

Title: Final Stage Impact Assessment: Amending the Private Rented Sector Energy Efficiency Regulations IA No: BEIS039(F)-18-HLE RPC Reference No: RPC-3608(3)-BEIS Lead department or agency: Department for Business, Energy and Industrial Strategy Other departments or agencies: None	Impact Assessment (IA)			
	Date: November 2018			
	Stage: Final			
	Source of intervention: Domestic			
	Type of measure: Secondary legislation			
	Contact for enquiries: Householdenergyefficiencycomms@beis.gov.uk			
Summary: Intervention and Options				RPC Opinion: Green

Cost of Preferred (or more likely) Option (in 2017 prices)

Total Net Present Social Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	Business Impact Target Status
£580m	£-968m	£34.5m	Measure qualifies as Qualifying Provision

What is the problem under consideration? Why is government intervention necessary?
 Upgrading the energy efficiency of homes addresses the root cause of fuel poverty, reduces greenhouse gas emissions, lowers energy bills, and improves security of energy supply. A number of market barriers and failures exist in the energy efficiency market, preventing the deployment of energy efficiency in the absence of Government intervention. The Private Rented Sector (PRS) faces particular barriers, such as the 'split incentive' whereby landlords are responsible for the cost of energy efficiency improvements but tenants are the main beneficiaries. Government intervention is necessary to overcome these barriers.

What are the policy objectives and the intended effects?
 The policy is intended to amend the current domestic Private Rented Sector Energy Efficiency Regulations to ensure that action is taken to upgrade the energy efficiency of the sector. The intended effects are to: make progress against Government's statutory fuel poverty and climate change commitments; reduce energy demand in the Private Rented Sector, thereby lowering energy bills and improving energy security; and improve thermal comfort and associated health outcomes.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)
 The government's final position is:

 To amend the existing regulations by placing a responsibility on landlords to meet the cost of energy efficiency improvements where no subsidy or Pay As You Save finance is available, subject to a cost cap of £3,500 inclusive of VAT and any third-party funding which may be obtained.

 The amending regulations will also make a number of secondary changes to support the introduction of the cost cap, particularly in relation to the exemptions framework. This includes:

- cancelling any existing 'no cost' exemption which have been lodged on the PRS Exemptions Register so that landlords will no longer be able to rely on any previously lodged exemptions and will need to take steps to comply with the amended provisions from 1 April 2019; and
- removing the exemption currently available to landlords where the tenant withholds consent to a Green Deal charge being added to their energy bill.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 2023					
Does implementation go beyond minimum EU requirements?			N/A		
Are any of these organisations in scope?		Micro Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: -0.7		Non-traded: -3.6

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible minister: Claire Perry Date: 23rd November 18

Summary: Analysis & Evidence

Final Government Position

Description: The domestic Private Rented Sector Energy Efficiency Regulations (2015) are amended to remove the 'no upfront cost' and 'no net cost' to landlords requirements, and to introduce a cap on the costs of meeting the regulations at **£3,500 per property**.

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2017	Time Period Years: 42	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: 580

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. transition) (Constant Price)	Total Cost (Present Value)
Low	0	0	Optional	Optional
High	0		Optional	Optional
Best Estimate	0		21.6	908

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

The largest societal costs are the material, labour, and financing costs associated with installation of energy efficiency measures (PV, £835m), and the hidden costs associated with the installation of energy efficiency measures (PV, £68m), as well as other smaller costs. Landlords will also face a cost stemming from the time spent on compliance activities, though this is less than under the existing regulations. The majority of these costs are expected to be incurred by landlords.

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

None identified.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	Optional	Optional
High	0		Optional	Optional
Best Estimate	0		35.4	1,488

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

Households that have energy efficiency measures installed are the main affected group. They will benefit from energy savings (PV, £739m), and increased comfort from warmer homes (PV, £204m). Society will also benefit from improved air quality (PV £256m), and reduced traded (PV £30m) and non-traded (PV £258m) greenhouse gas emissions.

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

The UK is likely to benefit from lower energy imports, and lower costs of meeting peak energy demand. Health impacts associated with the improved energy efficiency of properties treated under the regulations have been estimated at PV £29m. This benefit has not been included in the cost benefit analysis due to potential overlap with comfort taking.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5 (years 1-30), 3.0 (>30 years)
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All landlords are compliant with the regulations and pre-requisite regulations requiring rented properties to have an Energy Performance Certificate at the point at which they are offered for rent; Capital costs that landlords face are in line with our capital cost central assumptions; Energy prices over time are in line with IAG central projections. Energy savings have been estimated using the Standard Assessment Procedure (SAP) with in use factors to account for the real life performance of efficiency measures. High / low scenarios have been estimated using different capital cost assumptions (see Annex C) as capital costs not only impact the NPV but also other key estimates under this policy. Further sensitivity analysis is provided in Section 8.

BUSINESS ASSESSMENT (Final Government Position)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only)
Costs: 34.5	Benefits: 0	Net: 34.5	
			172.5

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1. Problem under consideration

1. Upgrading the energy efficiency of homes addresses a number of Government objectives directly, by:
 - **Tackling the root cause of fuel poverty**, making progress towards the Government’s statutory fuel poverty targets;
 - **Reducing greenhouse gas emissions** in the domestic sector, contributing to the Government’s legally binding emission reduction targets;
 - **Lowering energy bills**, helping keep bills as low as possible for households; and
 - Reducing energy demand and contributing to ensuring that the UK has a **secure and resilient energy system**.
2. Private rented properties are among the least energy efficient in the domestic housing stock, accounting for a quarter of all F or G-rated homes despite the sector making up only a fifth of the stock.¹ Homes in the domestic Private Rented Sector (PRS) that are F and G-rated represent around 6% of private rental market, and around 1% of the overall housing stock. Importantly, however, they:
 - account for a **disproportionate number of households in fuel poverty** – in England around 45% of F or G-rated PRS homes are fuel poor, whereas only 11% of the wider population are in fuel poverty;
 - represent some of the **coldest homes in the housing stock** – the most inefficient domestic properties are on average up to 2°C colder in winter than the most efficient homes, posing a risk to tenant health;
 - contribute to **residential greenhouse gas emissions**, which from an end-user perspective make up 23% of all emissions in the UK;
 - face **significantly higher energy costs** of keeping warm than typical households: on average over £600 per year more than E-rated PRS homes and almost £1,000 more per year than the average home²;
 - provide the opportunity to **improve the security of energy supply** through lowering energy consumption – the International Energy Agency estimates that since 1990 energy efficiency improvements have reduced the UK’s energy imports by around 25 million tonnes of oil equivalent, and reduced the UK’s import bill by around \$7 billion.³

More details are available in Annex A.

3. In 2015 Government put in place regulations requiring private landlords letting properties in England and Wales to ensure that those properties reach a minimum energy efficiency standard of Energy Performance Certificate (EPC) Band E in order to be able to let them. The regulations, which come into force for new tenancies from April 2018 (and with all tenancies covered by April 2020), exempted landlords from meeting the standard if doing so meant they faced either upfront costs or net costs (see Annex A for further details). It was expected that the majority of landlords would use Green Deal Finance⁴ as a means of funding of energy efficiency improvements without facing any upfront cost. Further, the repayments under the Green Deal are recouped through tenants’ energy bills, thereby avoiding any net costs to the landlord.
4. In 2015, the Government ended public investment in the Green Deal. Since then, the scheme has remained in operation so that existing Green Deal Plans can be serviced, and to allow for any private finance providers to enter the market. The level of activity has, however, been relatively low⁵. This means that significantly fewer landlords than originally intended may be able to finance energy efficiency improvements without

¹ The energy performance of domestic buildings is measured using Energy Performance Certificates (EPCs), which rate homes on a scale from A (very efficient) to G (very inefficient). Note This assumes the home is not under heated. More information can be found here: <https://www.gov.uk/buy-sell-your-home/energy-performance-certificates>.

² Typical energy cost to heat a home given dwelling and household characteristics. BEIS analysis based on EHS 2015/16

³ International Energy Agency Energy Efficiency Report (2015), available at:

<http://www.iea.org/publications/freepublications/publication/MediumTermEnergyefficiencyMarketReport2015.pdf>

⁴ Green Deal Finance is a mechanism whereby a homeowner can apply for a loan in order to fund energy efficiency improvements, whereby measures are only funded if the lifetime savings are greater than the costs of the installation. More information can be found here: <https://www.gov.uk/green-deal-energy-saving-measures/overview>

⁵ For further information see: <https://www.gov.uk/government/news/green-deal-finance-company-funding-to-end>

incurring upfront or net costs. In these circumstances, landlords would be able to register for an exemption from the regulations and would not be required to make any energy efficiency upgrades. As discussed in the accompanying consultation document, there have been recent signs of renewed interest in the Green Deal. For instance, the Green Deal Finance Company was sold to new owners in January 2017 following which Green Deal Plans are again being offered. Other private finance providers have also expressed interest. However, the full extent to which the market might develop is yet unclear.

5. The following sections outline the barriers to energy efficiency in the domestic PRS in the absence of Government intervention, the policy objectives of updating the existing Regulations, a cost-benefit analysis of the proposed updates, provisional estimates of the impact on business (specifically the Equivalent Annual Net Direct Cost to Business), risks and uncertainties, and monitoring and evaluation.

2. Rationale for intervention

6. There are a range of market failures and barriers to energy efficiency improvements in the domestic PRS, which provide a rationale for Government intervention in the private rental market (further detail is set out in Annex A). These include:
- **misaligned incentives**, such as where the costs of upgrading a property fall to landlords but the benefits of lower energy costs and/or a warmer home accrue to the tenant, with the landlord not necessarily being able to capture the benefits through increases in rent;
 - **externalities**, such as energy prices not fully reflecting the climate change costs of burning fossil fuels, or the public health benefits of warmer homes not fully accruing to those who pay for energy efficiency upgrades;
 - **incomplete or asymmetric information**, such as landlords or tenants not having a good understanding of the benefits of energy efficiency;
 - **equity** considerations, whereby lower income households can be 'locked in' to energy inefficient homes without the means to either make upgrades themselves nor move to a more efficient home.
7. The above barriers are exacerbated by relatively high tenant turnover in the PRS. A quarter of private sector tenants have lived in the Private Rented Sector for less than two years and 50% of tenants do not stay in the same property for 5 years or more.⁶ Most major energy efficiency improvements, such as wall or loft insulation, take longer time periods for the full benefits to accrue. This means that even if the above barriers can be overcome, the tenant is likely to have moved on before the full benefits can be experienced.
8. Without Government intervention to amend the current Private Rented Sector regulations it is likely that these barriers will continue to prevent the take up of energy efficiency measures, with negative consequences for the Government's objectives.

⁶ According to data analysed from the English Housing Survey 2015 (EHS). For further information on the EHS please see: <https://www.gov.uk/government/statistics/english-housing-survey-2015-to-2016-private-rented-sector>

3. Policy objectives

9. The Government's overarching policy objective is to ensure that the 2015 Regulations are effective in driving energy efficiency improvements in the worst performing domestic PRS properties. While a fledgling Green Deal/'Pay As You Save' finance offer is now returning to the market, it is not clear a suitable, nationally available finance product will be available. The Government is therefore proposing to take action to amend the Regulations to ensure improvements in the energy performance of F and G-rated PRS homes take place regardless of the long-term availability of Pay As You Save funding, or other sources of 'no cost' funding or subsidy.
10. Effective operation of the domestic PRS regulatory framework will support two of the Government's statutory objectives:
 - 1) **Making progress towards fuel poverty targets:** raising energy efficiency standards in the PRS to EPC Band E by 2020 mirrors the Government's interim target by the same date.⁷ The Regulations would therefore make a positive contribution to the Government's fuel poverty commitments for England, as well as the Welsh Government's own statutory target for 2018.⁸
 - 2) **Reducing energy demand and greenhouse gas emissions:** improving the energy efficiency of privately rented homes will cut energy use and the greenhouse gas emissions that result from it, contributing to the Government's climate change commitments.⁹
11. Improved energy efficiency standards in the sector will also contribute to improving public health, and increase security of energy supply. Further detail on the policy objectives is in Annex A.

⁷ The Government has a statutory target to raise as many fuel poor homes as reasonably practicable to energy efficiency Band C by 2030, with interim milestones of Band E by 2020 and Band D by 2025. The fuel poverty target for England and its interim milestones are measured using the Fuel Poverty Energy Efficiency Rating (FPEER), which is based on the same Standard Assessment Procedure methodology used to generate an EPC rating for domestic properties. More information is available here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332236/fpeer_methodology.pdf

⁸ For more information see: DECC (2015) *Cutting the cost of keeping warm – a fuel poverty strategy for England*, <https://www.gov.uk/government/publications/cutting-the-cost-of-keeping-warm>; Welsh Government (2010) *Fuel poverty strategy 2010*, <http://gov.wales/docs/desh/publications/100723fuelpovertystategyen.pdf>

⁹ For more detail on the UK Government's climate change commitments, see: <https://www.gov.uk/guidance/carbon-budgets>

4. Rationale for regulation and policy options

4.1 Rationale for regulation and alternatives considered

12. The 2015 Private Rented Sector Regulations Impact Assessment¹⁰ outlined the rationale for regulation as a means of overcoming the barriers identified in Section 2. The primary rationale continues to be that regulation is necessary to overcome the misaligned (or split) incentives that are particularly prevalent in the PRS – such as where the costs of improvements fall to landlords but tenants are the main beneficiaries.
13. A number of alternative approaches to regulation have been considered and either assessed as being unlikely to drive energy efficiency improvements or there is evidence to demonstrate that they have limited impact. These include:
- **Improving information:** The latest data show that over 90% of landlords rent out properties as a part-time exercise,¹¹ and the vast majority are not represented by a landlord association. This makes providing consistent information to the market as a whole complicated. This is exacerbated by landlord inertia even when information is provided. For example, the most recent Private Landlord Survey found that upon obtaining an Energy Performance Certificate, 70% of landlords had no intention of taking any action to improve the energy efficiency of their home, despite having low cost information about what could be done.
 - **Subsidising upfront costs:** PRS homes have been eligible for upgrades under a succession of Government funded schemes and obligations on energy suppliers (such as the Energy Company Obligation (ECO) that provide funding for upgrades¹²). However take up has consistently been disproportionately low. For example, the PRS accounts for just under 20% of the housing stock, but just 9% of measures delivered under the ‘CERO’ element of ECO2T (which could be delivered to any suitable property) have been in the sector.¹³ Subsidising costs alone appear to be insufficient to overcome barriers in the PRS.
 - **Fiscal incentives:** Between 2004 and April 2015 landlords were able to claim a tax deduction of up to £1,500 per property for improvements under the Landlord’s Energy Saving Allowance. Total claims under the allowance were low, however, which resulted in Government choosing to close the scheme.
 - **Voluntary action / self-regulation:** The diverse nature of PRS landlords and the fact that the vast majority do not belong to a landlord association limits the scope for effective voluntary standards that cover the whole market. Some Local Authority-led voluntary accreditation schemes have resulted in landlords signing up to minimum energy efficiency standards, however take up has again been relatively low compared to the size of the market.

