

DustConf 2007, a call to stakeholders and governments

April 23 - 24, 2007, Maastricht, The Netherlands

Conference Statement Annex

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1. Introduction

DustConf 2007 brought 285 people from 23 countries together, to discuss the sources of airborne particulate matter (PM) that have had less attention until now.

The conference was themed around three questions:

- What are the key PM problems?
- What are the key PM solutions (best practices)?
- What further actions are needed by whom to make these solutions work?

The panel discussed three questions:

1. How can we get the measures identified here implemented more widely?
2. PM10 Limit Values are widely exceeded in Europe. What is your key, concrete action to reduce these exceedences?
3. What is the most striking thing you have heard today.

This paper collates the responses from the participants on these questions, an overview of the presentations, panel discussion, and the concrete next steps identified. This paper, together with all the presentations from the conference, can be found on the Dustconf website - www.dustconf.org.



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2. Overview

- Current PM levels pose a substantial risk to human health.
- Without further measures PM emissions from some sectors are supposed to increase in the coming years due to increased activities.
- To achieve current ambient air standards on PM, action must be taken by all levels involved.
- Information on relevant sources is key to identify the right players.
- Solutions are at hand but must be known to the decision makers.

3. Issues raised by participants

Answers to the three key conference questions were gathered from participants, with 66 respondents prior to the conference on all three questions, and an additional 46 responses to questions that were gathered during the conference. The responses are collated here, together with output from the presentations.

3.1. Key problems:

The sources discussed at the DustConf are specifically those for which there has been less attention in recent years. Therefore it is not surprising that identifying source impacts and uncertainties featured considerably in the input received.

What is the most harmful particulate?

- Current action is based on PM10, and will move to PM2.5 but should it be other metrics? Such as PM1, particle number, composition,
- Do we risk focusing on reducing PM10, not the particulates that are most harmful-to-health?
- WHO concluded: insufficient evidence to discard the 'coarse' PM10 fraction, or change the PM metric, although combustion sources were likely to be more hazardous.
- Further research is needed to understand the health impact of the different particulate metrics and the health impact of long-term PM exposure.
- Fugitive emissions are difficult to tackle, yet these are likely to be one of the less harmful sources, so should effort be focused elsewhere?
- How should PM be balanced with other pollutants eg dioxins, PAHs, NO2? Or is it the combination that is the greatest problem?
- Some 'natural' PM10 fractions, such as sea salt, are being discounted in meeting the Limit Values, but there is evidence that these particles may also be harmful, as shown in the keynote speech on health.

Understanding source impacts

- More needs to be known about DustConf sources so
 - effort can be best focused
 - trade-offs understood
 - abatement measures developed
- Emissions data for different metrics, even PM2.5, are often not available.
- The PM composition from different sources need to be understood, if any new health data is to be acted upon.
- Appropriate monitoring need development of appropriate, reliable and low-cost measuring techniques for ultrafine particles and other metrics, including low concentration of microbes and other pathogens.
- How emissions interact in the atmosphere should be understood, influence of meteorology, topography, seasonal and spatial patterns etc.
- Unified emission statistics and measurement methods would allow research to be more easily compared and built on.



- Uncertainties about the impact of different abatement techniques on different particle fractions, and which therefore are the best to apply – eg with bag/fabric filters, and also queries about their energy penalty.
- Need clear 'accountability' studies, intervention studies. For example a study to compare- side by side, the top treatment options for reducing emissions from and inside animal houses (dust, ammonia, odors), and rank based on effectiveness, initial cost, operational cost, maintenance requirements, reliability and effects of the equipment on the environment.
- For better modelling and understanding the following is needed
 - Emissions data by summer and winter (24-hr limit value is exceeded wintertime)
 - Domestic heating and industrial emissions data related to daytime outdoor-temperature
 - Further model development
- Sources that are particularly poorly understood include
 - domestic wood burning (stoves/boilers)
 - construction & demolition
 - traffic non-exhaust, including resuspension
 - bonfires, forest fires etc.
 - storage and handling
 - indoor air

