

Environmental Protection Agency Submission on the Revision of Part J of the Building Regulations



1. Background

This submission from the Environmental Protection Agency to the Department of the Environment, Community and Local Government is in reply to the public consultation on Part J (Heat Producing Appliances) of the Building Regulations. This submission concentrates on measures to prevent solid fuel burning appliances causing nuisance and impacting on air quality.

2. Legislative and Treaty Issues Driving Regulation of Residential Fuel Combustion

2.1 National Emissions Reduction Target (NERT) for PM_{2.5}

As part of the CAFE Directive (2008/50/EC), Ireland must reduce its average PM_{2.5}¹ background concentration by 10% by 2018. The required reduction was calculated based on monitoring carried out by the EPA as part of the Average Exposure Indicator (AEI) over the years 2009, 2010 and 2011. The reduction needed is a 1µg/m³ reduction from 10µg/m³ to 9µg/m³. This reduction is a statutory obligation; and failure to address this could result in prosecution by the EU Commission in the Court of Justice of the European Union for failing to fulfil our obligations under EU law.

Bringing about reductions in particulate levels will also result in significant health benefits. The World Health Organisation has stated in relation to particulate matter that ‘there is little evidence to suggest a threshold below which no adverse health effects would be anticipated’. (WHO, 2005), thus any measure that is adopted to decrease concentrations of PM in ambient air should result in positive health effects for the general population. The OECD has recently completed a study (Hunt, 2011) assessing policy interventions to address health impacts associated with air pollution (and pollutants in other media). This study concentrated on air policy measures in relation to particulate and ozone and, based on review of various cost-benefit analyses, concluded that the annual value of benefits to health from particulate reductions were consistently positive across all policy variants.

¹ PM_{2.5} – PM_{2.5} are particles with diameters of 2.5 micrometres or less

Meeting the NERT will require a broad strategy across the country involving industry, the transport sector, the energy sector and all public authorities. One feature of the strategy will be an examination of Ireland's domestic heating sources, fuel types and the efficiency of the solid fuel heating systems used in Ireland for residential heating. The plan for achieving this reduction is currently under development by the EPA.

2.2 Air Quality Directives and Regulations

The CAFE Directive (2008/50/EC) and Fourth Daughter Directive (2004/107/EC) set standards for specified pollutants that can impact on health and the environment when present in ambient air. These were transposed into Irish law by SI No 180 of 2011 and SI No 58 of 2009 respectively. Residential combustion is a significant source of some of these pollutants, namely sulphur dioxide, particulate matter (PM₁₀ and PM_{2.5}) and polycyclic aromatic hydrocarbons (PAH). The legislation requires air quality to be maintained where it is good and improved where it is poor. Monitoring shows that while levels of sulphur dioxide in Ireland are low, levels of particulate matter are moderate across the country and levels of PAH in some areas are high and these pollutants are known to be associated with emissions from solid fuel combustion in particular.

2.3. Stockholm Convention on Persistent Organic Pollutants

Article 5 of the Stockholm Convention on Persistent Organic Pollutants (POPs) (United Nations Environment Programme, 2010) concerns measures to reduce or eliminate releases from unintentional production of POPs which includes emissions of pollutants such as dioxins and furans. Parties are required to develop an Action Plan designed to identify, characterise and address the release of unintentional POPs. The EPA has recently finalised Ireland's National Implementation Plan which includes the Action Plan on unintentional POPs, and the National Implementation Plan (NIP) has been transmitted to the Stockholm Convention Secretariat. The NIP can be found at:

- <http://chm.pops.int/Implementation/NIPs/NIPSubmissions/tabid/253/Default.aspx>).

One of the requirements of the Convention is that Parties shall promote the use of best available techniques (BAT) and best environmental practice (BEP) for certain sources that can give rise to unintentional POPs, including residential combustion sources. Guidelines on BAT and provisional BEP concerning 'Residential combustion sources' have been published by the Secretariat of the Stockholm Convention, see:

- <http://chm.pops.int/Implementation/BATBEP/Guidelines/tabid/187/Default.aspx>

3. Evidence

As required by the legislation, Ireland is divided into four zones for the purpose of managing air quality. Each zone is assessed in respect of each pollutant specified in the legislation. Figure 1, 2 and 3 show the classification of air quality zones in Ireland for PM₁₀, PM_{2.5} and PAH respectively².