4.2 Policy options

14. Regulation continues to be the Government’s preferred means of driving energy efficiency improvements in the domestic PRS, due to the barriers set out in Section 2 and the issues with alternatives to regulation set out in Section 4.1. As a result, the Government intends to amend the existing PRS Regulations in two ways:
- 1) To remove the ‘no cost to the landlord’ principle, which would transfer some or all of the cost of improvements from the tenant to the landlord. Under Green Deal Finance, a charge is attached to the property’s electricity meter to repay the upfront cost of measures with the energy user – normally the tenant in the case of rented property – repaying the charge over time. In instances where Green Deal Finance (or other suitable ‘no cost’ finance) is unavailable, or is only available to partially cover the costs of improvements, the balance of costs must be incurred by the landlord;

¹⁰ Section 4.1, see:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401382/150202_PRS_Final_Stage_Revised_For_Publication.pdf

¹¹ See DCLG’s 2010 Private Landlord Survey, available at: <https://www.gov.uk/government/statistics/private-landlords-survey-2010>

¹² For further detail on the Energy Company Obligation see: <https://www.gov.uk/government/consultations/energy-company-obligation-eco-help-to-heat>

¹³ Household Energy Efficiency Statistics (2016, November): <https://www.gov.uk/government/statistics/household-energy-efficiency-national-statistics-headline-release-november-2016>

- 2) Introduce a cost cap to ensure that landlords are not faced with disproportionate costs of ensuring their properties achieve an EPC of Band E or above.
15. Landlords whose properties are in scope of the regulations (details of which are in Annex A) would continue to be able to claim an exemption for 5 years for a limited number of specified reasons. Exemptions available include where a property/properties are not suitable for the necessary energy efficiency improvements (for example a cavity wall insulation measure in an area exposed to wind-driven rain if there is no other energy efficiency measure available for that property), or where a legally required consent cannot be obtained (for example planning consent for external wall insulation in a conservation area). Where landlords are not able to upgrade their property / properties to EPC Band E without exceeding the cost cap, they will be required to make as much progress as is feasible towards that goal within the cap, and then register an exemption on the PRS Exemptions Register on the basis that they have installed all relevant measures and the property remains below EPC Band E. The current full list of exemptions is discussed in detail in the domestic PRS minimum standards guidance available at: <https://www.gov.uk/government/publications/the-private-rented-property-minimum-standard-landlord-guidance-documents>
16. The primary rationale for putting in place a cap on costs, rather than a cost-effectiveness test like that which formed the basis of the Green Deal mechanism¹⁴, or a payback test as established for the non-domestic PRS minimum standards, is the simplicity for domestic landlords to implement and for Local Authorities to enforce. Views from stakeholders were invited on this during the consultation.
17. The policy options considered in the consultation Impact Assessment (IA) were:
- **Policy Option 0: Do Nothing.** No amendments would be made to the current Regulations, and few energy efficiency improvements would be expected in F and G-rated PRS properties (see Section 5.2 for further detail on expected take up under this option).
 - **Policy Option 1: Introduce a cost cap of £1,000.** Landlords would be required to upgrade their properties to at least EPC Band E, or incur costs of no more than £1,000 (nominal prices) per property in improving the energy efficiency to as close to this level as possible.
 - **Policy Option 2: (preferred option at consultation) Introduce a cost cap of £2,500.** As Policy Option 1 but landlords would face costs of no more than £2,500 (nominal prices) per property.
 - **Policy Option 3 (final preferred option): Introduce a cost cap of £3,500.** As Policy Option 1 but landlords would face costs of no more than £3,500 (nominal prices) per property.
 - **Policy Option 4: Introduce a cost cap of £5,000.** As Policy Option 1 but landlords would face costs of no more than £5,000 (nominal prices) per property.
18. As discussed in the published Summary of Responses¹⁵, the consultations preferred cap level of £2,500 attracted a range of views, with only a minority of respondents agreeing with a cap of this amount. 79% of respondents recommended an above £2,500 cap, ranging from £3,500 to £5,000 (with 48% of those arguing for a higher cap recommending £5,000) or for the landlord funding requirement to be entirely uncapped. Only a small minority argued for a lower cap (or for an alternative funding mechanism).
19. The Government's key concern is to ensure as many F and G properties as possible can be improved to E, and that as many tenants of these properties can benefit from energy efficiency improvements without the viability of the sector being adversely affected (either in terms of landlords exiting the market, or raising rents to cover costs). While our assessment continues to be that, even with a £5,000 cap, a majority of landlords would be unlikely to introduce significant rent rises, Government believes a cap of £3,500 represents an appropriate and workable compromise between the two key positions stakeholders argued at consultation. £3,500 will enable significant improvements to be made in those properties reaching EPC band E, while enabling improvements to all properties not able to quite reach band E, and also addressing concerns of those worried about the potential impact on landlords of imposing too high a financial

¹⁴ An example of a cost-effectiveness mechanism would be where only measures that had projected energy bill savings that were greater than the upfront costs would be required to be installed.

¹⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/753710/Final_PRS_Minimum_Standards_Consultation_Government_Response.pdf

commitment. The improvements, which will be delivered as a result of this cap level will also represent an important contribution towards our commitment to improve the energy efficiency rating of fuel poor homes to Band C by 2030, mindful of the interim fuel poverty milestone of Band E by 2020.

20. The following Section summarises the analytical approach to assessing these options and results, while further detail on the assumptions and modelling approach are set out in Annex C. The analysis draws on the latest available evidence on the size of the PRS, the costs of energy efficiency measures, the potential for landlords to make improvements to their properties, energy prices and other key modelling inputs.

5. Analytical approach

5.1 Modelling the stock

21. The National Household Model (NHM) was used to model the installation of measures in the domestic housing stock, and their associated energy savings using a SAP-based energy calculation. The model selected the combination of measures that improves a PRS F or G rated property to an EPC rating of E at the lowest cost under the cost cap. If an EPC rating of E could not be achieved for a particular property under the cost cap, the model maximised the increase in SAP score for that property. In use factors were used to account for the real life energy savings associated with installed measures. While this in use factors approach produces reasonable aggregate estimates of savings across the entire housing stock, it is less accurate when look at particular sub-populations.
22. Note that in reality, landlords may choose to install measures that do not maximise their SAP score or achieve EPC E at the lowest cost. However, the regulations do require landlords to improve their properties to EPC E if that is possible under the cost cap and our modelling approach shows an optimal way they could achieve that. The outputs from this model were then used the assess the impact of amending the PRS Regulations. The estimated costs and benefits assume full compliance from landlords; either installing measures or registering a valid exemption. Further details of the stock modelling approach can be found in Annex C.

5.2 Counterfactual

23. The impact of the amended PRS Regulations was assessed against a 'Do Nothing' counterfactual. In this counterfactual no amendments are made to the PRS Regulations, and we assume that Green Deal Finance (or an alternative 'Pay As You Save' financing product) continues to be unavailable at the required scale to enable the existing 'no up-front cost' regulations to result in any measure installations. As a result, it was assumed no action would be taken as a direct result of the existing regulations, with a majority of landlords whose properties are in scope registering an exemption.
24. Although we do not expect any measure installations under the existing PRS Regulations, we do expect other measure installations in the counterfactual that could overlap with the amended PRS Regulations measure installations. These are the replacement of boilers that have come to the end of the lifetime and switching to low energy lighting as a result of Ecodesign. In scenarios where these measures were installed earlier as a result of the PRS regulations, the costs and benefits of measures that would have been delivered in the counterfactual were calculated as if they were brought forwards by the regulations, and the difference between the impact of the PRS regulations and the counterfactual included in the costs and benefits. For instance, where we expect low energy lighting will be installed in F or G-rated PRS properties in 2022 as a result of Ecodesign, these were assumed to be brought forward and delivered at the start of 2020 as a result of these amended PRS Regulations.
25. The ECO regulations prohibit the use of ECO3 subsidy to be delivered to PRS F and G-rated properties, except for high cost measures such as solid wall insulation, first time central heating, and heat pumps. The amended PRS regulations do not result in the installation of these measures so we assumed no overlap between the policies. In other words, the uptake/impact of each policy was assumed to be unaffected by the other.
26. This counterfactual was used as the baseline both for the cost-benefit analysis in Section 6 and also the provisional Equivalent Annual Net Direct Cost to Business outlined in Section 7.

5.3 Appraisal period and re-installation of measures

27. The amended PRS Regulations will come into force from the 1st April 2019 and will continue indefinitely. For the first year, properties will only be required to meet the regulations when a new tenancy agreement is agreed on the property. After 1st April 2020 properties will need to meet the regulations regardless of the tenancy status. For the analysis presented here, we assumed that all installations occurred at the start of 2020 as it is difficult to determine which properties will be undergoing new tenancies before April 2020. In reality there will be some installations before and after this. The appraisal period ends at the start of 2062, the point at which all measures installed at the start of 2020 will have reached the end of their assumed lifetimes. This is in line with the consultation Impact Assessment and the ECO3 Impact Assessment, both of which also resulted in the installation of measures with a 42 year lifetime.
28. By the end of the appraisal period in which measures were installed due to the amended regulations, all of the measures installed in 2020 will have come to the end of their lifetimes. Some measures have a relatively short lifetime, though. For instance, low energy lighting has an estimated lifetime of 10 years and gas boilers a lifetime of 12 years. The Regulations will still apply, and we assumed that landlords will replace measures on a like-for-like basis as they expire. This is an assumption that enables the counterfactual and policy impact to be assessed over time on a consistent basis, although there may be differences in replacement behaviour in practice. These reinstallation costs and benefits were attributed to the amended regulations and apportioned on a pro-rata basis up to the end of the appraisal period. Counterfactual measure installations, for example boilers, were also assumed to be reinstalled during the policy appraisal period but were not attributed to the amended PRS Regulations.
29. When considering both the original installation and later re-installation of measures we assumed that landlords seek to achieve a rating of EPC Band E only and do not go beyond that. Were landlords to choose to install measures to achieve a higher level of energy efficiency than is required, this would not be a direct result of the regulations.

5.4 Categories of costs and benefits analysed

30. A range of costs and benefits have been considered. These have been summarised in Table 1.

Table 1: Categories of costs and benefits analysed

Group that costs or benefits fall to	Type of cost/benefit	Included in cost-benefit analysis or described qualitatively?
Costs		
Landlords (businesses)	• Capital cost of installing measures	Monetised in social cost-benefit analysis
	• Operating costs, excluding fuel use (e.g. annual maintenance of solar PV)	
	• Hidden costs of installing measures, such as the time required to research measures and oversee installation	
	• Familiarisation costs of understanding amended Regulations	
	• Costs in proving compliance with the regulations and applying for an exemption when this is not possible	
	• Finance costs, quantified as the 'opportunity cost' of using private capital to achieve social aims	
Local authorities	• Cost of enforcing regulations (note that this is assumed to be the same as for the existing PRS Regulations)	
Tenants	• Hidden costs of installing measures, such as the time required to clear rooms or learn new systems	

Group that costs or benefits fall to	Type of cost/benefit	Included in cost-benefit analysis or described qualitatively?
Benefits		
Landlords (businesses)	<ul style="list-style-type: none"> • Property value uplift as a result of making improvements 	Private benefit, not included in social cost-benefit analysis
Tenants	<ul style="list-style-type: none"> • Lower energy costs 	Private benefit, not included in social cost-benefit analysis
	<ul style="list-style-type: none"> • Improved thermal comfort in homes (comfort taking) 	Monetised in social cost-benefit analysis (also a private benefit)
	<ul style="list-style-type: none"> • Improved health outcomes as a result of warmer homes 	Quantified, but not included in the cost-benefit analysis because of potential double-counting with comfort-taking
Society	<ul style="list-style-type: none"> • Lower energy use 	Monetised in social cost-benefit analysis
	<ul style="list-style-type: none"> • Improvements in air quality from lower fuel use 	
	<ul style="list-style-type: none"> • Reductions in greenhouse gas emissions 	

6. Policy impact

6.1 Cost-benefit analysis

31. Table 2 summarises the main quantifiable costs and benefits of the policy. It has been monetised and discounted in line with HM Treasury's *Green Book*¹⁶ and supplementary guidance on valuing energy use and greenhouse gas emissions.¹⁷ The impacts have been modelled using BEIS's National Household Model, details of which can be found in Annex C, alongside the key assumptions and overall modelling approach.

Table 2: Estimated costs and benefits of final policy (Present Value, £m, 2017 prices), 2020 – 2062¹⁸

Type of cost or benefit	Cost cap of £3,500
Capital costs of installing measures	701
Operational costs	8
Hidden Costs	68
Finance Costs	134
Familiarisation and compliance costs for landlords	-2
Costs of enforcement to LAs	0
Total Costs (A)	908
Value of energy saved	739
Value of increased comfort in the home	204
Value of improvement in air quality	256
Value of traded greenhouse gases saved	30
Value of non-traded greenhouse gases saved	258
Total Benefits (B)	1,488
Net Present Value (B – A)	580
<i>Benefit:Cost Ratio (B / A)</i>	<i>1.6</i>

32. Table 2 shows that the capital cost of installing measures represents the largest overall cost. Hidden costs (for example, include the time cost of researching appropriate upgrades or overseeing installations) and finance costs (which capture the cost of foregone investment due to landlords being required to invest in energy efficiency instead of elsewhere in the economy) are smaller, but still significant.
33. The familiarisation and compliance cost for landlords is actually a small benefit under the amended PRS Regulations as there is a higher regulatory burden under the existing PRS Regulations, where the vast majority of landlords are assumed to apply for an 'up-front cost' exemption and then reapply for this exemption every 5 years. Under the amended PRS Regulations, if a landlord improves a property to an EPC rating of E, they must be able to demonstrate they have installed the measures that would allow them to reach an EPC rating of E, but would only need to do this once. Uncertainty in this assumption is explored further in the sensitivity analysis.
34. Enforcement costs (incurred by Local Authorities) are zero because their enforcement obligations are assumed to remain unchanged when compared to the existing PRS Regulations. This assumption is uncertain and its impact on the NPV is investigated further in the sensitivity analysis. We are also carrying out enforcement pilots to help gather data on likely enforcement costs.
35. Table 2 also shows that the value of the energy saved is the greatest monetised benefit, driven by the number and type of measures installed. The benefits in terms of improved householder comfort, air quality

¹⁶ HM Treasury (2018). *The Green Book*. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf

¹⁷ BEIS (2018). *Valuation of energy use and greenhouse gas (GHG) emissions*. Available at:

