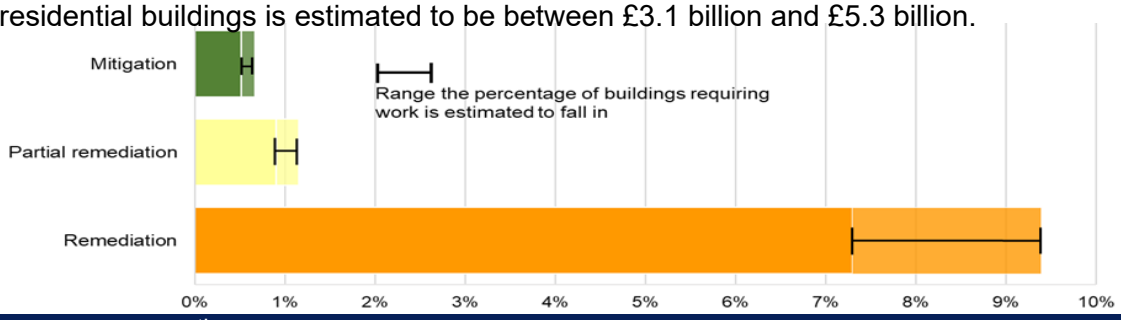
Department for Levelling Up, Housing & Communities

Data release

Estimating the prevalence and costs of external wall system life-safety fire risk in mid-rise residential buildings in England

Headlines:

- DLUHC's pilot study of mid-rise residential buildings in England estimates 7-9% of residential mid-rise buildings containing dwellings require external wall system remediation to alleviate life-safety fire risks. A further 1% are estimated to require partial remediation and 0.5-1% are estimated to require mitigation measures to alleviate life-safety fire risks.
- The majority (89–91%) of mid-rise residential buildings in England, containing dwellings, do not have an external wall system that poses a life-safety fire risk.
- It is therefore estimated that between 6,220 and 8,890 mid-rise residential buildings, containing dwellings, require remediation, partial remediation or mitigation to alleviate life-safety fire risk, of a building population of 71,000 – 79,000 in England.
- Of the 6,220 - 8,890 residential mid-rise buildings, containing dwellings, that require work to alleviate external wall system life-safety fire risks:
  - 5,210 – 7,430 buildings have at least one external wall system composition type that requires full remediation
  - 640 – 920 require partial remediation of one type of external wall system composition
  - 370 – 530 buildings require mitigation measures
- Of the 2,000 – 3,000 non-dwelling residential mid-rise buildings (hotels, student accommodation, sheltered accommodation), 8-12% (190 – 330 buildings) are estimated to require work to alleviate external wall system life-safety fire risks.
- The costs to alleviate external wall system life-safety fire risks for leasehold dwellings in mid-rise residential buildings is estimated to be between £3.1 billion and £5.3 billion.



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Introduction

Overview

Following the Grenfell Tower tragedy, the government established a Building Safety Programme to ensure that residents of high-rise and mid-rise residential buildings are safe, and feel safe from the risk of fire, now and in the future.

This Data Release provides estimates on:

1) The total number of mid-rise (between 11 metres and 18 metres in height) residential buildings in England;
2) The proportion of mid-rise residential buildings that require remediation, partial remediation and mitigation to alleviate life-safety fire risks from external wall systems;
3) The costs of funding the alleviation of life-safety fire risks of leasehold dwellings in mid-rise residential buildings, in England.

The estimates in this Data Release have been calculated using a sample survey of 2,856 mid-rise (11 – 18 metre) residential buildings in England. Ordnance Survey Address Base data was used to produce the sample, and in estimating the population of mid-rise residential buildings in England. DLUHC hired an expert contractor to complete desk-based surveys on the sample, to assess the probable life-safety fire risk of the external wall system on each building.

DLUHC and our contractor engaged with an independent expert advisory panel throughout this data collection who advised on the life-safety aspect of risk on mid-rise buildings and proportionate approaches to alleviate these risks. The contractor followed draft PAS 9980 guidance in assessing life-safety fire risks. The independent expert advisory panel have approved DLUHC's and their contractor's approach of estimating the prevalence of mid-rise residential buildings requiring work due to external wall systems that are a life-safety fire risk.

Because the estimates in this Data Release are based on a sample of the mid-rise building population in England, there is a degree of uncertainty around the estimates. The estimates in this Data Release are presented as a range, representing the lower and upper estimates calculated using confidence intervals at a 95% confidence level. The full methodology is detailed in the Technical Notes.

Background

Following the government's commitment to fund the remediation of high-rise (over 18 metres) residential buildings with ACM (Aluminium Composite Material) cladding systems unlikely to meet Building Regulations, DLUHC publishes monthly statistics on the number of high-rise buildings with ACM cladding systems and the progress of remediating them.

In March 2020, the government announced that it will provide £1 billion in 2020/21 to support the remediation of unsafe non-ACM cladding systems on residential buildings over 18 metres in both the private and social housing sectors. Building owners or managing agents could register with the Building Safety Fund from 1 June to 31 July 2020. DLUHC are continuing to process these registrations and publishes monthly data on the number of registrations and their progress through the fund.

On 10 February 2021, DLUHC announced a five-point plan to bring an end to unsafe cladding, including further grant funding of £3.5 billion to fully fund the removal of unsafe cladding for leaseholders in all high-rise residential buildings 18 metres and over in England.

