow, £2,039 was quoted as the cost for each incoming water main.[28]

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[24] Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, Table 4.3, February 2010

[25] Costings in this report are based on assumptions made in ODPM-BRE report, '*Effectiveness of sprinklers in residential premises'*, May 2004. The assumptions in the cost benefit analysis are currently being updated by BRE Global and are due by autumn 2010.

[26] Fire Sprinklers in Residential Premises (Scotland) Bill SP Bill 13 – Explanatory Notes, Nov 2003

[27] Building Research Establishment, Effectiveness of sprinklers in residential premises, February 2004

[28] Evidence to Member Proposed Legislative Competence Order on Domestic Fire Safety, DFS(3)-05-08(p1), submission by Community Housing Cymru, April 2008

These costs appear excessive in comparison with all other estimates.

8.18 In addition there will be an annual maintenance cost. Studies generally estimate these costs to be around £50-100 per year per property.[29] Although maintenance in a block of flats will be significantly less that this range and is more likely to cost around £20 per year per flat. As is the case with residential boilers and heating systems, not all owners will consider that they need to maintain the systems annually. As maintenance costs would arise through an annual check this cost could first arise a year after installation and annually thereafter.

Number of dwellings built and conversions

8.19 Statistics are collected on the number of dwellings built, but not on the number of conversions. However, information is available on the size of the domestic dwelling stock. The number of houses built does fluctuate over time due to market conditions and it would be prudent when looking at the costs of this proposed Measure to use a broad estimate of the annual increase in the number of dwellings rather than focus on the figures for an individual year. According to Welsh Government figures the number of dwellings has risen by almost 80,000 over 10 years, this is shown in Table 1. According to figures collected by the Data Unit Wales 83,000 houses were built in this period, this is shown in Table 2.[30] For the purposes of the calculations in this document, it is assumed that there are a combined 10,000 new builds and conversions a year in Wales. This will allow for the fact that the numbers of conversions may be slightly underestimated in these figures, costs of installation may be slightly higher in converted properties and also for possible growth in the construction industry in coming years.

[29] Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, Table 4.3, February 2010

[30] The definition of dwellings here is a building or any part of a building that forms a separate and self contained set of premises designed to be occupied by a single family or household. This does include conversions or improvement of premises, where there is a change of use or splitting a dwelling into flats or vice versa. This does not include hostels.

Table 1. Dwelling stock estimates, by tenure at 31 March. (a) (b) (c)

	Rented from local authorities (d)		Rented from registered social landlords (e)		Owner-occupier and other tenures (f)		Privately rented		Total
	Number (thousands)	Per cent	Number (thousands)	Per cent	Number (thousands)	Per cent	Number (thousands)	Per cent	Number
1999-2000	193,006	15	53,877	4	903,259	71	116,853	9	1,266,994
2000-01	187,720	15	54,999	4	904,514	71	127,267	10	1,274,500
2001-02	182,916	14	56,687	4	931,882	73	110,254	9	1,281,739
2002-03	177,081	14	57,483	4	924,787	72	129,924	10	1,289,275
2003-04	162,276	13	64,723	5	945,403	73	124,556	10	1,296,957
2004-05	157,516	12	65,009	5	950,235	73	132,647	10	1,305,407
2005-06	155,768	12	65,770	5	954,971	73	136,974	10	1,313,483
2006-07	154,412	12	66,652	5	967,106	73	134,618	10	1,322,788
2007-08	131,524	10	89,299	7	974,321	73	136,234	10	1,331,379
2008-09	112,996	8	106,891	8	954,710	71	163,893	12	1,338,490

Source: Welsh Assembly Government

(a) At 31 March 2009. Data are not National Statistics

(b) Data has been affected by the large scale voluntary stock transfers of local authority stock. For further details see Quality Information section.

(c) Due to rounding, the percentages may not equal 100% and the total column may not equal the sum of the different tenures

(d) Prior to 2008-09 data are from the Housing Revenue Account Subsidy (HRAS) second advance form. For 2008-09 data are from the annual Social Housing Stock return from local authorities.

(e) Prior to 2008-09 data are from the annual RSL1 to 4 forms from registered social landlords. For 2008-09 data are from the annual Social Housing Stock return from rgeistered social landlords.

(f) Includes, owner-occupied, intermediate and other tenures not socially or privately rented.

Table 2 Number of dwellings completed 1999-00 to Sept. 2009

	Dwellings completed during period			
Year	All tenures	Private enterprise	RSL	Local Authority
1999-2000	8,706	7,860	846	0
2000-01	8,333	7,386	900	47
2001-02	8,273	7,494	711	68
2002-03	8,310	7,522	782	6
2003-04	8,296	7,863	417	16
2004-05	8,492	7,986	475	31
2005-06	8,257	7,883	347	27
2006-07	9,334	8,988	346	0
2007-08	8,664	8,316	343	5
2008-09	7,121	6,429	692	0
2009-10 Q1+Q2	*3,040*	*2,620*	*420*	*0*

Source: Data Unit Wales

Note: 2009-2010 Q1+Q2 is April to September 2009

Note: The Data Unit also produce figures for the number of bedspaces completed in houses in multiple occupancy. For the past two years combined the total numbers recorded is well below 100, so the costings for HMOs have not been separately calculated.

