Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government

Delivering Cleaner Air

Smoky Coal Ban Regulations – Review and Public Consultation

April 2012

Introduction – Consultation

The Minister for the Environment, Community and Local Government, Mr Phil Hogan T.D., is conducting a consultation process with stakeholders and the general public to inform and assist a review of the 'smoky' coal ban regulations to ensure that they remain fit for purpose to safeguard and improve air quality, and to reduce harmful emissions of particulate matter and other air pollutants arising from the use of residential fuels.

This consultation paper reviews the regulations to date and identifies relevant considerations relating to their effective implementation in the context of the developments over the twenty years since their introduction. Developments in scientific understanding of the impact of air pollution on human health and the environment have highlighted the need to further enhance air quality to safeguard public health. In relation to the implementation of the regulations, societal developments have also highlighted the need for a review. For example, some urban settlements have extended beyond 'ban area' boundaries, leading to inconsistency in regulatory controls in those areas. In addition, the nature of solid fuel supply logistics including the use of 'new' media to promote on-line advertising, sales and delivery can make enforcement of the regulations more difficult; and the application of the ban areas to progressively smaller towns where prohibited fuels are easily accessible all present challenges to the sustained effectiveness of the regulations.

To provide a framework for consultations, this paper poses a number of questions. Any person or body wishing to comment on the issues raised is invited to respond to some or all of the questions, or make written submissions on any aspect of the issues identified.

All responses should be made by Thursday, 17th May to:

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Copies of the consultation paper are available for download from the Department's website: www.environ.ie or, alternatively, a hardcopy can be supplied on request to the above contact.

While it is not intended to publish the submissions received, release of some or all of the responses may be necessary in accordance with the Freedom of Information Act 1997.

Summary and Policy Context

Introduction

Clean air is vital for good public health and a clean environment, and is an essential element to the goal of delivering a sustainable society. We have no choice but to breathe the air around us, so air pollution, more than any other form of pollution, impacts directly on human health. To safeguard and enhance our air quality, action is required by public authorities at local, national and international levels.

The first modern comprehensive national clean air legislation was introduced following the severe London smog of 1952 which was estimated to have caused up to 4,000 deaths. However, the death toll only became apparent long after the event, but concerns about the health hazard of the smog were raised with the first reported casualty, a prize Aberdeen Angus which died at an agriculture show. Many significant pollution sources are now regulated by EU legislation, including vehicle and large-scale industrial emissions; however, national and local initiatives like the 'smoky' coal ban here in Ireland play an important role in addressing emissions from residential heating.

Ireland benefits from prevailing weather patterns which typically bring relatively clean Atlantic air over the country, but which also wash dirty air downwind, potentially over our neighbouring countries to contribute to 'transboundary' air pollution. Under certain conditions, typical weather patterns can be disrupted, and pollutant emissions build up in the air. These conditions can occur at any time of the year, but the impact on air quality can be particularly severe during winter, when the combination of cold still weather, increased heating demand and stagnated airflow can lead to high concentrations of pollutants with a consequent increased risk to human health. The ban has had some success delivering better public health and a clean environment though challenges still remain, so continued action is required to sustain and further enhance air quality.

Smoky Coal Ban Regulations

It is now just over 20 years since the 'smoky' coal ban was introduced in Dublin. The ban, on the *marketing, sale and distribution* of 'smoky' coal, was introduced in 1990 to restrict the availability of 'smoky' coal and so address the severe air pollution problems which resulted from its widespread use, and which was the cause of a significant increase in winter mortality across the city's population. The elevated levels of particulate matter also resulted in breaches of the EU air quality standards for black smoke at the time. However, the ban worked very effectively at reducing emissions and delivered a significant reduction in excess winter mortality, and compliance with the then standards. Following the success in Dublin, the ban was subsequently implemented in 19 other cities and towns across the country in the intervening years. The EPA, in its most recent State of the Environment Report, concluded that the ban on bituminous 'smoky' coal has had a positive effect on limiting particulate matter

emissions from home heating and should be extended to all urban areas. This recommendation is considered further in the document.

The ban which was primarily framed for Dublin worked very successfully there, and in the larger cities. However, it has not worked as effectively in the smaller cities and towns where people can travel outside a ban area more easily and acquire restricted fuel for use inside the ban area. Access to restricted fuel is often facilitated by businesses which have established premises just outside the ban area boundaries of smaller cities and towns, with ban area residents as their main market. This raises the question of whether the existing ban on the marketing, sale and distribution of restricted fuel needs to be supplemented by also regulating the use or burning of restricted fuel.

Developments since the introduction of the Smoky Coal Ban

While the ban has worked effectively, particularly in the larger cities, at dealing with the then known air pollution threats to human health and the environment which you can see (and often smell and taste!), improvements in scientific understanding of its impacts have led to additional tighter standards for a range of new, less visible, air pollutants. EU legislation now sets air quality standards for 12 pollutants, including for fine particulate matter and a number of known human carcinogens which have no lower exposure threshold for negative effects on human health (i.e. they are harmful even at very low levels).

The burning of solid fuel for residential heating makes a disproportionate contribution to these emissions, which generally occur within communities where exposure, including to vulnerable groups, can be highest. EU air quality standards provide for a *minimum* level of health protection; they are legally enforceable and are generally not exceeded at the national air monitoring network sites, though levels do exceed the tighter World Health Organisation (WHO) air quality guideline values for particulate matter at several of the network sites. The European Commission is expected to complete a comprehensive review of EU air quality policy and legislation in the latter half of 2013. The review will consider the latest scientific evidence of air pollution impacts on human health and the environment and set new EU air quality objectives and targets for 2020 and beyond.

Ireland's settlement patterns have also changed significantly in the last 20 years with many urban settlements now extending beyond the original ban area boundaries. Moreover, the improved road infrastructure today means that fuel suppliers can travel more easily around, and to and from Ireland, to supply fuels. Furthermore, the economic downturn is reportedly driving demand away from oil and gas to solid fuels, and driving an increase in the number of new solid fuel suppliers, some of whom may perhaps be displaced from less active economic sectors and may be unfamiliar with all the legislative requirements surrounding solid fuel supply. In addition, the increased use of 'new media' for the on-line marketing, sale and delivery of coal by operators, often outside ban areas and indeed outside the State, introduces a new supply route not conceived of when the original regulations were made. Together these

factors can create challenges for enforcement authorities to assure the quality and provenance of solid fuels. Dublin City Council has this year reported, for the first time in many years, a significant increase in the supply of 'smoky' coal within the Dublin area in breach of the regulations.

Links to wider policy issues

The issue of indoor air quality is increasingly recognised as an important aspect of exposure to air pollution. Ireland has shown international leadership by introducing the ban on smoking in indoor work places in 2004 to address a significant source of indoor air pollution. However, threats arise from other combustion sources: research in the EU has found evidence of poorer health outcomes, particularly for vulnerable groups, for those living in houses where coal is used for heating.

Climate change is also a top priority for government - generally climate policy has a positive influence on air quality as many relatively 'climate unfriendly' fuels like coal and peat are also 'pollution-intensive' fuels from an air quality perspective. So, initiatives to reduce reliance on these fuels, or to incentivise a shift from such fuels, will have both climate and air quality benefits. However, there can also be tensions between the two policy areas, where, for example, the increased used of wood-based fuels as a climate measure, can increase the emission of air pollutants, particularly the use of unprepared or unseasoned wood in open fires for residential heating.