In July 2021 DLUHC published an Independent expert statement on building safety in medium and lower-rise blocks of flats, recommending that any remediation or mitigation work in mid-rise blocks of 11-18m needs to be appropriate, proportionate and affordable.

On 10 January 2022, DLUHC announced that leaseholders in mid-rise residential buildings between 11 and 18 metres will not pay for the remediation of unsafe cladding. DLUHC will seek the funding from building developers.

DLUHC's contractor's assessment of life-safety fire risks and work required to alleviate these risks in mid-rise residential buildings in this data collection took an appropriate, proportionate and affordable approach, as was advised by the expert advisory panel. Therefore, the estimates in this Data Release also reflect this approach.

The assessments were completed in line with principles set out in (draft) PAS 9980:2021 Fire risk appraisal of external wall construction and cladding of existing blocks of flats guidance on undertaking fire risk appraisals and assessments of the external wall systems of multi occupied residential buildings.

1. Estimating the prevalence of mid-rise residential buildings requiring work due to external wall systems that are a life-safety fire risk

1.1 The population of mid-rise residential buildings in England

Number of mid-rise residential buildings in England

The total number of mid-rise residential buildings in England is estimated to be between 74,000 and 82,000. The Building Safety Programme Data Release details the central estimate of 78,000 and the methodology to derive this estimate.

Of the mid-rise residential buildings in England, between 71,000 and 79,000 buildings are identified as buildings containing dwellings. The remaining 2,000 to 3,000 buildings are identified as non-dwellings, split between hotels, residential education and sheltered accommodation.

Height breakdown

Of the mid-rise residential buildings in England, 73% are between 11 metres and 13 metres (11-13m), and 27% are between 14 metres and 18 metres (14-18m)[1]. This equates to 54,000 – 60,000 11-13m buildings, and 20,000 – 22,000 14-18m buildings.

Regional breakdown

Almost two thirds (64%) of mid-rise residential buildings are located in London, whilst 12% are located in the South East, and 9% are in the South West. The remaining regions each contain no more than 4% of England's mid-rise residential buildings.

1.2 The prevalence of external wall system life-safety fire risks in mid-rise residential buildings, containing dwellings, in England

It is estimated that 9-11% (between 6,220 and 8,890) mid-rise residential buildings, containing dwellings, require work to alleviate life-safety fire risks due to external wall systems.

[1] Buildings between 13 metres and 14 metres in height are included in the 11-13m category throughout this release

Overview

The majority (84%) of buildings with a life-safety fire risk require the full remediation of the building facade(s) deemed to be a fire risk. A smaller proportion (10%) of buildings with a life-safety fire risk require partial remediation to the building façade(s), and 6% require mitigation measures to mitigate the fire risk of the external wall system.

Across the stock of mid-rise residential buildings, containing dwellings:

- 7-9% (5,210 – 7,430 buildings) require external wall system remediation
- Around 1% (640 – 920 buildings) require partial remediation
- Less than 1% (370 – 530 buildings) require mitigation measures

Differences by height band

Of the mid-rise residential buildings, containing dwellings, that require work to alleviate life-safety fire risks, 55% are 11-13m buildings and 45% are 14-18m buildings.

The taller mid-rise building stock,14-18m buildings, have a greater proportion of buildings that require work (15-19%), than the 11-13m building stock (7-8%). There are similar numbers of 11-13m buildings and 14-18m buildings requiring work to alleviate life-safety fire risks, given the larger population of 11-13m buildings; 3,430 – 4,900 11-13m buildings and 2,790 – 3,980 14-18m buildings.

Of the 11-13m buildings that require work to alleviate life-safety fire risk, 76% require external wall system remediation, 16% require partial remediation and 8% require mitigation measures. By contrast 94% of 14-18m buildings requiring work to alleviate fire risk require remediation, 3% require partial remediation and 3% require mitigation. This means that as well as there being a higher proportion of 14-18m buildings that have a life-safety fire risk than 11-13m buildings, the 14-18m buildings are more likely to require more extensive work.

Table 1: The number of mid-rise (11-18m) residential dwelling buildings in England estimated to require work to alleviate external wall system life-safety fire risk, by height band and type of work required

	11-13m	14-18m	11-18m Total
Remediation	2,600 - 3,700	2,610 - 3,730	5,210 – 7,430
Partial remediation	570 - 810	80 - 110	640 - 920
Mitigation	270 - 390	100 - 140	370 - 530
Requires work total	3,430 – 4,900	2,790 – 3,980	6,220 – 8,880
No life-safety fire risk	48,800 - 53,000	16,300 - 17,200	65,100 – 70,200

Note: figures do not sum due to rounding

Differences by region

Half of mid-rise dwelling buildings that require work to alleviate life-safety fire risks are located outside of London, despite mid-rise buildings outside of London making up 36% of the mid-rise

stock of England.

Of the mid-rise residential buildings, containing dwellings, located in London, 7-9% are estimated to require work to alleviate life-safety fire risks relating to external wall systems. Outside of London, 12-15% of mid-rise residential buildings, containing dwellings, are estimated to require work to alleviate life-safety fire risks[2]. The sample was not stratified by region, therefore the outside of London estimates are based on a small sample size and there is a greater degree of uncertainty around these estimates.