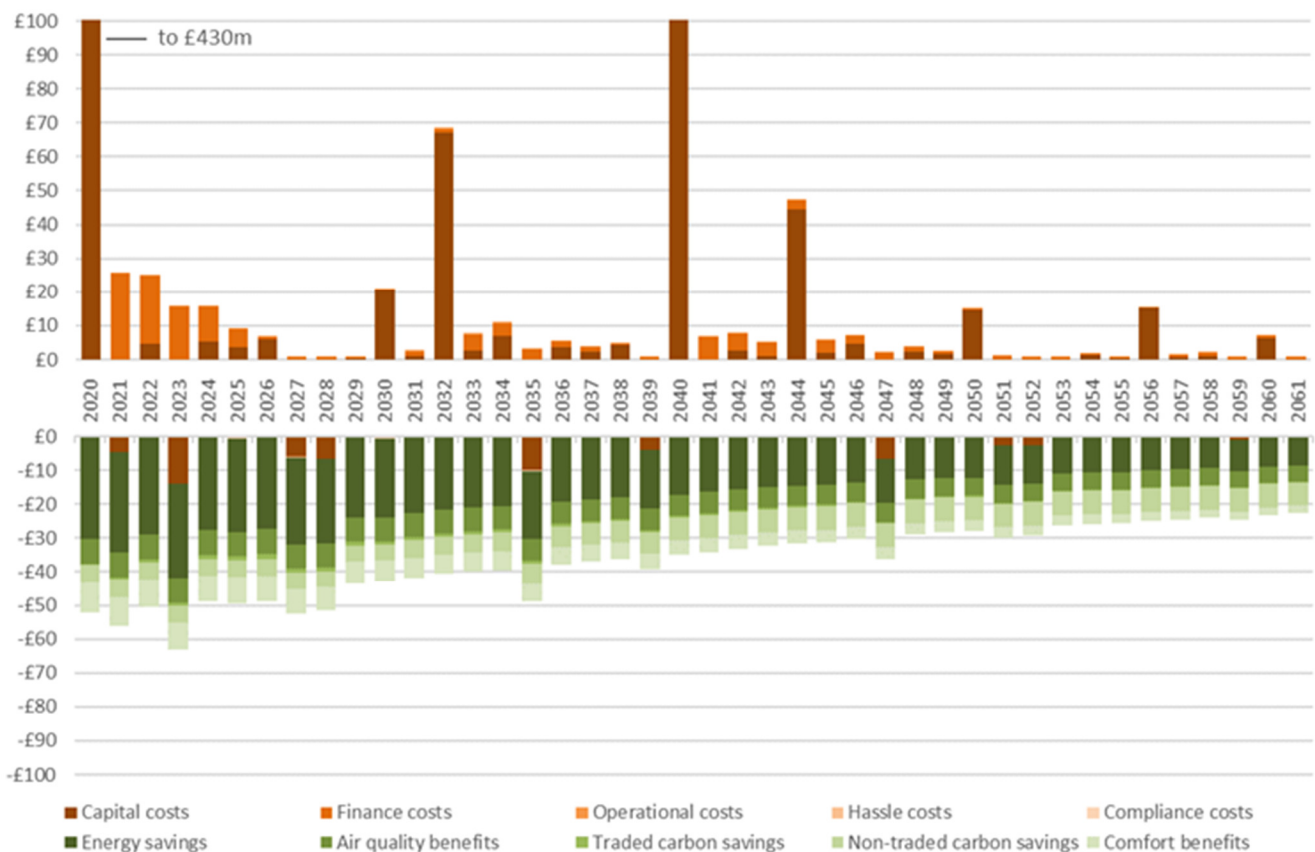
<https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

¹⁸ Figures may not add up due to rounding.

and greenhouse gas emissions are all driven by the changes in the amount and type of energy used in the home.

- 36. Overall, the NPV is strongly positive and the benefit:cost ratio is significantly above 1, showing the policy’s benefits exceed the costs.
- 37. Figure 1 shows the annual costs and benefits included in the NPV. Note that some items typically regarded as costs are sometimes negative (in other words, they are benefits). This is because, when compared to the counterfactual, the policy displaces certain costs. For example, less exemption renewals required due to more properties reaching EPC Band E, or the displacement of counterfactual measure installations as a result of the policy.

Figure 1: Annual costs and benefits included in the NPV (Present Value, £m, 2017 prices), where costs are positive numbers and benefits are negative numbers.



- 38. In addition to the results presented above, not all of the impacts of the regulations can be monetised as part of the cost-benefit analysis, but are important to consider when determining the appropriate level of a cost cap. The following sections outline these other, contextual impacts. The costs to business, including the Equivalent Annual Net Direct Cost to Business (EANDCB), are outlined in Section 7.

6.2 Cost-benefit analysis (equity weighted)

- 39. In addition to the NPVs presented in Table 2, it is also important to consider the relative impacts on different subsets of society, their ability to afford the policy costs, and the additional utility received from the monetised policy benefits. Equity weighting considers that landlords have an above median income whilst tenants have a lower than median income. Therefore, landlords have a higher ability than tenants to pay any costs arising from the amended regulations, but will also receive a lower gain than tenants from the policy benefits outlined in Table 2.

Table 3: Estimated costs and benefits of final policy (Present Value, £m, 2017 prices), 2020 – 2062¹⁹

Type of cost or benefit (£m)	Cost cap of £3,500
Non-equity weighted	
Non-equity weighted total costs	908
Non-equity weighted total benefits	1,488
Non-equity weighted NPV	580
Benefit:Cost Ratio (B / A)	1.6
Equity weighted	
Equity weighted total costs	448
Equity weighted total benefits	1,562
Equity weighted NPV	1,114
Benefit:Cost Ratio (B / A)	3.5

40. From Table 3, it is clear that, when accounting for equity weights, the NPV is higher than the non-equity weighted NPV. This is as a result of the equity weighted costs being lower due to the majority of policy costs falling onto the landlord, and higher benefits when using equity weights due to the majority of policy benefits being realised by the tenant.

6.3 Number of F and G-rated homes reaching Band E and measure mix

41. Table 4 outlines the number and type of measures installed as a result of the amended regulations and the proportion of F and G-rated PRS properties that are estimated to reach EPC Band E or above as a result of the amended PRS Regulations. The measures installed are net estimates, excluding those measures that would have been installed in absence of the proposed changes (for example under the natural replacement of boilers).
42. The modelling approach assumes that landlords seek to achieve an energy efficiency rating of EPC Band E at the lowest capital cost, subject to the cost cap. Therefore if a single, higher cost measure would achieve Band E at an upfront cost of £2,000, and Band E could also be achieved using a package of multiple lower cost measures that cumulatively add up to £3,500, we assume that the landlord would choose the former.

Table 4: Estimated number and type of measures installed as a result of the Regulations in 2020

Type of installation	Cost cap of £3,500
Loft insulation	53,000
Cavity Wall Insulation	25,000
Solid Wall Insulation	0
Floor insulation	60,000
Draught-proofing	118,000
First Time Central Heating	0
Electric Storage Heater	94,000
Heating Controls	197,000
Hot Water Cylinder Insulation	98,000
Hot Water Thermostat	67,000

¹⁹ Figures may not add up due to rounding.

Low energy lighting	139,000
Double glazing	17,000
Solar PV	10,000
Total	879,000

43. Table 5 shows the proportion of F or G-rated PRS households²⁰ that are estimated to be able to achieve EPC Band E, and those that can't achieve Band E but still need to install measures up to the cap level to prove compliance. Note that all properties in scope have at least one measure installed.

Table 5: Estimated proportion of F or G-rated PRS homes in scope that do / do not achieve Band E by 2020

	Cost cap of £3,500
Percentage of F and G-rated PRS homes in scope reaching Band E	48%
Percentage of F and G-rated PRS homes in scope not reaching Band E but taking some action	52%

6.4 Impact on insulation

44. Amending the Regulations is expected to drive greater uptake of insulation in the PRS. The estimated number of homes with at least one insulation measure in 2020 as a result of this policy are shown in Table 6.

Table 6: Estimated insulation installations in 2020 as a result of this policy

	Cost cap of £3,500
Total number of insulation measures installed in 2020	138,000
Number of homes receiving an insulation measure as a result of the policy in 2020	124,000

6.5 Impact on fuel poverty

45. Over 40% of PRS properties within FPEER²¹ Band F or G are in fuel poverty; this compares to around 19% of PRS as a whole, and 11% for all of England. PRS has the highest proportion of fuel poor of all tenures. The average fuel poverty gap of PRS F and G rated households is around £1,130, compared to an average of £326 across England, showing that this group requires a large reduction in fuel costs to move out of fuel poverty. PRS as a whole has the highest average fuel poverty gap of all tenures (£383 compared to £326).

46. Table 7 shows the estimated impact of the £3,500 cost cap on progress towards the 2020 fuel poverty target milestone, of raising as many existing fuel poor homes as reasonably practicable to EPC Band E by 2020²². It has not been possible to estimate the impact on fuel poverty in Wales due to data limitations.

47. It should be noted that there are currently limitations in estimating the full impact of the amended regulations on fuel poverty, in part due to not being able to account for measures that are not major insulation or heating installations,²³ and also due to the complexity of the interactions with other policies that affect the extent of fuel poverty. The relative nature of the fuel poverty metric also means that by lifting some existing fuel poor households to Band E, others in Band F or G may enter fuel poverty. As a result, the

²⁰ This covers those in scope of the regulations – properties that are not required to have an EPC are exempt from the regulations.

²¹ See footnote 7 for the difference in methodology between FPEER and EPC Bands.

²² For further information see the Fuel Poverty Strategy for England: <https://www.gov.uk/government/publications/cutting-the-cost-of-keeping-warm>. It is important to note that the fuel poverty target and EPCs use similar but slightly different methodologies – details of which can be found here:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332236/fpeer_methodology.pdf.

²³ At the present the fuel poverty estimates take account of first time central heating, storage heaters, cavity wall insulation, loft insulation, solid wall insulation and solar PV. They do not currently take account of other measures delivered under the amended PRS regulations.

impacts in Table 7 should be seen as indicative. We do not attempt to estimate the overall number of fuel poor households at each target milestone level due to the aforementioned methodology limitations.

48. It is important to also note that fuel poverty projections can be subject to a high degree of uncertainty, given that they are reliant on projected changes in energy prices, incomes, and energy efficiency levels (of which the PRS regulations are only one driver).
49. Table 7 uses the latest fuel poverty statistics²⁴ combined with Table 5 to estimate the number of fuel poor households in PRS F and G properties that would now be in Band E. Note that not all PRS fuel poor households in F and G properties will be moved to Band E by these amended PRS Regulations.

Table 7: Estimated impact of policy options on the Fuel Poverty Target Milestone (England only)

Change in all fuel poor households at EPC Band E or above by 2020 ²⁵	Percentage Point Change
All Fuel Poor Households	2.3
Fuel Poor PRS households	6.4

6.6 Impact on health outcomes

50. Living at low temperatures poses a risk to health, with a range of negative morbidity and mortality impacts associated with exposure to the cold. The Marmot Review Team report on cold homes and health²⁶, in addition to the Hills Fuel Poverty Review²⁷, set out the strong body of evidence linking low temperatures to these poor health outcomes. Making energy efficiency improvements in homes can improve the health of the occupants, for example by reducing their risk of cardiovascular and respiratory diseases from warmer internal temperatures.
51. BEIS has monetised the health benefits associated with making these energy efficiency improvements using BEIS’s Health Impacts of Domestic Energy Efficiency Measures (HIDEEM) model (more details on this model can be found in Annex C). HIDEEM simulates the change in relative risk of a range of cold-related morbidity and mortality risks for people living in homes receiving energy efficiency improvements. The changes in relative risk are then converted into Quality Adjusted Life Years (QALYs) and monetised in accordance with Department of Health guidance on health valuation²⁸.
52. There are potential overlaps with the comfort taking benefits included in the net present values set out in Section 6; therefore we do not currently include the monetised health impacts in the cost-benefit analysis. At present we are also not able to quantify the potential savings to health provision services (such as the NHS) from improving the energy efficiency of homes, although we expect these to potentially be significant in reality.
53. Table 8 presents the estimated impacts during the transition. Overall, the monetised health benefits are expected to be £29m, with installation of cavity and loft insulation making up the majority of these benefits

Table 8: Estimated value of improvements in tenant health (net of the counterfactual), £m, 2017 prices (not including re-installations)

Measure	Cost cap of £3,500
CWI	11
Loft	14

²⁴ <https://www.gov.uk/government/statistics/fuel-poverty-detailed-tables-2018>

²⁵ This number is indicative only, as those households within fuel poverty are likely to change due to the relative nature of fuel poverty. For example, some households with measures installed may move out of fuel poverty, with households moving in the opposite direction.

²⁶ Marmot Review Team (2011). *The Health Impacts of Cold Homes and Fuel Poverty*. Available at: <http://www.instituteofhealthequity.org/projects/the-health-impacts-of-cold-homes-and-fuel-poverty>

²⁷ Hills (2011). *Fuel Poverty: The Problem and Its Measurement*. Available at: <http://eprints.lse.ac.uk/39270/1/CASereport69%28Isero%29.pdf>

²⁸ See: <https://www.gov.uk/government/publications/green-book-supplementary-guidance-health>

Double glazing	5
Total	29

6.7 Impact on greenhouse gas emissions

54. Table 9 summarises the estimated impact of the amended PRS Regulations over 5 year periods covering Carbon Budget 4 (2023 – 2027) and Carbon Budget 5 (2028 – 2032). Note that the Carbon Budget 5 traded sector emission savings are lower than for Carbon Budget 4 as a result of electricity grid decarbonisation. Because we assume measures are reinstalled when they come to the ends of their lifetimes, the same amount of energy is saved over both Carbon Budget periods.

Table 9: Estimated savings in greenhouse gas emissions (net of the counterfactual), MtCO₂e

MtCO ₂ e	Cost cap of £3,500
Carbon Budget 4 – Traded Sector	0.2
Carbon Budget 4 – Non-traded Sector	0.4
Carbon Budget 5 – Traded Sector	0.1
Carbon Budget 5 – Non-traded Sector	0.4

6.8 Impact on landlords and the private rental market

55. The costs and benefits to landlords has been assessed. The monetised costs include capital costs and hidden costs, while the monetised benefit is the estimated property value uplift. The forthcoming Hedonic Pricing Study quantifies the difference in property value across different EPC bands. The study found a 0.09% difference in property value per percentage difference in SAP score. A previous study²⁹ also found the effect of an EPC label on property price and there is a growing global body of evidence³⁰ showing a link between a property's energy efficiency and its value. There is evidence³¹ suggesting that further benefits to landlords may include the reduction in void periods, the reduction in rent arrears as a result of lower tenant bills, and reduced maintenance costs, though these are difficult to accurately quantify. Responses to the consultation supported the view that these other benefits are important.

56. Landlords are the group that would bear the greatest costs that arise from amending the Regulations, as they would be responsible for funding the upfront cost of the installations required. They are also the biggest potential beneficiaries as improving the energy efficiency of their property's could result in a significant increase in property value, based on results from the forthcoming Hedonic Pricing Study (see below for further details). Table 10 shows the estimated average capital cost per property (in nominal terms) to landlords of either upgrading it to Band E or making as much progress as possible within the cost cap. It also shows the associated average hidden costs and average increase in property value. This compares against average (mean) gross rental income in the F and G-rated PRS of around £8,000 - £9,000 per year per property, based on the 2015/16 English Housing Survey, although there is significant variation across landlords.

