Department for
Business, Energy
& Industrial Strategy

RENEWABLE HEAT INCENTIVE: BIOMASS COMBUSTION IN URBAN AREAS

Consultation

October 2018

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Contents

1. General Information

Purpose of this Consultation

In the Clean Air Strategy published in May 2018, the government committed to consult on restricting new biomass installations in urban areas under the Renewable Heat Incentive. This document seeks views on this proposed restriction and how it should be implemented.

Published: 16 October 2018

Deadline for responses: 27 November 2018

Enquiries to: RHI Team, Department for Business, Energy & Industrial Strategy, 1 Victoria St London, SW1H 0ET. Email: rhi@beis.gov.uk

How to respond: Your response will be most useful if it is framed in direct response to the questions posed, though further comments and relevant evidence are also welcome. We encourage respondents make use of the online e-Consultation CitizenSpace platform to respond to this consultation wherever possible.

This platform can be found at:

https://beisgovuk.citizenspace.com/heat/rhi-biomass-combustion-in-urban-areas

Responses submitted by email or in writing to the specified addresses above will also be accepted.

Scope and Territorial extent: This consultation relates to the Domestic and Non-Domestic Renewable Heat Incentive schemes which operate in England, Scotland and Wales. It does not relate to the separate Renewable Heat Incentive scheme for Northern Ireland. BEIS will share relevant responses with the Scottish and Welsh governments.

Confidentiality and data protection

Information provided in response to this call for evidence, including personal information, may be subject to publication or disclosure in accordance with access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want information that you provide to be treated as confidential please say so clearly in writing at the point of submitting your consultation response outlining why you regard the information you have provided to us as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

We will summarise all responses and place this summary on the GOV.UK website[1]. This summary will include a list of names or organisations that responded but not people's personal names, addresses or other contact details.

Quality assurance
This consultation has been carried out in accordance with the Government's Consultation Principles. If you have any complaints about the consultation process (as opposed to comments about the issues which are the subject of the consultation) please address them by email to: beis.bru@beis.gov.uk.

2. Introduction

Air pollution is the top environmental risk to human health in the UK, and ranks alongside cancer, heart disease and obesity as a threat to public health.

In recent decades we have made major efforts to tackle pollutants from industry, power and transport sectors. Air pollution has reduced significantly since 2010 – emissions of toxic nitrogen oxides have fallen by almost 27% and are at their lowest level since records began. The UK continues to meet all current international and EU emission reduction targets.

We have national emission reduction commitments for overall UK emissions of five damaging air pollutants. These are:

- fine particulate matter (PM2.5) [2]
- ammonia (NH3)
- nitrogen oxides (NOX)
- sulphur dioxide (SO2)
- and non-methane volatile organic compounds (NMVOCs)

Our national emissions targets set ambitious reduction goals for 2010, 2020 and 2030. The UK has met the current targets since 2011[3].

But there is still more to do. The more stringent targets that we have set for 2020 and 2030 aim to cut the harm to human health by half. The government's draft Clean Air Strategy, published in May 2018, set out an ambitious package of measures focussing on the major remaining sources of pollution.

Burning biomass in boilers, such as those supported through the Renewable Heat Incentive (RHI), contributes to airborne pollution. They produce fine smoke particles and other toxic air pollutants including benzene, formaldhyde, acrolein and polycyclic aromatic hydrocarbons.

[1] https://www.gov.uk/government/consultations/renewable-heat-incentive-biomass-combustion-in-urban-areas
[2] Fine particulate matter, or $PM_{2.5}$, refers to airborne solid or liquid particles, with a diameter of 2.5 micrometers or less.
[3] Defra, 'Emissions of air pollutants in the UK, 1970 to 2016' (2018), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/681445/Emissions_of_air_ pollutants_statistical_release_FINALv4.pdf

Although biomass boilers are significantly cleaner than burning solid fuel on open fires or in stoves, they still produce much higher levels of particulate matter than gas- or oil-fired alternatives. As outlined in the Clean Air Strategy, these particles can enter the bloodstream and internal organs, risking long term health issues as well as having more immediate impacts on some people, such as exacerbating breathing problems or triggering asthma attacks.