Table 3 Costs of the installation of automatic fire suppression systems per dwelling (2007 prices excluding VAT)[31]

Cost category		Base estimate (average cost £)	Range for sensitivity analysis[1] (£) low	high
Installation	House	1,500	1,200	2,200
	Flat	750	600	900
Annual inspection and maintenance	House	75	50	100
	Flat	75	50	100

Source: Communities and Local Government, *A cost benefit analysis of options to reduce the risk of fire and rescue in areas of new build homes*

[1] As many of the cost assumptions are uncertain, the CLG report provides a range of values as part of sensitivity analysis which allows the cost to deviate from the "central" base value.
Note: The CLG report based its calculations on data for an area which does not have as good water supply as Wales. Hence costs for the installation of pumps and tanks which were included in their cost analyses which are not included in this analysis.

8.20 Estimates of costs below are based on the figures in Table 3. This is derived from the Communities and Local Government report, *A cost benefit analysis of options to reduce the risk of fire and rescue in areas of new build homes*, adjustments have been made as the estimates in this report are not for Wales, but using data for an area with relatively low water pressure. Also, the Thames Gateway development is more likely to have more high-rise development as land values are considerably higher than in Wales. It has been assumed that dwellings in Wales will not need an additional tank and or pump to augment the water supply. It is also assumed that 37% of new builds are flats, as in the Data Unit 2008-09 new build completion statistics.

8.21 Taking these assumptions, the average costs of installation per dwelling would be £1,223, with a low estimate of £978 and the high estimate £1,719. These cost estimates are in line with those from different sources stated in Paragraph 8.17. **Using these range estimates the total cost of installing automatic suppression systems in 10,000 residences a year could be in the region of £10 million to £17 million per annum**.

8.22 If around a third of owners perform annual maintenance on their systems,[32] maintenance costs would be zero in the first year, £250,000 in the second, £0.5 million in the third and so on. The

[31] Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, Table 4.3, February 2010
[32] Assuming a similar proportion to owners who have gas boilers with an annual maintenance contract.

estimates for maintenance costs do vary also, the U.S. Department of Commerce, National Institute of Standards and Technology (NIST), in their costs benefit analysis stated that "maintenance and repair costs are not examined because they are negligible".[33]

8.23 There are a number of factors that could cause the installation costs of automatic fire suppression systems to be considerably lower than the estimates above.

- It should be noted that more investigation is needed into trade-offs savings, which could reduce these costs.
- This assumes that none of the properties would have installed automatic fire suppression systems in any case if the proposed Measure were not in place.
- Evidence from Scottsdale, Arizona, suggests that the average cost of fitting residential sprinkler systems fell considerably over time as the market developed. "The impact and installation costs have been reduced dramatically, from $1.14 sq. ft. to $0.59 sq. ft." This is a fall of almost 100 per cent from 1986 to 1996, which would be even larger if inflation were taken into account[34].

8.24 It is likely that the cost of the system installation and subsequent maintenance could in many cases be incorporated into the value of the house or the rental charged to the occupier. There is a possibility that buyers, and renters, will attach a value to sprinklers, increasing demand for houses with sprinklers. An additional factor that could be modeled as a benefit variable is the increased present value of resale proceeds. The increased proceeds realizable from selling the house prior to the end of the sprinkler system's useful life could be deducted from purchase and installation costs.[35]

8.25 This assumption is backed by research into attitudes of the general public:

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[33] U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Benefit-Cost Analysis of Residential Fire Sprinkler System, September 2007
[34] Saving Lives, Saving Money Automatic Fire Sprinklers A 10 Year Study, Scottsdale, Arizona, 1997
[35] Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, February 2010, p63

> The Home Fire Sprinkler Coalition sponsored a December 2005 survey by Harris Interactive. Among the findings were that 45% of homeowners considered a sprinklered home more desirable than an unsprinklered home, that 69% believe a fire sprinkler system increases the value of a home, that 38% say they would be more likely to purchase a new home with sprinklers than one without, and that 43% would be more likely to have home fire sprinklers installed if the cost could be included in the mortgage. These read like the emerging perceptions of a nation that sees value for the cost of home fire sprinklers and sees ways to handle that cost within their home-buying budget.[36]

8.26 This would imply that there may be scope for the market to absorb the majority of installation and maintenance costs. The acceptance and willingness to pay is likely to grow as automatic fire suppression systems become an expectation rather than an exception.

8.27 Table 1 shows that in 2008-09, 83 per cent of dwellings stock was either privately owned or rented. Both local and registered social landlords both account for 8 per cent of dwelling stock, local authority dwellings account for the remainder, however these have fallen from 16 per cent to 8 per cent over the past 10 years, therefore the number of local authority new-builds is small.

Breakdown of where these costs could fall

8.28 In terms of this proposed Measure the costs highlighted in the preceding paragraphs could fall on local authorities, housing associations and homeowners / private landlords. The following section shows a breakdown of estimates of potential costings. These costings will not add up to the total estimates for Wales.