The goal of delivering cleaner air is aligned with and generally complements other Government policy aims. For example, the Building Regulations in combination with the Recast Energy Performance of Buildings Directive set out a roadmap to reduce carbon emissions and increase energy efficiency in buildings. Improving energy and carbon efficiency will reduce the use of solid fossil fuel in new homes given its high carbon content and relatively inefficient combustion compared to gas, oil or renewable energy and this will also deliver substantial air quality benefits. The publication, *Warmer Homes: Strategy for Affordable Energy in Ireland,* recognises that there is a greater incidence of energy poverty in those households reliant on solid fuel. The Warmer Homes programme aims to alleviate energy poverty by funding social enterprises to upgrade insulation in low-income households with benefits for air quality, climate policy and the social economy as well as cost savings to the resident as a result of the more efficient use of fuel.

Conclusion

For many air pollutants, there is now clear evidence that exposure even below mandatory standards causes adverse effects on human health. It is necessary therefore to continue to take action to enhance air quality for the protection of public health and the environment. Notwithstanding the issues identified in this consultation paper, the regulation of the quality of residential coal in ban areas has generally proved an effective approach to date. It will continue to play an important role in safeguarding and improving air quality across Ireland. It

will also help to consolidate Ireland's reputation and brand – '*Brand Ireland'* - as a clean and green place to live, visit and do business where the green economy is fostered and where sustainable development is a real and tangible aim of Government.

It is now timely to review the current 'smoky coal' legislation to ensure that it can continue to provide effective protection against the threat of air pollution as it is understood today.

It should be noted that wider policy issues regarding the impact of solid fuels more generally are not addressed in this consultation paper: these issues will be considered as part of a broader review of air quality, following completion during 2013 of the comprehensive review of EU air quality.

The following document summarises the development of the smoky coal ban in Ireland, and the development of EU and national air quality policy. To facilitate structured submissions, a number of issues and associated headline and supplementary questions are set out in section 5, and the headline questions are reproduced below.

The Department would welcome submissions and views in relation to some or all of the questions, or any other aspects of the use of residential solid fuel that affects air quality or the environment more generally.

Summary Questions for Public Consultation

1. *Do you agree with the EPA recommendation that the 'smoky' coal ban should be extended to cover all urban areas?*

2. *Do you have a view on the appropriateness of the current restricted area definition in relation to any of the cities or towns currently designated as restricted areas?*

3. *Do you agree that the burning of restricted fuels in restricted areas should be regulated to complement the ban on the marketing, sale and distribution?*

4. *Do you believe that enforcement of the regulations can be improved? If so, how can this best be achieved?*

5. *Do you believe that new statutory sulphur standard for 'smoky' bituminous coal for sale outside ban areas will assist implementation of the 'smoky' coal regulations? Are there areas where synergies between the two might be strengthened?*

1. Background to Regulation of Residential Emissions

The first modern comprehensive national clean air legislation was introduced in the UK following the severe London smog of December 1952 which was estimated to have caused up to 4,000 deaths from heart and lung ailments. However, the death toll only became apparent long after the event, and the first reported casualties were a prize Aberdeen Angus which died at an agriculture show and twelve other cattle that had to be slaughtered, raising concerns about the health hazard of the smog. The event placed the issue of clean air at the top of the political agenda and the Clean Air Act (UK) was introduced in 1956, giving local authorities the powers to declare smoke control areas and prohibit the emission of smoke from residential and industrial premises.

1.1 Dublin Smogs

The widespread use of 'smoky' or bituminous coal in Dublin resulted in very severe air pollution problems in the 1980s with significant exceedances of the EU air quality standards in place at the time[1]. To address these air pollutions challenges and to bring Ireland into compliance with EU air quality standards, the 'smoky' coal regulations were introduced in Dublin in September 1990. These regulations[2] prohibited the *marketing, sale and distribution* of 'smoky' coal, and limited the sulphur content of all solid fuel for sale in the Dublin area to 2%. The regulations had a dramatic effect on air quality and were subsequently implemented in Cork (1995) and Limerick (1998) and eventually extended to a total of 20 urban areas. The beneficial effect can been seen in Figure 1 below, showing levels of black smoke in the three largest urban centres before and after the implementation of the regulations in Dublin (1990), Cork (1995) and Limerick (1998).

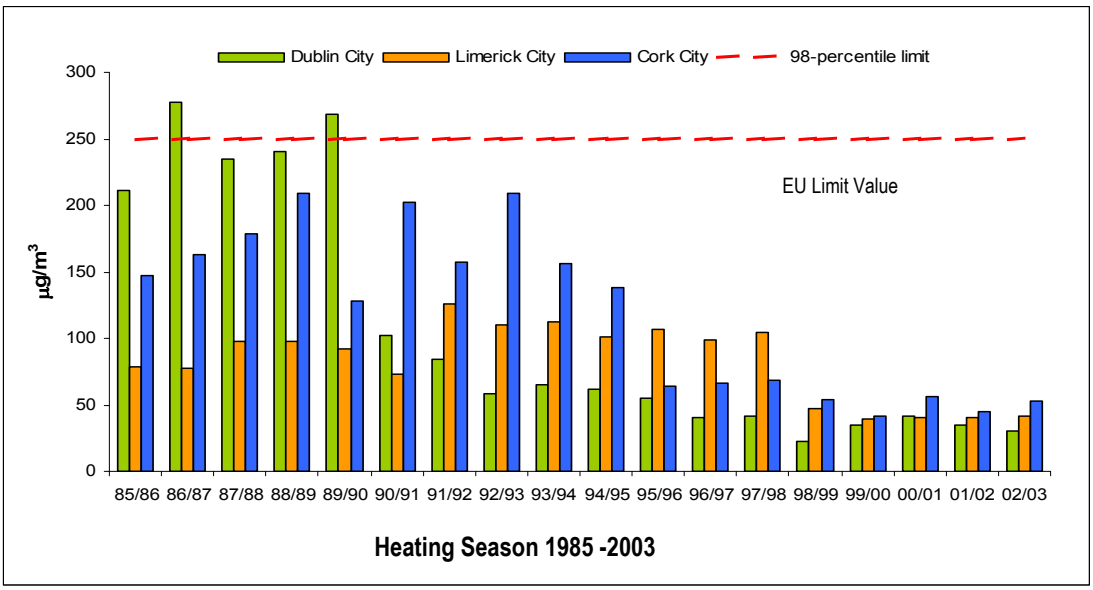


Figure 1. Black Smoke[3] levels before and after the introduction of the 'Smoky' Coal Regulations in Dublin (1990), Cork (1995) and Limerick (1998).

As well as bringing air quality levels into compliance with the then EU standards, the ban had the effect of significantly improving human health in the capital. Research led by Professor Luke Clancy[4] at St James' Hospital indicated that the ban in Dublin resulted in over 350 fewer annual deaths: 243 fewer cardiovascular deaths and 116 fewer respiratory deaths. An estimate[5] of these benefits in monetary terms put the value at over € 20 million: 75% of this resulting from the reduction of particulate matter and the remainder from sulphur dioxide (SO_2). Additional benefits of the regulations have also been identified through the stimulation of a move from solid fuels, which generally are less efficient and more polluting, to more efficient and less polluting gas and oil. The additional benefits in reduced fuel costs to consumers were estimated at €184 million per year. The additional benefits to the climate of reducing carbon dioxide from the use of cleaner fuels have not been included in this estimate.