For PM₁₀, all four zones are above the lower assessment threshold with levels highest in Zone A (Dublin) due to traffic emissions and in Zone C (towns and cities with population >15,000) due to emissions from residential solid fuel use.

For PM_{2.5} only Zone C (towns and cities with population >15,000) is above the lower assessment threshold, again due to emissions from residential solid fuel use.

² Environmental Protection Agency, 2012. Air Quality in Ireland 2011. Key Indicators of Ambient Air Quality. Web published www.epa.ie/downloads/pubs/air/quality/

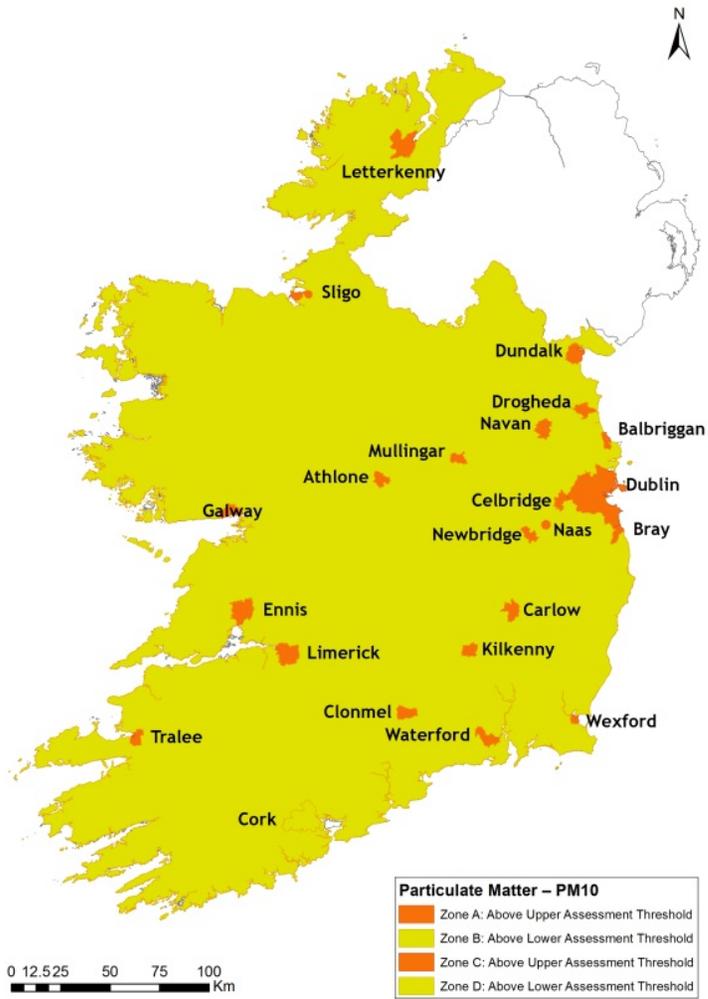