1.3 The prevalence of external wall system life-safety fire risks in mid-rise non-dwelling residential buildings, in England

This section refers to the prevalence of external wall system life-safety fire risks in mid-rise non-dwelling residential buildings, specifically student accommodation, hotels and sheltered accommodation[3].

It is estimated that 8-12% (between 190 and 330) mid-rise non-dwelling residential buildings require work to alleviate life-safety fire risks due to external wall systems.

Overview

The majority (79%) of non-dwelling buildings with a life-safety fire risk require the full remediation of the building facade(s) deemed to be a fire risk. The remaining buildings (21%) with a life-safety fire risk require partial remediation to the building façade(s).

Across the stock of mid-rise non-dwelling residential buildings:

- 6-9% (150 – 260 buildings) require external wall system remediation
- Around 2% (40 – 70 buildings) require partial remediation

Differences by height band

Of the mid-rise residential non-dwelling buildings, that require work to alleviate life-safety fire risks, half are 11-13m buildings and half are 14-18m buildings.

The taller mid-rise non-dwelling building stock,14-18m buildings, have a greater proportion of buildings that require work (15-22%), than the 11-13m non-dwelling building stock (5-8%). There are similar numbers of 11-13m non-dwelling buildings and 14-18m non-dwelling buildings requiring work to alleviate life-safety fire risks, given the larger population of 11-13m buildings; 100 – 170

[2] The sample sizes for each region, other than London, were too small to produce prevalence estimates by each region.

[3] The sample of non-dwelling buildings cannot be broken down by category due to the sample sizes surveyed.

11-13m buildings and 90 – 160 14-18m buildings.

Of the 11-13m buildings that require work to alleviate life-safety fire risk, 75% require external wall system remediation and 25% require partial remediation. For 14-18m buildings requiring work to alleviate fire risk require remediation, 84% require remediation and 16% require partial remediation.

Table 2: The number of mid-rise (11-18m) residential non-dwelling buildings in England estimated to require work to alleviate external wall system life-safety fire risk, by height band and type of work required

	11-13m	14-18m	11-18m Total
Remediation	70 - 120	80 - 140	150 - 260
Partial remediation	20 - 40	20 - 30	40 - 70
Requires work total	100 - 170	90 - 160	190 - 330
No life-safety fire risk	1,660 – 1,900	550 - 590	1,880 – 2,500

Note: figures do not sum due to rounding

Differences by region

Over half (59%) of mid-rise non-dwelling buildings that require work to alleviate life-safety fire risks are located outside of London, despite mid-rise buildings outside of London making up 36% of the mid-rise stock of England.

Of the mid-rise non-dwelling residential buildings located in London, 5-7% are estimated to require work to alleviate life-safety fire risks relating to external wall systems. Outside of London, 13-19% of mid-rise non-dwelling residential buildings are estimated to require work to alleviate life-safety fire risks[4]. The sample was not stratified by region, therefore the outside of London estimates are based on a small sample size so there is a greater degree of uncertainty around these estimates, and so should be treated with caution.

[4] The sample sizes for each region, other than London, were too small to produce prevalence estimates by each region.

2. Estimating the costs of alleviating external wall system life-safety fire risks for dwellings in mid-rise residential buildings in England

2.1 The average costs of remediating, part-remediating or mitigating mid-rise residential buildings, containing dwellings, with external wall systems that are a life-safety fire risk in England

This section details the average costs of alleviating external wall-system life-safety fire risks in residential buildings, containing dwellings, in England as at July 2021, including VAT but not accounting for inflation in the construction industry.

Average costs of remediation, partial remediation and mitigation

Full remediation of the external wall system is the most resource intensive, and therefore expensive, way to make a building life-safe from the risk of fire.

- The mean cost per building of external wall system remediation is estimated to be between £640,000 and £790,000.
- The mean cost per building of partial external wall system remediation is estimated to be between £380,000 and £470,000.
- The mean cost per building of mitigation measures is estimated to be around £120,000.

The estimated costs to fully remediate buildings include the cost to remediate balconies and spandrel window panels where these are a life-safety risk and need to be removed to remediate the external wall system behind them. The costs include materials, access, labour and VAT. The estimated costs to mitigate the risk of fire are based on the costs of installation of enhanced fire alarm systems and the installation of escape routes[5].

Differences by height band

Taller buildings are typically more expensive to remediate than shorter buildings as a greater building area means they're likely to require more resources.

- The estimated mean cost per building for full external wall system remediation of 11-13m buildings is between £540,000 and £660,000, and between £750,000 and £920,000 for 14-18m buildings.
- The estimated mean cost per building for partial remediation is between £360,000 and £440,000 for 11-13m buildings, and between £560,000 and £680,000 for 14-18m buildings.

[5] See the technical note for full details of how the average costs were estimated.

2.2 The total costs of alleviating external wall system life-safety fire risks for leasehold dwellings in mid-rise residential buildings in England

The total cost of the remediation, partial remediation and mitigation for all leasehold dwellings in mid-rise residential buildings with an external wall system life-safety fire risk is estimated to be between £3.1 billion to £5.3 billion. This estimate, unlike the costs detailed in section 2.1 of the release, accounts for inflation.

There are an estimated 97,000 – 138,000 leasehold dwellings in mid-rise residential buildings requiring work due to external wall system life-safety fire risks.