Current data from the Sustainable Energy Authority of Ireland (SEAI)[6] indicates that the effective cost of fuel for home heating using 'smoky' coal in an open fire is around 15 cent per kilowatt hour (c/kWhr) whereas the price for natural gas using a boiler meeting the Building Regulations[7] is half that at around 7.5c/kWhr - with the use of an open fire, over three quarters of the heat can effectively go straight up the chimney. The data also indicates that while on an energy basis the cost of manufactured smokeless coal is marginally more expensive than 'smoky' coal (less than 5%), the higher efficiency and more even burn of smokeless coal means that less heat is wasted so that in terms of heat delivered to the home, smokeless coal is less expensive in overall terms. To maintain efficiency, when using an appliance with a boiler to burn solid fuel, it is important to keep the flue/chimney clean; SEAI recommends[8] that it should be cleaned twice annually and the appliance itself should be cleaned as often as twice weekly, particularly if bituminous smoky coal is used as it produces a lot of slag deposits which, when burnt, can stick to the boiler surfaces and reduce efficiency.

A recent review of the effectiveness of the 'smoky' coal ban[9] in 2009 indicates significant reductions in air pollution levels in all the cities and towns where the ban has been implemented. Black smoke levels were reduced by a minimum of 45% in the smaller urban areas, up to a maximum of 70% in Dublin.

1.2 Solid Fuel Legislation

The main legislation governing emissions from residential solid fuel in Ireland is the Air Pollution Act 1987 (Marketing, Sale and Distribution of Fuels) Regulations 1998-2011, commonly known as the 'smoky coal regulations'. These regulations were augmented in 2011 so as to set sulphur standards for bituminous coal for sale outside ban areas. In addition, legislation providing for the application of fixed payment notices for alleged offences under the regulations was introduced in 2011 to facilitate and streamline enforcement activity by local authorities.

1.2.1 The Smoky Coal Regulations

These regulations prohibit the marketing, sale and distribution of 'smoky' coal in 20 restricted areas across the country listed in the Annex. The main elements of the 'smoky' coal regulations in restricted areas are as follows:

1. Ban on the marketing, sale and distribution of 'smoky' coal;
2. Requirement to label smokeless coal and sell in sealed bags;
3. Maximum sulphur content of 2 % for other solid fuels, e.g. smokeless coal, petcoke;
4. Restriction on the storage and transport of 'smoky' coal inside restricted areas; and
5. Legislative provisions enforced by the local authority.

While the regulations have the effect of banning the marketing, sale and distribution of unprocessed or 'lump' bituminous coal which is 'smoky', they do not ban processed bituminous coal in smokeless coal products or as coke, and so the regulations effectively set minimum standards for coal or its products in terms of smoke emissions. The approach has proved very effective at reducing levels of particulate matter in Dublin and the larger urban areas. Given the effectiveness of the approach, a public consultation by this Department in 2000[10] considered whether the ban should be extended nationwide to streamline its implementation and enforcement over an increasing number of ban areas. However, it was decided at the time not to opt for a nationwide ban but to extend the ban to include additional, smaller urban areas. However, EPA air quality monitoring data suggests that the ban approach has been less effective in smaller urban areas. Also, the marketing and sale of bituminous 'smoky' coal traditionally took place in clearly defined physical retail outlets, but with the increase in the use of 'new media', for the on-line marketing and sale of products, there is a question mark over how the regulation applies to sales through these channels. Furthermore, the regulations do <u>not</u> prohibit the burning of restricted fuels within restricted areas so that, in some ban-restricted areas, the actual use of restricted fuel can be considerable.

1.2.2 Sulphur Standards for 'Smoky' Bituminous Coal <u>Outside</u> Ban Areas.

The smoky coal regulations were amended in 2011(S.I. No. 270) to set maximum standards for sulphur in 'smoky' coal for sale *outside* ban areas. The regulations build on the approach of the existing 'smoky' coal regulations and the key elements are as follows:

1. A statutory prohibition on the placing on the market, of coal for residential heating which has a sulphur content greater than 0.7 %;
2. A requirement that smoky bituminous coal for residential heating is sold in sealed bags;
3. A requirement for all coal bagging operators to hold a record to demonstrate compliance with the sulphur standard, to be facilitated by certification scheme including an annual independent audit;
4. A requirement for coal bagging operators and fuel suppliers to register with the EPA;
5. Enforcement by local authorities and the EPA as appropriate.

The National Standards Authority of Ireland (NSAI) in consultation with a range of stakeholders has developed a specification, SWiFT 7[11], to assure the provenance of bituminous 'smoky' coal supplied to the residential market outside restricted areas, and to ensure it complies with the sulphur specification set out in SI 270 of 2011. SWiFT 7 includes the label shown here, and recommends that 'smoky' coal placed on the market should use this label as a *marque* of quality and traceability. It demonstrates to the consumer the commitment of the producer to compliance with the national sulphur standard for residential coal, to high environmental standards, and to safeguarding and improving air quality in towns outside 'smoky' coal ban areas and across the country.

Note: *These new provisions do not affect the existing smoky coal provisions which continue to prohibit the marketing, sale and distribution of 'smoky' coal within restricted areas. There are synergies between the two sets of provisions as the new sulphur standard provisions should help to improve the effectiveness of the 'smoky' coal ban by assuring the quality and provenance of coal, and coal suppliers in Ireland.*

1.2.3 Environment (Miscellaneous Provisions) Act 2011

The Environment (Miscellaneous Provisions) Act 2011 amends the Air Pollution Act 1987 to introduce fixed payment notices or 'on the spot fines' for a range of offences in relation to both the 'smoky' coal and the sulphur standard provisions. The intention of the legislation is to provide an effective deterrent as well as providing an alternative, more administratively streamlined approach for local authorities to enforce the law.

The legislation provides for a range of fixed payment notices, from €250 to €1,000 depending on the seriousness of the alleged offence. Persons found to be marketing, selling or distributing bituminous coal in breach of the Regulations are now liable for a fixed payment notice of €1,000. The legislation also increased the fines on summary conviction of an offence from €1,270 to €5,000, and on conviction on indictment from €12,700 to €500,000.

1.2.4 Summary

The original ban has been extended over the years and has been supplemented in 2011 with additional provisions to restrict sulphur levels in 'smoky' coal outside restricted areas; and new legislation to provide for 'fixed payment notices' to facilitate and streamline enforcement. There are a number of emerging issues which need to be addressed to ensure the regulations remain fit for purpose, including the online marketing of solid fuel over 'new media', consistent enforcement across local authorities, and whether the ban on the market, sale and distribution needs to be supplemented with a prohibition on the burning of restricted fuels. These issues are addressed in Section 5.

2. Emissions Trends and Ambient Air Quality Levels

Traditionally, emissions of smoke, sulphur dioxide (SO_2) and oxides of nitrogen (NO_x) were the primary pollutants of concern regarding air emissions from the residential sector. Reductions in the sulphur content of coal and oil have significantly reduced the levels of SO_2 in ambient air. The EU National Emission Ceilings Directive (2001/81/EC) sets overall caps for emissions of certain pollutants, including SO_2 and NO_x, to be achieved from 2010 to protect human health, and acidification and eutrophication of ecosystems caused by these pollutants. A revision to the Directive will set tighter ceilings for the pollutants, and a new ceiling for $PM_{2.5}$ to be achieved from 2020.