Table 10: Estimated average costs and benefits to landlords from amending the Regulations (2017 prices)

Average (mean) cost per property	Cost cap of £3,500
Average capital cost for those achieving Band E or above	£1,200
Average cost for those making as much progress as possible towards Band E before applying for an exemption	£2,000
Average hidden cost per property	£150
Average increase in property value	£8,500

²⁹ <https://www.gov.uk/government/publications/an-investigation-of-the-effect-of-epc-ratings-on-house-prices>

³⁰ https://ec.europa.eu/energy/sites/ener/files/documents/20130619-energy_performance_certificates_in_buildings.pdf

³¹ <https://www.sustainablehomes.co.uk/publication/touching-the-voids/>

57. The average capital cost for landlords per home does vary between those that are able to achieve Band E compared to those that cannot. This is because those that do not reach Band E will need to install all the measures they can under the cost cap, while some of the properties that did reach Band E may have only needed one or two cheap measures to improve their SAP score enough. Some landlords may also incur financing costs to fund the measures (which have been accounted for in the cost benefit analysis). It is interesting to note that the average capital cost to landlords is always significantly lower than the cost cap. Also, landlords who are VAT registered would be able to claim VAT back, further reducing their costs. Some improvement costs can also be reclaimed against capital gains tax upon eventual sale of the property.
58. The capital costs (materials + labour + VAT) that fall on landlords outlined in Table 10 are only those costs that are subject to the cap. Landlords are also likely to bear the majority of the hidden costs of installing measures, such as researching which measures would be appropriate, contacting installers about undertaking the work, and 'make good' costs post-installation.³²
59. Table 10 also shows the potential increase in property value, assuming that a property increasing its energy efficiency rating has an increase in value that is the same as the difference in value observed between properties with different SAP scores analysed in the forthcoming Hedonic Pricing Study. The average increase in property value is significantly higher than the average landlord's cost.
60. The wider potential impacts on landlords are summarised below and in Annex D:
- **Size of the market:** a number of academic studies³³ have examined the relationship between regulation and the size of the private rental market across a number of countries, finding there to be an ambiguous connection. For example, the UK approach has been largely deregulatory and the PRS has grown substantially, however Germany has among the largest PRS in Europe but adopts a highly regulated approach. Although these studies were conducted before the Government announced that from April 2016 buy-to-let landlords will also face an additional 3% stamp duty charge, it is not anticipated that amending the PRS regulations would have a significant effect on the size of the market.
 - **Market rents:** in a transparent rental market with good information and informed consumers, landlords should in theory be able to command a rent premium as a result of offering prospective tenants a property with lower energy costs. However, at present the Government's assessment is that F and G-rated PRS properties make up a small section of the private rental market (around 6%), and that the majority of landlords will already be charging the maximum rent that tenants in the local area are willing to pay. This limits the extent to which landlords would be able to raise rents as a result of the amended regulations, which respondents to the consultation generally agreed with. The forthcoming Hedonic Pricing Study also did not find a statistically significant relationship between rent levels and EPC bands below Band D, though it did find that properties with an EPC rating of C commanded a higher rent than those with a rating of D.
 - **Displaced investment in the sector:** the drivers of investment in the PRS are complex, however we expect that the prospect of future rent gains or growth in the value of property are significant drivers. The amended PRS Regulations will result in more investment in energy efficiency, though there is limited evidence around the other landlord investment this might displace. Only a small share of the market is currently affected by the regulations so the overall impact on displaced investment will be small, and landlords will still need to maintain their properties in order to retain and attract tenants.

6.9 Impact on tenants

³² In keeping with recent PRS Regulations Impact Assessments and others involving the installation of domestic energy efficiency measures (such as the January 2017 Energy Company Obligation Impact Assessment), hidden costs are estimated using the 2009 report by ECOFYS *The Hidden Costs and Benefits of Energy Efficiency and Carbon Saving Measures*, available at: http://webarchive.nationalarchives.gov.uk/20111011153039/http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/saving_energy/analysis/1_20100111103046_e_@@_ecofyshiddencostandbenefitsdefrafinaldec2009.pdf

³³ Including one from the London School of Economics ([Scanlon & Kochan, 2011](#)) and another from the [University of Cambridge \(2012\)](#).

61. Overall, tenants are expected to be the net beneficiaries as it is not anticipated that landlords will be able to capture the property’s energy savings through higher rents (see Section 6.8). In cases where they do, we’d expect some of the benefits for tenants to be accrued by landlords instead. Tenants would be negatively affected to some degree by the hidden costs of installing energy efficiency measures (such as clearing rooms before measures are installed), though these are more than offset by a year’s worth of bill savings as shown in Table 11.³⁴ Section 6.6 sets out the estimated value of improvements in tenant health.

Table 11: Estimated average annual energy savings experienced by tenants in 2020 (2017 prices)

	Cost cap of £3,500
Average hidden cost per household	£80
Average (mean) annual energy bill saving per household	£180

6.10 Summary of Impact of £3,500 cap

Table 12: Summary of Impact of £3,500 cap

Policy Option	Net Present Value (£m)	Percentage of F and G-rated PRS homes reaching Band E in 2020	Estimated percentage-point change in fuel poor households at band E in England at 2020	Estimated total value of improvement in tenant health (£m)	Estimated average capital cost to landlords reaching EPC E or above (£/property)	Estimated average potential increase in property value (£/property)	Estimated average annual energy bill savings (£/property)	Non-traded carbon savings over CB4 (MtCO2e)
£3.5k cap	580	48%	2.3	29	1,200	8,500	180	0.4

³⁴ The bill savings estimates are based on central scenario from the latest published energy price projections in the Green Book supplementary guidance on valuation of energy use and greenhouse gas emissions for appraisal.

7. Business impact

7.1 Equivalent Annual Net Direct Cost to Business & Business Impact Target

62. The proposed amendments to the PRS regulations will result in increased costs to landlords, who are assumed to all be businesses (see section 7.2) in keeping with previous regulations affecting the sector³⁵. This means that the PRS regulations would change from a ‘zero net cost’ measure, as landlords can currently claim an exemption if they need to bear any costs themselves, to an ‘in’ measure as a result of the proposed amendments being made, as they will now bear these costs directly.
63. Direct costs determined to be in scope are:
- **Capital costs of installations** (parts, labour and VAT³⁶)
 - **Finance costs**
 - **Compliance costs (the cost of time taken by landlords to prove compliance with or apply for an exemption from the regulations plus familiarisation with amended regulations)**
 - **Hidden/hassle costs of installations**
 - **Operating costs**, excluding fuel (i.e. maintenance of central heating and solar PV only)
64. The direct costs to business are therefore the sum of each of the five components above, over the appraisal period of the policy (42 years). The main assumptions and evidence sources used for each component are set out in Annex C. Using the Department for Business, Energy and Industrial Strategy’s Impact Assessment Calculator,³⁷ the provisional Equivalent Annualised Net Direct Cost to Business (EANDCB) of the preferred policy option of a £3,500 cost cap is set out in Table 13 below, alongside the Business Net Present Value and Business Impact Target score³⁸. Note that the increased property value benefit has not been included.

Table 13: EANDCB and Business Net Present Value (£m)

	Cost cap of £3,500
Equivalent Annualised Net Direct Cost to Business (EANDCB) – 2014 prices	£34.5
Business Net Present Value – 2017 prices	-£968
Score against the Business Impact Test	172.5

7.2 Small and Micro Business Assessment

65. Table 14 sets out an estimate of the portfolio size for domestic landlords, drawing on data from the Ministry of Housing, Communities and Local Government’s Private Landlord Survey.³⁹ This shows that the majority (78%) of domestic landlords own a single property and 1% of landlords own 25 or more properties.⁴⁰

Table 14: Estimated distribution of property portfolios for private landlords

Number of properties	1	2-4	5-9	10-24	25-100	>100
Proportion of private landlords	78%	17%	3%	1%	1%	0%

³⁵ For example see the 2015 PRS Impact Assessment (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401382/150202_PRS_Final_Stage_Revised_For_Publication.pdf) and the recent consultation Impact Assessment on Domestic Heating Replacement Regulations (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/575300/Short_Term_Domestic_Boiler_2016_Initial_IA.pdf)

³⁶ VAT is not counted in the cost-benefit analysis (Table 2) as it is a transfer from landlords to the Exchequer, but landlords face this direct cost and therefore VAT is included as part of the capital costs when calculating the EANDCB.

³⁷ Available at: <https://www.gov.uk/government/publications/impact-assessment-calculator--3>

³⁸ The BIT is a cross-government target for the reduction of regulation on business.

³⁹ <https://www.gov.uk/government/statistics/private-landlords-survey-2010>

⁴⁰ This distribution is based on all PRS properties. Similar data for properties that are specifically, ‘F’ or ‘G’ rated are not available.

Classification of PRS Landlords as small and micro businesses

66. As most landlords in the domestic PRS only own one property, it seems appropriate to make the conservative assumption that all landlords in the domestic sector should be classified as small or micro businesses for the Small and Micro Business Assessment.
67. There are around 1.6 million domestic landlords in England and Wales.⁴¹ It should also be noted that while small and micro businesses comprise most of the sector, only landlords owning the least energy efficient properties (those F and G rated) required to make any improvements to their properties. This equates to around 6% (around 100,000) of businesses operating in the domestic private rental market (due to a lack of data on PRS ownership by EPC Band, we assume the distribution of property ownership for F and G rated properties is the same as that for the overall PRS). Given most landlords only own one property they are highly unlikely to require more than 49 staff.

Rationale for the non-exclusion of small and micro businesses from the Regulations

68. All domestic landlords are classified as small and micro business for the purpose of this assessment; therefore their exclusion would remove most, if not all, of the intended benefits of the policy. Many of the costs incurred by landlords as a result of the Regulations are likely to be on a per-property basis – meaning that landlords with small property portfolios (and therefore deemed to be small or micro businesses, as discussed above) will not be disproportionately burdened by the Regulations.
69. With the costs of understanding the Regulations, however, there are clear economies of scale – with landlords with large property portfolios able to spread the costs of installation or organising finance over a large number of properties.

Mitigating the impact on small and micro businesses

70. The proposed amendments discussed in this impact assessment will affect the same landlord cohort as those in scope of the 2015 Regulations, a majority of whom are likely to be small and micro businesses. The establishment of a cap on likely landlord costs is designed to moderate the effect of a requirement on these businesses to improve any sub-standard rental property to a minimum of EPC band E, even where no third-party funding is available. However, funding is likely to be available in at least some cases. For instance, the Green Deal scheme has been in operation since 2013, and continues to be available to landlords. While the Government ended public investment in the scheme in 2015, the Framework supporting the scheme remained in place for private investors wishing to enter the market. Since then, there has continued to be a number of Providers operating. Similarly, some local authorities periodically operate funding schemes for private landlords, and details of available support can be searched for on the new, Government endorsed Simple Energy Advice service. Landlord businesses whose tenants qualify for supplier obligation support may be able to access full or partial funding for higher value improvements (for instance, solid wall insulation or renewables) which will further mitigate the impacts for these landlords. The impacts, including estimated average costs, of improving substandard property to an EPC Band E, are set out in Table 10.
71. As discussed in the impact assessment for the 2015 regulations, it is possible that some of the burden faced by some small and micro landlords is partially offset through the use of letting agencies. These agencies may, in some instances, bear the costs of understanding the Regulation, and can therefore advise landlords using the agency about compliance. There is some evidence that agents are already offering these kinds of services in some cases. Agents are likely to have economies of scale as they may manage a number of properties on behalf of landlords. However, this will not offset the costs in all instances, with around 39% of landlords not using letting agencies when letting out a domestic property in 2017⁴². There is no evidence of whether

⁴¹ Estimate based on HMRC Survey of Personal Incomes 2014-15 which shows the number of landlords declaring income from letting their properties in the UK. Available at <https://www.gov.uk/government/statistics/personal-incomes-statistics-tables-31-to-311-for-the-tax-year-2014-to-2015> and converted to cover England and Wales only

⁴² <https://landlords.org.uk/news-campaigns/news/sudden-spike-in-use-letting-agents>

landlords of F and G properties are more or less likely to use letting agencies than those owning more energy efficiency properties.

72. Government has published comprehensive guidance to landlords and others with an interest in the minimum standard to ensure that businesses in scope can understand their obligations in as straightforward a manner as possible. This landlord guidance is available [here](#)⁴³, and will be updated and expanded in due course to reflect the changes to the domestic regulations made as a result of these amended Regulations. Advice and support, including an interactive minimum standards decision tree, is also available on Simple Energy Advice webservice [here](#). This advice information will also be updated to reflect the amended scheme provisions.

⁴³ www.gov.uk/government/publications/the-private-rented-property-minimum-standard-landlord-guidance-documents

8. Risks and uncertainties

73. The impacts of the amended PRS regulations are uncertain due to a range of factors. The main factors identified are the capital cost of measures, energy prices, compliance costs, enforcement costs, and the stock in scope.

8.1 Capital costs

74. The extent to which landlords make energy efficiency improvements will depend on the costs they face against the proposed cost cap. The analysis in this IA draws on the most up to date evidence available on capital costs, but these may change in future – for example as a result of innovation. The High and Low NPV estimates for the £3,500 cost cap reflect the impact of using different capital cost assumptions (low and high respectively, according to the ranges outlined in Annex C). Capital cost assumptions are altered to estimate the High and Low scenario of the preferred option, because capital costs not only have a significant impact on the NPV but also on other key variables, such as the cost to landlords and the proportion of PRS properties achieving Band E. Table 15 provides additional detail on the impact that varying the capital cost assumptions have on key estimates under the £3,500 cost cap.

Table 15: Estimated change in percentage of homes reaching EPC Band E and average costs under high and low capital cost assumptions

	Low cost assumptions	Central cost assumptions	High cost assumptions
Net Present Value (£m)	836	580	430
Benefits (£m)	1,637	1,488	1,430
Costs (£m)	801	908	999
Percentage of homes in scope achieving EPC Band E	54%	48%	46%
Percentage of homes in scope taking action but not achieving EPC Band E	46%	52%	54%
Average (mean) capital costs for those achieving EPC Band E	£1,100	£1,200	£1,400
Average (mean) capital costs for those not achieving EPC Band E	£1,800	£2,000	£2,000

75. The sensitivities in Table 15 show that if the costs landlords face are higher than those assumed under the central scenario, fewer would achieve Band E. Higher costs of measures mean that more landlords would find that they could not make further progress towards Band E without breaching the cost cap, and this is reflected in the lower proportion of properties reaching Band E compared to the central scenario. Under a scenario where costs of measures are lower, a larger number of landlords can achieve Band E within the cost cap.

76. The higher the cost of measures, the higher the average capital cost for those achieving Band E. There is, however, a positive NPV for all cost assumptions, with the low cost scenario having the highest NPV. Table 16 shows the number and type of measures installed under the three capital cost assumptions:

Table 16: Estimated number of measures installed under the £3.5k cost cap, for different capital cost assumptions

Type of installation	Low cost assumptions	Central cost assumptions	High cost assumptions
Loft insulation	60,000	53,000	54,000
Cavity Wall Insulation	26,000	25,000	25,000
Solid Wall Insulation	0	0	0
Floor insulation	62,000	60,000	50,000

Draught-proofing	115,000	118,000	122,000
First Time Central Heating	5,000	0	0
Electric Storage Heater	89,000	94,000	86,000
Heating Controls	189,000	197,000	193,000
Hot Water Cylinder Insulation	95,000	98,000	99,000
Hot Water Thermostat	65,000	67,000	56,000
Low energy lighting	142,000	139,000	145,000
Double glazing	28,000	17,000	8,000
Solar PV	21,000	10,000	1,000
Total	899,000	879,000	839,000

8.2 Energy prices

77. Future energy prices are uncertain, and as outlined above the value of energy saved by the amended regulations is a major driver of the benefits. Throughout this Impact Assessment the central price projections are taken from the Green Book supplementary Guidance on valuing energy and greenhouse gas emissions. Table 17 below shows the sensitivity of the analysis to “high” and “low” price projections.

Table 17: Estimated Net Present Value under Central, High and Low Energy Price Assumptions (£m)

	High energy price assumptions	Central energy price assumptions	Low energy price assumptions
Net Present Value (£m)	732	580	437
Benefits (£m)	1,640	1,488	1,345
Costs (£m)	908	908	908

78. The sensitivity to higher and lower energy price assumptions shows that the amended PRS Regulations generate positive net present values under all price scenarios, with NPVs highest for the high energy price assumption because of the higher value of energy savings.

8.3 Enforcement costs

79. There is uncertainty around the cost to Local Authorities of enforcing the amended PRS Regulations. It is assumed that net enforcement costs of these amendments are zero, given the uncertainty around these costs and that Local Authorities are required to enforce the current PRS regulations. Table 18 shows there would be a negative effect on NPV were enforcement costs to be doubled (without doubling the enforcement costs in the counterfactual).