Costs on Local Authorities - fitting of automatic fire suppression systems

8.29 Local authorities will incur costs under this proposed Measure if they build new dwellings or convert existing dwellings. It can be seen in table 2 that local authorities have only built five new homes in the past three whole years for which data is available. It is assumed that as local authorities are building few new houses that the same holds for conversions. As there are few

[36] National Fire Protection Association, U.S. experience with sprinklers and other automatic fire extinguishing equipment, February 2010

new dwellings being built by local authorities so there would be limited cost to local authorities in installing and maintaining automatic fire suppression systems in properties they have built.

8.30 There will be costs involved with regards to the provision of social housing. However this is dealt with in the next section.

Costs on other bodies, individuals and businesses

8.31 Others affected by this proposed Measure are individuals or companies and other bodies who build housing or convert properties. For the purposes of this memorandum they are separated into registered social landlords and private landlords / homeowners.

Costs on registered social landlords

8.32 Broadly speaking, registered social landlords (RSLs) are bodies that were previously registered as housing associations, industrial and provident societies and companies that are registered after the introduction of the new register for RSLs. RSLs provide accommodation for letting and do not trade for profit. Figures from the Welsh Government state that there are over 100,000 dwellings rented from RSLs in Wales.

8.33 Costs from this proposed Measure will only fall on RSLs who build new or convert existing properties. According to figures provided by the Data Unit Wales, shown in table 2, between 300 and 900 houses have been completed by RSLs per year in the past 10 years. However a recent study for Community Housing Cymru stated that 1,415 houses were built by housing associations in Wales in 2008-09.[37] This report estimated that the number of renovated units was 42 and 685 were acquired. It is difficult to be sure of the reason for these differences between these two data sources but it could be that they are not using consistent definitions in terms of what is a building completion and what is a renovation. It should also be noted that a renovation is not the same as a conversion of use.

8.34 A statistical release provided by the Welsh Government, *Affordable housing provision in Wales, 2007-08 to 2010-11*

[37] The Housing Associations of Wales, Measuring the Impact II, November 2009, table 2c

states that RSLs provided 2,050 units of affordable housing in 2008-09. This figure does include new build, purchase, acquisition, leasing or conversion of existing dwellings. The figure also includes social rented, intermediate rented[38] and shared equity schemes[39]. Of these newly available units of affordable housing around 60 per cent (1,282) were funded by Social Housing Grant (or any recycled Social Housing Grant or Strategic Capital investment Fund). Therefore, the number of new builds and conversions may be greater than the figures in table 2 but less than 1,400.

8.35 Table 4 shows that using these assumptions the estimated potential costs for RSLs will be between **£0.5 million** and **£3.3 million a year**, depending on the numbers of new builds and conversions undertaken.

[38] Intermediate rented housing: Where prices or rents are above those of social rented housing but below market housing prices or rents. This can include equity sharing schemes (for example Homebuy). Intermediate housing differs from low cost market housing, which the Assembly Government does not consider to be affordable housing for the purpose of the land use planning system.

[39] Shared Equity: This includes units where:
a) the registered social landlord provides an equity loan to assist with the purchase of a property (e.g. through the Homebuy scheme);
b) there is shared ownership between the occupant and the RSL (e.g. part ownership / part rent);
c) there is any other low cost home ownership arrangement; and
d) that are offered under "neutral tenure" principles (where applicants can choose to rent or buy depending on individual circumstances) if the first occupancy is on equity sharing terms.

Table 4 Estimate of potential costs for RSLs in Wales

	Year 1		Year 2		Year 3	
	Number	Cost £'000	Number	Cost £'000	Number	Cost £'000
New builds						
Low estimate	500	489	500	489	500	489
High estimate	1,400	2,407	1,400	2,407	1,400	2,407
Conversions						
Low estimate	0	0	0	0	0	0
High estimate	500	860	500	860	500	860
Total						
Low estimate		489		489		489
High estimate		3,266		3,266		3,266

Note: Estimates of costs are based on the figures in Table 3. It has been assumed that 37% of new builds are flats, as in the Data Unit 2008-09 new build completion statistics. The low estimate of average installation cost per dwelling of installation is £978 and the high estimate £1,719.
Also, some of these costs will already be incurred as this table assumes that no new dwellings will have automatic fire suppression systems installed without the Measure being in place.

8.36 Whilst in principle, the cost of the installation of these systems could be covered by lower land values, incorporated into property values or rental charges, in some cases, and especially in the case of social housing this it may not be possible to recoup all the installation costs. Community Housing Cymru state in their evidence to the LCO committee that:

> For housing associations this will mean extra costs at construction and during the lifetime of the home. Without additional grant from the Assembly this will mean additional borrowing and higher rents to tenants as well as higher service charges to cover the on-going maintenance costs. So there will be a resultant cost to the public purse, either in additional grant or through housing benefit.