The estimated dwelling numbers, tenure split and proportion of leasehold dwellings of buildings with external wall systems that are a life-safety fire risk are based on dwelling, tenure and leasehold estimates across the whole mid-rise residential building stock[6].

Costs of alleviating life-safety fire risks for leasehold dwellings, by residential tenure

The total cost of work to alleviate external wall system life-safety fire risks for leasehold dwellings in mid-rise buildings in the private sector is estimated to be between £2.4 billion and £4.1 billion. It is estimated that there are between 75,000 and 106,000 leasehold dwellings in mid-rise private sector buildings that require work due to external wall system life-safety fire risks.

The total cost of work to alleviate external wall system life-safety fire risks for leasehold dwellings in mid-rise buildings in the social sector is estimated to be between £0.7 billion and £1.2 billion. It is estimated that there are between 22,000 and 32,000 leasehold dwellings in mid-rise social sector buildings that require work due to external wall system life-safety fire risks.

Table 3: The total estimated costs to alleviate external wall system life-safety fire risk for dwellings in mid-rise (11-18m) residential buildings in England, and number of leasehold dwellings covered, by residential tenure

	Private leaseholds in private sector buildings	Private leaseholds in social buildings	**Private leaseholds total**
Costs	£2.4 billion - £4.1 billion	£0.7 billion - £1.2 billion	**£3.1 billion - £5.3 billion**
Number of leasehold dwellings	75,000 - 106,000	22,000 – 32,000	**97,000 – 138,000**

[6] See the technical note for full details on how the total cost and dwelling estimates were calculated.

Costs of alleviating life-safety fire risks for leasehold dwellings, by type of work required

The costs of full remediation for leasehold dwellings in mid-rise buildings in England is estimated to be between £2.9 billion and £4.9 billion, partial remediation is estimated to be between £0.2 billion and £0.4 billion, and mitigation between £0.04 billion to £0.06 billion. Full remediation of external wall systems that are a life-safety fire risk account for 92% of the estimated leasehold dwelling costs, partial remediation costs account for 7% and mitigation costs account for 1%.

There are an estimated 83,000 – 118,000 leasehold dwellings in mid-rise residential buildings requiring full remediation of the building facade(s) deemed to be a life-safety fire risk. There are fewer leasehold dwellings in mid-rise residential buildings requiring partial remediation and mitigation than full remediation, estimated to be between 8,400 and 13,000 and 5,100 and 7,500 respectively, as there are fewer buildings that can be partially remediated or mitigated to alleviate life-safety fire risks.

Table 4: The total estimated costs to alleviate external wall system life-safety fire risk for leasehold dwellings in mid-rise (11-18m) residential buildings in England, and number of leasehold dwellings covered, by type of work required

	Remediation	Partial remediation	Mitigation	**All types of work**
Costs	£2.9 billion - £4.9 billion	£0.2 billion - £0.4 billion	£0.04 billion - £0.06 billion	**£3.1 billion - £5.3 billion**
Number of leaseholder dwellings	83,000 - 118,000	8,400 – 13,000	5,100 – 7,500	**97,000 – 138,000**

Costs of alleviating life-safety fire risks for leasehold dwellings, by building height

The costs of work to alleviate external wall system life-safety fire risks for leasehold dwellings in 11-13m residential buildings is estimated to be between £1.4 billion to £2.4 billion, and the costs for leasehold dwellings in 14-18m residential buildings is estimated to be between £1.7 billion to £2.9 billion.

Of the costs of work to alleviate external wall system life-safety fire risks for leasehold dwellings in mid-rise residential buildings, 11-13m buildings account for 45% of the costs and 14-18m buildings account for 55%. This is due to 14-18m buildings on average being more expensive to alleviate life-safety fire risks than 11-13m buildings, despite there being fewer 14-18m buildings requiring work than 11-13m buildings.

There are an estimated 42,000 - 61,000 leasehold dwellings in 11-13m buildings that require work due to external wall system life-safety fire risks, and an estimated 55,000 - 77,000 leasehold dwellings in 14-18m buildings that require work.

Table 5: The total estimated costs to alleviate external wall system life-safety fire risk for leasehold dwellings in mid-rise (11-18m) residential buildings in England, and number of leasehold dwellings covered, by building height

	11-13m	14-18m	11-18m Total
Costs	£1.4 billion - £2.4 billion	£1.7 billion - £2.9 billion	£3.1 billion - £5.3 billion
Number of leaseholder dwellings	42,000 - 61,000	55,000 – 77,000	97,000 – 138,000

3. Technical Notes

3.1 Data collection

Sample

A randomly stratified sample was drawn from Ordnance Survey Address Base data. The sample was stratified on building height and property classification (buildings containing dwellings and non-dwellings).

The sampling was designed to ensure a large enough sample of both 11-13m and 14-18m buildings was collected so robust estimates could be made for each height group at a 95% confidence level.

A sample of 2,856 mid-rise residential buildings was collected and used in the estimates detailed in this release. A sub-sample of 2,138 buildings containing dwellings were used in calculating the estimates detailed in section 1.2 and 3. A sub-sample of 718 non-dwelling buildings were used in calculating the estimates detailed in section 1.3.

