adroit economics ltd

June 2023

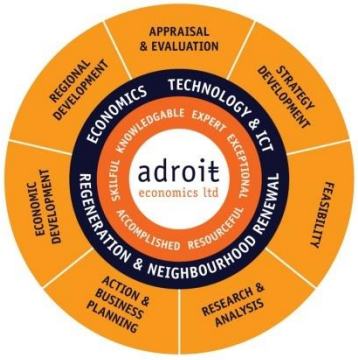
ADR-W-22-007 Combustible Cladding, Alarms, PIB and Signage Consultation CBA Assumptions Report

Prepared by Adroit Economics and PRP

For and on behalf of

Welsh Government

Contents



Registered Office:

Adroit House, 31 Finchley Road, Hale, Altrincham, Cheshire, WA15 9RE

Company registered in England No: 05567197

www.adroit-economics.co.uk

1. Introduction

1.1 This document sets out approach, methodology, assumptions, and results of the cost-benefit modelling exercise.

2. Policy Objectives

2.1 The Task Request set out the following background and objectives.

Background

2.2 Currently, a ban on combustible cladding applies in Wales for certain buildings. Welsh Government proposes changes to requirements of the Building Regulations which in-effect extent the ban the use of combustible materials in and on the external walls of certain buildings and in specified attachments to the external walls. We also propose to make amendments to require evacuation alert systems, secure information boxes and wayfinding signage.

Outline of Proposals

Ban on combustible cladding

2.3 Changing the Building Types Covered by the Ban

- We propose including hotels, hostels and boarding houses within the scope of the ban.

2.4 Ban on the Use of Metal Composite Materials with a Polyethylene Core

- We propose extending the ban to all buildings, regardless of height, purpose or use, only in relation to the use of metal composite materials with a polyethylene core in and on external walls and in specified attachments.

2.5 Including Solar Shading Products Within the Ban

- We propose extending the ban to include solar shading products, including but not limited to blinds and shutters.

2.6 Changing the List of Exemptions

- We propose several changes to the list of exemptions in Regulation 7(3) including to enable fibre optic cables, extend the use of insulation/waterproofing materials.

Requirements for buildings between 11-18m

- We propose new statutory guidance which sets clearer, stronger standards which will set limits on the combustibility of materials used in the external walls of buildings above 11m while still allowing flexibility in design.

Evacuation alert systems

2.7 We propose provision is introduced for Evacuation Alert System (EAS) to be provided in accordance with BS 8629 in new blocks of flats (purpose group 1(a)) with a top storey over 18m above ground level. These will help fire and rescue services to alert residents to a change in evacuation strategy during an incident, alongside existing communication methods.

Secure information boxes

2.8 We propose provision is introduced for Secure Information Boxes in all new blocks of flats over 11 metres in height. These boxes provide a secure facility to store information about a building and will further assist fire and rescue service during an incident.

Wayfinding signage.

2.9 We propose floor identification and flat indication signage within new blocks of flats with storeys over 11m

Requirements

2.10 A consultation and final cost benefit analysis of the proposals to extend fire safety provisions.

3. Approach and Methodology

Overall approach

3.1 The overall objectives are to:

- identify, quantify and monetise the main costs of the policy proposals, to industry
- identify, quantify and monetise the main societal benefits
- to match the two together to identify if the benefits outweigh the costs, or if the policy is cost neutral, or if there is a net policy cost

3.2 This involves a two-step process:

- Estimating the costs and benefits for each element of the policy per dwelling type
- Scaling these per dwelling costs and benefits up, to the level of Wales and over the length of the appraisal period

Policy Costs

3.3 The four policy proposals are costed separately, these are:

- Combustible Ban
- Evacuation Alert Systems
- Secure Information Boxes
- Wayfinding Signage

Building types

3.4 The analysis considers the impact of the policies on several different building types of different heights. The building types that have been assessed are:

- Apartments and student accommodation
- Care Homes
- General Hospital
- Hotels
- Hostels

3.5 The building height categories are

- 0-11m
- 11-18m
- 18m+

Appraisal period

3.6 The appraisal period comprises two time periods:

- The policy implementation period – 10 years
- A further 60 years to capture the life of the benefits that flow from implementation of the policy over a 10-year period
- Giving a total appraisal period of 70 years

Present value

3.7 All costs and benefits are presented in 2023 prices, in 2023 present values using discount rates for health and non-health impacts as set out in the Green Book.