8.37 Approximately two-thirds of the units provided by RSLs are funded by social housing grants, although it is not known if social housing grant funded houses are more likely to be existing or newly built properties. Costs of installation on average are likely to be lower in affordable housing and it is possible that the costs will be reflected in lower land values, or the additional costs could be recouped through the market value of the house or rental charges.

8.38 Maintenance costs for these properties will be well below the average as staff would be able to schedule maintenance along with other visits to rented properties.

Costs on private landlords and home owners

8.39 Private enterprise is responsible for the majority of houses built in Wales, over 90 per cent over the past 10 years. In the first case, the costs associated with this proposed Measure will fall on private organisations building new or converting existing properties. These will be part of construction projects and incorporated into project costs. The cost of the work is likely to be reflected in higher value of sprinklered houses, or if this is not the case in slightly lower land values of building plots. Therefore, it is likely that the cost of the work would be reflected either in the value of the dwelling or recouped over a period as part of a rental agreement.

8.40 The maintenance costs would fall on the homeowner, or in terms of rental properties would be either passed on to the renter or serviced by the landlord. It would be suggested that automatic fire suppression systems have an attached long term maintenance contract to ensure that this maintenance will be carried out regularly by householders who cannot afford or understand the importance of maintenance.

8.41 Based on the estimated costs of £978 to £1,719 for the installation of an automatic fire suppression system and building of 6,500 to 9,000 dwellings by private enterprise in a year**. Installation costs would be between £6.4 million and £15.5 million**, although it is assumed that the majority of these costs would be subsumed into property values or rental charges, as would maintenance costs. It should be noted that there may be design "trade-offs" that could considerably reduce these costs. It also should be noted that international experience suggests that installation costs are also likely to fall considerably over time.

8.42 There is a possibility that buyers, and renters, will attach a value to sprinklers, increasing demand for houses with sprinklers.[40] This would imply that there may be scope for the market to absorb the majority costs installation and maintenance costs.

[40] Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, p63, February 2010

Other costs

Welsh Government

8.43 The costs of preparing new regulations to prescribe the standards for automatic fire suppression systems (see Section 5.2) are likely to be minimal, given that there are already well-established British and European Standards. There would need to be some guidance drafted following on from the setting of standards (see Section 5.3). This guidance would need to be circulated to local authorities to enable them to process information provided by developers in relation to provision of automatic fire suppression systems in planned new or converted residences. Although dependent on standards set, this is likely to only require a handful of days output plus legal advice. If this were to equate to a maximum of one day's input for a senior executive officer a week, the total cost to the Assembly Government would be up to £10,000 a year. It is considered that such minimal additional requirements could be absorbed within the duties of existing staff.

Local authority costs

8.44 The actual processes required will be dependent on standards and regulations set by Welsh Ministers. However, it is intended that information will be considered and installation will be approved alongside the Building Regulations process. This would mean that there would be an add-on to the process and associated costs but these would not be significant. Sprinklers are referred to in the Building Regulations already as a means of contributing to life safety and in terms of the design freedoms that are gained by their use. People who monitor Building Regulations should therefore be aware of sprinklers, specifications and their potential usage in domestic properties. There may be some additional skills required and training needed for staff and the need for the information for automatic suppression systems to be additionally considered when considering the plan as a whole. This could form part of existing schemes of continual professional development for building inspectors. The anticipated increase in workload is very small compared to the current overall building control function. Therefore, the current overall £5.1 million Welsh local authority

net expenditure on building control, as at 2008-09, would only at most see a minor increase.[41]

8.45 The number of decisions and information that needs to be assessed will not be equal to the total number of dwellings, as new builds are usually part of a development containing a number of individual dwelling units.

8.46 In terms of enforcement, this would only be at the point of the completion of building work as the proposed Measure does not address maintenance of these systems. The responsibility would fall upon local authority or "approved inspectors" who are employed by private companies approved for purposes of Building Regulations. This would only add on a small additional responsibility and hence minimal costs.

8.47 The provisions of the proposed Measure will be enforced by the local authority. If there were any prosecutions, they would prepare and bring forward cases.

8.48 It is difficult to quantify for the purposes of this memorandum if and how many offences are likely to be committed under the proposed Measure. It is likely that the cases in which information regarding automatic fire suppression systems is not sufficient but Building Regulations are all complied with would be very small.

8.49 Therefore it is thought that any additional enforcement costs specifically due to this proposed Measure will not be major and can be absorbed with only a small additional requirement for additional staff or resources.

Costs in relation to other types of residence

8.50 The proposed Measure also covers residential care homes, boarding schools, residential colleges and student halls of residence. There is less information relating to the provision of

[41] A similar requirement in a draft bill in Scotland estimated that similar requirements would have no cost impact. The Scottish Housing Bill stated that

> *"It is anticipated that the Bill will cost local authorities no more than any other change in building regulations to enforce. No new staff will be required to carry out these functions as building regulations are updated on average every two years. This Bill provides for amendment of the existing legislation and falls to be treated in exactly the same way as other amendments by building control departments."*

such new residences. A higher proportion of these residences will already be likely to have automatic fire suppression systems incorporated into plans for new builds.