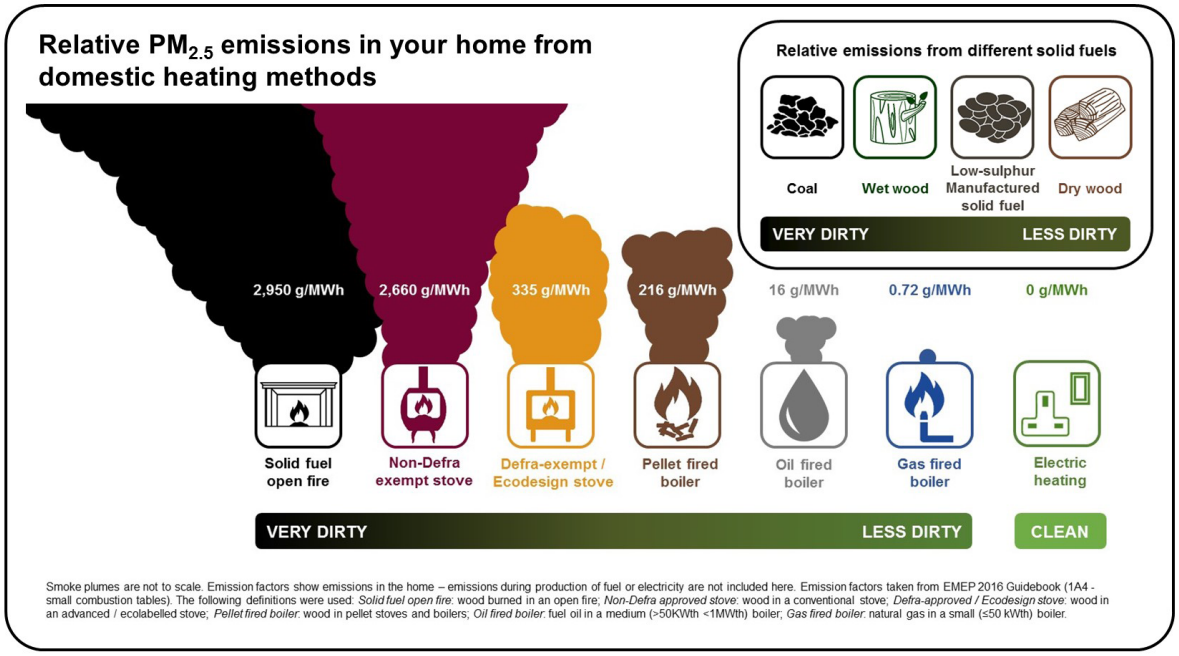


Figure 1. Fine particles ($PM_{2.5}$) from pellet fired boilers compared to other forms of domestic heating.
Source: Clean Air Strategy

Further detailed comparisons can be seen in Annex C.

Particulate pollution is most acute in urban areas. Here, local sources such as transport and domestic burning are present, in addition to background pollution from more distant sources, leading to higher measured pollution levels. Population density is also higher in urban areas, resulting in higher exposure. It makes sense, therefore, to avoid incentivising burning in urban areas. The draft Clean Air Strategy committed the government to "*minimise the air quality impacts of the RHI;* including by *consulting on excluding biomass from the RHI if installed in urban areas which are on the gas grid.*"

The RHI is targeted on, but not restricted to, off-gas grid areas. Not only is gas lower carbon than most conventional alternatives (direct electric, coal-based solid fuel or oil) but its relatively lower cost makes the economic case for low carbon alternatives much harder. The majority of RHI biomass installations are not in urban areas but, as Table 1 shows, a small but significant proportion has been accredited in on-grid, urban areas, and will thus be contributing to urban air pollution.

Table 1 – Urban-Rural Biomass deployment in the RHI (June 2018)

Technology	Urban*			Rural*			
	On-grid	Off-grid	Sub-Total	On-grid	Off-grid	Sub-Total	Total
Non-domestic biomass & CHP	2077	608	2685	2508	11763	14271	16956
	12.2%	3.6%	15.8%	14.8%	69.4%	84.2%	
Domestic biomass	582	290	872	1325	10427	11752	12624
	4.6%	2.3%	6.9%	10.5%	82.6%	93.1%	

*Based on urban classifications as detailed in Annex A.

**Domestic totals may not sum as they include a small number of installations with unknown location on rural-urban splits

Source: RHI deployment statistics to June 2018

3. Proposals:

The government proposes that biomass combustion installations should no longer be eligible for RHI support if they are located in urban areas that are on the gas grid. This would apply to new applications from the time amending regulations come into force but would not apply to existing RHI installations. These proposed changes would apply to domestic and non-domestic biomass installations of all sizes, and also to biomass combined heat and power (CHP) installations. The government proposes that this restriction does not include biogas. Biogas does not create the same level of particulate and other pollutant emissions as biomass combustion.

A new biomass installation will not be permitted in the RHI at any site which is urban and has access to the gas network.

Urban areas in England and Wales are defined according the 2011 Rural Urban Classification published by the Office of National Statistics[4]. Those for Scotland are defined in the Scottish Government Urban Rural Classification[5]. For this policy proposal we are using a common threshold of settlements of 10,000 or more to define urban areas. Further details of the applicable categories are outlined in Annex A. The classification of any given location can be determined at postcode level using the ONS Postcode Directory look-up tool[6] or data files available from these sites.

Access to the gas network can be determined at postcode level using industry data[7]. A map showing off-grid areas is at Annex B. It should be noted that there are large numbers of urban properties which have no gas connection but are in areas served by the gas network. These properties would count as “on grid” for the purposes of this restriction.