4. Sequence of Calculations

4.1 Table 4.1 sets out the sequence of calculations undertaken and assumptions.

Table 4.1: Cost Modelling Methodology			
Step 1	Spec of buildings in scope	Agree buildings in scope	
Step 2		Agree new build and refurbishment rate per annum rates	
Step 3	Appraisal period	Agree start date, price year, policy appraisal period and benefits appraisal period	2024, 10-year policy period, 60-year benefits period = 70-year appraisal period
Step 4	PV Discount rates	Heath and non-health over 70-year period	As in Green Book
Step 5	Building impacts	Prepare baseline specification for typical building in scope	
Step 6		Estimate the proportion of buildings with components that would be in scope of the policy	
Step 7		Define types of impacts on building design to be costed	**Material costs** – uplift in component costs; new components **Maintenance costs** **Running Costs**
Step 8		Unit costs	MGAC (cost consultants) costed the spec
Step 9		Define types of benefits to be assessed	**Improved safety** – reduced fires; reduced evacuation times, improved fire fighting
Step 10		Improved safety	Literature review and paper to identify metrics
Step 11	Counterfactual	Estimate the proportion of buildings meeting requirements under the counterfactual and policy	
Step 12	Transition	Agree transition assumptions	Standard assumptions for new-build housing
Step 13		Agree proportion of schemes that are exempt	none
Step 14		Familiarisation costs	
Step 15	Scale up	See sequence of steps in 'Calcs_Mid Scenario' tab	
Step 16	High and low scenarios	High/low estimates of benefits modelled	

5. Assumptions – Buildings in Scope

5.1 The proposals being costed are that policy applies to new builds dwellings with internal staircases only.

Building Types

5.2 Table 5.1 shows the building types adopted for the cost modelling.

Table 5.1: Building Types
Apartments (including student accommodation)
Care Homes
General Hospital
Hotels
Hostels

5.3 Impacts were considered for buildings of different heights.

Table 5.2: Height Bands
0-11m
11-18m
18m+

Number of new builds per annum

5.4 Table 5.2 shows the number of new builds per annum.

Table 5.3: Estimated Current Stock of Buildings				
	0-11m	11-18m	18m+	Source
Apartments and student accommodation	55,175	6,131	171	Welsh Government (total number of apartment and number of 18m) Consultants estimate that 10% of buildings are 11-18m based on profile of buildings in England
Care Homes	1,005	21	0	Welsh Government (total number of care homes) Consultants estimate that 2% of buildings are 11-18m based on profile of buildings in England
General Hospital	126	14	5	Welsh Government (total number of hospital buildings over 18m) Valuation Office Data (total number of buildings) Consultants estimate that 10% of buildings are 11-18m based on profile of buildings in England
Hotels	464	87	29	Valuation Office Data (total number of buildings) Consultants estimate that 20% of buildings are 11-18m based on profile of buildings in England
Hostels	1,121	47	12	Valuation Office Data (total number of buildings)

				Consultants estimate that 5% of buildings are 11+m and 1% are 18m+ based on profile of buildings in England

Table 5.4: Estimated New Build and Refurbishment Rates (as a % of stock p.a.)

	New Build Rates		Refurbishment Rates	
	11-18m	18m+	11-18m	18m+
Apartments	1.3	3.0	2.0	4.0
Care Homes	2.5	3.0	2.0	3.0
General Hospital	1.5	1.5	3.0	2.0
Hotels	2.7	2.5	2.5	2.3
Hostels	**2.5**	**3.0**	**2.0**	3.0

6. Assumptions –Amount of external wall material on new buildings

6.1 The table below illustrates the estimated average amount of material that is installed on the reference buildings.

Table 6.1: Amount of Material per Building				
	All buildings (except hospitals[1])			
	Units	0-11m	11-18m	18m+
Facades	sqm	1,656	2,070	3,450
Structural timber frame	Storeys	3	4	10
Cavity trays in façade	m	480	533	1,600
Waterproofing and insulating material at ground level	sqm	60	60	60
Balconies	number	15	17	64
Solar Shading	Sqm	48	48	72
Glass balustrades	Sqm	168	192	704
Awnings	number	2	2	2

6.2 The table below illustrates the estimated proportion of material that is replaced on the reference buildings during a refurbishment.