8.51 In April 2007 part B of the Building Regulations changed in England and Wales, bringing opportunities for developers to use fire sprinklers as an added life safety system. The inclusion of such systems enables certain cost saving design freedoms, such as a care home "*where a sprinkler system is provided fire doors to bedrooms need not be fitted with self closing devices, protected areas may contain more than 10 beds and bedrooms may contain more than one bed*."

8.52 The costs of installing the systems will depend again on a number of factors, such as the size of establishments. The CLG report, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, estimated that fitting automatic fire suppressant systems in a care home for children with 9 beds would cost in the region of £6,000 to £8,000 and a care home for elderly with 19 beds would cost £12,000 to £20,000. **This would suggest that costs are in the region of up to £1,000 per bedspace for a new property**. A contact from BUPA suggested that costs for installation in a care home would "*vary significantly dependant on the type of property, the size of the rooms and the age of the property*" and that "*some of the older buildings we have which require a more sensitive, detailed approach to the installation".* The British Automatic Fire Sprinklers Association stated in a newsletter, Fire Sprinkler Systems in Care Homes, October 2007, that **"*whilst it is difficult to generalise, it is likely that in most care home projects sprinklers can be installed for around 2-3% of the project cost*".**

8.53 In Scotland legislation already exists requiring residential fire sprinklers to be installed in all new care homes following a serious fire in 2003 in which 13 occupants died. Although there was a Regulatory Impact Assessment for the *Building Regulations (Scotland) 2004*, in which this requirement was introduced, no costs were provided to evaluate the impact of the requirement for new care homes to have automatic fire suppression systems installed.

Potential savings as a result of the proposed Measure

8.54 There are significant potential savings associated with this proposed Measure which are set out in the following paragraphs.

8.55 The main benefits will be in terms of lives saved, injuries avoided, property protected, fire and rescue service costs, rehousing costs and other savings. The financial value of such savings is based on estimates of the reduction in severity of fires and subjective assessments of the value of lives saved.

8.56 The number of deaths per year fluctuate considerably. In the year to September 2009, there were 12 deaths in accidental fires and 400 fire related injuries in dwellings in Wales. In addition there was one death and 87 fire related injuries from deliberate fires in dwellings in Wales[42].

8.57 According to Data Unit Wales performance indicators, over the past five years there have been on average 18 deaths per year in Wales as a result of fires in dwellings, attended by the Fire and Rescue Services.

8.58 This would suggest that on average approximately 18 people die and around 500 are injured caused by fires in dwellings each year.

8.59 Evidence gathered worldwide shows that while sprinklers are primarily intended to contain or control fires, people in the room of origin of a fire have survived as a result of the effectiveness of the sprinkler system. There are no cases on record where multiple fire deaths have occurred in buildings with working sprinkler systems complying with the appropriate standard.

8.60 A report[43] published in the USA in 2010 by the National Fire Protection Association concluded that in residential properties where wet pipe sprinklers are fitted:

- The death rate per fire is lower by an estimated 83 per cent;

[42] Welsh Assembly Government, Statistical Directorate, Fire Statistics Monitor, Quarter 2 and 3 2009
[43] National Fire Protection Association, U.S. experience with sprinklers and other automatic fire extinguishing equipment, February 2010

- The average cost of property damage is $4,000, compared with $17,000 for a home without a sprinkler system (a 74 per cent reduction);
- 97 per cent of reported structure fires have flame damage confined to the room of origin (all types of sprinklers) compared to 76 per cent when no automatic extinguishing system is present.

8.61 A 2007 study[44] by the US National Institute of Standards and Technology concludes that sprinklers in single family residential units make very good economic sense in terms of the return on investment.

Table 5 Estimates of the reduction in deaths, injuries and properties in case of a fire due to the installation of an automatic fire suppression system

	Source report		
	BRE (2004)	US Dept of Commerce (2007)	FSA (2004)
	%	%	%
Reduction in:			
Deaths	70	83	100
Injuries	30	..	85
Property damage	50	74	90

Sources: BRE (2004) Table A.6, U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Benefit-Cost Analysis of Residential Fire Sprinkler System and FSA – An appraisal of the Office of the Deputy Prime Minister (ODPM)-BRE report, '*Effectiveness of sprinklers in residential premises'*

8.62 The BRE figures in table 5 are taken from baseline levels of deaths, injuries and property damage are taken from the ODPM publication "The Economic Costs of Fire: Estimates for 2000". These figures appear to be a significant underestimation compared to estimates made in other reports, these assumptions are currently being updated by BRE Global and are due by autumn 2010.

8.63 In a critique of the BRE figures, the Fire Sprinkler Association (FSA) contends that more accurate estimates, based on other international reports,[45] are 100 per cent reduction in deaths, 85 per cent reduction in injuries and 90 per cent reduction in

[44] U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Benefit-Cost Analysis of Residential Fire Sprinkler System, September 2007
[45] FSA – An appraisal of the ODPM-BRE report, '*Effectiveness of sprinklers in residential premises'*, May 2004

property damage, the final estimate of a 70 per cent reduction in fatalities as a result of sprinkler systems used in BRE (2004) is an underestimate of sprinkler effectiveness. It asserts that the BRE methodology does not concur with the "actual recorded number of deaths in a sprinkler protected building in the UK – namely none".