Figure 1: Classification of air quality zones for PM₁₀ in Ireland

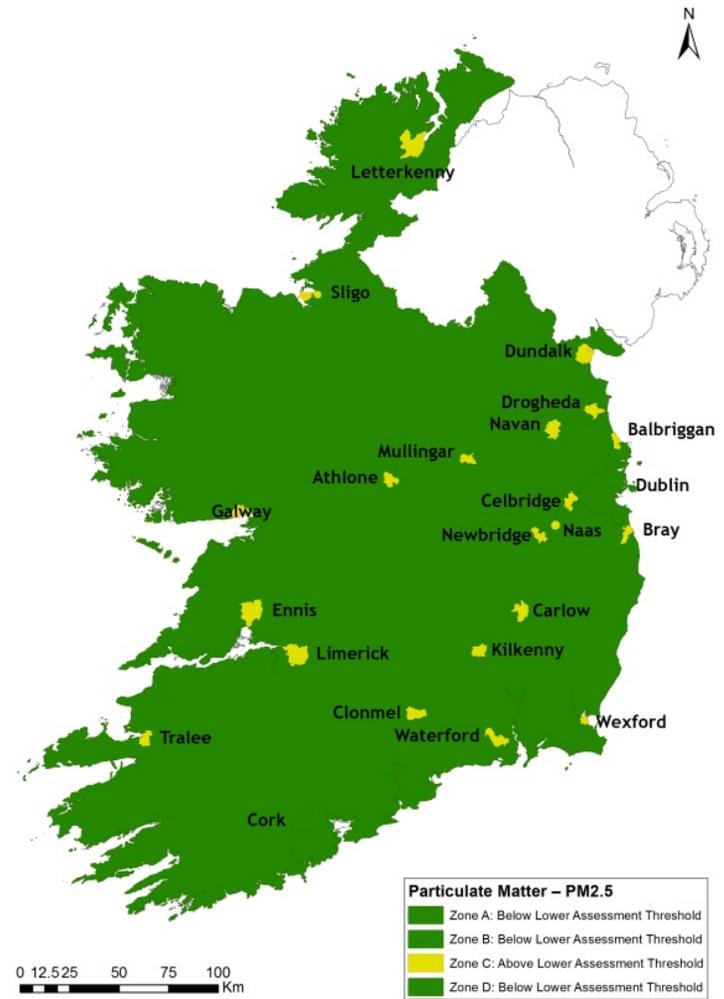


Figure 2: Classification of air quality zones for PM_{2.5} in Ireland

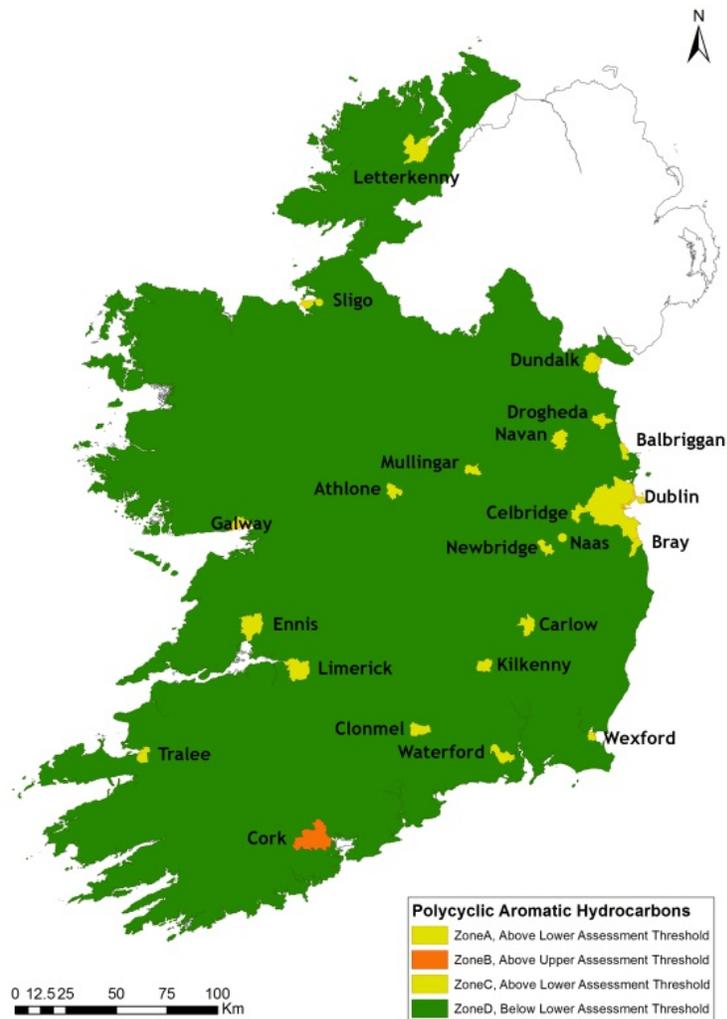


Figure 3: Classification of air quality zones for polycyclic aromatic hydrocarbons in Ireland

For PAH, levels are highest in Zone B (Cork) due to traffic emissions and residential solid fuel use. Levels are above the lower assessment threshold in Zone A (Dublin) due to traffic emissions and in Zone C (towns and cities with population >15,000) due to emissions from residential solid fuel use.

