UFP-Integrating action for cleaner air and climate protection-fraction-by-fraction approach with focus on ultrafine particles (UfP)

by

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Contribution to implement LTS of the Air Convention

at

6 th TFTEI Annual Meeting, Warsaw, October 23 rd 2020

Overview

- EFCA Strategy: “One Atmosphere”
- Current EFCA position on particulate matter, black carbon and UfP
- Developing a policy for UfP
- Characteristics of UfP as a target for action
- Elements of a policy for UfP
- Regimes and mechanisms
- Conclusions

Principals

EFCA is committed to

- an evidence-based approach to development of policies, measures and their implementation using UfP as a „Troyan Horse”

- promotion of a “one-atmosphere approach***-climate and pollution interactions and challenges***” to the framing of air/climate protection policies while guided by synergy and symetry

- working with other civil society bodies and public institutions to improve understanding of air pollution and its consequences at all levels

Activities


Clean Air


EFCA President
18th WORLD CLEAN AIR CONGRESS 2019
WCAC'19
23-27 September 2019
ISTANBUL / TURKEY
Hilton Istanbul Maslak

Characteristics of UfP as a Policy Target (1)

Wide range of sources and substances:

- Natural sources: sea spray, smoke
- Manufactured: process or end of life release of industrial and medical materials
- Use of nanomaterials in products
- By-products: combustion particles, wear of machinery, food preparation
- Secondary pollutants: formed from photochemical reactions of primary emissions of SO_2 , ammonia and VOC etc., including SLCPs

UfP makes up little of the mass in measures of PM (PM_{10}, $PM_{2.5}$), but has high numer density and high surface area

Characteristics of UfP as a Policy Target (2)

Effects at all scales:

- Local scale, human health: evidence of multiple impacts, including on respiratory and cardiovascular systems and some evidence of UfP as factor in cognitive decline
- Regional scale, ecosystem impacts: evidence of damage to plants, reduced ecosystem function with consequences for ecosystem services
- Climate system: evidence of impacts on global warming through direct forcing (black carbon) and role in cloud formation

Health effects ambient/exposure-some sources/emissions seem particularly aggressive

- Vehicle exhausts
- Aircraft engines
- Shipping

Health effect/indor

- Transport in vehicle
- Cooking
- Chimneys (wood burning)

Characteristics of UfP as a Policy Target (3)

Reducing PM reduces UfP

- Many sources already subject to emission controls, but many others are not e.g. release of manufactured UfP in products at end of life
- Some technologies have proved effective in reduction UfP emissions (DPFs, low S fuel, replacing wood burning heaters etc.)

Therefore as elements of a policy for UfP

- Tackling major sources (transport, residential heating, S content in fuel…)
- Extend controls where technology exists (DPF retrofit for construction machinery, SCR on ships etc)
- Take opportunities for exposure reduction in physical planning and building control (ventilation in food preparation, timetable for reduction and elimination of solid fuels for residential heating, thermal insulation, separation of cycling from vehicular traffic ..)
- Research agenda to address key knowledge gaps (aviation a major growth sector, non-combustion traffic emissions etc.)

Statements from UFP Symposium 7th-Brussels, May 2019

- There are considerable differences in the toxic potency of UfP from various sources when using mass as unifying metric

- The toxic potency of UfP when using mass as a dose descriptor differs from PM 2,5 often showing that UfP cause greater effect, particularly to the lung

- Increased understanding of the importance of chemical composition for toxicological effects of UfPs and the use of surface area or particulate numer (PN) rather than mass as dose metric may possibly shed more light on the issue