Lives saved and injuries avoided

8.64 The annual number of primary fires in dwellings in Wales for the last two years has been approximately 2,240.[46] An ODPM report *The economic cost of fire: estimates for 2004*, estimated the average economic cost of injuries and fatalities as £14,600 per domestic dwelling fire. If the increase in RPI inflation since mid-2004 of 20 per cent were applied, this would equate to £17,500 at current costs, or an **annual cost almost £40 million for Wales as a whole**.

8.65 Assuming an annual rate of 18 deaths and 500 injuries per year in 1.35 million dwellings, when the proposed Measure comes into effect, this would equate to an annual 0.13 deaths and 3.70 injuries per 10,000 residences. On the assumption deaths are reduced by the percentages in table 5 in houses containing sprinklers, 10,000 residences a year are fitted with automatic fire suppression systems and a constant rate of risk for all dwellings table 6 estimates the number of lives that would be saved and injuries avoided.

Table 6 Cumulative estimates of lives saved and injuries avoided

	BRE Report		US report		FSA report	
	Lives saved	Injuries avoided	Lives saved	Injuries avoided	Lives saved	Injuries avoided
First 5 years	1	17	2	..	2	47
First 10 years	5	61	6	..	7	173
First 15 years	11	133	13	..	16	378
First 20 years	20	233	23	..	28	661

Sources: BRE (2004) Table A.6, U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Benefit-Cost Analysis of Residential Fire Sprinkler System and FSA – An appraisal of the ODPM-BRE report, '*Effectiveness of sprinklers in residential premises'*

[46] Welsh Government, Fire Statistics Monitor Wales, Quarter 2 and 3 2009, 14 May 2010

8.66 While there are difficulties in estimating the "value of a life", the FSA state that in 2004 the inflation linked value, based on the United Nations Intergovernmental Committee on Climate Change estimate, would be £1.5 million.

8.67 As a result of the proposed Measure, there will also be a reduced risk of injury to fire and rescue service personnel and other emergency services staff.

Property protected

8.68 There are also a range of estimates for the relative proportion of property loss in a dwelling with or without an automatic fire suppression system. The BRE report says losses are twice as high, the US Dept of Commerce report states four times as high, the Chief Fire Officers' Association states five times as high and the FSA ten times as high in dwellings without these systems.

8.69 The annual number of primary fires in dwellings in Wales for the last two years has been approximately 2,240.[47] If the property loss cost of this number of fires is around £8,800 per incident,[48] the **total annual cost in Wales is almost £20 million**. Initial savings will be modest as the proportion of houses fitted with automatic fire suppression systems is small, but over the lifetime of the system in each property the savings will be considerable.

Rehousing costs saved

8.70 Local authorities have a responsibility to house anyone made homeless as a result of a fire. Therefore any action that will reduce the number of serious fires will reduce local authority costs.

8.71 Rehousing costs can be considerable, both in financial terms and the impact on individuals and families. A recent example of a serious fire in a block of flats with no sprinkler system took place in Camberwell, in which six people died, on 3 July 2009. The Residential Sprinkler Association stated that "*Experience*

[47] Welsh Government, Fire Statistics Monitor Wales, Quarter 2 and 3 2009, 14 May 2010

[48] An ODPM report *The economic cost of fire: estimates for 2004*, estimated the average property damage cost as £7,300 per domestic dwelling fire. If RPI inflation of 20 per cent were applied, since mid-2004 this would equate to £8,800 at current costs

shows that s fire sprinkler system would have controlled this fire in its early stages and probably prevented it from becoming a threat to those who died." At January 2010, Southwark council estimated that costs incurred by the council due to the fire were in the region of £8 million (£4 million revenue for emergency payments, temporary accommodation, moving costs, rent forgone, welfare facilities, counselling, making building safe, site security and legal costs and £4 million capital related spend). These costs will continue to rise as further additional costs are anticipated in terms of building reinstatement and further legal fees and representation. [49]

Fire and Rescue Service costs

8.72 The following information is provided by Chris Enness, Chief Fire Officers Association, 2009:

> On average it costs the Fire Service £287 per hour per appliance at an incident. Therefore, in monetary terms, on average if 2 appliances were at a house fire for 3 hours, it could be said that it would cost the fire service in the region of £1,722. This however is not the full cost as for this period of time we would have to make cover moves to maintain fire cover, this would put an additional £1,722 on the cost making a total of £3,444 per incident.
>
> In addition to this the cost of an Officer to attend needs to be factored in at £75 per hour giving a total of £3,669.
>
> It is fair to say that on average it takes in the region of 8 minutes for the fire service to attend a house fire, which by that time the fire is developed, therefore if the fire service were to attend an incident where sprinkler were fitted and had actuated, then the cost would be reduced by 2/3 to £1,148, that is making an assumption that cover moves would need to be made, however in my experience I would say that in 9 times out of 10 these would not have to be made as the fire would be contained to the room of origin and only need a minimal intervention by the fire service.