The term particulate matter (PM) is now generally used to refer to particles in the air including smoke, soot, dust, dirt, and liquid droplets. Air quality standards are set for two types of PM:

(i) the coarser particles, less than 10 millionths of a metre (μm or micrometres) in diameter (PM_{10}), which pose a health concern because they can be inhaled into, and accumulate in, the respiratory system; and

(ii) fine particulate matter, less than 2.5 μm in diameter ($PM_{2.5}$) which are believed to pose the greatest health risks; because of their small size (approximately 1/30th the average width of a human hair), $PM_{2.5}$ particles can lodge deeply into the lungs and are linked to cardiovascular and respiratory disease.

PAHs (polycyclic aromatic hydrocarbons) are a family of pollutants which arise as a by-product of combustion. The chronic or long-term effects of exposure to low levels of PAH may include cataracts, kidney and liver damage and jaundice. Many PAHs have also been identified as carcinogenic, with airborne PAH most likely to cause lung cancer. B[a]P (Benzo[a]pyrene) is used as a marker for PAHs, and a maximum level in ambient air is specified in legislation. Residential combustion was responsible for 93% of all B[a]P emissions in 2010, and of this, smoky coal and peat were responsible for approximately 82%, with smokeless coal and wood fuels equally responsible for the remaining 18%.

2.1 Trends for Particulate Matter (PM_{10} and $PM_{2.5}$) Emissions

Residential emission sources generally occur within built-up communities and can lead to exposure to air pollution through indoor and outdoor routes, and so can be more significant in terms of exposure to people than larger industrial sources. PM_{10} and $PM_{2.5}$ emissions from the residential sector have fallen since 1990, by over 55% for PM_{10} and over a quarter (27%) for $PM_{2.5}$. This has occurred as a result of a shift from solid fuels to cleaner, less polluting fuels like gas and oil driven in part by the smoky coal ban.

The residential sector was the largest source of emissions for both pollutants in 1990 but was the second largest source for both in 2010, after power generation for PM_{10}, and after road traffic exhaust for $PM_{2.5}$. PAH emissions from the sector have followed a similar trend falling

by over 60% between 1990 and 2010. The graphs below in Figure 2 and Figure 3 show the emission trends for PM_{10} and $PM_{2.5}$ since 1990.

The pie-chart graphs in Figures 4 and 5 below show the trends in home-heating sources for both PM_{10} and $PM_{2.5}$ as well as B[a]P in the residential sector between 1990 and 2010.

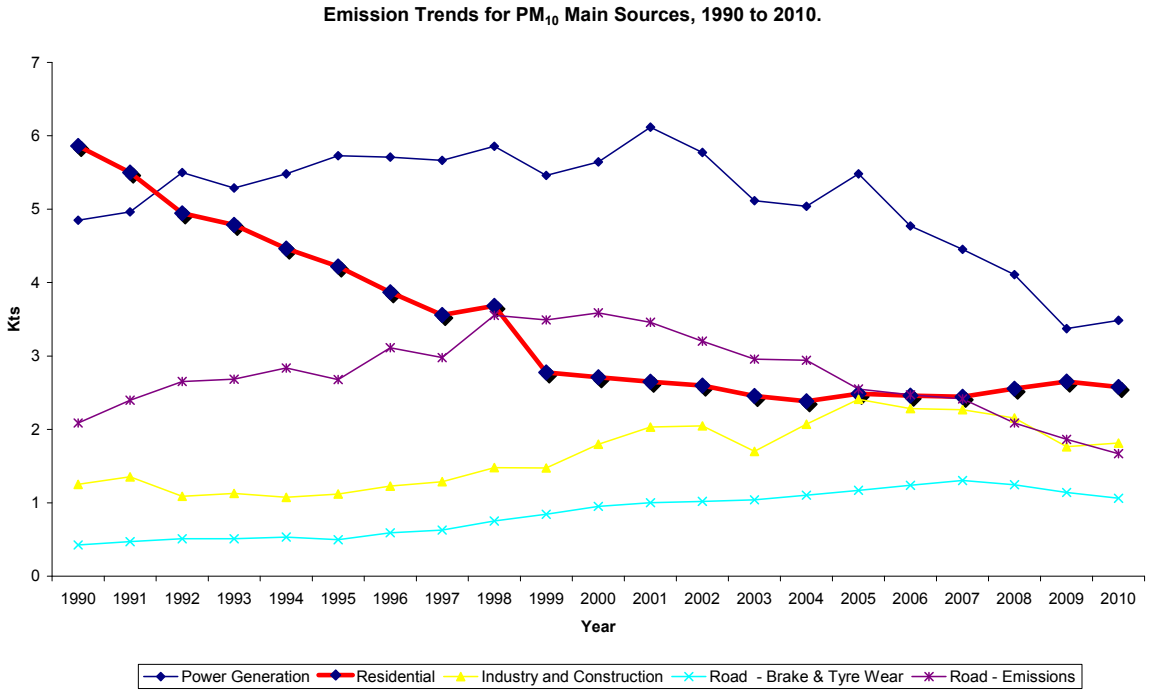


Figure 2: Emission trends for main sources of PM_{10}, 1990 to 2010.

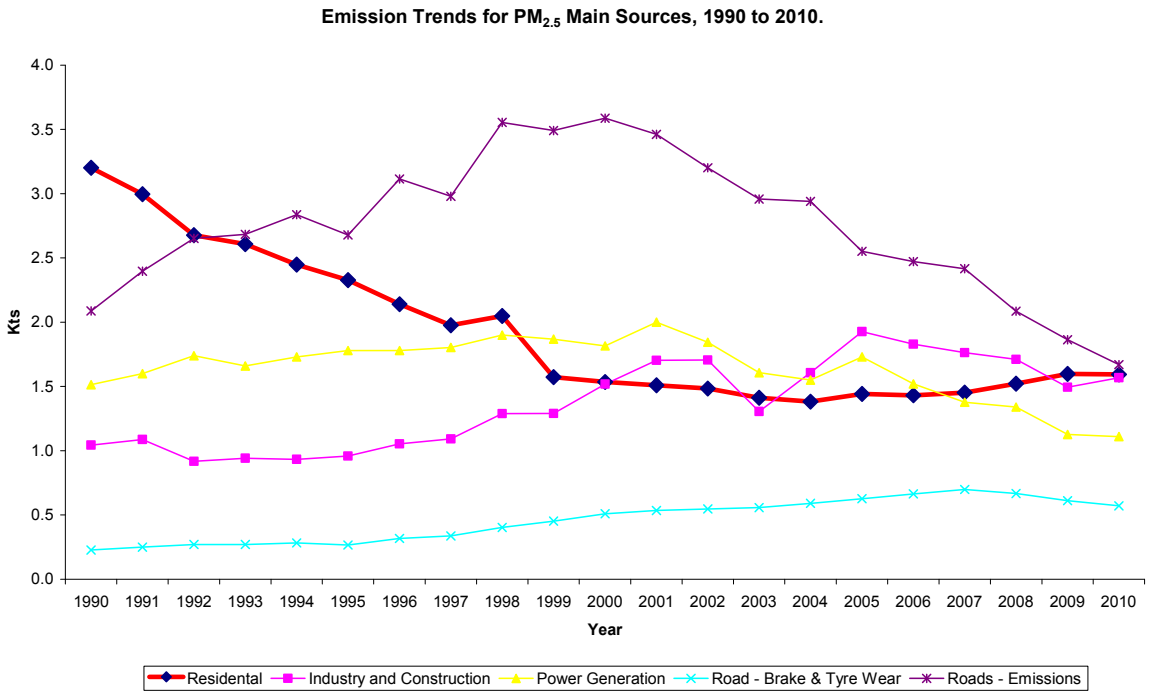


Figure 3: Emission trends for main sources of $PM_{2.5}$, 1990 to 2010.