Larger biomass plant are subject to planning controls and much tighter emission controls than smaller plant. However, even with these controls in place, they will still emit pollutants to air. This consultation therefore asks whether such plant should or should not be included in any restriction on RHI biomass.

Existing RHI biomass plant

The proposed restriction above would only apply to new applications. The proposed restriction above would only apply to new applications. There is, however, anecdotal evidence that some existing RHI biomass installations emit pollutants to air at far higher levels than those specified by the applicable emission standards. One reason for this is the use of inappropriate fuels such as wood that is wet or contaminated. Another is equipment that is not maintained properly, resulting in its environmental performance reducing over

[4] https://www.gov.uk/government/statistics/2011-rural-urban-classification
[5] http://www.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification
[6] https://onsdigital.github.io/postcode-lookup/
[7] https://www.xoserve.com/wp-content/uploads/Off-Gas-Postcodes-V2.xlsx

time. This consultation, therefore, seeks views on whether mandatory maintenance checks for existing and new installations should be introduced into the RHI.

4. Consultation Questions

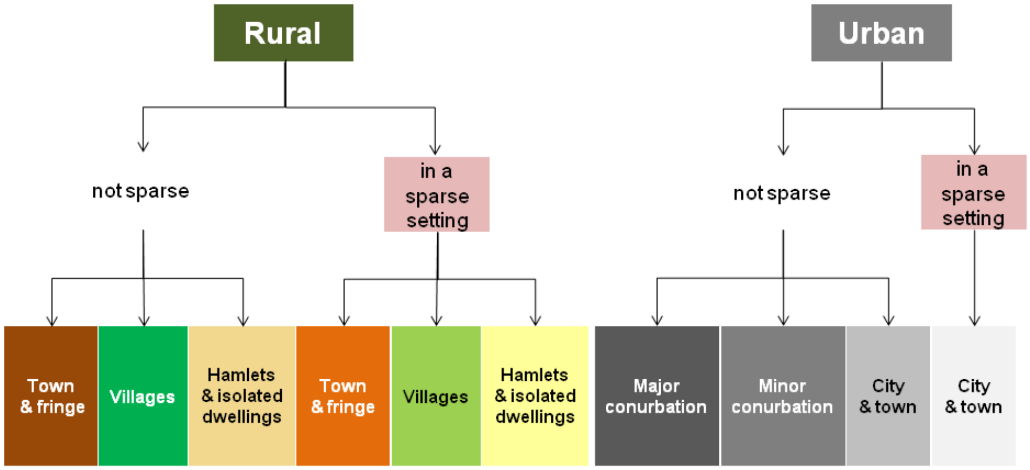
Consultation Questions	
1.	Does your interest in the RHI relate to the operation of the scheme in a particular geographical area? (indicate all those that apply) a) England b) Wales c) Scotland Responses which indicate that your interest relates to the operation of the scheme in Scotland or Wales will be shared with the Scottish or Welsh devolved authorities respectively, unless you explicitly state that you do not wish for your response to be shared.
2.	a) Do you agree with the proposal to remove RHI support for biomass in urban areas on the gas grid? Yes / No. b) Please provide any available evidence in support of your response.
3.	a) Do you agree that for the purposes of this restriction, the criterion should be based on being both urban and having access to the gas network? Yes / No. b) Please provide any available evidence in support of your response.
4.	a) If 'you have answered No' to Question 3, what method would be more appropriate and why? b) How could this criterion be verified by Ofgem? c) Please provide any available evidence in support of your response.
5.	a) Should installations that comply with stricter emissions criteria, such as those, under the Medium Combustion Plant Directive be included in this proposal? Yes / No. b) Please provide any available evidence in support of your response.
6.	(a) Should biogas combustion remain eligible without geographical restriction? Yes / No (b) Please provide any available evidence in support of your response.

Consultation Questions	
7.	(a) Should existing biomass boilers installed under the RHI be required to have regular maintenance checks? Yes / No (b) Please provide any available evidence in support of your response.
8.	(a) Do you have any other proposals on how to minimize the air quality impacts of biomass in the RHI? If so please provide further details here. (b) Are there any other issues you wish to raise with respect to RHI support for biomass in urban areas? If so please provide further details here.

Annex A. Urban-Rural classifications.

Cells in grey would count as urban for the purposes of this policy.

Fig 1. Rural-Urban typology for Output Areas in England and Wales (RUC 2011)
Settlements of population 10,000 or above are classified as urban.