Not enough solutions for these sources

- Research and feasibility studies are needed into appropriate, feasible, cost effective abatement for these sources, and these results should then be disseminated.
- Research should include operators, manufacturers of equipment and regulators to ensure it is appropriate.
- Small scale biomass burning. How to regulate < 50MW or even < 10 MW plants.
- Domestic wood heating is increasing - good for CO2 not for PM.
 - High polluting manually controlled installations and inappropriate fuel quality
 - No appropriate low cost measures yet developed
 - Weak or non-existent emission standards
 - No appropriate particulate filters available – need to be relatively simple, self cleaning and independent of electricity
 - Measures are complicated and expensive to reduce and less cost effective
- Dust emissions and indoor concentrations from intensive livestock houses
- Fugitive (diffuse) emissions, including building demolition and transport, storage and handling of fine or abrasive solid material
- Resuspended particulate, particularly from road traffic, and other non-exhaust emissions such as break and tyre wear
- Agriculture, including animal husbandries, grain firing installations, ammonia sources (due to secondary PM), wind erosion
- Industrial emissions
- Indoor sources (smoking)

Barriers to action

- Measures with no regulation, or that do not save the operator/polluter money - through intrinsic savings or financial incentives are hard to implement
- Lack of political will and engagement
- Negative trade-offs and inconsistency of different strategies – e.g. economic development, CO2
- Implementation can take considerable time
- Solutions not yet identified or developed for all sources. Lack of Best Available Technology (BAT), knowledge and examples



- Needing to change current practice and policy
- Getting industry to take action - there is not always the regulation available
- Operators/polluters not aware of the problems or solutions – particularly farmers
- Environmental technology will not be developed without regulation, and yet regulation needs to be achievable
- Technical solutions being too expensive for the operators/industry/farmers
- Source apportionment rarely being local and PM monitoring being background
- No emission and concentration standards limits for PM2.5 and other PM metric
- PM10 and PM2.5 is not monitored at waste processing, storage and handling plants, making it harder to enforce regulation
- PM concentrations not reducing in line with emissions reduction
- Cost estimates of abatement on big emitters are difficult to obtain

3.2. Key Solutions

Solutions identified (mechanisms)

- Researching, identifying, compiling effective and economically feasible best practices in partnership and discussion with all interested parties
- Spreading information on the best practices so that they can be adopted, and outdated techniques phased out. Information needs to go to both the operators and the regulator
- Information campaigns to increase public knowledge on health effects (risks and benefits) and actions needed to help raise the political will.
- Improved communication to farmers about importance of problem and available solutions, possibly also through trade bodies or other mechanisms for small businesses
- Coherent, well planned strategies, consistent with other strategies, developed in time and regularly evaluated and monitored
- Changing current policy measures – e.g industrial abatement TSP and not PM10-based
- Combine particulate and greenhouse gas emissions measures development and implementation
- Including dust with ammonia regulation for animal livestock, so technology is chosen that does both
- Additional levers are needed to get measures implemented by operators, eg farmers understanding the impact of dust inside housings on livestock health and in disease transmission.
- More initiative taken by industry
- Include particulate in BREFs and other guidances
- Full implementation of IPPC in EU 27 Member States
- Small combustion plants could be covered by IPPC, other directive, or though national regulation eg planned German regulation on “Small and Medium Size Combustion Installations”
- Integrated approach
- Take measures that have effect on several pollutants: SO₂, dust, heavy metals, dioxins, energy consumption
- Develop integrated approach for energy policy (consumption, efficiency, biofuels)
- Set appropriate product standards
- Permanent training and education, including workshops
- Public procurement
- Account for the cost-effectiveness of various measures in various sectors
- Researchers should transfer data with known uncertainties and political conclusions must be made taking into account any uncertainties