Emissions from residential solid fuel use in Ireland contribute to increased levels of pollutants that are harmful to health. Measures which reduce these emissions and prevent increases in these emissions in the future will benefit air quality and health. These measures include:

1. Increasing people's awareness of the potential harm to indoor and outdoor air quality caused by inefficient use of solid fuels;
2. Measures that encourage the use of low emission fuels such as gas;
3. Measures that encourage the use of efficient solid fuel burning methods. A correctly installed, properly maintained stove is an efficient method of solid fuel burning.
4. Measures that encourage better residential combustion management to improve the safety and efficiency of solid fuel burning. An enclosed stove is more fuel efficient than a traditional open fire for solid fuel burning.
5. Other measures include maintenance and cleaning of flues, sufficient airflow, avoiding overloading of fuel and proper ventilation, as well as measures that discourage the use of non-renewable solid fuels such as coal and peat. While coal has high emissions of particulate matter and PAH compared to gas, peat and wood have potentially much higher emissions of both these pollutants. The combustion of renewable fuels such as wood should be controlled via the use of highly efficient heating appliances which minimise pollutant emissions to atmosphere.

Research Evidence

The EPA is currently funding two research projects in the area of emissions from small scale combustion. These projects are as follows;

- Emissions from Transport and Small Scale Combustion Installations (ETASCI) – 2007 EPA call;
- Emission Factors for Domestic Solid-Fuel Appliances (EFDOSOF) - 2011 EPA call.

Both of these projects are studying the emissions from small scale combustion installations (< 50kW) of various fuel types (oil, gas, coal, wood, wood pellets, peat briquette, peat sod) and the variation in performance with different parts of the duty cycle of boilers/stoves. As mentioned earlier in this document, the combustion of peat and wood in particular can have significantly

elevated concentrations of particulates. Results from both of these projects will inform the air quality policy area (Smith *et al*, 2011).

Research is also being undertaken by Teagasc (Oak Park, Contact Dr Barry Caslin/John Finnan) into different biofuel blends and the emissions performance and heating performance from combustion installations. Teagasc are also participating in a European Research Area Network (ERA-Net) on Bioenergy Futurerbiotec³. Research and guidance is being undertaken by this ERA-Net regarding the low emission operation of chimney stoves as well as guidelines for the design and application of particle precipitators for residential biomass combustion. Teagasc are currently trialling some of these electrostatic precipitation units in Oak Park. These guidelines are draft at present but will be published in the coming weeks by the ERA-Net. Such guidance is also relevant in an Irish context to ensure that stove operators using solid fuel, in particular biomass, are operating them correctly to ensure low emissions. In Germany, the emission performance standards of some stoves and boilers are being revised which forces manufacturers to improve the design of these units. (Personal Communication John Finnan – Teagasc).

There is a draft EC Working Document on possible Ecodesign/Energy Labelling measures for solid/liquid/gas fired Local Space Heaters (LHSs)⁴. The document specifies various Emission Limit Values for the different LHS types. The draft working document was discussed at the Consultation Forum for LHSs to the Eco-design of Energy related Products Directive (the Eco-Design Directive - 2009/125/EC) in September of this year.

Complaints

The EPA has an oversight role in relation to the performance by local authorities of their statutory function in protecting the environment. Through these interactions with local authorities the EPA has been made aware of an increasing number of nuisance complaints due to emissions from solid fuel burning devices which have been retrofitted to houses. The EPA does not typically receive these complaints directly, hence this information has been gathered through

³ <http://www.eranetbioenergy.net/website/exec/front>

⁴ http://env-ngo.eup-network.de/fileadmin/user_upload/ENGOS_Intern/Position_Papers/20120716_Explanatory_Notes_FINAL.pdf?PHPSESSID=35a30bc1e244b14b4b31964cec53a3a7

discussions with local authorities through the enforcement network. Commonly the issue relates to stoves installed in single storey extensions to dwellings, where the stove chimney extends only a metre or two above the height of the extension roof height. In many cases this results in nuisance complaints to the local authority from neighbours who are experiencing nuisance due to smoke from the stove chimney impacting upon their houses and gardens, particularly where the complainants house is two storey. Often smoke from neighbouring stoves is reported to impact upon and enter through upper floor windows.