Source: https://www.gov.uk/government/statistics/2011-rural-urban-classification

Table 1. Scottish Government 8 fold Urban Rural Classification

1 Large Urban Areas	Settlements of 125,000 or more people.
2 Other Urban Areas	Settlements of 10,000 to 124,999 people.
3 Accessible small Towns	Settlements of 3,000 and 9,999 people and within 30 minutes drive of a settlement of 10,000 or more.
4 Remote Small Towns	Settlements of between 3,000 and 9,999 people and with a drive time of over 30 minutes to a settlement of 10,000 or more.
5 Very Remote Small Towns	Settlements of 3,000 and 9,999 people and with a drive time of over 60 minutes to a settlement of 10,000 or more.
6 Accessible Rural	Areas with a population of less than 3,000 people, and within a 30 minute drive time of a settlement of 10,000 or more.
7 Remote Rural	Areas with a population of less than 3,000 people, and with a drive time of over 30 minutes but less than 60 minutes to a settlement of 10,000 or more.
8 Very Remote Rural	Areas with a population of less than 3,000 people, and with a drive time of over 60 minutes to a settlement of 10,000 or more.

Source: www.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification

Fig 2. Map of rural urban output areas in England and Wales (RUC2011). Areas shaded grey would be covered by the proposed restriction on RHI biomass deployment.