Table 6.2: Proportion of Components Replaced During Refurbishment			
	Apartments		
	0-11m	11-18m	18m+
Facades - type 1 (brickwork)	0%	0%	0%
Facades - type 2 (rainscreen)	100%	100%	100%
Facades - type 3 (mix of type 1 and 2) – i.e. rainscreen element	15%	15%	15%
Structural timber frame	0%	0%	0%
Cavity trays in façade	0%	0%	0%
Waterproofing and insulating material at ground level	0%	0%	0%
Balconies	20%	20%	20%
Solar Shading	100%	100%	100%
Glass balustrades	20%	20%	20%
Canopies	100%	100%	100%

[1] Hospitals are assumed to have significantly large façade area of 12,000sqm for 0-11m buildings and 16,000sqm for 11-18m buildings.

7. Assumptions – Options

7.1 Three options have been considered for the combustible cladding ban.

Table 7.1: Policy Option – Combustible Cladding Ban
The application of the ban on combustible cladding (including regulation 7.3) to buildings (the addition of hotels, hostels and boarding houses to the existing categories of flats, hospitals, residential care premises and student accommodation) of 18m and over
An amendment to AD B for buildings between 11m-18m that would limit the use of combustible materials (this would replicate the amendment in England https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1080214/ADB_amendment_booklet_June_2022.pdf)

7.2 For the other proposed changes, one policy option has been considered against the counterfactual

Table 7.2: Policy Options – Evacuation Alarm Systems, Secure Information Boxes and Wayfinding Signage	
Evacuation Alarms	Evacuation Alert System (EAS) to be provided in accordance with BS 8629 in new blocks of flats (purpose group 1(a)) with a top storey over 18m above ground level.
Secure Information Boxes	Secure Information Boxes in all new blocks of flats over 11 metres in height
Wayfinding Signage	floor identification and flat indication signage within new blocks of flats with storeys over 11m

8. Assumptions – Cladding Counterfactual

Combustible Ban

8.1 The profile of the amount of combustible materials anticipated to be used on 18m+ Hotels and Hostels under the counterfactual has been estimated based on i) how commonly components are used on buildings and ii) how likely they are to have combustible elements.

8.2 The table below illustrates the assumptions used for 18m+ Hotels and Hostels.

Table 8.1: Estimated Proportion of Building Works Using Combustible Materials in External Walls of Hotels and Hostels 18m+

	New Build	Refurbishment
Facades - type 1 (brickwork)	0%	n/a
Facades - type 2 (rainscreen)	30%	75%
Facades - type 3 (mix of type 1 and 2)	15%	8%
Structural timber frame	0%	n/a
Cavity trays in façade	30%	0%
Waterproofing and insulating material at ground level	100%	0%
Balconies	0%	0%
Solar Shading	4%	16%
Balcony balustrades	1%	20%
Awnings	4%	0%

Limiting the use of combustible material on buildings 11-18m

8.3 The profile of the amount of combustible materials anticipated to be used on 11-18m Apartment buildings under the counterfactual has been estimated based on i) how commonly components are used on buildings and ii) how likely they are to have combustible elements.

Table 8.2: Estimated Proportion of 11-18m Apartment Buildings Using Combustible Materials in External Walls

	New Build	Refurbishment
Facades - type 1 (brickwork)	40%	0%
Facades - type 2 (rainscreen)	10%	10%
Facades - type 3 (mix of type 1 and 2)	25%	4%
Structural timber frame	1%	0%
Cavity trays in façade	85%	0%
Waterproofing and insulating material at ground level	100%	0%
Balconies (decking area)	20%	4%
Solar Shading (assume 75% of area is combustible materials)	7%	7%
Balcony Balustrades - Laminated Glass	20%	4%
Awnings	5%	5%

Note: the items indicated as n/a are not assumed to be replaced as part of refurbishment works

Source:

- Consultant's judgment, based on portfolio of current live projects (PRP)

9. Assumptions – Alarms, Secure information boxes and signage counterfactual

9.1 The analysis assumes a proportion of new buildings will already be compliant (or in the case of signage, partially compliant) with the proposed policy under the counterfactual. The following tables set out these assumptions.