Based on this information from local authorities and from complaints directly to the EPA, it is considered that the draft guidance on the minimum chimney outlet height in the Part J Draft Technical Guidance (Diagram 1, Part C) does not provide adequate protection from nuisance impact upon adjacent houses. At present the guidance indicates that where the distance between the chimney and the adjacent house is less than 2.3 metres the chimney outlet must be 600 mm above the roof height of the adjacent building. However in cases where the separation distance is greater than 2.3 metres there is no such protection offered to adjacent residents while there remains a potential for significant nuisance (and potentially health) impacts due to smoke emissions from lower level chimneys.

4. General Comment on Further Measures to Improve Air Quality

The EPA also supports the provision of grants under the Sustainable Energy Authority of Ireland Better Energy Homes Scheme, as these measures will lead to reduced energy consumption and thus reduced emissions to atmosphere from residential heating.

Improving the efficiency of solid fuel burning also reduces emissions of polycyclic aromatic hydrocarbons, PM₁₀ and PM_{2.5}. Open fireplaces are common in Ireland with low temperature inefficient combustion. Switching to more efficient stoves and boilers would reduce emissions of particulate matter. Policy and enforcement measures should be considered to incentivise this, while bearing in mind that the use of solid fuels over cleaner fuels (e.g. natural gas) should not be incentivised. One area in particular which could be investigated is the more robust application of building regulations requirement (Building Regulations Technical Guidance Document J on Heat Producing Appliances) in relation to installation of stoves and other appliances to ensure that they meet relevant standards. The Building Regulations should also make direct reference to

minimum required efficiency and installation standards for solid fuel heating appliances, such as (see references for full titles):

- EN 13229 (Inset appliances)
- EN 13240 (closed fire)
- EN 14785 (pellets)
- EN 15250 (slow heat release)
- EN 12815 (cookers)
- EN 12809 (Space heaters with indirect heating functionality)

There is evidence that stoves sales are increasing significantly in Ireland (Irish Times, Tuesday October 2 2012) with little regulation of these potentially significant source of pollution, hence a greater level of control on stove performance is required in order to protect air quality in Ireland.

In this regard it is also worth noting that Denmark has recently (November 2012) published stricter national standards for particulate emissions from stoves. This aligns the Danish Standards with the stringent standards already in place in Germany. The Danish Environment Minister wants other European countries to apply the same standards, and hopes similar standards will be agreed as part of current negotiations on ecodesign requirements (see reference to this in Section 3 above, page 7) for solid fuel boilers and stoves (Ends Europe News Report, December 2012).

This would also be in keeping with Ireland's obligation, as a Party to the Stockholm Convention on POPs, to promote the use of best available techniques and best environmental practices for sources of unintentional persistent organic pollutants including residential combustion sources.

The applicability of using the Building Energy Rating System (S.I. 666 of 2006) for the purpose of solid fuel heating system enforcement could also be investigated (e.g. refusal to issue a BER certificate where a stove is not compliant with minimum specified standards). In particular Article 16 (5) specifies that:

(5) A BER certificate and related advisory report shall be rendered invalid if there is any material change in the building to which it relates which could affect its energy performance, including-

(a) any significant deterioration in the fabric of the building; or

(b) any extension of the building; or

(c) any change in the heating system for the building or in the type of fuel used by that system.

The International Energy Agency (IEA) has set up a working group on biomass combustion and co-firing which has recently published a study (IEA Bioenergy, 2011) on available particulate precipitation devices for residential combustion (up to 50 kW). This work highlights the available technology to control emissions from residential combustion as well as providing information on the high level of regulations of domestic combustion which exists in other European countries (and which could be considered in Ireland where not already in place), such as:

- Local or regional bans of burning of certain fuels;
- Limitations of the type of technologies which can be used;
- Minimum performance requirements for combustion appliances;
- Requirement for regular inspection and maintenance (e.g. chimney cleaning);
- Development of basic simple portable on-site measurement equipment;
- Specific emissions for small combustion appliances.