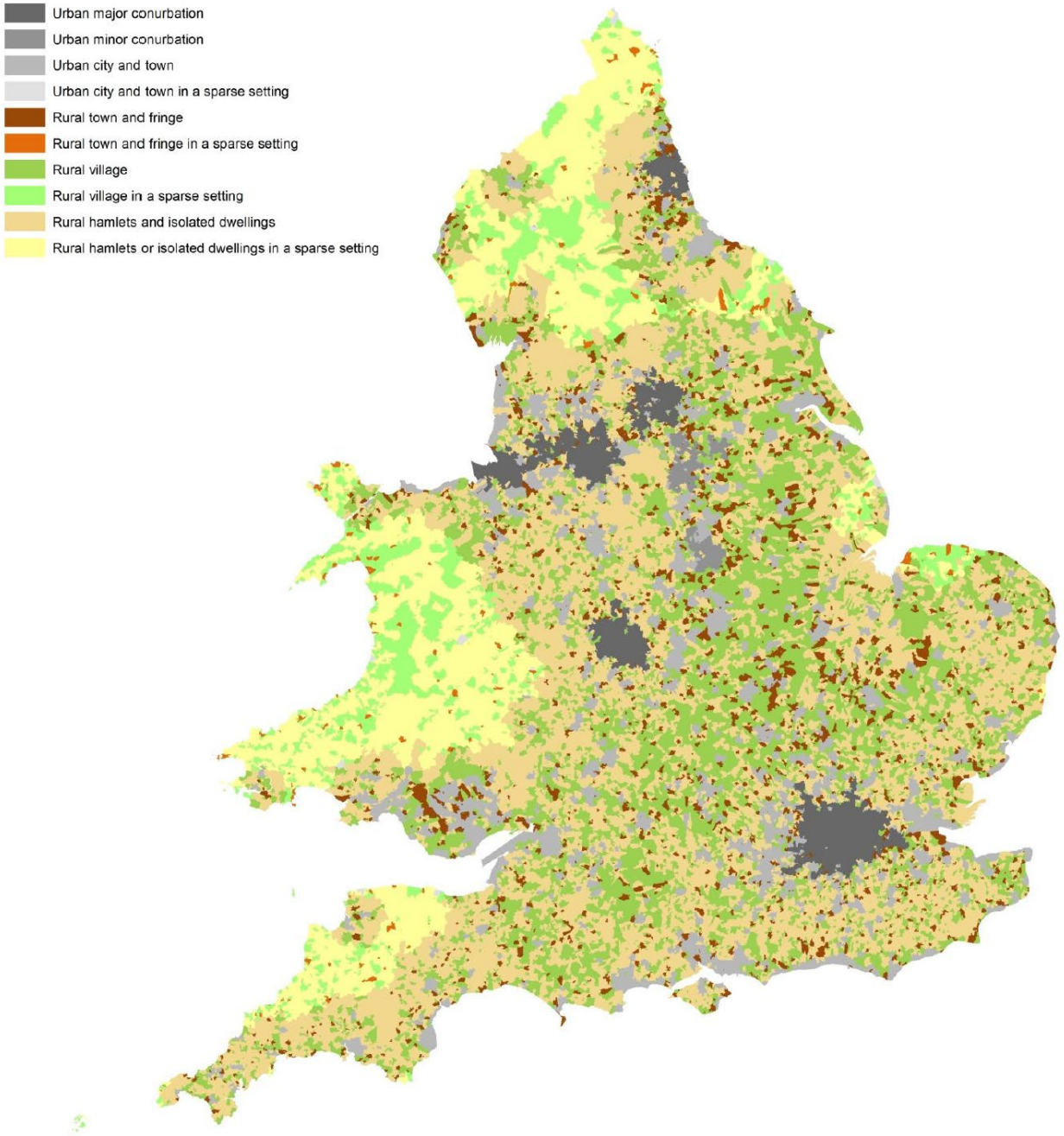
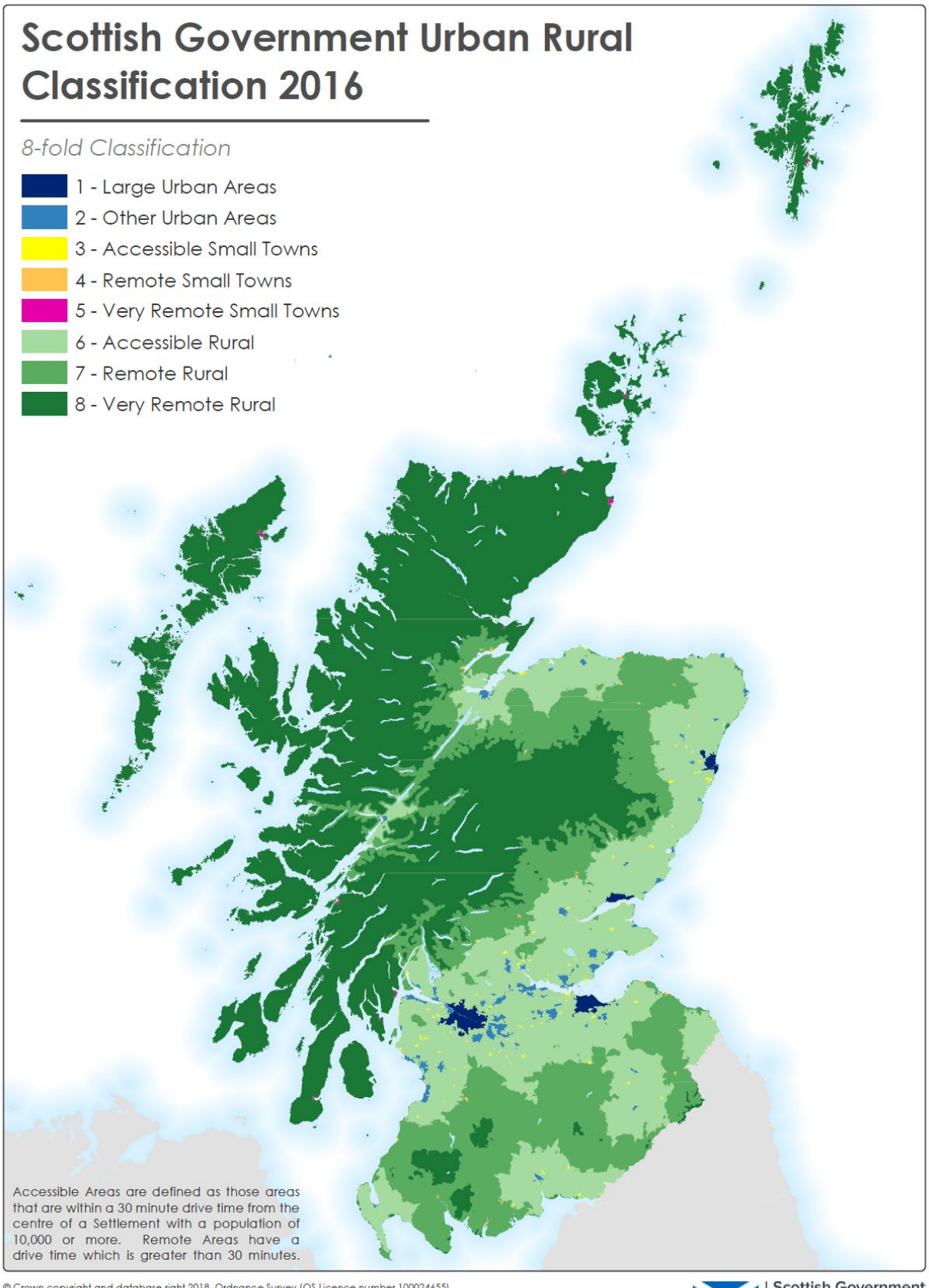
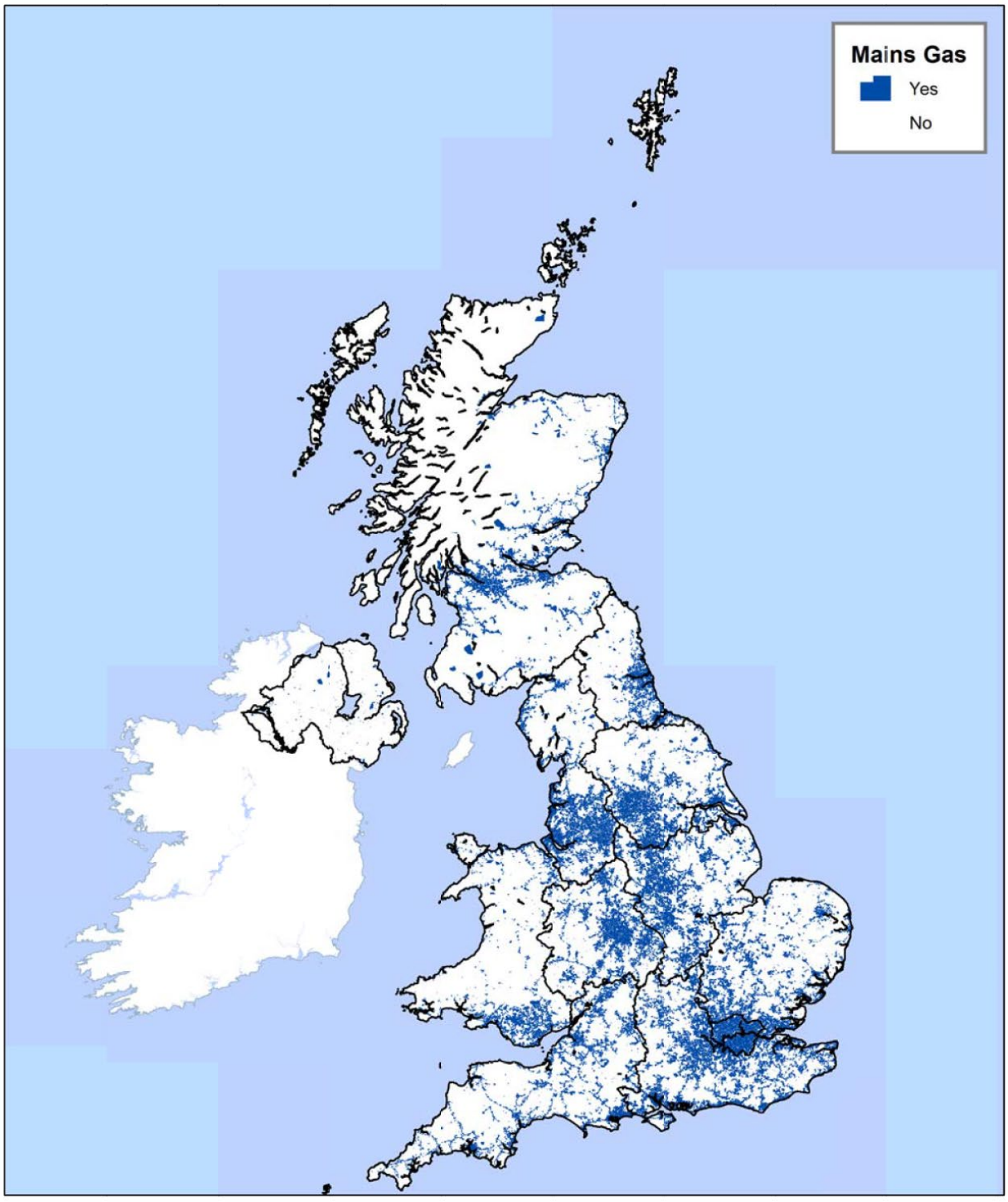