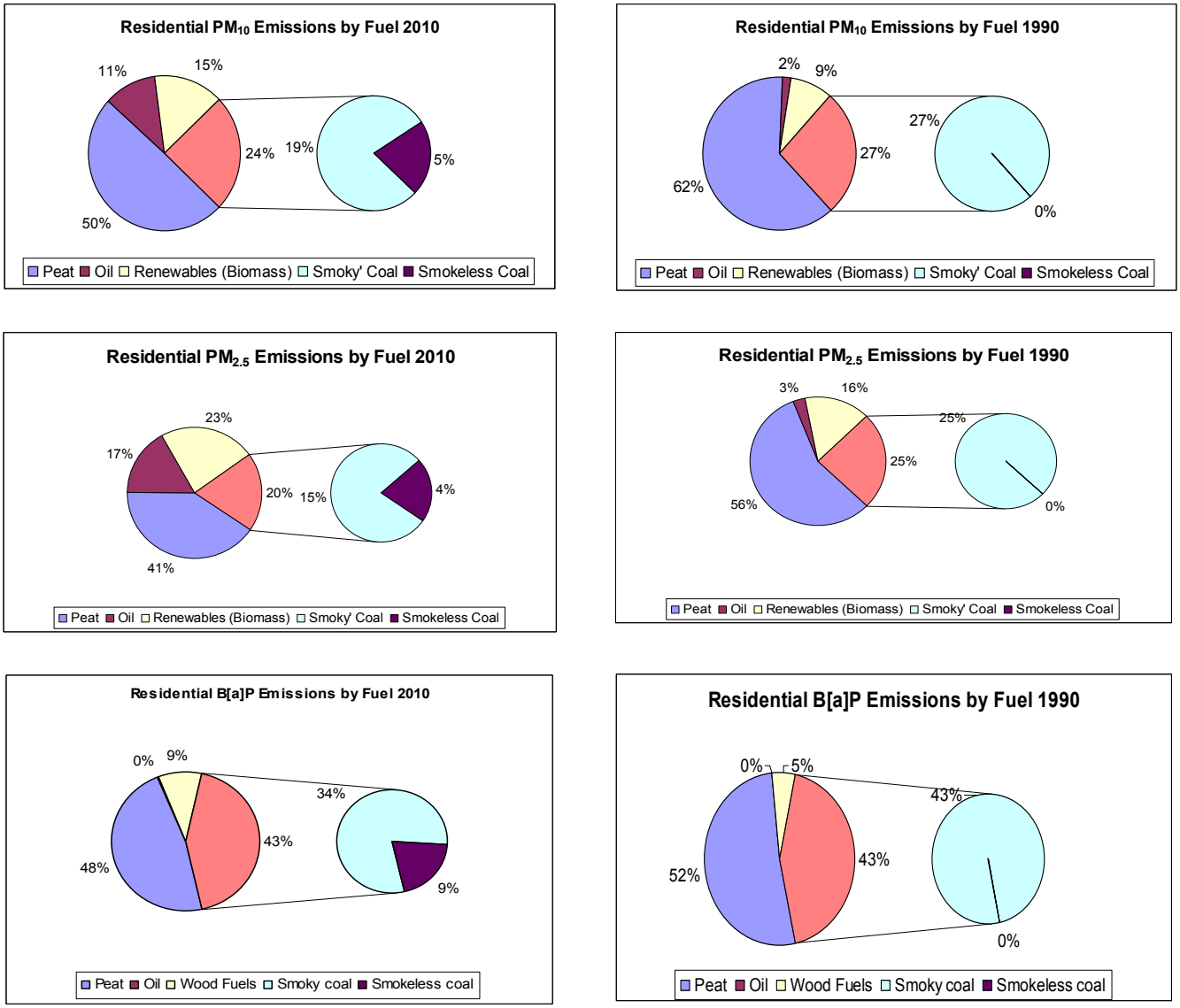


Figure 4: Emissions by fuel, 2010 and 1990 (Source: EPA).

2.2 Levels in Ambient Air

Ireland benefits from prevailing weather patterns which typically bring relatively clean Atlantic air over the country, but which also wash dirty air downwind, potentially over our neighbouring countries to contribute to 'transboundary' air pollution. Under certain conditions, typical weather patterns can be disrupted, and situations arise where local pollutant emissions build up in the air. These conditions can occur at any time of the year, but the impact on air quality can be particularly severe during winter, when the combination of cold weather, increased heating demand and stagnated airflow lead to high concentrations of pollutants and a consequent increased risk to human health.

The EPA reports an annual assessment of air quality in Ireland based on the levels recorded by the national air quality monitoring network set against the EU legislative standards; the latest

year for which data is available is 2010[12]. Levels of PM_{10} in ambient air in the largest cities have generally been declining in recent years though that trend has been reversed in Cork since 2007. The EPA reports that towns and cities with a ban on the sale of bituminous coal have lower levels of PM_{10} than those without a ban. For example, in Ennis in 2010 before the 'smoky' coal ban was introduced there, there were 34 (of 35 permissible) exceedances of the daily PM_{10} limit value – this compares with a figure of 10 in Dublin and 8 in Cork. The number of recorded exceedances in Ennis between October and December 2011 after the ban was introduced in August 2011 was 6 - the corresponding number in 2010 was 26, with 18 in December 2010 alone. However, the 2011/12 winter season has been very mild, so it will take more time to confirm the downward trend in ambient levels in Ennis.

The monitoring network for $PM_{2.5}$ and PAHs has only been established in the last two years so it is not yet possible to report on ambient air quality trends. In 2010 the highest $PM_{2.5}$ daily level and annual average was monitored in Ennis, higher than the levels recorded in either Dublin or Cork. For PAH, the highest levels were recorded in Dublin and Cork where in both cities the EU limit value was reached, so it will be important to monitor PAH trends and take action as necessary to ensure that levels in air are minimised and that the limit value is not exceeded. While the EU ambient air quality standards were not exceeded, the tighter WHO guideline values were exceeded in several cities and towns for both PM_{10} and $PM_{2.5}$.

2.3 Pollution Intensity of Residential Fuels

The 'pollution intensity' of an activity gives a measure of how much pollution is emitted for a given amount of that activity. The pollution intensity of a particular fuel can be defined as the amount of pollution that is emitted to the atmosphere for a given amount of energy. The precise amount of pollution will depend on a range of factors, including the quality of the fuel and the efficiency of the combustion installation. Typical estimates are published for the purposes of compiling emission estimates and these allow for indicative comparison between different fuels.