Evacuation Alarms

9.2 The analysis assumes a small proportion of buildings will install evacuation alarms under the counterfactual.

Table 9.1: Proportion of New Buildings Installing Evacuation Alarms		
	% of new buildings	
11 to 18m	5%	
18 to 30m	5%	
30m+	5%	

Wayfinding Signage

9.3 Most buildings are expected to install wayfinding signage under the counterfactual. However, this is typically standard vinyl signage and not reflective signage as required by the proposed policy.

Table 9.2: Proportion of New Buildings Installing Wayfinding Signage (Vinyl)		
	% of new buildings	
11 to 18m	80%	
18 to 30m	80%	
30m+	80%	

Secure information boxes

9.4 It is assumed that 50% of new buildings will install secure information boxes.

Table 9.3: Proportion of New Buildings Installing Secure Information Boxes		
	% of new buildings	
11 to 18m	50.0%	
18 to 30m	50.0%	
30m+	50.0%	

Source:

- Source: Consultants assumption

10. Assumptions – Transition

Phase-in – timing assumptions

10.1 Table 10.1 shows the phase-in assumptions used in the cost modelling.

Table 10.1: Transition Phase-in Assumptions		
	Year 1	Year 2 onwards
	2023	2024
PIB, Evacuation Alarms and Signage	50%	100%
Combustible Ban	100%	100%

Source:

- Source: Consultants working assumption

11. Assumptions: Unit Cost – Combustible Cladding

11.1 The unit costs[2] for the counterfactual and policy options have been estimated by RLF based on specification by PRP.

11.2 Table 11.1 summarises the specification of the materials used under each option.

Table 11.1: Specification of Combustible and Non-Combustible Materials in External Walls		
	Counterfactual	Policy
Facades	Including combustible insulation / materials	non-combustible façade, insulation, and other materials
Structural timber frame	Structural timber frame (concrete ground floor)	concrete frame only
Cavity trays in façade	Polypropylene	Stainless Steel
Waterproofing and insulating material at ground level	PIR	Mineral Fibre Board
Balconies	Timber Joists and Decking	Steel Frame with Aluminium decking
Solar Shading	Horizontal Steel frame with timber slats	Horizontal Aluminium frame and slats
Balcony balustrades	Laminated Glass	PPC Steel
Awnings	Fabric	None

11.3 Each element of the external wall has been costed for both the counterfactual and policy options. These figures are presented in the table below:

Table 11.2: Unit Cost of Combustible and Non-Combustible Materials in External Walls				
	Units	Counterfactual	Policy	Difference
Facades (excluding cavity tray) - type 1 (brickwork)	Per sqm	£1,801	£1,809	+£8
Facades (excluding cavity tray) - type 2 (rainscreen)	Per sqm	£1,724	£1,799	+£75
Facades (excluding cavity tray) - type 3 (mix of type 1 and 2)	Per sqm	£1,790	£1,807	+£17
Structural timber frame	Per floor	£772,578	£855,523	+£82,946
Cavity trays in façade	Per sqm	£4	£16	+£12
Waterproofing and insulating material at ground level	Per sqm	£76	£94	+£17
Balconies	Per balcony	£4,946	£6,112	+£1,166
Solar Shading	Per sqm	£703	£523	-£180
Balcony balustrades	Per sqm	£1,410	£970	-£439
Awnings	Per awning	£1,684	£0	-£1,684

11.4 The costs estimates for the impact of the policy on 11-18m buildings using AD B route to demonstrate compliance, includes a different range of materials for the policy option.

Table 11.3: Unit cost of combustible and non-combustible materials on external walls to meet AD Route to compliance				
	Units	Counterfactual	Policy	Difference

[2] Material costs are estimated based on UK average prices and labour costs are estimated based on Wales average rates.

Facades (including cavity tray)- type 1 (brickwork) – linear route	Per sqm	£1,805	£1,824	+£19
Facades (including cavity tray) - type 2 (rainscreen) – linear route	Per sqm	£1,728	£1,767	+£39
Facades (including cavity tray) - type 1 (brickwork) – BR135	Per sqm	£1,805	£1,788	-£17

11.5 The analysis assumes that most projects (60%) will used a linear route to compliance – i.e. using non-combustible materials. This includes all rainscreen facades and a proportion of brick facades. For projects that use the alternative approach (i.e. submitting a BR135 classification report to demonstrate compliance), there are additional costs and the analysis assumes that projects will use either of the 3 alternative approaches:

- 5% will commission an 8414 test to demonstrate than a new wall system meets the requirement
- 25% will use existing test data and commission an assessment in lieu of test (AILOT) to demonstrate compliance
- 10% will use test data and a BR135 report from previous wall systems to demonstrate compliance.