**Solutions identified (Specific measures):**

- Agriculture
 - Emissions from livestock housing: air cleaning equipment (air scrubbers, combined scrubbers, electrostatic space charge systems, TiO₂ catalytic reduction, appropriate ventilation, spraying oil/water mixtures, changing the housing type, changing activities such as the manure removal or bedding distribution regimes, ionisation of the air, and type and method of feed administered.
 - Regulators force pig farmers to consider PM as well as ammonia so farmers choose chemical air scrubber that reduces both.
 - A test framework for waste air purification systems in animal husbandry has been developed
 - Oil spraying may be better for new low emission (chicken) broiler houses than scrubbers
 - For horse stables beddings of straw pellets, straw and paper give lower emissions than others
 - Ban agricultural burning
 - Minimise soil erosion by measures such as shelterbelts (hedges or walls), strip cropping, soil cover, appropriate tilling, cover crops, surface fixation with synthetic stabiliser or liquid manure
- Technologies available for wood heaters include:
 - Switching to the best-performing wood heaters, preferably automatic systems
 - Smoke control zones for domestic solid fuel
 - Heat accumulators to ensure stable operating conditions over time
 - Potentially sensor-based automatic air management to ensure optimal burning
 - Combining electronic control with cleaning technology can halve PM10 emissions
 - Advanced wood combustion systems for logwood; chips and particularly pellets can reduce emissions by >90% compared to conventional fireplaces
 - Type approval of domestic boilers, with strict emissions limits
 - Cleaner wood burners need to be encouraged with financial incentives and other mechanisms, particularly for the existing older, most polluting wood fires
- Fugitive emissions can be reduced by:
 - Good operating practices
 - Transport and storage being taken closed systems as far as possible
 - Gathering fugitive emissions to enable abatement by a filter
 - Validation of fugitive emissions measurements
 - New real-time monitoring techniques to support operational activities, eg fugitive emissions assessed by reverse dispersion modelling, using monitored data and weather conditions
- Construction
 - Construction best practice schemes, required through the planning or other system
 - Demolition and blasting emissions can be reduced with a water curtain generated by an explosive hose
 - Retrofitting machinery with particle filters
 - Weather related building periods – eg avoiding demolition when particularly windy
- Waste processing sites
 - Optimum project set-up.
 - Sprinklers fitted to demolition hammers, pulverizers and shears, water sprayers fitted to machinery (fine spray), and air hose with spraying plant
 - Rubber flaps at crusher chambers inlet and outlet, and flap systems on trucks
 - Foaming machine
 - Ultrasonic dust-combating agents



- Appropriate filters should be used, such as
 - Fabric filters wherever applicable
 - An electrofilter is the most reliable for PM abatement in industry, but could be improved
 - Bag filters/particulate traps are effective in removing PM_{0.1}, PM₁ and PM_{2.5}, and associated (or not) with a reactor, also reduce other emissions
 - Good integration of the bag filter in the flow sheet is necessary and the use of active bypass may be an advantage
- Industry
 - More sophisticated measurements on industrial installations, including of PM₁₀ and PM_{2.5}
 - Stricter legislation, stricter permits
 - More trial and error to identify solutions
 - Validation of stack emissions measurements
- Energy efficiency programs for domestic houses
 - Grants or other financial incentives
 - German requirement for energy usage/bills to be stated in rental properties
- Harbours
 - On-shore power for ships in harbours
 - Particulate traps on ships entering harbours
- Source apportionment
 - The use of isotopes is a promising upcoming method
- Wood processing
 - Filtration of the air wood processing workshops with a cyclone followed by an electrostatic precipitator, and recycling the wood dust
- Indoor air
 - Smoking bans in public places
 - Adequate and smart filtration/ventilation techniques where people are exposed

3.3. Further action needed

- Further policy, solution-finding oriented research, as identified above
- Financial support for implementation of existing measures
- Further regulation to push industry and science to implement current and develop further solutions
- (Further) emission reduction programmes in eastern Europe
- Regulations and recommendations on indoor exposure
- Set achievable and realistic thresholds for the near future, and clear ambitious goals into (far) future to set a long term consistent policy and help set future developments.
- For domestic wood burning:
 - Policies and financial support for introduction of electronic, cleaner technologies, possibly including an annual tax/licencing for domestic wood stoves and incentives for fuel switching
 - Emissions standards for wood stoves
 - Increasing energy from biomass to be hand-in-hand with low emission (PM, NO_x, CO) technology development, supported by EU and national legislation
- Policies and financial incentives to encourage energy efficiency
- Require measuring PM₁₀ in waste processing to assist reduction and enforcement
- For agriculture
 - Funding of international measuring and research programs
 - International network for standardisation and harmonisation of measuring techniques, and network for modellers
 - Focused integrated study to identify the effectiveness of abatement techniques