Table 1 below sets out the pollution intensities for a range of fuels and pollutants compared to emissions from home heating oil, the. From Table 1, it can be seen that for NO_x (oxides of nitrogen), emissions from solid fuels are broadly comparable to those of gas and oil. However, for all the other pollutants, emissions from solid fuel are significantly higher. Smoky bituminous coal is the most polluting coal or coal product for particulate matter; PM_{10} and $PM_{2.5}$, emissions are, respectively, 125 and 52 times greater than for home heating oil. With the new statutory 0.7% sulphur standard for bituminous coal, sulphur dioxide (SO_2) emissions are comparable to those of anthracite and smokeless solid fuel, and just over 10 times greater than for home heating oil. However, emissions of B[a]P from smoky coal are very much higher than for other coal or coal products: almost 30 times higher than anthracite and over a factor of 4 higher than for smokeless solid fuel. Natural gas is the cleanest fuel with negligible emissions for all the pollutants except NO_x where its emissions are similar to the other fuels.

The table also shows that both peat and wood are relatively pollution intensive fuels for PM_{10}, $PM_{2.5}$ and B[a]P.

Fuels	Particulate Matter		NO_x	SO_x	B[a]P
	PM_{10}	$PM_{2.5}$			
	Relative to Home Heating Oil				
Smoky Bituminous Coal	125	52	1	11	513
Anthracite (Smokeless Coal)	13	4	2	12	10
Smokeless Solid Fuel	29	8	1	11	95
Peat	132	55	1	6	513
Wood	141	109	1	0	693
Home Heating Oil (Gas oil)	1	1	1	1	1
Natural gas	0	0	1	0	0

Table 1. Pollution Intensities of Residential Fuels Relative to Home Heating Oil.
Source: Adapted from the National Atmospheric Emission Inventory, UK. (NAEI) and EPA.

Another way to compare different fuels in terms of the relative impact of emission to air is to consider how much pollution they emit for a standard amount of energy provided. For example, smoky coal emits over 11kgs of PM_{10} per tonne of coal burned whereas, for the same amount of energy, anthracite, a natural smokeless coal, emits just over 1 kg. Smokeless solid fuel, a manufactured smokeless coal briquette which can contain smoky bituminous coal but is processed and blended with other products to reduce smoke emissions, emits around 2.5kgs. In comparison, oil would emit just 90 grammes and gas would have negligible emissions, while peat and wood have relatively high emissions. The values corresponding to the range of pollutants residential fuels in Table 1 are set out in Table 2 below.

Fuels	Particulate Matter		NO_x	SO_x	B[a]P
	PM_{10}	$PM_{2.5}$			
	kgs				mg
Smoky Coal	11.3	4.3	2.3	14.0	1,550.0
Anthracite (Smokeless Coal)	1.2	0.3	3.5	15.4	30.0
Smokeless Solid Fuel	2.7	0.7	2.7	13.9	287.1
Peat	11.9	4.5	1.1	8.4	1,550.0
Wood	12.7	9.0	1.1	0.2	2,094.6
Home Heating Oil (Gas oil)	0.1	0.1	2.1	0.6	3.0
Natural gas	0.0	0.0	2.3	0.0	0.0

Table 2. Emissions of residential fuels per tonne of smoky coal energy equivalent.
Source: Adapted from the National Atmospheric Emission Inventory, UK. (NAEI) and EPA.

It is interesting to note that, while wood fuels are considered carbon neutral and climate friendly, a significant increase in their use particularly in urban areas could in the future present air quality challenges. A recent study of PAHs (including B[a]P) in Northern Ireland recommended that smoke control areas ought to be effectively enforced there and that the areas covered by smoke control legislation should be examined[13].

2.4 Ongoing Emission Research.

The EPA are funding a project which investigates emissions of residential, solid-fuel, combustion appliances to gain a greater understanding of the nature of residential emissions from homes in Ireland. It is planned that four solid fuels will be assessed (coal, smokeless coal, peat briquettes and wood) in three classes of combustion appliances, namely an open fire, a stove, and a stove with integral water-heating function.

It is planned that emission measurements will be taken in homes and in the laboratory in respect of a range of pollutants, including PM_{10}, $PM_{2.5}$, NO_x, and SO_2. In addition to quantifying typical emissions from the fuels, the programme will examine the effect of cold start and refuelling on both the nature and the rate of emissions.

3. Developments in EU Legislation and International Guidelines

Since the introduction of the 'smoky' coal ban in Dublin, a range of new EU air quality standards have been introduced to protect human health and the environment. The Directive *on Ambient Air Quality and Cleaner Air for Europe* (the "CAFÉ" Directive, 2008/50/EC[14]) sets air quality standards for eight pollutants, and furthermore requires that air quality is maintained where it is good and the best ambient air quality compatible with sustainable development is preserved. The Directive sets absolute ambient air quality standards for fine particulate matter ($PM_{2.5}$) to be achieved by 2015 and 2020. As there is no lower exposure threshold below which adverse human health effects are not observed for $PM_{2.5}$, regardless of compliance with these absolute levels, the Directive also requires a percentage reduction, depending on ambient levels, to be achieved by 2020. The required reduction in Ireland will be 10% and will likely require reductions in emissions from the residential sector, given it was the second largest source of $PM_{2.5}$ emissions in 2010.

In addition, EU Directive 2004/107/EC *relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air* sets air quality standards for the listed pollutants, which are generally carried in air on particulate matter and monitored by analysis of PM_{10} samples.

The European Commission is currently conducting a comprehensive review of EU air quality policy which is due for completion next year. The review will consider the latest scientific evidence of air pollution impacts on human health and the environment, interactions with other policy areas including climate change and consider a range of possible new measures to abate air pollution in the transport, industry and residential sectors. The National Emission Ceilings Directive (2001/81/EC) which set overall ceilings for a range of air pollutants to be achieved from 2010 will be revised to set further emission reduction targets for 2020 including a new ceiling for $PM_{2.5}$. Neither the use nor specification of solid fuel for residential heating is currently regulated by EU legislation, although such sources can, cumulatively through a range of air pollutant emissions, have a significant impact on the local and regional environment.

The World Health Organisation (WHO) sets a range of air quality guideline values to inform the setting of air quality standards in countries around the world. Unlike EU legislation, these are not legally enforced in Ireland but are developed to ensure that guideline values based on the best available scientific evidence on air pollution and human health are available to authorities in setting air quality standards. The WHO air quality guideline values are tighter than EU standards in some cases. Generally the EU air quality standards are not exceeded in Ireland though levels in excess of the WHO guideline values for particulate matter, both PM_{10} and $PM_{2.5}$, do occur.

4. Air Quality Links to Wider Policy Considerations

Environmental policy is characterised by the many inter-linkages between it and other sectoral policy areas. A core principle of national and EU environment policy is that of *environment integration* which means that environmental concerns should be fully considered early in the policy formulation process of other sectors. This is so that potential environmental impacts are anticipated and addressed as early as possible and avoided entirely or reduced through early action, with the aim of promoting sustainable development.

Action to enhance air quality is aligned with a range of other Government priorities, for example, in relation to public health, climate change, energy efficiency, the green economy and social equity to support an improved quality of life for all.