Survey method

DLUHC hired a specialist contractor to complete desk-based surveys on each building. Using imagery on a range of publicly available sources, surveyors collected data on:

- Building height
- Number of storeys
- Building age
- Whether a building is as-built, converted or overclad externally
- Probable external wall system composition types and percentage covering of the building
- Balcony prevalence, types and materials
- Spandrel panels prevalence and materials

- Solar shading prevalence and materials

The contractor created and refined an app used by the surveyors to collect building data and images. This ensured consistency as data collected via the app was as objective as possible, minimising the need for surveyors to make subjective judgements. Data on all buildings in the height range of 11-18m were reviewed for consistency and accuracy by the lead contractor.

The data, alongside the images, were reviewed by the lead contractor who determined the likelihood of need for external wall system remediation, partial remediation or mitigation on a 'life safety' basis. The surveyor identified which façade type (or types) were a risk to life safety, and then made a judgement on whether the building needed remediation, partial remediation or mitigation on a building-by-building basis. The assessment on life safety was made using principles set out in draft PAS 9980 guidance.

Where the contractor had identified that a building is not in height range of 11-18m, the building survey was not completed.

Confidence in survey method

The data was collected using building imagery rather than physical surveys of the building materials. It was therefore not always possible to accurately identify the building's external wall system composition types, and the insulation behind it, and their combustibility. Where the contractor could not definitely identify the life-safety fire risk of a composition type, a weighting was applied based on fire risk likelihood of different types of buildings, as explained in Section 3.3.

As well as completing the desk-based surveys that the estimates in this release are produced from, DLUHC's contractor also completed a number of intrusive surveys on mid-rise buildings. Intrusive surveys involve opening up the external wall system, to accurately identify material and insulation types and their combustibility. DLUHC's contractor was able to apply learning from undertaking the intrusive surveys, and following PAS 9980 guidance in doing so, to the assessment of life-safety fire risk in the desk-based assessments that the estimates are based on.

To account for the uncertainty in the estimates as a result of the survey method, a range of lower-upper prevalence estimates were produced which DLUHC are confident will capture the true figure.

3.2 Method: Estimating the population of mid-rise residential buildings in England

The estimate of the number of residential buildings has been derived from Ordnance Survey data adjusted to take account of inaccuracies in the data. See the Building Safety Programme Data Release Technical Notes for the full methodology.

3.3 Method: Estimating the prevalence of external wall system life-safety fire risks in mid-rise residential buildings in England

For each façade type on each building surveyed, the contractor identified whether the external wall system is definitely a life-safety fire risk, is potentially a life-safety fire risk or is not a life-safety fire risk. External wall system composition types were categorised as ‘potentially a life-safety fire risk’ if the imagery was unclear whether the composition type is definitely safe or definitely a risk, or where the external material is safe but could be on top of combustible insulation. For buildings with an external wall system that is definitely or potentially a life-safety fire risk, the contractor then identified whether remediation, partial remediation or mitigation is required to alleviate the risk.

Weighting System

A weighting system designed by the contractor was applied to buildings with an external wall system identified as ‘potentially requiring remediation’, ‘potentially requiring partial remediation’ or ‘potentially requiring mitigation’. The weighting system, in Table 6 below, is based on the likelihood of certain external wall system composition types requiring work on buildings of different ages and types, and was designed to be applicable only to the buildings that were assessed from the building imagery to be ‘potentially a life-safety fire risk’.

Table 6: The weighting system provided by DLUHC's contractor to apply to buildings identified as 'potentially' being a life-safety fire risk

	Building Age								
	Pre 1980			1980-2000			2000-2020		
Façade type	**As Built**	**Converted**	**Overclad**	**As Built**	**Converted**	**Overclad**	**As Built**	**Converted**	**Overclad**
Brick			75%			75%	5%	5%	
Stone									
Render		75%	75%		75%	75%	75%	75%	
Concrete									
Tile									
HPL	90%	90%	90%	90%	90%	90%	90%	90%	
Fibre Board		90%	90%	90%	90%	90%	90%	90%	
Cement Fibre									
Aluminium		10%	10%		10%	10%	10%	10%	
Zinc									
Copper									
Timber	90%	90%	90%	90%	90%	90%	90%	90%	
Curtain walling (glass)									
Roof membrane		75%	75%		75%	75%	75%	75%	
Metal Sandwich		75%	75%	75%	75%	75%	75%	75%	

No remediation or mitigation (buildings of this type generally are not a life-safety fire risk)

Not applicable

For example, in DLUHC's estimates, 75% of all render facades identified as being 'potentially a life-safety fire risk' on buildings built from 2000 onwards with as-built exteriors are considered to be a life-safety risk and require work. The other 25% are considered to be safe. Render facades on buildings built before 2000 with as-built exteriors in the 'potentially a life-safety fire risk' category are assumed to not be a risk in DLUHC's estimates.

The weighting system designed by the contractor considers the differing likelihood of different composition types being a risk on different building types. However, DLUHC's overall estimates are not suggesting that 75% of render facades on buildings built from 2000 onwards with as-built exteriors are considered to be a life-safety risk, but only 75% of those in the 'potentially a life-safety fire risk' category.

A similar weighting system was provided for other external wall system composition types that could be assumed to rarely require remediation due to the non-combustibility of the material itself -

tile, cement fibre, zinc and copper (see Table 7). The weighting system takes into account the probability of different buildings with these materials on having an insulation behind the material that is a life-safety fire risk requiring remediation. For example, 40% of buildings with a zinc façade are considered to require remediation due to the insulation behind the zinc.