Fig. 3 Map of urban rural areas in Scotland. Areas shaded blue would be covered by the proposed restriction on RHI biomass deployment.



Annex B – Off-Gas grid areas

Map of off-gas-grid areas based on industry data on gas connections



Source: Experian, based on Xoserve data. Used by permission. Note: Definitive information is postcode level data from Xoserve. https://www.xoserve.com/wp-content/uploads/Off-Gas-Postcodes-V2.xlsx

Annex C – Emission Factors

Emission values of various plant (sorted by PM emissions). RHI-eligible technologies are shaded green

		Emissions (g/GJ)			
Fuel	**Technology name**	NO_X	NMVOC	SOx	$PM_{2.5}$
Natural gas	Conventional boilers < 50 kW	42	1.8	0.3	0.2
Natural gas	Standard boilers >50KWth <1MWth	73	0.36	1.4	0.45
Natural gas	Standard boilers >1MWth <50MWth	40	2	0.3	0.45
Gas oil	Conventional boilers < 50 kW	69	0.17	79	1.5
Natural gas	Partly closed/closed fireplaces <50 kWth	60	2	0.3	2.2
Gas oil	Conventional stoves <50 kWth	34	1.2	60	2.2
Fuel oil	Standard boilers >50KWth <1MWth	100	15	140	3
Fuel oil	Standard boilers >1MWth <50MWth	100	5	140	30
Wood	Pellet stoves and boilers <50 kWth	80	10	11	30
Wood	Standard boilers >1MWth <50MWth	210	12	11	33
Wood	Boilers <1MWth – automatic feed technology	91	12	11	37
Wood	Advanced stoves <50 kWth	95	250	11	47
Coal	Boilers <1MWth – automatic feed technology	165	23	450	70
Coal	Standard boilers >1MWth <50MWth	180	20	900	72
Wood	Standard boilers >50KWth <1MWth	91	156	11	86.5
Coal	Boilers <1MWth – manual feed technology	200	100	450	130
Wood and similar wood waste	Conventional stoves <50 kWth	50	600	11	140
Wood	High-efficiency stoves <50 kWth	80	350	11	140
Wood and similar wood waste	Conventional boilers < 50 kWth	80	350	11	140
Wood	Boilers <1MWth – manual feed technology	91	300	11	140
Coal	Standard boilers >50KWth <1MWth	160	200	900	170
Solid fuels (excluding biomass)	Conventional boilers <50kW	158	174	900	201
Coal	Advanced stoves <50 kWth	150	300	450	220
Wood	Open fireplaces <50 kWth	50	600	11	240
Solid fuels (excluding biomass)	Open fireplaces <50 kWth	60	600	500	330
Solid fuels (excluding biomass)	Conventional stoves <50 kWth	100	600	900	450