8.73 If there are 2,240 incidents per year and the cost per incident is £3,669 **the total annual cost to the fire and rescue services is over £8 million**. Initial savings will be modest as the proportion of houses fitted with automatic fire suppression systems is small, but over the lifetime of the system in each property the savings will be considerable. There is also potential for a

[49] Southwark Council, presentation on the Camberwell fire, 11 January 2010.

gradual planned relocation of resources in line with the increased installation of sprinklers that would enable all Fire and Rescue Services to save more lives through other activities such as work with businesses to enable and encourage growth to the economy.

Other savings

Insurance costs

8.74 It is generally accepted that the installation of sprinklers reduces the risk of loss or damage to the contents and fabric of a building, by giving early detection and reducing the growth of a fire. These points are recognised by insurance companies, they may be able to offer a lower premium for fire insurance because of a lower cost of claims, although the fire element of private home insurance is small.

8.75 The Chief Fire Officers Association response to the NERA report[50] on the Thames Gateway Housing Project, 21 May 2010, states that "at least one insurer has indicated he would offer 3-5% discount for sprinklers in Wales. That could be worth £10-£15." This would mitigate at least part of possible annual maintenance costs.

Use of Water

8.76 In accordance with section 147 of the *Water Industry Act 1991*, no charge may be made for water used for fire fighting, testing fire fighting equipment or training people for fire fighting. This applies to automatic fire sprinkler systems. Therefore, savings in terms of water usage and the associated costs would be made by water providers.

8.77 The following information is provided by Chris Enness Chief Fire Officers Association, 2009:

> The amount of water used on a house fire without sprinklers compared to one with a system installed and if possible the cost on this.
>
> A domestic sprinkler will only discharge 38 to 57 litres (10 to 15 gallons) of water per minute compared to a fire-fighters hose which will deliver 950 to 1,900 litres (250 to 500 gallons) of water per minute. If we factor

[50] Communities and Local Government, *A Cost Benefit Analysis of Options to Reduce the Risk of Fire and Rescue in Areas of New Build Homes*, February 2010

this into this the cost of water, which within the Severn Trent region is at 130.6p per cubic meter, then we can see the cost ranges from 5 to 7p per minute for a sprinkler system, compared to £1.24 to £2.48 per minute for the water used by the fire service at a similar incident.

Therefore for example if a sprinkler system were to operate for 20 minutes it would cost between £1 to £1.40, compared to the same period for a fire-fighters hose which would be £24.80 to £49.60

8.78 There is a clear saving in terms of water used and the cost of that water used and the costs of provision of that water where an automatic fire suppression system is installed in a dwelling. Further savings could be made as the number of fire hydrants that the water authority would need to provide and maintain could be reduced over time.

Environmental savings

8.79 The following summary of environmental benefits is taken from a report by the British Automatic Sprinkler Association.[51]

The products of a building fire discharged into the environment are primarily dependent upon the materials burning. The presence of plastics and modern materials, even fire retardants, can lead to significant amounts of toxic gases being emitted into the atmosphere. All building fires discharge large quantities of hydrogen chloride (HCl), hydrogen cyanide (HCN) and large amounts of carbon monoxide (CO). The provision of sprinklers can enable mitigation and limitation strategies to be developed to address sustainability issues in the design and alteration of buildings. Sprinklers may not only provide benefits in terms of costs and life safety but also can impact on environmental issues, either by limiting the damaging effect of fire or by enabling reduced passive fire protection measures. Typical examples of this are:

- Reduction of fire doors and dampers.
- Reduction of fire resisting partitions and walls.
- Reduction of fire resisting glazing.
- No need to construct temporary and permanent accommodation as large destructive fires are prevented.
- Reduced amounts of fire and smoke damaged contents require disposal post fire.
- Reduced need to provide additional transportation to alternative sites.
- Reduced impact on the habitats of wildlife.
- Prevention of loss of important documents (historical importance to future generations).
- Reduced exposure to harmful materials and substances such as asbestos that may be released in a large fire.

[51] British Automatic Sprinkler Association, Use and benefits of incorporating sprinklers in buildings and structures, draft 2 November 2005

- Reduced risk of polluting ground, air and watercourses.

8.80 A recent USA research report by FM Global examines the environmental impact of automatic fire sprinklers.[52] This report considers expanding the assessment of lifecycle carbon emissions of a residential building to incorporate risk factors such as fire. It shows that the lack of a proper risk management and effective fire protection, including automatic fire sprinklers, statistically increases carbon emissions over the lifecycle of the occupancy of the building. The report also states:

> "typical benefits gained from 'green' construction and energy efficient appliances and equipment can be negated by a single fire event. This is due to the subsequent carbon dioxide, and other greenhouse gases, generated burning combustible material, in addition to the embodied carbon associated with disposal of damaged materials and reconstruction."