- Industry could start a European benchmark for emissions control
- Undertake the actions identified under the 'Understanding source impacts' section
- There should be detailed studies undertaken to identify the health impact of different PM fractions/metrics, so they can be used for regulation
- Regulations that the EU should implement, with support from Member States - or where not possible through the EU by individual Member States, or through bi-lateral initiatives
 - Emissions reduction regulation in addition to concentration Limit Values, with state-of-the-art emissions limit values
 - Biodiesel in Combined Heat and Power plants to be required to have PM emissions as low as EURO5/6 heavy duty vehicles
 - Particulate-trading, with prices on emissions of PM (like carbon-trading)
 - NEC-Directive for particles
 - Implementation, enforcement, extension and tightening of IPPC
 - Regulation of small and medium sized combustion plants in IPPC or elsewhere – including domestic boilers
 - Requiring the application of BAT to all installations emitting particles and precursors
 - Ban of agricultural fires and negotiations with neighbouring states on agricultural fires
 - BREFs to include PM10 and vertical BREF on measures per sector in addition to the horizontal BREF, which are too general
 - Emissions limits for inland ships and (wood)stoves; tighter standards for diesel cars and lorries
 - Member States to be able to define PM-reduction regulations
 - Reduction of sand erosion from the Sahara – eg reducing the use of 4x4 vehicles
 - Marine fuel quality directive or (IMO) international agreement
 - (International) emissions standards for shipping
 - Energy efficiency Directive

4. Measures to help implement and concrete next steps

There is no one solution to the Dust problem. Traffic is an important source, but is not the only source to be considered. A mixture of measures are needed. There are concrete next steps for many sources that can be taken. Those involved with the DustConf need to take forward the conclusions of the DustConf, to ensure that the further steps identified happen. These concrete next steps came out of the conference, and final panel discussion.

IPPC

Should be implemented more appropriately and consistently across Europe. The BREF documents are a 'shopping list', and some countries implement IPPC using the flexibility aspect more than others.

- The Commission should take infringement action against countries that contravene IPPC – for example do not regulate by deadlines
- The Commission should change the rules to require regulators to justify their use of flexibility
- PM should be included in BREF document revisions
- BREF documents should be tightened when they are revised, and the range of options narrowed wherever possible
- A BREF document should be produced for fugitive emissions and small installations
- Implementation should require a holistic approach – e.g. reducing dust can increase waste
- Regulators and local authorities should consider IPPC and planning in a wider context. For example, requiring mitigation through the planning system (a 'bubble concept'), where a new emitting installation is given planning permission if they pay for reducing similar emissions from another local source.



For livestock housing:

- A focused, applied research contract should be undertaken to identify the best chicken housing for Dust.
- Once this has reported, a workshop should be held with all those local authority officers responsible for regulating livestock housing, and ensure that they are aware of Dust issues and what to require from farmers. It should involve officers from different countries. Written guidance should also be provided and be made widely available.
- Government and regulators need to set the organisational arrangements to ensure implementation of the currently available techniques. Emissions reduction from agriculture can be relatively cheap and be cost-beneficial for society.

Spreading Best Practice

- There should be EU and national workshops sharing best practice. The output of these should be on the web. IMPEL Network (informal EU-wide network of environmental authorities) and other networks should be used.

Domestic heating

- Member States and local authorities should produce emissions limit values for wood burners (e.g. planned German ordinance on small boilers) – possibly leading to an EU-wide, or CEN, limit
- Governments should introduce financial incentives to replace the older, most polluting, wood stoves
- Local Authorities should use smoke control areas, and define which emission stoves are allowed in this area

Health impacts

- There is an understanding that some PM is more harmful to health than others, but not yet the evidence to base further limit values – a chicken-and-egg situation, with monitoring only being undertaken when a problem is confirmed, yet confirming the problem requires monitoring. Health and air quality researchers should be brought together so that the evidence can be understood by 2013, the next revision of the EU air quality directive.
- Cost benefit analysis can be used to help focus effort on the most harmful PM, using the health data available (at present PM10 and PM2.5)

Public and stakeholders

- Information campaigns should inform the public of health impacts – maybe taking new approaches
- Governments and local authorities should work together with industrial trade bodies to help get the message out to particularly smaller operators, of the problems and solutions.

5. Panel members most striking aspects of the conference

The collection of most striking things to the DustConf panel were:

- The significance of ship emissions
- Different PM chemical composition and their health impacts
- The level of enthusiasm and amount of work going on
- Disappointment that most participants were from the Netherlands, Germany, Belgium and France, and there were not more from eastern, southern and northern Europe.
- Should the public take a role in requesting better quality, and therefore more expensive, meat?
- That there were lots of changes required for the BREFS
- How seasons affected Dust emissions, particularly from agriculture
- How difficult it is to measure PM from livestock housing