Source: EMEP/EEA air pollutant emission inventory guidebook 2016 (https://www.eea.europa.eu/publications/emep-eea-guidebook-2016)

Annex D - Assessment of impacts

Assessment of impacts methodology and estimates

This assessment focuses on the potential changes to benefits and resources resulting from less deployment of new urban biomass RHI installations arising from a ban on such installations.

The methodology follows that used in the RHI Impact Assessment of February 2018[8], which included an estimate of resource costs as well as carbon abatement and air quality benefits of deploying RHI technologies. The impact of the ban has been estimated by calculating the proportion of the future deployment that was expected to be in urban areas which will be affected, and the associated costs and benefits of this deployment. This produces a set of estimates of the impact of this ban.

RHI technologies covered in this analysis are: Small, Medium and Large Solid Biomass Boiler, CHP Biomass and Bioliquids, and Domestic Biomass. All assumptions in this analysis are consistent with the IA, except for the counterfactual technology assumed to materialise instead of urban deployment. The appraisal period used is 2018/19 to 2041/42.

The definitions of urban area as well as on-gas-grid area used here are based on the methodology described in the August 2018 RHI Official Statistics tables 1.13 and 2.14[9]. This assessment estimates the impact of a ban affecting future RHI biomass installations which are both in an urban area and on the gas grid.

The sensitivity of these findings has been tested by varying the following factors:

- deployment from other technologies materialising (or failing to materialise) in place of the banned urban biomass deployment
- counterfactual technology mix for the case where deployment from other RHI technologies does not materialise in place of urban biomass
- the exact month in which the ban comes into force.

Deployment scenarios

BEIS's latest Market Intelligence suggests that there will be fewer biomass plants deployed than was estimated at the time of producing the February 2018 Impact Assessment. This

[8] The IA document can be accessed here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/680624/ukia_20180029_en.pdf

[9] RHI Official Statistics can be found here: https://www.gov.uk/government/statistics/rhi-deployment-data-july-2018. This analysis excludes small towns with less than 10,000 residents from the definition of urban, although these towns are classified as urban in the Official Statistics covering Scotland.

analysis therefore uses the 'Low' IA deployment scenario as the lower bound of the impact estimates, and the 'Central' IA scenario as the upper bound.

Counterfactual technology mix

In the February 2018 IA analysis, even though biomass has higher emission factors[10] than other RHI technologies, its emission costs are lower than that of its counterfactual technologies. This is because while biomass is proportionally more likely to be replacing oil boilers, relative to the RHI technologies in general.

However, these counterfactual scenarios are based on the national average of the technologies displaced by each RHI technology in the past. It is likely therefore, that this does not accurately reflect the counterfactual technologies which would have materialised in the urban setting, where gas or electricity are more likely than oil to be the relevant counterfactual.

For this reason, this analysis uses the English Housing Survey data for urban areas to determine the most realistic mix of non-RHI heating technologies. This indicated the counterfactual technology mix for urban biomass to be mainly gas (91%) and electricity (8%).

Additionally, because would-be RHI installers might be more likely than the average population to choose a lower carbon heating system such as a heat pump, these assumptions are varied in our sensitivity analysis to increase the electricity counterfactual proportion to 24%.

Replacement deployment

There are various alternative RHI technologies that can be deployed to meet the demand that urban biomass would have met. This assessment has tested the case where:

a) no other renewable deployment occurs in place of urban biomass (this ban leads to lower overall deployment);
b) other RHI technologies are deployed instead (based on the technology mix assumed in the latest IA).

Results

The table below presents the results for the Net Present Value (NPV), renewable heat deployment, carbon savings and air quality impacts if the ban comes into force in January 2019. This presents the central estimate of this analysis, as these parameters have been deemed most likely at the time of producing this analysis. However, results of varying the

[10] Emission factors can be found here: http://naei.beis.gov.uk/data/ef-all

time of the ban is presented in table 2. All values have been presented relative to the counterfactual.