4.1 Climate Change

Climate change is recognised as one of the major global challenges today and there are strong links between the science and policy aspects of air quality and climate change. Several air pollutants also cause global warming, and action to reduce air pollution will generally reduce greenhouse gas emissions. Black carbon is very fine particulate matter emitted when fossil and other solid fuel is burned, and contributes to global warming by absorbing energy from the sun and trapping it in the atmosphere. Black carbon can penetrate deep into the lungs with associated human health impacts; so measures to reduce the emissions of fine particulate matter can have both air quality and climate co-benefits. Solid fuels are generally disproportionate sources of fine particulate matter (see section 2.4) and black carbon. A recent UN report estimated that by 2020, small-scale residential heating will become the dominant source of black carbon emissions in most countries and cause about half of total emissions. If climate policy promotes biomass (wood fuels) for residential heating this trend could be even stronger. Air emissions from combustion also cause the formation of ozone, a local air pollutant and also a powerful greenhouse gas.

Thus, effective reduction strategies must address residential combustion as a priority[15]. Where cleaner fuels like gas and oil are not available, a move from smoky coal to smokeless would still have air quality and climate co-benefits. A further recent UN report[16] concluded that the replacement of coal by smokeless coal for residential heating and cooking has a large emission reduction potential.

4.2 Indoor Air Quality

Indoor air quality is increasingly recognised as an important source of exposure to air pollution given that we spend the majority of our time indoors. The WHO estimate that globally nearly 2 million people per annum die prematurely from illness attributable to indoor air pollution from household solid fuel use – this impact falls primarily in the developing world, where crude indoor heating and cooking facilities coupled with a lack of ventilation mean that indoor smoke can be 100 times the acceptable levels. However, research[17] [18] in the EU suggests that people living in houses where coal is used for heating, or where solid fuels are used for cooking, also have poorer health outcomes.

Research in Ireland has had mixed findings: researchers at UCD found that using a fireplace for heating with coal, peat or wood increased transient concentrations of air pollutants to several times higher than the normal house average level, with some houses having a high percentage of time exceeding health guidelines: this would indicate a potential health risk in these houses. However, more recent EPA-funded research found levels of indoor air pollutants linked to solid fuel use were generally similar to outdoor levels, suggesting adequate ventilation and well maintained combustion systems in the monitored homes.

The actual level and type of indoor air pollution in homes from heating and cooking will depend on a range of factors including the fuel used, how well the heating appliance is maintained, and how well ventilated the house is. Energy efficiency considerations require that ventilation requirements are optimised. The level of outdoor air quality is also an important factor and this itself can be significantly influenced by the choice of fuel for heating and cooking. Generally in residential areas, levels of outdoor particulate matter and other air pollutants will be lower with the use of cleaner fuels like gas and oil.

4.3 Energy Efficiency and Affordability

The Building Regulations in combination with the EU Energy Performance of Buildings[19] Directive sets out a roadmap to reduce carbon emissions and increase energy efficiency in buildings. A consequential effect of improving efficiency and reducing emissions will be a reduction in the use of solid fossil fuel use in new homes, given its high carbon content and relatively inefficient combustion compared to oil or gas or renewable fuel and this will deliver air quality co-benefits. The efficiency of solid fuel appliances is also taken into account in calculating the energy use of dwellings by the Building Energy Rating methodology. This will lead to more efficient solid-fuel burning appliances, thus reducing the quantity of solid fuel used and associated air pollutants.

As mentioned above, the *Warmer Homes: Strategy for Affordable Energy in Ireland* recognises that there is a greater incidence of energy poverty in those households reliant on solid fuel. The Warmer Homes programme administered by SEAI aims to alleviate energy poverty by funding social enterprises to increase the efficiency of heating systems and upgrade insulation in low-

income households with consequential benefits for air quality, climate policy and the social economy, as well as cost savings to the consumer as a result of the more efficient use of fuel.

The Social Housing Improvement Programme provides funding to Housing Authorities to undertake improvement works to social housing units, including works to improve the energy efficiency and general standard of the houses concerned, which may in turn facilitate improved efficiency and lower emissions of solid fuel appliances.

5. Issues for Consultation

The aim of this public consultation process is to inform and assist a review of the smoky coal ban and the associated regulation of residential solid fuel in Ireland to assess whether it is fit for purpose to safeguard and improve air quality, and to reduce harmful emissions of particulate matter and other pollutants.

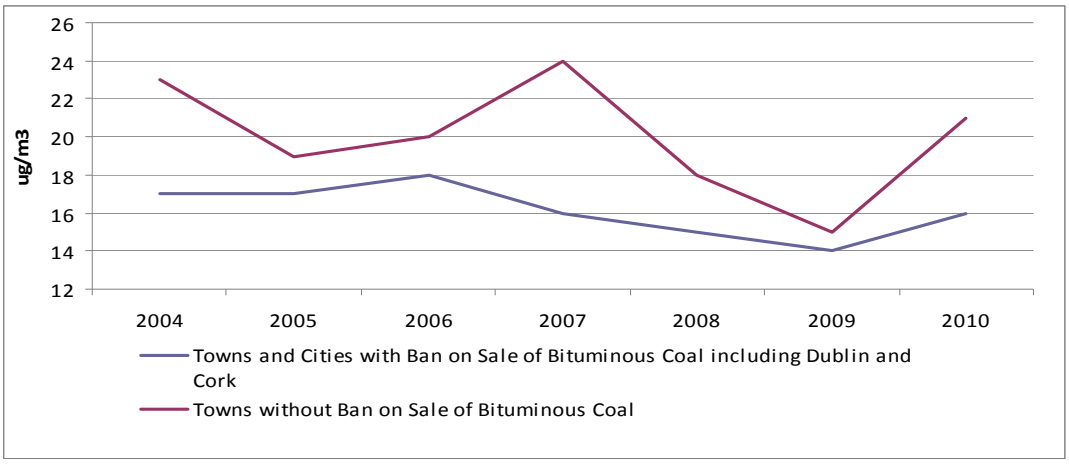
To facilitate structured comment by stakeholders, a number of areas and associated questions are set out below. The Department welcomes submissions in relation to these questions, or in respect of other aspects of the use of residential solid fuel that affects air quality or the environment more generally.

5.1 Extension of the Ban to Cover Additional Towns

The 'smoky' coal ban currently applies to 20 urban areas all designated between 1990 and 2011. For the purpose of air quality monitoring, management and assessment under EU legislation, the EPA has divided Ireland into 4 air quality zones[20]:

- Zone A (Dublin);
- Zone B (Cork);
- Zone C (21 towns with population greater than 15,000), and
- Zone D (the remainder of the country).

EPA monitoring of particulate matter (PM_{10}) in Zone C towns has indicated higher levels in those towns where the ban is not in place, and levels higher than in either Dublin or Cork (see graph below). In its most recent State of the Environment Report, the EPA concluded that the ban on bituminous 'smoky' coal has had a positive effect on limiting particulate matter emissions from home heating and should be extended to all urban areas (e.g. built-up areas with a specified population threshold). There are only four current Zone C towns (Letterkenny, Newbridge, Mullingar and Navan) where the ban is not in place. To provide for a consistency of air quality management across all Zone C towns, it would seem appropriate that all Zone C towns should fall within the ban.