Table 18: Estimated Net Present Value of policy options under high enforcement cost assumption

	Central enforcement cost assumption	High enforcement cost assumption
Net Present Value (£m)	580	541
Benefits (£m)	1,488	1,488
Costs (£m)	908	947

8.4 Compliance costs

80. Assumptions are made on the amount of time it will take landlords to comply with the regulation amendments. For instance, this includes familiarisation with the changes, and applying for cost exemptions. Table 19 shows the change in NPV if the amount of time taken to comply with the amended PRS Regulations doubles, while the original counterfactual compliance time remains the same. Higher compliance costs result in a small decrease in NPV.

Table 19: Estimated Net Present Value of policy options under high compliance assumptions

	Central compliance assumptions	High compliance assumptions
Net Present Value (£m)	580	573
Benefits (£m)	1,488	1,488
Costs (£m)	908	915

8.5 Stock in scope

81. 10 per cent of the stock in scope is removed to account for HMOs (Houses in Multiple Occupation) and listed buildings not requiring an EPC and therefore being exempt from the regulations. Table 20 compares NPVs where twice as many households are removed from those in scope, and an assumption that none of the PRS EPC band F and G households are out of scope. The proportional change in NPV is approximately equal to the proportional change in the stock in scope, though all NPVs remain positive.

Table 20: Estimated Net Present Value of policy options under different stock in scope assumptions

	Central assumption	Double stock out of scope	No stock out of scope
Net Present Value (£m)	580	515	644
Benefits (£m)	1,488	1,323	1,653
Costs (£m)	908	807	1,009

8.6 Property value uplift

82. The forthcoming Hedonic Pricing Study found that there is a 0.09% difference in property value per percentage change in SAP score. However, despite growing evidence of the positive link between EPC rating and house price, it is difficult to control for all factors affecting property value. Property value uplift is not included in NPV calculations as this is largely a transfer price effect.

83. Table 21 shows the average house price increase under the central assumption of 0.09%, compared with the

House Price Impact Assumed	Average increase in house price (£)
Central house price increase	8,500
Low house price increase	4,300

low assumption of half the difference in property value per change in SAP score.

Table 21: Estimated benefits of increased house prices to landlords

House Price Impact Assumed	Average increase in house price (£)
Central house price increase	8,500
Low house price increase	4,300

8.7 Combination of risks and uncertainties

84. Table 22 compares the NPV under central assumptions against a scenario which results in the lowest NPV based on the findings from Sections 4.1 – 4.5. High capital cost assumptions are combined with low energy prices, high compliance and enforcement costs, and less stock in scope. The scenario that results in the lowest NPV still results in a large, positive NPV.

Table 22: Estimated NPV under central assumptions against a low scenario NPV

	Central assumptions	Low NPV scenario

Net Present Value (£m)	580	215
Benefits (£m)	1,488	1,148
Costs (£m)	908	933

9. Monitoring and evaluation

An evaluation of the PRS MEES regulations commenced in June 2017, this evaluation was conceived with the flexibility to account for changes in the regulations such as those set out in this impact assessment.

The evaluation has two central aims:

- Aim 1 – provide evidence to inform future policy development to improve the energy efficiency of domestic properties, required from 2018 onwards.
- Aim 2 - provide evidence of the impact of the scheme to support a regulatory review, required in 2023.

In relation to the requirements of the regulatory review, the evaluation will make use of existing datasets (such as the English Housing Survey) to provide a robust evaluation of the impact on the energy efficiency of the PRS housing stock, including establishing the causation between the regulations and any observed impacts. Additional assessments will evaluate the wider impacts on landlords and the property market, including property purchase and rental prices.

Alongside the impact evaluation, a process evaluation will collect evidence from landlords, tenants and other stakeholders to assess how the regulations are being implemented on the ground. This part of the evaluation will provide early insight (from 2019) into the potential impacts that the regulations are having through the assessment of self-reported behaviours.

The impact evaluation included in the regulatory review, as this relates to impacts on the housing stock, will consider evidence up to the year 2020/21 and will likely include a degree of uncertainty at that point in time. This is the first year in which all landlords with F and G properties, not just those entering a new tenancy agreement, are required to have been improved in line with the regulations. To support the regulatory review, the English Housing Survey and Welsh Housing Conditions Survey data will be interrogated to assess the number of properties improving to an E rating. By comparing individual survey estimates' confidence intervals, it is possible to assess whether the survey estimates in one year are statistically higher or lower than in previous years. At this stage of the evaluation available data will not be able to support an impact methodology that assesses whether the PRS MEES regulations can be said to have caused any observed changes in the housing stock.

The implementation of the policy and time lag in accessing data dictate that a full test of compliance, including a difference-in-differences analysis impact evaluation, can be conducted in winter of 2023 when data from 2020/21 and 2021/22 is available. This is in line with the suggested methodology for using English Housing Survey data, where two years of data are required to provide sufficient statistical power to assess impacts on smaller sub-groups of property types⁴⁴. This means that the impacts reported in the regulatory review will be updated in a publication scheduled for spring 2024.

⁴⁴ http://doc.ukdataservice.ac.uk/doc/8067/mrdoc/pdf/8067_testing_significant_change.pdf

Annex A. Policy background, objectives and rationale for intervention

A.1 Policy background

1. Private rented properties are among the least energy efficient in the housing stock (see 'Scale of the Problem' Section A.4). This means that the sector accounts for a disproportionate number of households in fuel poverty, some of the coldest homes in the housing stock, and some of the most cost-effective opportunities to cut carbon emissions and energy bills.
2. The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015 contain several provisions to raise energy efficiency standards in the Private Rented Sector (PRS). The key provision is the Minimum Level of Energy Efficiency (Part 3 of the Regulations) which provides that: from April 2018 domestic and non-domestic privately rented properties in England and Wales must meet a minimum energy efficiency standard of EPC E in order to be let. The standard applies to all privately rented property let on a qualifying tenancy type, and which is legally required to have an EPC. The minimum standard will take effect from the point at which a new tenancy is issued, or where an existing tenancy is renewed. The standard will then apply to all relevant properties, even where there has been no change in tenancy, from 1 April 2020 in the domestic sector - this is referred to as the 'backstop' date.
3. The current regulations require landlords to install measures which can be funded with no upfront and no net cost to the landlord. The existing Regulations provide that measures will involve no upfront or net cost where they can be fully paid for using Green Deal finance, supplier obligation funding (meaning the Energy Company Obligation (ECO) or its successor(s)), or other third party funding (for example Local Authority grants). Green Deal finance, in many cases in combination with supplier obligation support, was anticipated to be the main route for funding improvements under the existing Regulations.
4. Following the closure of the Green Deal Finance Company to new business in 2015, the Regulations, if not amended, are likely to be significantly less effective at driving improvements to the domestic private rental stock than anticipated. The Green Deal Finance Company was sold in early 2017 and the new owners have started the process of introducing a new Pay As You Save finance offer to the market, including a landlord focused offer. However, there is no guarantee that this will lead to an offer which a majority of landlords might access in the medium term. A fuel poverty focused successor to the current supplier obligation, ECO, will deliver energy efficiency improvements from 2018 to 2022. However, the increasing fuel poverty focus of this phase of ECO means that funding will only be available to private rental properties where the tenants are in receipt of certain benefits and tax credits, which rules out a majority of the sector. In addition, ECO support to PRS F and G properties will only be available for higher cost measures (solid wall insulation, first time central heating, and renewables), meaning that funding will be unavailable for the kinds of measures which could be installed under the £3,500 cap.
5. Given the levels of uncertainty around availability of permitted finance, it is likely the existing PRS Regulations would result in a majority of domestic landlords claiming an exemption from the prohibition on letting substandard property, diluting the intended impact of the minimum standard. The majority of relevant exemptions under the current Regulations, including the exemption relating to lack of suitable finance, last for five years, and domestic landlords have been able to registering exemptions since October 2017.

A.2 Policy objectives

6. The Government's overarching policy objective is to ensure that the 2015 Regulations are effective in driving investment in the energy efficiency of the worst performing buildings in the domestic Private Rented Sector (PRS). The proposed amendments seek to ensure that, in the absence of a Green Deal finance mechanism, the 'minimum level of energy efficiency' provisions deliver energy efficiency improvements additional to that which may be delivered through Energy Company Obligation funding alone. Effective operation of the domestic PRS regulatory framework will support two of the Government's statutory objectives:

- **Tackling fuel poverty:** raising energy efficiency standards in the PRS to EPC Band E by 2020, mirrors the Government's interim target to raise as many fuel poor homes in England to energy efficiency Band E by the same date.⁴⁵ The Regulations would therefore make a positive contribution to the Government's fuel poverty commitments for England, as well as the Welsh Government's own statutory target for 2018.⁴⁶
- **Reducing energy demand and greenhouse gas emissions:** improving the energy efficiency of privately rented homes will cut energy use and the greenhouse gas emissions that result from it, contributing to the Government's climate change commitments.⁴⁷

A.3 Broader policy objectives

7. The installations driven by amending the 2015 Regulations will also contribute to a number of broader Governmental objectives:

- **Increase the security of the UK's energy supply:** reducing domestic energy use means lower demand for imported fuels and power generation, including at times of peak energy demand.
- **Support economic growth, jobs in the green construction industry and investment:** Increased demand for energy efficiency measures is likely to support productivity growth and jobs within the green construction industry and the wider supply chain. Greater competition within these markets may also spur innovation, lowering the end costs of installing measures, and help sustain jobs. There could be benefits in the wider macro-economy associated with some of the bill savings experienced by households being spent on other goods and services.
- **Improving public health outcomes:** the least energy efficient homes are typically also the coldest homes (see Figure A3 below), and cold homes can lead to poor health outcomes, with a resulting resource pressure on health services. Improving the energy efficiency of F and G-rated PRS homes will lead to improved health outcomes for households and generate resource savings for health service providers.

A.4 Scale of the problem

8. There were an estimated 4.9 million domestic PRS properties in England and Wales in 2016-2017 (the latest available data from the 2015-16 English Housing Survey⁴⁸) comprising around 24% of the total domestic housing stock. This makes it the second largest form of tenure after owner occupied.
9. The Government's official means of measuring energy efficiency in buildings is the Standard Assessment Procedure (SAP)⁴⁹, which rates domestic properties on a scale from 1 (very high energy costs) to 100 (very low energy costs). This scale is in turn banded on a scale from 'G' (very high energy costs) to 'A' (very low energy costs). Between 2005 and 2016 the average SAP rating in the PRS increased from 46 (an EPC Band E) to just over 60 (an EPC Band D). This improvement over time is partly due to an increase in the sector's size over this period, and is shown in Figure A1, whereby a large number of more efficient properties have entered the sector and improved the average efficiency. New properties were responsible for most of the increase in PRS supply, meaning that by 2015 around 17% of PRS properties in England were post-1990 vintage compared to around 16% for the owner occupied sector. Newer properties tend to have higher energy efficiency ratings, due to more stringent building regulations.

⁴⁵ The fuel poverty target for England and its interim milestones are measured using the Fuel Poverty Energy Efficiency Rating (FPEER), which is based on the same Standard Assessment Procedure methodology used to generate an EPC rating for domestic properties. More information is available here:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/332236/fpeer_methodology.pdf

⁴⁶ For more information see: DECC (2015) *Cutting the cost of keeping warm – a fuel poverty strategy for England*, <https://www.gov.uk/government/publications/cutting-the-cost-of-keeping-warm>; Welsh Government (2010) *Fuel poverty strategy 2010*, <http://gov.wales/docs/desh/publications/100723fuelpovertystrategyen.pdf>

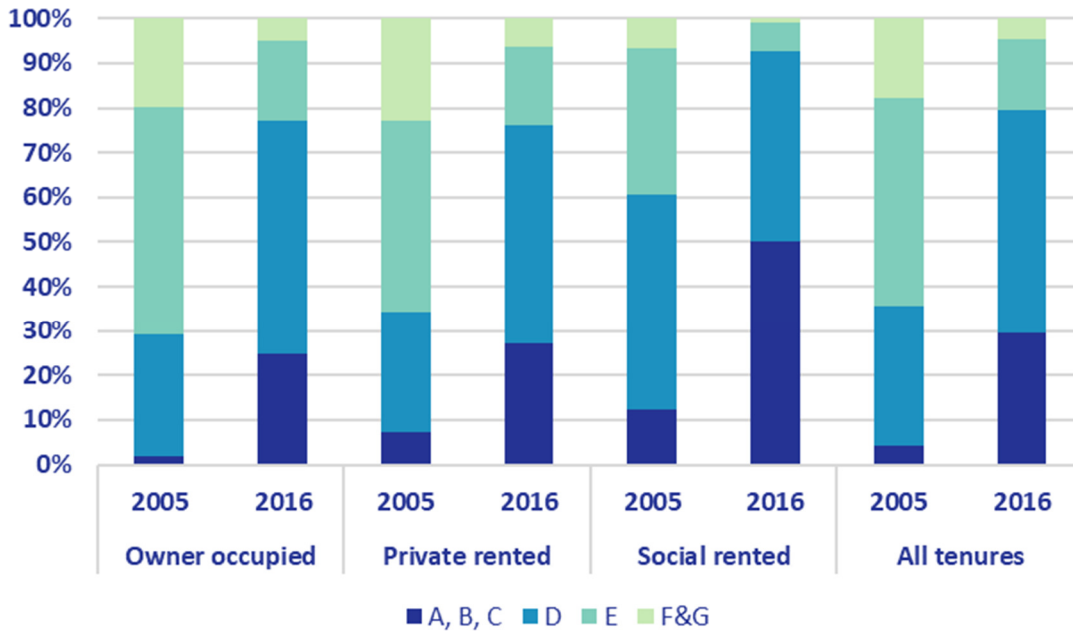
⁴⁷ For more detail on the UK Government's climate change commitments, see: <https://www.gov.uk/guidance/carbon-budgets>

⁴⁸ There has not been a housing survey in Wales since 2008, with figures for Wales for 2016-17 taken from <https://stats.wales.gov.wales/Catalogue/Housing/Dwelling-Stock-Estimates/dwellingstockestimates-by-localauthority-tenure>

⁴⁹ For further information see: <https://www.gov.uk/guidance/standard-assessment-procedure>

10. There remains a stock of older properties in the PRS which have the lowest energy ratings of all domestic properties. The sector has a high proportion of dwellings constructed pre-1919 – 34% compared with 20% in the owner occupied sector. Figure A1 below shows the distribution of EPC ratings by tenure in 2005 and 2016. Although there has been a reduction in the proportion of F/G PRS properties over this period, this will partly be due to the growth in the PRS sector with more new build and energy efficient properties entering the sector.

Figure A1: Distribution of EPC Ratings in England by Tenure in 2005 and 2016



Source: English Housing Survey 2015-16

11. The distribution of EPC ratings within the PRS, and a comparison with other tenures, is shown in Figure A2. The PRS has the highest percentage of homes with the lowest energy efficiency ratings.