Table 7: The weighting system provided by DLUHC's contractor to apply to buildings assumed to rarely require remediation

	Building Age								
	Pre 1980			1980-2000			2000-2020		
Façade type	As Built	Converted	Overclad	As Built	Converted	Overclad	As Built	Converted	Overclad
Tile						5%	5%	5%	
Cement Fibre		30%	30%		30%	30%	30%	30%	
Zinc	40%	40%	40%	40%	40%	40%	40%	40%	
Copper	40%	40%	40%	40%	40%	40%	40%	40%	

No remediation (buildings of this type generally do not require remediation)

Not applicable

Remediation prevalence methodology

The number of buildings that have one or more façade types that definitely require remediation were summed.

For buildings that don't have a façade type that definitely requires remediation but have one or more façade type that potentially requires remediation, the weighting system provided by the contractor was applied. Where only one external wall system composition type potentially requires remediation, the associated weight was assigned to that building. For example, for a building built from 2000 onwards with as-built exteriors and a render façade identified as potentially requiring remediation, a weighting value of 0.75 was assigned to the building.

For buildings with more than one façade type that potentially requires remediation, the weightings of each external wall system composition type were combined using the following formula:

Building remediation weighting value = 1- ((1 –*material1 weight*) x (1- *material 2 weight*))

The same formula was used for buildings with more than two façade types 'potentially requiring remediation'.

The weighting values were summed with the sum of the number of buildings that definitely require external wall system remediation to give the total number of buildings requiring external wall system remediation in the sample.

DLUHC's contractor approved this method of applying the weighting system to the data to create a prevalence estimate.

Partial remediation prevalence methodology

The methodology for estimating the number of buildings requiring partial remediation is similar to the above methodology for estimating the number of buildings requiring full remediation. The number of buildings that have one or more façade types that definitely require partial remediation were summed. For buildings that have one or more façade types that potentially require partial remediation, the weighting system was applied in the same way as detailed above.

Mitigation prevalence methodology

The methodology for estimating the number of buildings requiring mitigation is similar to the above methodology. The number of buildings that definitely require mitigation were summed. The weighting system was applied for buildings that potentially require mitigation.

Weighting the estimates to the population

As is common practise with survey statistics, the prevalence estimates calculated for the sample were weighted to take account of the sampling strategy and to be representative of the mid-rise building population in England.

The weights were calculated using the height breakdowns used in the sampling methods.

DLUHC are grateful to colleagues from Methodology and Quality in the ONS for advice and guidance on the sampling and weighting methods for this data collection.

The sample was split by property classification, and the below steps completed separately for dwelling buildings and non-dwelling buildings in the sample.

The proportion of weighted buildings in the sample that are 11-13m and requiring remediation was applied to the central population estimate of 11-13m buildings in England to calculate a central estimate of the number and proportion of 11-13m buildings in England requiring remediation. This was repeated for buildings that are 14-18m, with the proportion applied to the central population estimate of 14-18m buildings, giving a central estimate of the number and proportion of 14-18m buildings in England requiring remediation. The central estimated number of 11-13m and 14-18m buildings requiring remediation were summed to give the central mid-rise total, and this total was applied to the central mid-rise population estimate to calculate a central estimate of the proportion of mid-rise buildings residential buildings requiring remediation in England.

These steps were repeated for buildings requiring partial remediation and mitigation to create central estimates of the number and proportion of mid-rise residential buildings, containing dwellings, that require partial remediation and mitigation in England.

Lower and upper estimates

Because DLUHC's prevalence estimates are based on a sample of the mid-rise residential building population, there is a degree of uncertainty around the estimates, as is the case with all survey statistics.

Lower and upper estimates of the proportion of mid-rise buildings requiring work due to life-safety fire risks were calculated, using the confidence intervals calculated at a 95% confidence level. The lower and upper prevalence proportion estimates were applied to the lower and upper population estimates of 71,000 and 79,000, to calculate a lower and upper estimate of the number of mid-rise residential buildings requiring work due to life-safety fire risks.

The proportionate breakdown of the number of buildings requiring work in the central estimate that require remediation (84%), partial remediation (10%) or mitigation (4%) was applied to the lower and upper estimate of the number of buildings requiring work. This gave the lower and upper estimates of the number and proportion of mid-rise residential buildings requiring remediation, partial remediation and mitigation in England, presented as a range in Section 1.2.

3.4 Method: Estimating the average building costs of remediating, part-remediating and mitigating mid-rise residential buildings, containing dwellings, with external wall systems that are a life-safety fire risk in England

Assumptions

The estimates of the costs to remediate, partially remediate and mitigate mid-rise residential buildings, containing dwellings, that are a life-safety fire risk were calculated using a series of assumptions provided by DLUHC's contractor and applied to the dwelling buildings identified in the desk-based survey as definitely or potentially being a life-safety fire risk. The cost assumptions provided are as at July 2021.

Table 8 below details what the remediation, partial remediation and mitigation costs include, and the assumptions used in the estimates.