Table 1: Impacts on NPV, renewable energy, carbon savings and air quality using January 2019 as start date of the ban

Future deployment	**Feb IA Low Scenario**		**Feb IA Central scenario**	
Impact on overall deployment	**No other deployment materialises**	**All resources spent on other technologies**	**No other deployment materialises**	**All resources spent on other technologies**
Net Present Value	£52m	£77m	£60m	£89m
Renewable heat deployed	-4,100 GWh	-2,000 GWh	-5,900 GWh	-3,200 GWh
Carbon savings	-0.7 MtCO2e	0.5 MtCO2e	-0.9 MtCO2e	0.6 MtCO2e
Air quality impact	£14m	£17m	£19m	£23m

The results above show that, in all cases, the ban on urban biomass has a positive NPV. This is driven largely by a high positive value of social resources saved[11]. The NPV of the ban increases if the government funds saved from not paying out tariffs to new urban biomass installations are spent on the deployment of other technologies, because more renewable heat, carbon abatement and air quality savings are realised in this case.

The effect on the deployment of renewable heat is negative in all cases presented, but this effect is lessened in the cases where other deployment materialises. Carbon savings are 0.5-0.6 $MtCO_2e$ in the case where other RHI technologies are deployed instead of urban biomass.

Air quality impacts of the ban are positive in all presented cases because, on average, biomass in urban areas produces more air quality pollutants than the technologies it replaces. This positive effect is larger when other low carbon technologies are deployed instead of urban biomass because these other technologies also lead to air quality improvements.

[11] Although the RHI Scheme has a positive Net Present Value (NPV), deployment of some of the RHI technologies have a negative NPV. This is the case for biomass, because it has a relatively high resource cost when compared to most other RHI technologies. While biomethane has a higher resource cost than biomass, it also produces a significantly higher value of carbon savings per each pound spent on it by the RHI.

This analysis shows that the impact of the ban is mixed. There will be some positive impacts for air quality (in all cases presented) and carbon abatement (in some cases). However, it is expected to lead to lower renewable heat deployment, which would otherwise be contributing to meeting the UK's Renewable Energy Directive commitments.

In addition to the central estimates presented above, table 2 below shows the different impacts when varying the time at which the ban comes into effect.

Table 2: Impacts on NPV, renewable energy, carbon savings and air quality when varying the start date of the ban (from November 2018 to March 2019)

Future deployment	**2018 IA Low Scenario**	**2018 IA Low Scenario**	**2018 IA Central scenario**	**2018 IA Central scenario**
Impact on overall deployment	**No other deployment materialises**	**All resources spent on other technologies**	**No other deployment materialises**	**All resources spent on other technologies**
Net Present Value	£48m – £56m	£71m – £84m	£55m – £65m	£81m – £96m
Renewable heat deployed	-3,800 GWh – -4,500 GWh	-1,800 GWh – -2,150 GWh	-5,500 GWh – -6,500 GWh	-3,000 GWh – -3,500GWh
Carbon savings	-0.6 $MtCO_2e$ – -0.7 $MtCO_2e$	0.5 – 0.6 $MtCO_2e$	-0.9 $MtCO_2e$ – -1 $MtCO_2e$	0.5 – 0.6 $MtCO_2e$
Air quality impact	£13m – £15m	£16m – £19m	£18m – £21m	£21m – £25m

As this sensitivity analysis affects the magnitude but not the direction of impacts, the main conclusions drawn based on the central estimate hold regardless of which assumptions are used for the exact time of the ban coming into force. Furthermore, changing the counterfactual technology mix towards a larger share of electricity (24% instead of 8%) has a negligible effect on the results presented above.

Uncertainty around the analysis

Due to limitations in data and information about future deployment of all RHI technologies, this analysis carries some uncertainty. The main limitations and points of uncertainty are:

1. This analysis does not adjust the value of emissions based on location, so the impact of avoiding urban particulates is not captured.
2. This analysis assumes that new deployment will follow the same pattern as existing installations, in terms of geography. This is inherently uncertain.
3. This analysis carries the same uncertainty as the February 2018 IA, in terms of assumptions about future deployment's technological split and heat produced.
4. There is uncertainty in assuming that counterfactual technologies deployed instead of new urban biomass will follow the behaviour of urban heating installations as measured by the English Housing Survey 2012.
5. The methodology for the rural/urban and on/off-gas grid definitions follow the RHI Official Statistics from August 2018. For the final proportions used to reflect the amount of heat in each technology, this analysis uses June data for the urban/rural and on/off-gas grid split, as well as for RHI heat. This also implicitly aggregates the proportions of rural and urban biomass in Scotland, Wales and England, which carries with it potential inaccuracy.