

AIR & DOMESTIC HEATING

Small-scale domestic combustion is the biggest source of emissions of fine particles - known for their harmful effects on human health

Small-scale domestic combustion in fireplaces, wood and coal-fired stoves as well as boilers are significant contributors to air pollution. They emit fine particulate matter (PM_{2.5}), sulphur oxides (SO_x), carbon monoxide (CO), poly-aromatic hydrocarbons (PAHs), dioxins, organic gaseous compounds (OGCs) and nitrogen oxides

(NO_x) which form ground level ozone. These pollutants damage human health and cause premature deaths (see Air & Health factsheet). Wood and coal burning also emits black carbon (BC), known as soot, which contributes to climate change by absorbing heat from the sun.

The technical potential for cutting emissions from the burning of solid fuels in small-scale combustion appliances is huge. There is an urgent need for action.

EU legislation

- Air pollution from domestic heating boilers and stoves is addressed by the Ecodesign implementing regulations which set EU-wide rules for the marketing and use of energy using products. The EU is currently discussing emission limit values (ELVs) for biomass and fossil fuel boilers and stoves to enter into force in 2018 or later. Energy efficiency requirements will also be set. Such ELVs will only apply to new installations. This

is particularly problematic due to the long life time of the units (more than 30 years) which means that existing installations will continue polluting for many years.

- Other EU instruments are there to improve air quality - in particular the National Emission Ceilings (NEC) and Ambient Air Quality Directives.
- Additional efforts may be made at national level, for instance in restricting fuel use (see Dublin and Krakow examples).

FACTS AND FIGURES



PM2.5 EMISSIONS

Small-scale domestic combustion is the biggest source sector for emissions of PM_{2.5}, responsible for nearly 1/3 of the total emissions in the EU [1].



Savings of €31.5 billion annually could be achieved if the WHO recommended limits for PM_{2.5} are met in just 25 large European cities [3].



BLACK CARBON

Under current legislation, domestic heating will be the largest source of black carbon (50%) in the EU by 2030 [2].



PM2.5 EMISSIONS

may be up to 250 times higher if a stove is not properly operated [4].



In addition to continued coal use in some countries, a major challenge is the increase of biomass use, driven partly by renewables policy which encourages the use of biomass for energy to fulfil renewables targets without necessarily taking into account the health implications or sustainability of their supply.



HEALTH PROBLEMS

Exposure to particles from biomass combustion may be associated not only with respiratory but also cardiovascular health [5].

The economic crisis in many EU countries has had a negative effect on air pollution. There has been an increase in the burning of wood and other cheap materials which has worsened air quality.



BAN ON SOLID FUELS IN KRAKÓW, POLAND

Today, Kraków is one of the most polluted cities in Europe. The daily limit value for PM₁₀ is exceeded up to 250 times a year. During peak pollution days over the winter, levels of PM₁₀ can reach up to 400 µg/m³ – eight times over the limit. The main culprit is coal used for domestic heating. Emissions from domestic heating account for 42% of PM₁₀, 34% of PM_{2.5} and 68% of benzo(a)pyrene [6] - the most harmful pollutants to health which are associated with asthma, cancer and heart disease.

Measurements methods:

- mg/m³ - milligrams of pollutant per cubic meter of air
- g/GJ – grams of pollutant per gigajoule net heat input (comparable to power plants emissions)
- g/kg – grams of pollutant per kg of combustible solid fuel (i.e. wood).

For several years local and regional authorities have done very little to improve the situation. Only after civil society increased pressure on authorities to take strong measures to tackle air pollution was a ban on using solid fossil fuels for domestic heating introduced in Kraków. The ban will come into full force in 2018. According to experts, it is the only solution to reach the limit values [7].

DUBLIN “SMOKY COAL” BAN

A ban on smoky coal was introduced in 1990 in Dublin as a response to episodes of severe winter smog, which were caused by the widespread use of smoky coal in residential heating. The ban is estimated to have resulted in around 350 fewer annual deaths because of reduced PM, smoke and SO₂ levels. The ban has now been extended to 20 other cities in Ireland. An estimate of these benefits in monetary terms put the value at over €20 million. Householders have also benefitted from the switch from solid fuel to more efficient and less polluting gas and oil energy sources [8].



GERMAN REGULATION TO REDUCE WOOD BURNING EMISSIONS



Germany has put in place a specific law to reduce wood burning emissions. The new regulation contains a list of fuels that can be burnt, including their maximum moisture. It also sets emission limit values (ELVs) for several air pollutants – including PM – for boilers and stoves. As of January 2015, stoves will have to comply with more stringent ELVs, ranging between 20mg/m³ and 40mg/m³ depending on the type of fuel used. Inspections have been extended to all stoves above 4 KW (previously this was set at 15 KW) [9]. This is expected to significantly reduce PM emissions from domestic heating.



For footnotes, please refer to separate reference sheet and to the EEB website.

RECOMMENDATIONS

- Introduce a harmonised EU method for measuring PM (including condensates) to be used as a test standard when approving all new small combustion installations.
- Introduce an ELV for PM (including condensates) of 200 g PM/GJ heat from 2015 for new log-based combustion installations, going down to 100 g PM/GJ in 2018 and 50 g PM/GJ in 2020.
- Ensure that only appliances emitting less than 4 g of PM/kg of solid fuel are placed on the EU market (Ecodesign Regulation).
- Introduce an EU wide labelling scheme based on the PM emissions performance of new residential wood, pellet and coal fuelled installations.
- Use economic incentives (e.g. taxes or subsidies) to promote the replacement of old domestic combustion installations with better home insulation, heat pumps, new wood pellet installations or, in cities, with district heating or gas.
- Prohibit or restrict residential solid fuel burning in residential areas and promote alternatives.
- Inform consumers about the cleanest types of appliances and fuel used as well as about how to install and operate them efficiently.
- Adopt ambitious emissions reduction commitments, including for PM_{2.5} under the revision of the NEC Directive. Emission reduction commitments must go beyond the Gothenburg Protocol and aim to achieve the health and environmental objectives of the EU's 6th and 7th Environment Action Programmes by 2030.

More information

- IIASA TSAP Report #11, February 2014
- WHO REVIHAAP Report, 2013
- EMEP/EEA emission inventory guidebook 2013; Small combustion