Table 8: Remediation, partial remediation and mitigation assumptions provided by DLUHC's contractor

Remediation Costs	Partial Remediation Costs	Mitigation Costs
External wall system remediation - Costs between £225 - £735 per m^2, dependent on composition type - Façade area per storey is 209 m^2 to 255 m^2 for 5 storey buildings - Façade area per storey is 243 m^2 to 297 m^2 for 6 and 7 storey buildings - Includes the costs of labour for the removal and replacement of the external wall system	Partial external wall system remediation - Costs between £225 - £735 per m^2 - Façade area per storey is 209 m^2 to 255 m^2 for 5 storey buildings - Façade area per storey is 243 m^2 to 297 m^2 for 6 and 7 storey buildings - Includes the costs of labour for the removal and replacement of the external wall system *The surveyors assessed on a building-by-building basis the proportion of the external wall system composition type to be remediated.*	Evacuation fire alarm system installation - £70,000 per building Or Stairway escape route installation - £120,000 per storey *The surveyors assessed on a building-by-building basis which mitigation option was required to make a building life safe.*
Balconies and spandrels remediation where dangerous balconies or spandrels need to be removed from the building to remediate the external wall system - Cost of balcony remediation- £6,700 per balcony - Cost of spandrel window panel remediation - £598 per m^2 - Overall, the cost of remediating balconies and spandrels increases the external wall system remediation cost by 3% for 11-13m buildings and 6% for 14-18m buildings - Includes the cost of labour for the removal and replacement of the balconies and/or spandrels	Scaffolding – where needed - Cost of £205 per m^2 - Includes the cost of labour for the scaffolding set-up and removal *The surveyors assessed on a building-by-building basis the proportion of the building that would need to be scaffolded to partially remediate the façade.*	Preliminaries - Costs included in the installation costs detailed above
Scaffolding on 75% of the	Preliminaries – 23% of external	Overheads and profits - Costs included in the in-

building - Cost of £205 per m^2 - Includes the cost of labour for the scaffolding set-up and removal	wall system and scaffolding costs	stallation costs detailed above
Preliminaries – 23% of external wall system and scaffolding costs	Overheads and profits – 17% of external wall system, scaffolding and preliminaries costs	Professional fees - Costs included in the installation costs detailed above
Overheads and profits – 17% of external wall system, scaffolding and preliminaries costs	Professional fees – 17% of external wall system, scaffolding, preliminaries and overheads and profits costs	VAT – 20% of overall costs
Professional fees – 17% of external wall system, scaffolding, preliminaries and overheads and profits costs	VAT – 20% of overall costs	
VAT – 20% of overall costs		

Confidence in assumptions

The cost assumptions were provided by DLUHC's contractor based on their experience of multiple real-life remediation and mitigation projects. A set of comparable costings were also provided by a different external expert, providing confidence in the cost assumptions received. Some of the composition type cost assumptions were based on experience of remediating high-rise (18m+) buildings, rather than mid-rise (11-18m) buildings. The cost of these materials per m^2 should not differ for mid-rise buildings compared to high-rise buildings.

The façade area measurements were based on average measurements of mid-rise residential buildings measured by DLUHC's contractors from physical surveys, Ordnance Survey plans and Google Streetview imagery. Measuring using desk-based methods like survey plans and imagery introduces a degree of error in the average measurements, so a lower and upper bound measurement of 10% difference around the mean is used in the lower and upper cost estimates to account for this error in the range of cost estimates.

The cost assumptions provided by DLUHC'S cost contractor were based on industry costs at July 2021. DLUHC's cost contractor has identified that material and labour costs have increased since then, thought to be due to inflation and material and labour shortages.

Whilst the average costs and façade area assumptions are based on DLUHC's contractor's expert experience in the industry, the averages were not calculated using a robust statistical methodology. The averages are assumptions, with a degree of uncertainty and error around them. To account for this uncertainty in the assumptions, DLUHC has produced a range of lower-upper

prevalence and cost estimates.

External wall system remediation costs

The remediation and partial remediation costs were calculated for each external wall system composition type on each building in the sample assessed as definitely or potentially requiring full or partial remediation.

The area of façade to be remediated for each composition type to be fully remediated was calculated by multiplying the percentage covering of the composition type on the building, by the number of building storeys and the relevant façade area per storey in m^2. The lower cost estimates use a lower estimate of facade area per storey, 10% lower than the central estimate, and the higher cost estimates use a higher estimate of façade area per storey, 10% higher than the central estimate. The calculated area in m^2 was multiplied by the relevant composition type remediation cost per m^2 to calculate the cost to fully remediate that composition type.

For external wall system composition types that potentially require remediation, the calculated cost to remediate the composition type was multiplied by the composition type's weighting value.

This was replicated and the costs summed for all external wall system composition types requiring or potentially requiring full remediation on each building in the sample.

The scaffolding costs were then calculated, first by calculating the area of the building in m^2 to be scaffolded by multiplying 75% (the percentage of the building assumed to be scaffolded) by the number of building storeys and the façade area per storey. This area was then multiplied by the cost of scaffolding per m^2, £205, to calculate the scaffolding cost per building for buildings requiring or potentially requiring full external wall system remediation.

The additional costs of preliminaries, overheads and profits and professional fees were added for each building, as a 68% extra cost to the summed remediation and scaffolding cost.

Finally, VAT was added for each building at a rate of 20%.

For buildings in the sample requiring partial remediation, the contractor assessed on a building-by-building basis the percentage of the total building façade area which requires remediation. This was used instead of the percentage covering of the composition type on the building to calculate the partial remediation costs. Additionally, for buildings requiring partial remediation, the contractor assessed on a building-by-building basis whether the scaffolding is required for remediation, or the percentage covering of the building that required scaffolding, and the scaffolding calculations were adjusted accordingly.