Emissions of particulates can be reduced effectively by switching from solid fuel to other fuels, particularly gas which emits over 100 times less PM_{2.5} and PM₁₀ than smokeless coal. Therefore the switch from solid fuel combustion to gas as a method of home heating could be further encouraged and incentivised where feasible.

5. Summary of Key Recommendations

The following are the key points/recommendations from the EPA response to the DECLG public consultation:

- Decreased particulate levels result in positive health effects with policy measures to reduce particulates typically found to have a positive health benefit from a costs/benefit analysis viewpoint;
- Combustion of fuel in open fires is very inefficient and results in significant emissions of pollutants to the atmosphere as well as indoor air pollution issues. Where domestic combustion of solid fuel is being carried out in open fires, policy measures should be considered to incentivise a switch to more environmentally and energy efficient systems, including enclosed solid fuel appliances. Strictly from an air quality viewpoint, increasing the penetration of natural gas supply across the country should also be considered as a preferred option as emissions from natural gas combustion are lower than from solid fuel stoves;
- Measures should to be taken to reduce the nuisance associated with the locations and heights of solid fuel appliance flues. In cases where houses are located adjacent to each other (i.e. terraced, semi-detached or detached houses within close proximity to each other) the minimum height should be specified at a height greater than the roof ridge height of the adjacent house and in compliance with the requirements in the building regulations with regard to separation distance from combustible materials;
- The requirements of the building regulations need to be robustly enforced to ensure that installed heating appliances meet all required standards;
- The requirements of the building regulations in relation to heating appliances needs to be publicised to increase public awareness of the minimum standards;
- The applicability of using the Building Energy Rating Sytem (S.I. 666 of 2006) for the purpose of solid fuel heating sytem enforcement should be investigated (e.g. not issuing certificates where installed stoves fail to meet minimum specified standards);
- Given the significant increase in usage of stoves in Ireland for space heating it is critical that minimum efficiency standards should be specified in the building regulations for solid fuel heating appliances (and also for other appliances operating on gases and liquids). Such standards for solid fuel appliances include (see full references below):
 - EN 13229 (Inset appliances)
 - EN 13240 (closed fire)

- EN 14785 (pellets)
- EN 15250 (slow heat release)
- EN 12815 (cookers)
- EN 12809 (Space heaters with indirect heating functionality)

There is significant ongoing discussions at a European level in relation to specification of design and performance standards for solid fuel stoves. This work should be considered carefully by the DECLG as part of the Part J review process.

- There is ongoing research in the area of emissions from small scale combustion sources and the relevant regulations and guidance should be reviewed and updated regularly to reflect advances being made in the performance of domestic heating technology. The EPA will submit any outputs from these research projects to the DECLG to assist in informing policy decisions.
- Other complimentary measures to improve air quality should also be considered, such as increasing public awareness of the health and economic benefits of efficient use of solid fuels (including maintenance and flue cleaning), better regulation of solid fuel burning appliances and their emissions and the continuation and development of the grant scheme for home energy efficiency.

6. References

EC Working Document (draft) on possible Ecodesign/Energy Labelling measures for solid/liquid/gas fired Local Space Heaters (LHSs): http://env-ngo.eup-network.de/fileadmin/user_upload/ENGOS_Intern/Position_Papers/20120716_Explanatory_Notes_FINAL.pdf?PHPSESSID=35a30bc1e244b14b4b31964cec53a3a7

EN 13229:2001/A2:2004/AC:2007. Inset appliances including open fires fired by solid fuels - Requirements and test methods.

EN 13240:2001/A2:2004/AC:2007. Roomheaters fired by solid fuel - Requirements and test methods.

EN 14785:2006. Residential space heating appliances fired by wood pellets - Requirements and test methods.

EN 15250:2007. Slow heat release appliances fired by solid fuel - Requirements and test methods.

EN 12815:2001/A1:2004/AC:2007. Residential cookers fired by solid fuel - Requirements and test methods.

EN 12809:2001/A1:2004/AC:2007. Residential independent boilers fired by solid fuel - Nominal heat output up to 50 kW - Requirements and test methods.

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