Figure A2: Distribution of properties by EPC Ratings and housing tenure (England), 2016



Source: English Housing Survey 2015-16

12. The English Housing Survey produces statistics on the number of PRS properties in England using dwelling and household weights. Dwelling weights would include properties which are vacant and not currently let (these would not require a EPC and are exempt from the regulations), while the statistics based on household weights only include properties which are let and so require a valid EPC and are subject to the PRS regulations.⁵⁰ We therefore use household weights to estimate the number of F or G-rated PRS properties in scope of the regulations. Figures for Wales have been included by uplifting figures for England by around 9% - based on official government statistics, the number of PRS households in Wales is around 9% of the number in England. There has not been an equivalent household survey in Wales since 2008.⁵¹
13. Based on the 2015-16 English Housing survey, if all properties in England and Wales in the PRS were required to obtain or display an EPC when they are let out, we estimate there were around 320,000 domestic PRS properties in England and Wales with an EPC rating of Band F or Band G in 2017. Removing properties not in scope, we estimate that at the beginning of 2017 there are estimated to be approximately 290,000 F or G-rated PRS properties in England and Wales in scope of the regulations.

A.5 Properties not in scope of the regulations

14. The domestic PRS Regulations only apply to those properties that are let on assured, regulated or domestic agricultural tenancies and which are legally required to have an Energy Performance Certificate (EPC) when they are marketed for let (or for sale). EPC exclusions for certain buildings are set out in the accompanying MHCLG guidance documents⁵², and typically apply to Houses in Multiple Occupation (HMOs) and certain listed buildings/ancient monuments. However the PRS regulations do apply where a legally required EPC exists for the property and only part of the property is let (such as an individual room within a House in Multiple Occupation). The PRS regulations also apply to listed buildings that are legally required to have an EPC.

Houses in Multiple Occupation (HMOs)

15. A property is classified as a House in Multiple Occupation⁵³ if at least 3 tenants live in the property, forming more than 1 household, where tenants share toilet, bathroom, or kitchen facilities. Local authority statistics published by MHCLG⁵⁴ for England combined with Welsh government estimates of HMOs in Wales⁵⁵ suggest that around 10% of PRS properties in England and Wales fall under this definition of HMO. Whether an HMO is required to obtain an EPC depends on the particular set-up of the property and/or tenancy agreement.

Listed buildings and ancient monuments

16. Data on the specific tenure of these building types is not available. However, according to the 2015-16 English Housing Survey the PRS accounts for around 24% of privately owned homes (with the other 76% being owner occupierd), therefore a pro-rata estimate for the PRS would mean that around 24,000 privately rented properties are either a listed building or ancient monument (of the 100,000 within the private domestic sector). Not all of these will be exempt from the legal requirement to have an EPC at point of let (or sale), but even if all were exempt, this would still represents less than 1% of the PRS housing stock.
17. Combining HMOs with EPC exempt listed buildings and ancient monuments we exclude 10% of PRS properties from our modelling of the impacts of the amended regulations.

⁵⁰ We will seek to gather evidence during the consultation on the extent to which currently vacant domestic properties are likely to enter the PRS in the period 2018 – 2020.

⁵¹ Calculated on the latest household estimates for England and Wales as published in the 2018 fuel poverty National Statistics report, available here: <https://www.gov.uk/government/statistics/annual-fuel-poverty-statistics-report-2018>
Wales figures for 2016-17 can be found here: <https://statswales.gov.wales/Catalogue/Housing/Dwelling-Stock-Estimates/dwellingstockestimates-by-localauthority-tenure>.

⁵² <https://www.gov.uk/government/publications/energy-performance-certificates-for-the-construction-sale-and-let-of-dwellings>

⁵³ For a definition of a HMO, see: <https://www.gov.uk/house-in-multiple-occupation-licence>

⁵⁴ <https://www.gov.uk/government/statistical-data-sets/local-authority-housing-statistics-data-returns-for-2016-to-2017>

⁵⁵ <https://statswales.gov.wales/Catalogue/Housing/Hazards-and-Licences/HousesInMultipleOccupation-by-Area>

A.6 Rationale for Government intervention

Market failures and behavioural barriers

18. There are a range of barriers that prevent households making energy efficiency improvements to their homes, with some particularly relevant to the Private Rented Sector. These have been well documented in previous PRS Impact Assessments,⁵⁶ but can be summarised as follows:
- **Misaligned incentives** – for properties in the PRS, the costs of installing energy efficiency measures traditionally fall to landlords, while the benefits of lower energy bills and a warmer property usually fall to tenants. This generates a split-incentive, whereby landlords have little motivation to invest in upgrading the energy efficiency of their property as they do not enjoy the benefits. In principle, in a well-functioning market, rent levels should fully reflect differences in a property’s energy efficiency. This would overcome the issue, however the presence of other market failures, such as imperfect information on the costs and benefits of energy efficiency measures, mean rents may not fully reflect differences in energy efficiency.
 - **Externalities** – households generate carbon emissions through using energy in the home (e.g. heating). They experience the benefit of doing so (e.g. a warm home), but the climate change costs resulting from the emissions are not fully reflected in the price they pay. This leads to overconsumption of fossil fuel-based energy and low demand for energy efficiency because the costs and benefits to society of energy use are not aligned.
 - **Incomplete or asymmetric information** – the energy efficiency market is characterised by a lack of trusted information for consumers, who are not well informed about energy efficiency measures. Householders may not be aware of the potential benefits, or be less well informed about the performance of measures than those looking to sell them. As a result, households may heavily discount the potential benefits to them from energy efficiency improvements and choose not to take them up.⁵⁷
 - **Access to capital** – the upfront cost of energy efficiency measures means landlords must choose between investing in them or using the same money for other purposes (the ‘opportunity cost’).
19. While tenants have the option to invest in energy efficiency upgrades themselves, short tenancy lengths can mean that in many instances they are unlikely to live in a property long enough for the benefits of energy efficiency to be worth the initial investment. Table A1 shows that around a quarter of tenants have lived in their current place of residence for under a year, and the median length of stay for all tenants is around two years.

Table A1: Length of residence in the Domestic Private Rented Sector

	< 1 Year	1 Year	2 Years	3-4 Years	5-9 Years	10-19 Years	20-29 Years	> 30 Years
Private Renters (%)	26	15	16	17	16	7	2	2

Source: English Housing Survey, 2015-16

⁵⁶ For example see the 2017 Consultation Impact Assessment (Section 2):

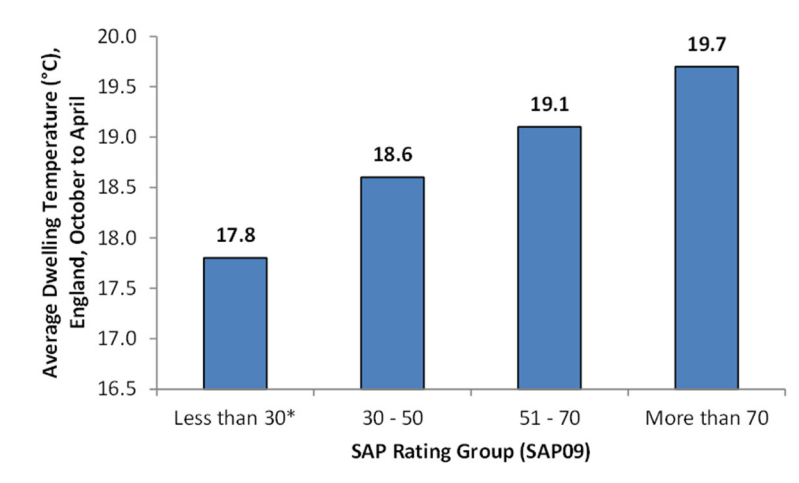
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/669214/PRS_Consultation_stage_IA.pdf

⁵⁷ Royal Institute for Chartered Surveyors (2010) “Energy Efficiency and Value Project” noted a lack of consistent or easy to access information on energy efficiency and found that this influenced a low level of demand for energy efficiency measures. Consumer research undertaken in 2011 for the Department of Energy and Climate Change showed that after requests for lower heating costs, having access to convincing information about benefits and information from a trusted source are the main reasons given for what would encourage people to make their homes more energy efficient.

Equity considerations

20. The above barriers to improving energy efficiency are compounded by concerns that a disproportionate share of F or G-rated PRS homes are lived in by households in fuel poverty. In England around 11% of all households are fuel poor, around 19% of all PRS households are fuel poor, and over 40% of F or G-rated PRS households are fuel poor. F or G-rated PRS households have an average fuel poverty gap of £1,130 compared to an average of £326 across all households. Households on lower incomes typically face the greatest trade-offs between using their constrained resources to adequately heat their homes and spending on other basic essentials. Upgrading the energy efficiency of the dwelling is the most sustainable and cost-effective means of alleviating fuel poverty.
21. Living at low temperatures poses a risk to health, with a range of negative morbidity and mortality impacts associated with exposure to the cold. The Marmot Review Team report on cold homes and health⁵⁸ and the Hills Fuel Poverty Review⁵⁹ set out the strong body of evidence linking low temperatures to these poor health outcomes – in particular the cardiovascular and respiratory illnesses that drive the number of excess winter deaths each year (around 34,000 in England and Wales in 2016/17).⁶⁰
22. Poor energy efficiency standards, and high energy costs driven by poor energy efficiency, have been shown to be robustly linked to lower indoor temperatures (see Figure A3). Households in the PRS facing the barriers to upgrading their energy efficiency risk being ‘locked in’ to low temperatures and the subsequent negative health outcomes. Improving the energy efficiency of homes has been demonstrated to improve indoor temperatures significantly, reducing the risk to tenants of poor health outcomes.

Figure A3: Average dwelling temperatures during winter heating season (2011), by SAP rating group⁶¹



⁵⁸ Marmot Review Team (2011). *The Health Impacts of Cold Homes and Fuel Poverty*. Available at: <http://www.instituteofhealthequity.org/projects/the-health-impacts-of-cold-homes-and-fuel-poverty>

⁵⁹ Hills (2011). *Fuel Poverty: The Problem and Its Measurement*. Available at: http://sticerd.lse.ac.uk/dps/case/cr/CASEREport69_Executive_Summary.pdf

⁶⁰ Office for National Statistics (2017). *Excess Winter Deaths Statistics*. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/excesswintermortalityinenglandandwales/2016to2017provisionaland2015to2016final>

⁶¹ The SAP scale (1 – 100) is used to determine EPC bands. For example, Band G covers ratings 1 to 20, F covers 21 to 38 and so on. The group “Less than 30” refers to the very least efficient homes (all G-rated and some F-rated).

Annex B. Counterfactual and policy overlaps

1. The impacts of the amended PRS Regulations have been assessed against a 'Do Nothing' baseline – the counterfactual. There are two main aspects to the counterfactual that affect the net costs and benefits (including the direct ones to business):

Number of landlords applying for an exemption

2. The impacts of the consultation policy proposals have been assessed against a 'Do Nothing' baseline – the counterfactual. Given that under the existing PRS Regulations landlords can apply for an exemption if they face upfront or net costs from installing measures, and that Green Deal Finance is not currently available at scale, an assumption that no activity would occur in the PRS as a direct consequence of the existing PRS Regulations is made. Exceptions to this delivery assumption are those improvements that occur as a result of the natural replacement of boilers and low energy lighting as they come to the end of their natural lifetime. Some measures would also be installed by landlords themselves.
3. This is a conservative assumption as some landlords may choose to meet the Regulations by spending from accumulated funds, however, there is no evidence at present relating to how many landlords would do this.

Measures delivered to private rented homes under other policies

4. Counterfactual uptake of low energy lighting is taken from the modelling underpinning Ecodesign. Uptake of conventional heating measures assumes replacement with Ecodesign compliant condensing boilers as existing boilers reach the end of their lifetimes. No boilers are expected to be installed as a result of the amended PRS Regulations so this assumption has no impact on the model.
5. The ECO modelling estimates the impact of that policy on different household types, and provides an estimate of the level of uptake that could be expected under ECO. Because ECO can only be applied to high cost measures in the PRS, we do not model any overlap between ECO and the amended PRS Regulations.
6. As the Feed in Tariffs for landlords installing Solar PV is low, we assume that there would not be significant take up of this measure in PRS F and G rated properties in the absence of the PRS Regulations. Measures which are covered by the Renewable Heat Incentive e.g. air source heat pumps and biomass boilers have high up front capital costs so installation of these measures would not typically be in the scope of the amended PRS Regulations.

Annex C. Modelling approach and key assumptions

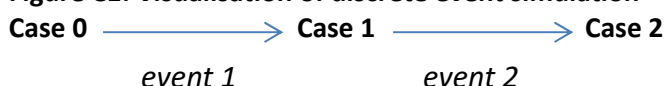
1. This annex sets out the modelling approach used in this impact assessment, the detail of the costs and benefits analysed in the cost-benefit analysis, and the key assumptions made.

C.1 Modelling approach

Background to the National Household Model (NHM)

2. The modelling of landlord actions under the amended PRS regulations was undertaken using the National Household Model (NHM). This is a discrete event simulation model; a flexible modelling method characterised by the ability to represent complex behaviour within, and interactions between, individuals, populations and their environments. The term *discrete* implies that such a model moves forward in time at discrete intervals, from one event to another for instance, and that these events are mutually exclusive. Only the event being simulated by the model can change the state of a case over time (illustrated in Figure C1). For example in this instance, *cases* can be thought of as PRS F and/or G rated properties whilst *events* represent the installation of energy efficiency measures.

Figure C1: Visualisation of discrete event simulation



3. The NHM models energy-related behaviour for domestic dwellings using a SAP-based energy calculation. This simulation environment allows the energy and carbon savings from installing measures to homes across housing stock in England and Wales to be modelled. SAP-based energy savings estimates are aligned with the real life energy savings of different measures using in use factors. The dwelling data is derived from the English Housing Survey (EHS) 2014.

Modelling Approach

4. There were 4 main steps to modelling the impact of amending the PRS Regulations: deriving the 2019 stock, modelling the counterfactual (installations we would have expected to happen anyway), modelling the policy, and calculating the net impact of the policy.
 - Deriving the modelled stock of F and G-rated PRS properties for the beginning of 2020:
 - The NHM started with the housing stock from the 2014 EHS.
 - Measures were then installed in line with installations from National Statistics⁶² for years where this information is available.
 - Incandescent / halogen bulbs were replaced with low energy lighting at a rate of 6% pa. to the end of 2019 (in line with Ecodesign estimates of lighting upgrades).
 - Modelling the counterfactual:
 - This started from the derived model stock of F and G-rated PRS properties at the end of 2019.
 - As with the modelled stock derivation, the 6% pa. incandescent / halogen lightbulb replacement rate continued in 2020, at which point it increased to 13% until 2030 (again, in line with Ecodesign estimates of lighting upgrades).
 - Boilers were replaced at a rate of 8% each year (broadly in line with a 12 years boiler lifetime).
 - No other counterfactual installations were assumed.
 - Modelling the scenario
 - Again, this started from the derived model stock of F and G-rated PRS properties at the end of 2019.
 - Combinations of all feasible measures were generated for each of the modelled dwellings. Our methodology created combinations of measures by selecting up to 1 measure from each group shown in Figure C2.