Balcony and spandrel window panels remediation costs

The cost of remediating unsafe balconies and spandrel window panels where these need to be

removed to remediate external wall systems are included in the remediation cost estimates.

On a smaller sub-sample of the 2,138 residential buildings containing dwellings in the sample, the contractor identified the number of balconies, if any, and the percentage covering of spandrel window panel, if any, that are a risk and need to be removed to remediate the external wall system.

The costs of remediating unsafe balconies were calculated by multiplying the number of balconies the contractor identified as requiring removal by the cost of balcony remediation per balcony of £6,700.

The costs of remediating unsafe spandrel window panels were calculated by working out the area in m^2 of spandrel window panel to be remediated, by multiplying the percentage covering of panel to be remediated by the number of building storeys and the façade area per storey in m^2. The area was then multiplied by the cost of spandrel window panel remediation per m^2 of £598.

In this smaller sub-sample, including the cost of balcony and spandrel remediation increased the total external wall system remediation costs by 3% for 11-13m buildings and 6% for 14-18m buildings. Therefore, across the full sample of buildings, 3% of the external wall system remediation cost was added to each 11-13m building requiring or potentially requiring remediation. For 14-18m buildings in the sample requiring or potentially requiring remediation, 6% of the external wall system remediation cost was added to the building's cost.

The total costs for full remediation of external wall systems that are a life-safety risk therefore include the cost of remediation of unsafe balconies and spandrel window panels where these need to be removed to remediate the external wall system. However, because the detailed information gathered on balcony and spandrel window panel remediation was gathered on a sub-sample, DLUHC cannot calculate robust estimates on the number of buildings that require balconies and spandrel window panels to be removed where full external wall system remediation is also required.

Mitigation costs

DLUHC's contractor assessed for each building requiring or potentially requiring mitigation, the most appropriate measure required to mitigate life-safety fire risks. Measures included enhanced fire alarm system installation in the whole building or part of the building, or stairway escape route installation.

The mitigation costs for each building in the sample were then costed using the cost assumptions provided and the mitigation measure specified. Where the contractor has identified a building would benefit from fire alarm installation in part of the building, a proportionate cost of full building fire alarm installation (£70,000) was applied based on the proportion of the building identified to require fire alarm installation.

For buildings identified as potentially requiring mitigation, the mitigation cost was multiplied by the building's mitigation weighting value.

3.5 Method: Using the average buildings costs to produce modelled estimated costs of work for leasehold dwellings in mid-rise buildings in England

As the prevalence and cost estimates presented in this release are based on a sample survey, there is not a dataset available of mid-rise residential buildings with external wall systems that are a life-safety risk. The costs were therefore scaled up based on building population estimates.

Applying the average building costs to the population of buildings requiring work

The mean costs of remediation, partial remediation and mitigation were calculated for dwelling buildings in the sample by each height band: 11-13m and 14-18m.

The mean cost of full remediation for each height band was multiplied by the central estimate of the number of buildings, containing dwellings, requiring full remediation in each height band to create central estimates of the pre-inflation costs to remediate 11-13m and 14-18m mid-rise residential buildings, containing dwellings.

The central partial remediation and mitigation costs were calculated in the same way.

The lower and upper pre-inflation estimates were calculated in the same way as the central estimates but using the lower and upper façade area per storey measurements where applicable. The lower and upper mean estimated per building costs were then multiplied by the lower and upper calculated estimates of dwelling buildings requiring work.

In all cases an adjustment for cost inflation was applied, which it should be noted is highly uncertain given current market conditions.

Estimating the costs of completing the work for leasehold dwellings

Estimates of the building tenure, number of dwellings (by height band) and proportion of leasehold dwellings per building of the 11-18m building stock[7] were applied to the estimated number of 11-18m buildings, containing dwellings, requiring work. This allows for the estimated number of leasehold and non-leasehold dwellings in 11-18m buildings requiring work to be calculated, by tenure or height, with the estimated associated costs.

[7] The tenure, dwellings per buildings and leasehold dwellings per building estimates were taken from estimated detailed in the Building Safety Programme Data Release.

Related Statistics

DLUHC's Building Safety Programme Monthly Data Release publishes monthly statistics on the number of high-rise (over 18 metres) residential buildings identified with ACM cladding systems unlikely to meet Building Regulations and progress with remediation. The monthly data release also reports on the Waking Watch Relief Fund, detailing the status of applications and the amount of funding approved to the Waking Watch Relief Fund; a fund to pay for costs of installing alarm systems in high-rise buildings with unsafe cladding where waking watch costs have been passed on to leaseholders.

In March 2020, the Chancellor announced in the Budget a £1 billion fund in 2020/21 to fund the removal and replacement of unsafe non-ACM cladding systems. On 10 February 2021, DLUHC announced a five-point plan to bring an end to unsafe cladding, including further grant funding of £3.5 billion to fully fund the removal of unsafe cladding for leaseholders in all high-rise residential buildings 18 metres and over in England. Statistics on the most recent registrations to the Building Safety Fund are available here.

DLUHC is collecting data on all external wall systems on residential buildings 18 metres and above in height and will publish appropriate information from the data collection when ready.

This document/publication is also available on our website at www.gov.uk/dluhc

If you have any enquiries regarding this document/publication, complete the form at http://forms.communities.gov.uk/ or write to us at:

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