Source. Adapted from EPA (2010)

The Department has received representations in the past from some local authorities seeking to have towns/areas included in the ban. The Air Pollution Act does provide powers for a local authority to declare a special control area in order to prevent or limit air pollution. However, the process to designate a special control area is unwieldy and local authorities have not used these powers.

Do you agree with the EPA recommendation that the 'smoky' coal ban should be extended to cover all urban areas?

Should the ban be extended beyond EPA designated Zone C towns to include additional towns, or should consideration be given to extending the ban nationwide?

If not, should local authorities responsible for any towns beyond Zone C be facilitated to "opt in" to the ban to safeguard air quality, where it is deemed appropriate?

5.2 The Definition of the Boundaries of Restricted Areas

The definition of the restricted area boundary in each city and town is set out in legislation and was adopted when each city or town was brought within the ban. There is clear evidence that the current boundaries in some cases no longer fully capture the actual urban area in those cities and towns as there have been significant changes in settlement and development patterns since many were first included in the ban. For example, Wexford Borough Council has extended its boundary significantly since Wexford was designated as a restricted area in 1998.

The EPA reported[21] elevated levels of particulate matter in Wexford and concluded that the most likely reason is that the coal ban area in Wexford is too small for the size of the town, leaving some newer areas outside the coal ban area, and that extension of the ban area would address this problem. There may also be other towns where the current effective urban area stretches beyond the current restricted area definition. The EPA's air quality Zone C covers the full urban area of a town in most cases, rather than just the administrative district and so might provide a basis for defining ban areas. This approach would also give a consistency between EPA air quality monitoring and management zones and the application of the ban which is the most significant air quality management intervention in most cases.

Do you have a view on the appropriateness of the current restricted area definition in relation to any of the cities or towns currently designated as restricted areas?

Might the EPA designated Air Quality Zone C boundaries provide a basis for defining ban areas to ensure that the ban area covers the full urban area of a city or town?

Should restricted areas be subject to a fixed-term review, for example, to reflect changes in settlement patterns?

5.3 Effectiveness of the 'Smoky' Coal Ban in Smaller Cities and Towns.

While the ban was considered particularly effective in the larger urban areas, there is evidence that its application to smaller urban areas has been less effective at reducing the *use* of 'smoky' coal. This may be because many people in these areas can travel outside the ban area more easily and acquire restricted fuel for use inside ban areas. This travel can be conducted as part of the daily routine or commute and so, in these towns, the ban on the marketing, sale and distribution may not be a sufficient dis-incentive to the use of restricted fuel.

Moreover, access to restricted fuel can often be facilitated by businesses which have established premises just outside the ban area boundaries of smaller cities and towns to serve ban area residents as their main market. Significant use of restricted fuel within a ban area, undermines the effectiveness of the ban and may blur the line for residents as to what is permitted and what is not. This lack of clarity can mean that the use of restricted fuels can become well established and even the norm, so that illegal sale and supply can become established to meet demand.

This raises the question of whether the existing ban, on the marketing, sale and distribution of restricted fuel, needs to be *supplemented* to regulate its actual burning in restricted areas?

Local authorities in the UK can declare a smoke control area and prohibit the emission of smoke from premises in the area. This approach facilitates enforcement as evidence of an offence can be gathered visually by observing chimney emissions. In Ireland, the Air Pollution Act 1987 provides the Minister with powers to take a similar approach to that in the UK by prohibiting the emission of smoke but those provisions have not been invoked.

The Air Pollution Act also provides the Minister with powers to make regulations to prohibit the burning of particular fuels for the purpose of preventing or limiting air pollution – regulations could therefore be introduced, prohibiting the burning of restricted fuels as a natural *complement* to the existing prohibition on the marketing, sale and distribution in restricted areas. It is recognised that obtaining evidence of an offence may not be as straightforward as obtaining visual evidence of a smoke emission. However, enforcement

activities could be focused on facilitating compliance though provision of information on compliance options rather than through the prosecution of the individual. Application of a fixed payment notice might facilitate compliance where there is evidence of an offence in the case of a persistent offender.

It may be that the clarity which a legal prohibition on burning would bring, would mean that the vast majority of the residents in a restricted area would comply, particularly given the air quality benefits to their own community. A similar approach was taken to the 'back-yard burning' of waste which is expressly prohibited by regulations introduced in 2009[22]. Generally, the experience of the provisions has been positive in terms of the clarity provided to the public, by explicitly defining the offence of back-yard burning of waste. It is this legal clarity, rather than specific prosecutions, that has proved beneficial in facilitating compliance, although prosecution of a persistent offender is an option open to the local authority, where it is considered appropriate.

Do you agree that the burning of restricted fuels in restricted areas should be regulated to complement the prohibition on the marketing, sale and distribution?

If so, and *where there is evidence of an offence, would fixed payment notice provisions assist enforcement of a ban on burning of restricted fuels?*

5.4 Implementation and Enforcement

Active enforcement is a crucial part of the successful implementation of any environmental legislation and this is particularly the case with the 'smoky' coal regulations, where the local authorities overseeing the twenty ban-designated urban areas must be especially vigilant and pro-active. Ease of enforcement and required enforcement effort are also key issues, given the current resource limitations in the public sector.

Local authorities are responsible for the implementation and enforcement of the regulations in their functional areas. However, the priority attached to enforcement of the regulations can be variable across the range of local authorities. In addition, the increased use of 'new media' for the on-line marketing, sale and delivery of coal by operators, often outside ban areas and indeed outside the State, introduces a new supply route not conceived of when the original regulations were made.

The EPA's Office of Environmental Enforcement co-ordinates the Environmental Enforcement Network (EEN) which is a cross-agency network whose functions are, *inter alia*, to:

- ensure more effective co-ordination in the implementation of environmental enforcement activities,
- develop a consistent approach to the enforcement of environmental legislation,

- promote the exchange of information and experience in the implementation, application and enforcement of environmental legislation, and
- provide assistance to local authorities and other relevant agencies in the development of best practice.

An EEN sub-committee addresses the enforcement of legislation regarding emissions to air and the enforcement of the 'smoky' coal regulations. However, heretofore the EEN's key priority areas have focused on waste enforcement and other areas, rather then on enforcement of emissions to air legislation.

Do you believe that the enforcement of the regulations can be improved, in terms of the enforceability of the regulations as well as actual enforcement?

If so, how can this best be achieved?

5.5 Sulphur in Coal Regulations

The 'smoky' coal regulations were amended last year (SI 270 of 2011) to set maximum standards for sulphur in 'smoky' coal for sale *outside* ban areas. The regulations build on the approach of the existing 'smoky' coal regulations and should provide for improved regulation of both the smoky coal and sulphur elements of the regulations through, *inter alia*, the certification scheme and registration obligations. While the regulations are in force for less than a year and so are still in the process of 'bedding in', we would welcome any views on their effectiveness.

Do you believe that the new statutory sulphur standard for 'smoky' bituminous coal will assist implementation of the 'smoky' coal regulations?

Are there areas between the two where synergies might be strengthened?

5.6 Wider Policy Issues

Action to enhance air quality is aligned with a range of other Government priorities, for example, in relation to public health, climate change, energy efficiency, the green economy and social equity to ensure an improved quality of life for all. If there are any more general views you wish to express on any other aspects of the regulation of solid view, please do so here.

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