⁶² Household Energy Efficiency Statistics (including technical potential update), available at: <https://www.gov.uk/government/collections/household-energy-efficiency-national-statistics>

- The model selected the cheapest package of measures that improves the property to an EPC rating of E at a total cost below the specified cost cap. If such an outcome could not be achieved, the model selected the package of measures that maximised the property's SAP rating whilst remaining below the specified cost cap (illustrated in Figure C3).
 - Counterfactual installations continued until 2030 as before.
 - Once both a counterfactual and scenario model run had been produced, the net impact of the policy could be calculated by subtracting the counterfactual from the scenario. This accounted for bringing forward the installation of measures that would have happened if the policy had not been implemented. Finally, the results were scaled to our expected stock in scope (see Annex A for description). By carrying out this scaling outside the NHM, a more robust sample size could be maintained within the NHM.
5. The biggest change since the Consultation Impact Assessment was the new measure groups (Figure C2). Previously, the model could choose measures from five groups of measures. This meant excluding measures that were not mutually exclusive (for example, choosing between draught proofing and low energy lighting). The new 11 measure groups not only mean more measures could be installed under a given cost cap, they also allowed for more cheap measures to be installed. This in turn resulted in a higher proportion reaching EPC E and more benefits associated with energy savings. Other changes included expanding the types of heating controls modelled, and updating cost assumptions to reflect our latest evidence⁶³.
6. The output from the model allowed the changes which have occurred as a result of the policy to be examined by comparing the stock before and after the 2020 scenario measure installations. Changes over the entire policy appraisal period, net of the counterfactual, could also be assessed to calculate the net present value of the policy.

Figure C2: Each package of installed measures can include a measure from each box

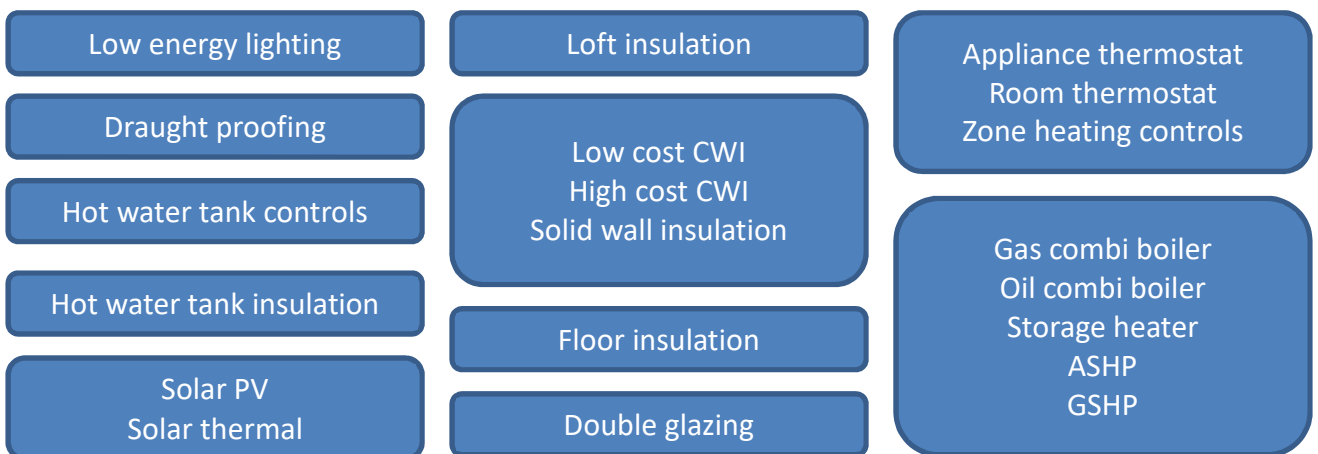
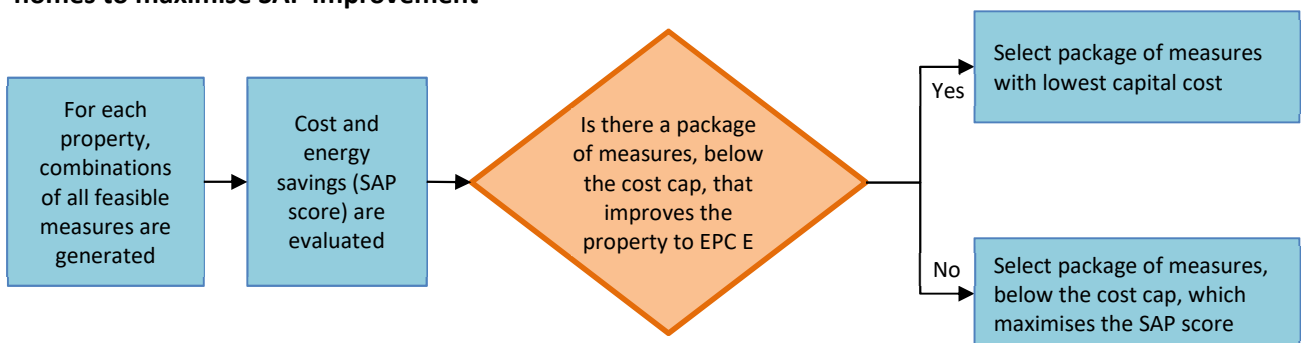


Figure C3: Choice function which the NHM deploys to allocate the optimal package of measures to PRS homes to maximise SAP improvement



⁶³ An internal study completed at the start of 2018, which involved interviews with installers, manufacturers, and other industry association input on the costs of heat generation measures and controls.

C.2 Costs and benefits included in the cost-benefit analysis

7. **Installation costs.** This is the largest individual cost of the Regulations. When installations come to the end of their life, it is expected that replacement will be made. It is assumed that installation costs are incurred again at that stage and these costs are included in the NPV.
8. For the purposes of this IA, we do not assume any reductions in the real costs of installations over time except for Solar PV systems, which are assumed to fall by around 7% between 2015 and 2020, based on projections by Parsons Brickerhoff.⁶⁴ In practice, technological improvements and increased competition may lower the costs of installing energy efficiency measures and therefore lower the costs of the Regulations. We also do not assume the costs to rise over time, as it is assumed that the supply chain can meet the additional demand for energy efficiency measures.
9. **Operational costs.** Covers the annual cost of running heating measures and solar PV installations. These costs include servicing and maintenance costs (see Section C.3 for further details).
10. **Financing Costs.** Supplementary guidance to the Green Book on valuing energy use and greenhouse gas emissions⁶⁵ advises that “the costs of private financing would generally be considered to be a real social cost”. This is because financing costs may affect private sector allocation decisions. When capital is tied up in a specific project, alternative profitable use of such capital is ruled out and there is a foregone social benefit. Finance costs have been included in this impact assessment, ensuring consistency with guidance, and mirroring assumptions used in the latest Energy Company Obligation Impact Assessment whereby we assume a social interest rate of 5.5%⁶⁶ over 5 years.
11. **Hidden costs.** These include the time taken by landlords to research potential installations, to liaise with the installer, prepare the property for installation, oversight of the installation, as well as clean-up or redecoration costs associated with the installation. Some hidden costs may also fall to the tenant, for example, clearing rooms where work is required or learning how to use new systems. A detailed breakdown of the different costs associated with installing different measures was used to allocate the split between landlord and tenant for different measures. These costs are estimated to be small in the majority of cases.
12. **Cost of understanding the regulations.** Landlords will face costs in understanding the Regulations. The cost to landlords is associated with the time they spend reading the guidance. This is assumed to take, on average, one hour for domestic landlords. There may be a cost to letting agents in understanding the Regulations, though these are likely to be small and have not been monetised.
13. **Compliance costs.** Landlords will also incur a time cost in demonstrating compliance or applying for an exemption from the regulations when this is required (see Section C.3 for further details).
14. **Administration and enforcement costs.** Local authorities will be required to administer and enforce the PRS Regulations, however, there is considerable uncertainty in the costs required to do so. Several pilots to explore different enforcement options with local authorities are due to start towards the end of 2018 and will provide much more detailed information on enforcement costs. For this Impact Assessment, we assumed that the amended PRS Regulations would not result in a change to the administration and enforcement costs when compared to the existing PRS Regulations. As a result, the amended PRS Regulations have a net zero administration and enforcement cost compared to the counterfactual. Until the enforcement pilots have concluded, our best estimate of the absolute level of this cost is still that presented in the 2015 Impact Assessment for the existing PRS Regulations⁶⁷.

⁶⁴ Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/456187/DECC_Small-Scale_Generation_Costs_Update_FINAL.PDF

⁶⁵ Available at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

⁶⁶ 146. The Committee on Climate Change have previously undertaken research on the appropriate means of estimating the opportunity cost of capital where private funds are used to achieve social aims. They found that the appropriate for individual financing of social aims was in the region of 3.5% to 7.5%. We use the mid-point of this range, 5.5%, as the assumed private interest rate assumption. The CCC report is available here: <http://archive.theccc.org.uk/aws/Time%20preference,%20costs%20of%20capital%20and%20hidden%20costs.pdf>

⁶⁷ <https://www.gov.uk/government/consultations/private-rented-sector-energy-efficiency-regulations-domestic>

15. **Energy savings benefits.** The installation of energy efficiency measures reduces energy used. This has been monetised in accordance with Green Book supplementary guidance on valuing energy use and GHG emissions.
16. **Air quality improvements and reductions in greenhouse gas emissions benefits.** The reduction in the amount of energy that needs to be used improves air quality and reduces traded and non-traded carbon emissions. Reductions in carbon emissions help meet the UK's legally binding carbon targets, while improvements in air quality reduce adverse health impacts, and long-term environmental impacts (including climate change). These benefits have been calculated in accordance with Green Book supplementary guidance.
17. **Comfort taking benefits.** Energy efficiency measures reduce the amount of fuel required to deliver a given level of energy service, meaning that some households will heat their homes to a higher temperature, for a longer period, or heat more rooms in their homes. This is valued at retail energy prices which act as a proxy for the willingness of consumers to pay for the additional comfort.

C.3 Key input assumptions

Capital costs

18. Table C1 presents the cost of the different measures (excluding heating) which may be applied to properties⁶⁸. For major installations such as cavity wall insulation, loft insulation, solid wall insulation the costs are the same as those used for the most recent Energy Company Obligation Impact Assessment⁶⁹, with adjustments made to include the cost of VAT (which most landlords would be expected to need to pay, but energy companies would not be expected to). For Solar PV installations, capital costs are calculated as a function of roof area based on data from Renewable Energy Consumer Code (RECC)⁷⁰.

Table C1: central non-heating capital cost assumptions used in the modelling, by dwelling type (2017 real prices)

Measure Description	Dwelling Type							
	Small Flat	Large Flat	Small Semi-detached House	Large Semi-detached House	Small Detached House	Large Detached House	Small Mid-terrace House	Large Mid-terrace House
Loft insulation	£189	£452	£242	£389	£326	£672	£231	£357
Low cost cavity wall insulation	£399	£452	£555	£693	£714	£998	£483	£530
High cost cavity wall insulation	£1,680	£2,625	£2,835	£4,515	£2,415	£3,885	£2,835	£4,515
Hot water cylinder insulation (tank)	£36	£36	£36	£36	£36	£36	£36	£36
Draught proofing	£50	£86	£81	£129	£109	£225	£76	£120
Low energy lights	£36	£60	£60	£84	£72	£96	£60	£84
Cylinder (hot water tank) thermostat	£189	£189	£189	£189	£189	£189	£189	£189
Appliance thermostat	£189	£189	£189	£189	£189	£189	£189	£189
Room thermostat	£217	£217	£217	£217	£217	£217	£217	£217
Zone controls	£729	£729	£729	£729	£729	£729	£729	£729
Double/secondary glazing	£2,880	£4,320	£6,600	£7,680	£7,080	£9,960	£4,680	£6,000

⁶⁸ <https://www.gov.uk/government/publications/domestic-cost-assumptions-what-does-it-cost-to-retrofit-homes>

⁶⁹ <https://www.gov.uk/government/consultations/energy-company-obligation-eco3-2018-to-2022>

⁷⁰ For more information, see: <https://www.recc.org.uk/>

Solid wall insulation (external)	£5,565	£7,035	£8,190	£8,820	£10,710	£12,075	£7,140	£7,875
Floor insulation	£504	£860	£813	£1,287	£1,095	£2,249	£761	£1,193

19. Table C2 breaks down the capital cost assumptions for gas and oil boiler installations, as well as first time central heating associated with each fuel type and storage heaters by size. Again these cost assumptions are consistent with those used in the most recent Energy Company Obligation Impact Assessment, with adjustments made for VAT, landlords not being able to achieve the same economics of scale as energy suppliers, and characteristics of the PRS F and G rated housing stock.

Table C2: central capital cost assumptions for heating measures used in the PRS modelling (2017 real prices)

	Gas Boiler	Gas with First Time Central Heating	Oil Boiler Upgrade	Oil with First Time Central Heating	Storage Heaters
kW Capacity					
12	£2,460	£4,182	£4,284	£5,998	£1,758
15	£2,520	£4,284	£4,284	£5,998	£2,277
18	£2,580	£4,386	£4,284	£5,998	£2,796
24	£2,700	£4,590	£4,392	£6,149	£3,834
30	£2,820	£4,794	£4,680	£6,552	£4,872

20. High and low capital cost assumptions of $\pm 30\%$ on the prices above was used to estimate our low and high NPV scenarios in Section 8. This range captures the likely range of costs based on evidence from commissions research and observed delivery data.⁷¹

Operational costs

21. Operating costs relate to the annual maintenance of heating systems and solar PV. Drawing on assumptions used for the most recent Energy Company Obligation and Feed-in Tariff Impact Assessments (for central heating and solar PV respectively), we use cost assumptions of £100 per year for central heating and £24 per kW of installed capacity for solar PV.

Landlord costs of understanding the regulations and compliance

22. We assume that 1 hour of familiarisation time is required per landlord, in order for them to understand the amended PRS Regulations.

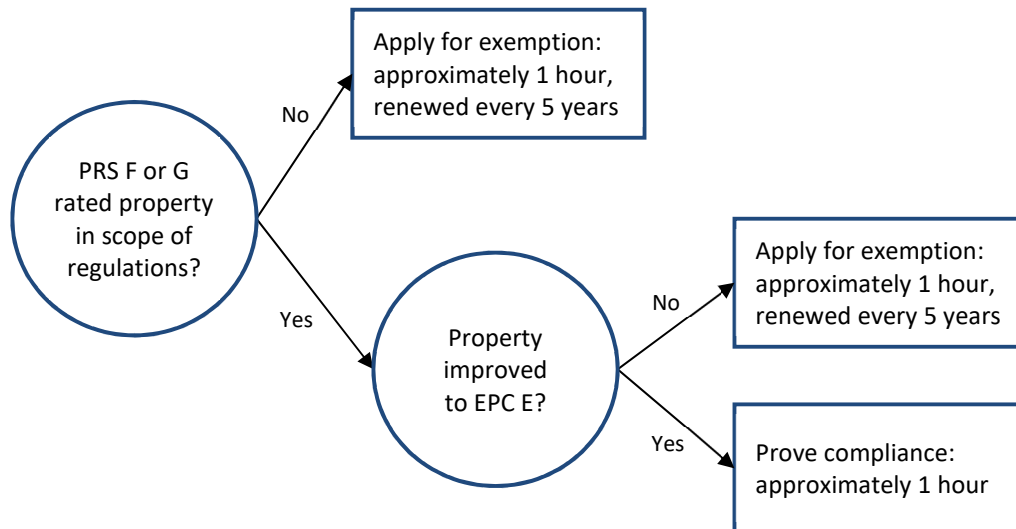
23. Under the original regulations, we assumed that landlords would apply for a cost exemption if they were unable to source funding for improvements. This was expected to take approximately 1 hour per property and would need to be renewed every 5 years. This is the counterfactual against which the compliance cost under the amended PRS Regulations can be compared

24. Under the amended PRS Regulations there are three main compliance outcomes expected (summarised in Figure C4):

- The property reaches EPC E, at which point the landlord can provide evidence showing the measures that would improve their property to an EPC rating of E have been installed. This is expected to take approximately 1 hour.
- The landlord has carried out work on the property, but it has not reached EPC E. In this case the landlord will have to provide evidence that all suggested measures under the cost cap have been installed. This is expected to take approximately 1 hour and needs to be renewed every 5 years.
- An estimated 10% of F and G-rated PRS properties will be out of scope of the regulations for other reasons. We have assumed that these exemptions will again take approximately 1 hour and need to be renewed every 5 years.