Table 11.4: Additional Unit Cost to Demonstrate AD B Compliance (BR135)

	Additional Cost	% of buildings
Cost of 8414 test + BR135	£50,000	5%
Cost of AILOT + BR135	£5,000	25%
Cost of BR135	£1,200	10%

12. Assumptions – Unit Costs – Evacuation Alarms, Wayfinding Signage and secure information boxes

12.1 The analysis unit costs have been estimated for the reference buildings based on the number of dwellings and floors. The costs exclude VAT but include materials, installation costs, prelims, overheads and profits[3].

Evacuation Alarms

12.2 The installation costs for alarms is based on the specification and estimate for one reference building and adjusted for different building sizes based on the estimated number of flats per building.

12.3 The annual operating cost includes an estimate of the cost of briefing residents on how to respond to an alarm (either through residents meeting, or information leaflet) and the electricity costs for the system.

12.4 The annual maintenance cost is assumed to be 1% of the installation costs.

Table 12.1: Installation, Operating and Maintenance Costs for Evacuation Alarms per Building

	Alarms (installation cost)	Alarms (annual operating cost)	Alarms (annual maintenance cost)
11 to 18m	£ 70,857	£ 395	£ 709
18 to 30m	£123,999	£ 440	£ 1,240
30m+	£165,332	£ 440	£ 1,653

Wayfinding signage

12.5 The counterfactual wayfinding signage is assumed to be in standard vinyl format, which is estimated to be 50% of the cost of the reflective vinyl standard under the proposed policy.

12.6 Installation costs are calculated based on the number of signs required per floor and multiplied by the number of floors in the buildings of different heights.

12.7 Maintenance costs are assumed to be 1% of installation costs.

counterfactual (Vinyl)

Table 12.2a: Installation, Operating and Maintenance Costs for Wayfinding Signage (Vinyl) per Building

	Signage - Vinyl (installation cost)	Signage - Vinyl (annual operating cost)	Signage - Vinyl (annual maintenance cost)
11 to 18m	£ 2,836	£0	£ 28
18 to 30m	£ 4,538	£0	£ 45
30m+	£ 8,509	£0	£ 85

policy (Reflective Vinyl)

Table 12.2b: Installation, Operating and Maintenance Costs for Wayfinding Signage (Reflective Vinyl) per Building

	Signage – Reflective Vinyl (installation cost)	Signage – Reflective Vinyl (annual operating cost)	Signage – Reflective Vinyl (annual maintenance cost)
11 to 18m	£ 5,672	£0	£ 57

[3] Material costs are estimated based on UK average prices and labour costs are estimated based on Wales average rates.

18 to 30m	£ 9,076	£0	£ 91
30m+	£ 17,017	£0	£ 170

Secure Information Boxes

12.8 Secure information boxes have been costed based on a standard design – it is assumed that there is one box per building irrespective of height.

12.9 Maintenance costs are assumed to be 1% of installation costs.

Table 12.3: Installation, Operating and Maintenance Costs for Secure Information Boxes per Building

	Secure information Box (installation cost)	Secure information Box (annual operating cost)	Secure information Box (annual maintenance cost)
11 to 18m	£ 551	£0	£6
18 to 30m	£ 551	£0	£6
30m+	£ 551	£0	£6

Central, High Low Assumptions

12.10 The assumptions presented in the tables are for the central estimate of costs. The high and low costs have been estimated assuming +/- 20%.

Source:

- Specification by PRP and costing prepared by RLF

13. Aggregated Costs

13.1 The estimated policy costs of the proposed changes are set out below.

Evacuation Alarms, Wayfinding Signage and Secure Information Boxes

Table 13.1: 10 Year PV Policy Costs (2023 prices) - Signage, Alarms, Secure Boxes					
Option 1	Height Threshold	Transition Period	Low	Mid	High
Familiarisation Costs			£0.06	£0.07	£0.09
Wayfinding Signage	11m+	6 months	£2.26	£2.83	£3.39
Evacuation Alarm	18m+	6 months	£4.07	£5.34	£6.69
Secure Boxes	11m+	6 months	£0.20	£0.25	£0.31
Total policy costs			**£6.59**	**£8.49**	**£10.47**

Combustible Cladding Ban

13.2 The analysis assesses the costs of extending the combustible cladding ban to hotels, hostels and boarding houses over 18m. The central estimate of the costs is presented in Table 13.2 below.