8.81 In a comparison of the environmental impact of automatic fire sprinklers tests were carried out of the impact of fire on a sprinklered and a non-sprinklered residential room. This showed that the use of sprinklers reduced the peak heat release and total energy generated was reduced from 13,200 kW to 300 kW. The fraction of combustible material consumed in the fire was less than 3 per cent in the sprinklered test and between 62 and 95 per cent in the non-sprinklered test. The greater fire damage in the non-sprinklered test has a direct impact on the carbon emissions of the building due to the embodied carbon associated with the building materials necessary for reconstruction and those associated with the manufacturing of furnishings and contents.

8.82 Further economic benefits would therefore be a reduction in the need to rebuild damaged housing stock. This would also assist the Welsh Government with their aim to improve the sustainability of Welsh housing.

8.83 This would be set against the environmental cost of producing and installing the systems.

[52] FM Global, *Environmental impact of automatic fire sprinklers*, Research Technical Report, March 2010

Part 3: Explanatory Notes

Section 1- Duty to provide fire suppression system

In respect of building work comprising the construction of a building for use as a residence, converting a building or part thereof for use as one or more residences, subdividing one or more existing residences to create one or more new residences or amalgamating existing residences so as to create a new residence or residences, there is a duty to provide each residence with an effectively operating fire suppression system which complies with such requirements as may be prescribed by Welsh Ministers in regulations.

This duty will not apply to building work carried out for the purpose of discharging any function of a Minister of the Crown or where building regulations impose requirements relating to the provision of fire suppression systems or would so apply but for a direction under section 8 of the *Building Act 1984* dispensing with such requirements.

Section 2 – Enforcement

Save where building work is supervised by authorised inspectors, this Measure is to be enforced by local authorities.

Section 3 – Provision of information

Where, in accordance with building regulations, notice is given to a local authority of a proposal to carry out building work or full plans of such work are deposited with a local authority, such notice or plans must be accompanied by information provided for the purpose of demonstrating that the building work is capable of satisfying the requirements prescribed in regulations made under section 1. Information is to be provided in such form as may be prescribed in regulations made by Welsh Ministers.

Where a local authority is of the opinion that the information provided is incomplete or does not demonstrate that the work, when completed, is capable of complying with the requirements of section 1(4), it must give written notice of its opinion to the person giving notice or depositing plans. Any question arising as to the correctness of the opinion may be referred to the Welsh Ministers for determination.

Section 3A – Authentication and service of documents

The provisions of sections 93 (authentication of documents), 94 (service of documents) and section 94A (electronic service of documents) of the *Building Act 1984* are to apply in relation to documents authorised or required to be given, made, issued or served under the Measure.

Section 4 – Interpretation

Section 4 interprets expressions used in the Measure. The section also provides that the definition of “residence” may be amended by order

made by the Welsh Ministers where such amendment relates to the adding of a class of residential premises or amending the description of an existing class of residential premises.

Section 5 – Transitional and consequential provisions
A power is conferred on Welsh Ministers to make, by order, transitional, transitory, consequential, saving, incidental, supplementary and other provision, including provision that amends, repeals or otherwise modifies an enactment, as necessary or appropriate in connection with or to give full effect to the Measure.

Section 6 – Regulations and orders
This section provides that regulations or orders made under the Measure are to be made by statutory instrument and provides for the procedure to be followed including any requirement to consult prior to the making of regulations.

Section 7 – Short title and commencement
Section 7 sets out the short title of the Measure together with commencement provisions.

Schedule 1 – Enforcement

Save as provided by Schedule 2, the Measure is to be enforced by local authorities.

A person carrying out building work which fails to comply with the requirements of section 1 is guilty of an offence triable summarily and liable to a fine not exceeding level 5 on the standard scale.

Without prejudice to its right to take proceedings in respect of offending building work, a local authority may serve notice – a "paragraph 3 notice" - requiring the owner to effect such alterations as may be specified in the notice. Where the notice is not complied with a local authority may effect works to ensure compliance with the notice and recover from the person on whom the notice had been served the expenses incurred by the local authority in so doing. A paragraph 3 notice must set out the grounds upon which the notice may be appealed against. Appeal is to the Magistrates' Court by way of complaint.

Where work has been undertaken in accordance with information provided to a local authority in accordance with the provisions of section 3, a local authority may not issue a paragraph 3 notice unless it had given notice under section 3 that in its opinion the information does not demonstrate that the work will comply with the requirements of section 1.

Where a paragraph 3 notice has been issued, the recipient of the notice may notify the local authority that he or she intends to obtain from a suitably qualified person a report concerning the work to which the paragraph 3 notice relates and, where the report results in the local authority withdrawing the paragraph 3 notice, the local authority may pay to the recipient of the paragraph 3 notice the expenses incurred in obtaining the report.

Authorised officers of the local authority have a right of entry to any premises for the purposes of enforcing the provisions of the Measure. A local authority has the power to require or itself undertake testing to ascertain whether or not building work complies with any requirement of the Measure.

Schedule 2 – Building work supervised otherwise than by local authorities

This Schedule has effect where an initial notice under Part 2 of the *Building Act 1984* is in force in relation to building work to which this Measure applies. In such cases the function of enforcing the Measure conferred on a local authority is not exercisable in relation to the building work and the Measure is to be enforced by an approved inspector.