⁷¹ For more information, see: <https://www.gov.uk/government/publications/domestic-cost-assumptions-what-does-it-cost-to-retrofit-homes> and <https://www.gov.uk/government/consultations/energy-company-obligation-eco3-2018-to-2022>

Figure C4: Compliance routes modelled



25. The majority of PRS properties are owned by landlords owning fewer than 5 properties. These landlords are likely to use their rental income as supplementary income to their main job and are likely to do much of the work required around these regulations in their free time. The Department for Transport estimate the value of free time at £6.04/hr⁷², and this has been used to monetise the time costs outlined above. There will be some professional landlords who may carry out this work or hire staff to carry out this work. While this group is likely to have a higher value associated with their time taken for familiarisation and compliance, they represent a minority of landlords and will also benefit from economies of scale. As a result, using the median salary for a property professional is likely to overestimate costs. However, compliance and familiarisation costs are an area where there is limited evidence and the potential impact on the results is explore in greater detail in Section 8.
26. Obtaining a new EPC is not a requirement of the original or amended regulations. As a result, it is assumed that landlords do not bear this cost due to the policy amendment.

Hidden costs of installations

27. The hidden costs of installing measures are drawn from the ECOFYS report⁷³, consistent with the data used in the ECO Help to Heat Final Stage Impact Assessment and tailored to the characteristics of the PRS F and G stock. This report details the additional time taken to install different measures. The value of landlord time follows the same assumption as the landlord compliance cost. Although it is likely that landlords would carry out work during void periods, we have conservatively assumed a hidden cost to tenants as if they were living in the house. The value of tenant time also follows the same value of free time as landlords. The hidden costs are summarised in Table C3.

Lifetime of measures

28. The lifetime of measures used in the PRS modelling are consistent with those used in the most recent Energy Company Obligation Impact Assessment⁷⁴. These lifetimes are shown in Table C3.

In use factors

⁷² Values of time and vehicle operating costs:

http://webarchive.nationalarchives.gov.uk/20140304105410/http://www.dft.gov.uk/webtag/documents/expert/pdf/U3_5_6-Jan-2014.pdf

⁷³ See the ECOFYS (2009) "The hidden costs and benefits of domestic energy efficiency and carbon saving measures" report for further details

http://webarchive.nationalarchives.gov.uk/20121217150421/http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/saving_energy/analysis/1_20100111103046_e_@@_ecofyshiddencostandbenefitsdefrafinaldec2009.pdf

⁷⁴ <https://www.gov.uk/government/consultations/energy-company-obligation-eco3-2018-to-2022>

29. In use factors scale the SAP energy savings so that they better represent the observed savings of particular measures. In use factors from Ofgem have been used where available⁷⁵. The in use factors for other technologies have been taken from other internal data sources on the real world effectiveness of particular measures and discussions with BEIS scientists. These In use factors are shown in Table C3.

Table C3: Hidden costs, In use factors, and measure lifetimes assumed in the PRS modelling (2017 prices)

Energy efficiency measure	Estimated hidden cost to landlords (£)	Estimated hidden cost to tenants (£)	In use factor	Lifetime (years)
Loft insulation	125	90	0.65	42
Cavity Wall Insulation	105	40	0.65	42
Solid Wall Insulation (external)	275	25	0.67	36
Floor insulation	150	170	0.85	42
Draught-proofing	75	0	0.85	10
First Time Central Heating	110	70	-	42
Gas boiler	25	0	0.75	12
Oil boiler	25	0	0.75	12
Electric Storage Heater	25	0	0.75	12
Heating Controls	50	20	0.5	12
Hot Water Cylinder Insulation	5	0	0.85	10
Hot Water Thermostat	50	20	0.9	12
Low energy lighting	5	0	1	10
Double glazing	50	0	0.85	20
Solar PV	155	45	1	30

C.4 Additional modelling assumptions

30. The PRS model within the NHM uses consistent assumptions with other models used for related policies – such as the latest Energy Company Obligation Impact Assessment⁷⁴ – with two main exceptions.

31. The PRS model includes **Solar Photovoltaic (PV)** panels in the selection of measures which can be applied to F or G-rated homes as part of the policy. With this type of measure, however, factors such as roof coverage, efficiency, and total energy produced and/or sold back to the National Grid have to be considered to accurately reflect the impact this measure's inclusion may have on SAP ratings and carbon savings. Considerable research, testing and collaboration with BEIS engineers and scientists was undertaken, and assumptions on efficiency and proportion of generation exported are consistent with those used in modelling for Feed-in Tariffs. This results in the following assumptions being included in the model;

- the proportion of roof area that can be covered by Solar PV per household is assumed to be 30%,
- 50% of the energy produced by the panels is assumed to be used by the household with the other 50% being exported back to the grid,
- the efficiency of any Solar PV installation is taken to be 12%,
- the take-up of the measures is capped at 50% of the total stock under assessment - this accounts for households with unsuitable orientation, overshadowing, etc.

32. The other exception is **boiler sizing** and the allocation of **First Time Central Heating (FTCH)**. Previous research has indicated that average domestic boiler size is considered to be between 24 – 28kW, and anything in excess of 60kW to be considered 'non-domestic'. However, the PRS policy is focused specifically on the lower extremes of the property distribution- EPC F/G homes. In some cases, these may constitute larger, older properties which require larger boiler sizes to meet a household's heat demand. As the PRS is focused on domestic properties, boilers included in the measures are capped at a size of 60kW.

33. The application of **FTCH** is applied as a function of boiler installation size and cost. By default, the National Household Model accounts for the cost of FTCH based on floor area. For the PRS, we have chosen to modify

⁷⁵ https://www.ofgem.gov.uk/system/files/docs/2018/01/eco2t_measures_table_-_jan_2018_-_v1.2.pdf

this to incorporate data on delivered costs of FTCH that are used for ECO modelling. This applies scaling factors to the cost of boiler installations to account for the additional charges a landlord may incur through installing a central heating system – such as new radiators, piping work and labour costs. These scaling factors are based on delivery data from the Warm Front Scheme.

34. Over recent years BEIS has been collaborating with a team of leading experts from University College London and London School of Hygiene and Tropical Medicine to develop a model to estimate the change in occupants' health from the installation of energy efficiency measures (resulting from changes in the indoor temperature and pollutant exposure). The model that was developed is the HIDEEM model.
35. HIDEEM uses the English Housing Survey as a basis for the analysis. The model is built from a number of inter-related modules covering a building's permeability properties and individual health conditions. Pollutants included in the model that impact on health are: particulate matter, tobacco smoke, radon gas and mould growth. The health conditions linked to these pollutants include heart and circulatory diseases, cancers and strokes, as well as respiratory illness and common mental disorders. HIDEEM uses the Quality Adjusted Life Year (QALY) method to monetise these health impacts. This involves placing a value on the change in a person's health over time.
36. More details on HIDEEM can be found in Section 6 of the analytical annex to Fuel Poverty: A Framework For Future Action⁷⁶.

⁷⁶ Available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211137/fuel_poverty_strategic_framework_analytical_annex.pdf

Annex D. Impact of amending the regulations on landlords

The Impact of Regulations on the size of the PRS

1. Studies on the relationship between regulation and the size of the Private Rented Sector suggest the relationship is ambiguous. A comprehensive 2012 study by the Cambridge Centre for Housing and Planning Research (CCHPR), University of Cambridge (*The Private Rented Sector in the new century – a comparative approach*) examined the role of regulation in the Private Rented Sector across 11 European countries, and suggested that: “the outcomes of regulatory regimes depend on the general context in which they operate as well as on finding a balance between too much interference which deters investment and too little protection for tenants”.
2. This CCHPR study noted that deregulation has been the norm in most European countries at least since the 1980s, but that in some countries, particularly Germany and Switzerland, the Private Rented Sector had remained large and stable over time, despite a high degree of regulation. These countries, it found, had amongst the largest sectors providing mainstream housing for families as well as for more mobile households.
3. This study also notes that in many countries, decreases in regulation have historically been associated with decreases in the size of the sector. The study also reported that England was the only country reviewed where the Private Rented Sector had been growing rapidly in recent years. This was attributed, in part, to deregulatory trends in the country, but more significantly to “the development of a dedicated range of mortgage products for residential landlords, which fuelled investment in the PRS since the mid-1990s”.
4. The CCHPR report suggests that regulation governing housing quality is the oldest form of government intervention in the housing sector. It notes that these standards tend to increase with economic growth and improvements in the standards of living. It also notes that, at the present time, housing quality regulations demonstrate an increasing emphasis on energy efficiency and sustainability, which in turn carry increased capital costs. The report does not identify any specific consequences resulting from housing quality regulation, however it does suggest that “regulation that allows landlords who upgrade their properties to increase rents by more than would otherwise be permitted can be an effective way to incentivise investment in the quality of the PRS.” This point is only relevant to situations where rent is regulated, which is not the case across the majority of the PRS stock in England and Wales.
5. For non-regulated tenancies in the UK Landlords may be able, subject to general market restrictions, to pass improvement costs (including costs of energy efficiency improvements) on to tenants in the medium to long term through modest rent increases. Many landlords may also be able to recover expenditure on energy efficiency either through tax deductions (dependent on the measure), upon future sale of the property (through reduced capital gains tax) or through capital appreciation of the asset.
6. Discussing potential negative impacts on tenant choice of standard and quality regulation, the CCHPR study referred to Ball (*The Future of Private Renting in the UK: Social Market Foundation 2004*) who argued that the imposition of high minimum standards in housing could limit housing options for some private tenants who are willing to accept lower quality housing for a lower price. He further suggested that low price–low quality dwellings may serve as stepping stones for some people, enabling them to afford a better home later on or to move into a different locality. Turner and Malpezzi (2003), summarise the existing studies on the relationship between regulation and the size of the PRS sector, stating “regulation per se is neither good nor bad. What matters are the costs and benefits of specific Regulations under specific market conditions”
7. Aside from potentially placing restrictions on tenant choice, there is limited evidence that quality and standards regulations, and in particular energy-efficiency focused regulations, would have a significant impact on the size or health of the PRS in England and/or Wales. In particular, as the proposed amendments discussed here and in the accompanying consultation document would impact around 5% of the private rented housing sector (especially once exemptions are accounted for) it is unlikely that a regulatory requirement on landlords to meet some or all of the costs of reaching or maintaining a minimum standard of EPC E would materially affect the sector.

Investment within the PRS

8. Investment in the Private Rented Sector is similar to other types of investment – namely that the expected net present value of an investment should be at least as high as substitute investments, and ideally should pass some minimum rate of return. Landlords will consider the costs and benefits to them before deciding on whether to invest in the sector.
9. Research suggests that the most important factor in whether or not to invest in the PRS is the anticipated capital appreciation, with rental income of secondary consideration. For example, a report by Shelter⁷⁷ (summarising the findings of other studies) states: “The overwhelming majority of returns over the next fifteen years are likely to stem from house price changes rather than rental income. This has been the model for residential investment over the past decade or more and seems unlikely to change. As a result, changes to rental terms and conditions have only a marginal effect on overall investment returns” (paragraph 7.1.18)
10. With capital gains expected to be the key driver of investment within the domestic PRS, the Regulations are unlikely to hamper investment. For example, there is international research suggesting that improving the energy efficiency of properties increases a property’s value and/ or rent levels.

Potential Investment Displacement

11. Investment in energy efficiency may potentially displace other productive investments. This situation could arise, for example, if landlords were credit constrained, and therefore had a limited amount of funds to invest in their properties. However, there is evidence that PRS landlords do generally have better access to funds than the general population, suggesting that investment in energy efficiency improvements could be made in many cases without necessarily displacing other investment.
12. A 2013 study by the Strategic Society Centre (*Understanding Landlords a study of private landlords in the UK using the Wealth and Assets Survey* – derived from the nationally representative dataset: *the Wealth and Assets Survey 2008-10.*) suggested that:

PRS Landlords had greater financial wealth than both non-landlord homeowners and the general adult population, with over a quarter (26%) holding £70,000 or more. This can also be shown by the mean and median value of total financial assets held by PRS Landlords, which was £75,103 and £20,500 respectively, over twice as high as the figures for non-landlord homeowners (£36,934 and £8,105 respectively) and all adults aged 16 or more (£22,981 and £2,300 respectively). This indicates that PRS Landlords have access to a significant amount of financial wealth in addition to the value of the properties they own.

13. A recent Energy Saving Trust (EST) report: *Trigger points: a convenient truth* surveyed a range of property owners, including PRS landlords, to understand attitudes to incorporating energy-saving improvements within existing or planned property improvement projects. The survey also examined willingness to stretch the refurbishment budget to pay for some energy-efficiency measures – the ‘energy saving stretch’. The report noted that, despite significant landlord scepticism around the value of installing energy-saving improvements, nine out of ten claimed to be willing to stretch their budgets to include an element for energy-saving measures. The report noted that the average stretch envisaged by landlords is nine per cent – which worked out at an average of £1,118. The report also noted:

Private landlords are planning bigger refurbishment projects, and planning to spend more on each refurbishment project, than homeowners. Though they are more sceptical about energy efficiency than owner-occupiers, they accept the logic of fitting energy-saving measures alongside other refurbishment jobs.

⁷⁷ https://england.shelter.org.uk/data/assets/pdf/file/0004/569641/Jones_Lang_LaSalle_PRS_Shelter_report.pdf

14. The University of Cambridge CCHPR report discussed above considered levels of financial management literacy amongst landlords. This concluded that the majority of PRS Landlords have comparatively high levels of financial resilience and suggests that they manage their finances sufficiently to 'cope with substantial income shocks', as well as unplanned purchases associated with their investment property.
15. The reports discussed above do not represent every financial eventuality which a landlord may face, nor do they necessarily speak for the comparatively small proportion of landlords who own property currently at EPC F or G. Nevertheless, they suggest that investment in energy efficiency improvements of either the voluntary or obligatory kind is unlikely to postpone or displace other investment in a majority of cases.

Impact on Rents and Rent affordability

16. Current BEIS analysis suggests that demand for housing within the Private Rented Sector is relatively unresponsive to rent levels. This is partly due the perceived inability of tenants to obtain suitable alternative accommodation in either the owner occupier or social housing sector. However, in the case of the proposal discussed in this impact assessment, rent levels are not expected to be materially affected by the imposition of improvement costs on landlords of EPC F & G rated properties due to the relatively small proportion of the landlord population required to act (around 5% of the overall PRS sector).
17. According to DCLG analysts landlords are typically price takers, rather than price setters, and the 5% of domestic PRS landlords affected by this proposal may struggle to remain competitive if they sought to recover costs by raising rents significantly above the average rate for their local market. Evidence suggests that rental levels are more likely to be affected by changes which affect a greater proportion of the market, such as changes in mortgage rates.

Impact on PRS property values

18. A number of studies both from abroad and in the UK have shown a robust link between higher standards of energy efficiency and increased property values. For example, a forthcoming study for the English rental housing market found that EPC Band D-rated rental homes command around a 10% sale premium compared to F or G-rated homes.
19. Landlords may, therefore, benefit from improved capital value as a result of the amended regulations, but this will vary depending on the property and only if they look to sell in future – we therefore do not seek to quantify this potential impact here.