Table 13.2: 10 Year PV Policy Costs (£m 2023 prices) - Combustible Cladding Ban – Hotels, Hostels and Boarding Houses Over 18m			
	New Build	Refurbishment	New build and Refurbishment
	18m+	18m+	18m+
Hotels	£0.67	£0.53	£1.20
Hostels and Boarding Houses	£0.33	£0.29	£0.62
Total Policy Costs	**£1.00**	**£0.82**	**£1.83**

13.3 The analysis also assesses the costs of amending AD B for 11-18m to limit the use of combustible materials in external walls. The central estimate of the costs is presented in Table 13.3 below.

Table 13.3: 10 Year PV Policy Costs (£m 2023 prices) - Amend AD B for 11-18m Buildings to Limit the Use of Combustible Materials in External Walls			
	New Build	Refurbishment	New build and Refurbishment
	11-18m	11-18m	11-18m
Apartments	£14.29	£8.74	£23.03
Care Homes	£0.10	£0.03	£0.13
Hospitals	£0.43	£0.55	£0.98
Hotels	£1.21	£0.95	£2.16
Hostels and Boarding Houses	£0.60	£0.41	£1.01
Total Policy Costs	**£16.63**	**£10.69**	**£27.32**

14. Benefits

14.1 The benefits of the proposed changes have not been monetised. The non-monetised benefits are described below.

Evacuation Alert Systems

14.2 In the case that a severe fire, one that spreads beyond the initial flat or compartment in which evacuation beyond the flat of origin is necessary, EAS are in place to increase the speed and efficiency at which residents are alerted about the need to evacuate the building. The availability of an EAS will provide Fire and Rescue Services with an additional tool which can be used where they deem it necessary.

14.3 The system gives Fire and Rescue Services the possibility of triggering the evacuation of the building in a phased manner so that escape routes are not overwhelmed.

Wayfinding signage

14.4 The main benefits of increased wayfinding signage in residential blocks of flats is in reducing the time for the emergency services to a) get to the source of the fire, and b) to help evacuate residents.

14.5 As such, we expect clear and consistent wayfinding signage could increase the operational performance of firefighters during a fire by reducing the risk of them becoming disorientated in a building with heavy smoke build up. Increasing consistency of signage between buildings by requiring a certain size and numbering system would also benefit the orientation of FRS personnel. Therefore, the impact will be on reducing fire spread/size and reducing casualties.

Secure Information Boxes

14.6 Secure information boxes are easily identifiable repositories for documents intended for use by the fire and rescue service during a fire. This includes hard copy building plans which can help first attending fire service crew to be able to understand the layout of the building and to respond effectively through use of these plans in a dynamic environment without having to rely on technology. This will help the fire service operational response and the impact will be on reducing fire spread/size and reducing casualties.

Combustible Ban

14.7 Widening the scope of the ban by including hotels, hostels and dormitories in boarding schools with a storey more than 18 m in height, including solar shading devices and a complete ban on metal composite materials with unmodified polyethylene core will make compliance easier to identify for designers, installers and building control bodies. Better compliance will ensure that fire safety risks are better identified and managed by developers, which will reduce the level of risks in buildings and make buildings safer. This reduction in risk has not been monetised.

14.8 The proposed changes to Approved Document B (ADB) will clarify the provisions in ADB for the external walls of building between 11 and 18m in height. This will provide a clearer route to compliance for designers and developers and reduce the potential for non-compliances reducing the level of risk in these buildings. This reduction in risk has not been monetised.

14.9 The clearer route to compliance and so, the reduction in the use of combustible materials, should improve residents' attitudes towards the safety of their residence. This is difficult to monetise as there is insufficient evidence to value the impacts of feeling safe on mental health.

14.10 Switching values have been used to estimate the monetised value of benefits to residents as a result of the proposed changes to the height threshold. This equates to £238 per resident of new or refurbished residential buildings of between 11 and 18m in height.