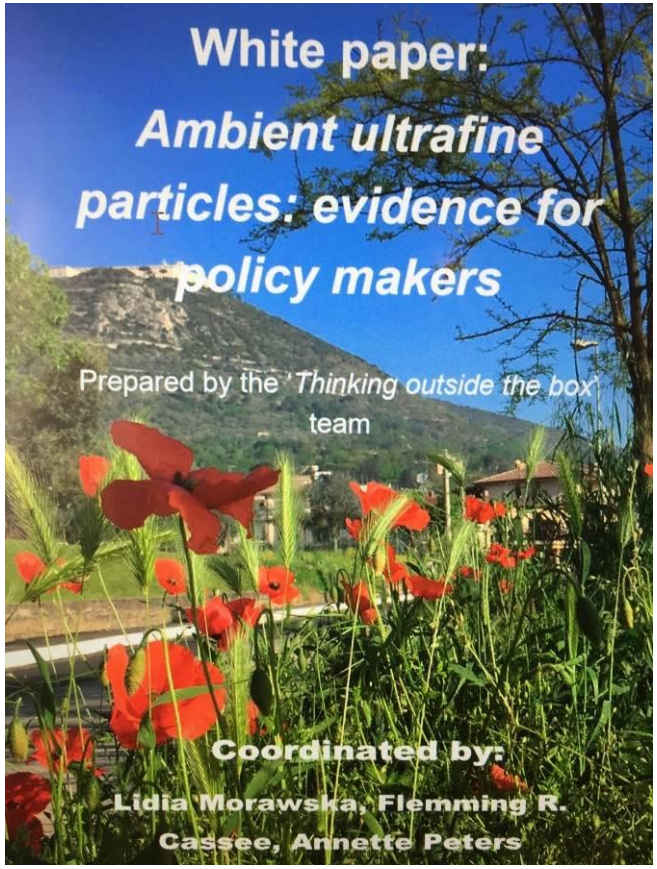
- UfPs do not only affect respiratory health alone but also do have systemic effects e.g. on cardiovascular system more than PM 2,5

Conclusion>***using PN concentration (PNC) as a predictor for health impact may be preferred above mass and surface areas***

Added-value from EFCA side-event on UfP at 18 th WCAC

- Scope of the side events (5 presentations, including the White Paper covering exposure, toxicology and epidemiology), good attendance and promotion of EFCA itself and its policy proposal on UfP
- The theories underpinning UFP emission and formation process are generally well developed (LM)
- The chemical composition of UfP (solid/liquid, organic carbon/elemental carbon, metals, etc.) is generally very limited as well as their emission inventories hardly exist
- Very little or even no relationship between PNC and $PM_{2.5}$ ➔ due to their different sources and behaviour in ambient air. Therefore, they are not representative of each other e.g SMOG>UfP while SOA>PM2,5 (LM)
- There is a lack of adequate instrumental methods to measure UfP
- Toxicological evidence of potential detrimental effects of UFP on human health is sufficient
- BUT the existing body of epidemiological evidence is insufficient to conclude on exposure/response relationship to Uf particles
- SO there is an urgent need to develop an optimal way of exposure assessment for epidemiological studies, utilising the emerging science and technology (LM)

Follow-up to the White Paper



- The White Paper – finalized
- Epi meta analyses – in progress, manuscript expected by the end of the year
- Update of the 2008 review paper – in progress, manuscript expected by the end of the year

We (EFCA and QUT) hope that the outcome of this work will come in time to inform the WHO process

ACC | AQSM

EFCA

European Federation of Clean Air and Environmental Protection Associations

Conclusions from 14 th WCAC-Istanbul 2019

- Prospects for climate stabilisation and cleaner air need speeding up the energy transition and quick acting on Short-lived Climate Pollutants>less UfP in the air

- Global action driven by WHO now needs to develop an international strategy that can deliver substantial reductions in mortality and morbidiity, particularly from PM and its smallest fraction e.g. UfP (White Paper)

- EFCA and its members should participate in the development and activities of the International Forum for Cooperation on Air Pollution launched under the Air Convention in December 2019

- Action on air quality at urban and local scales should take into account the cost-effectiveness of local measures and incorporate more effective ctizen and societal engagements e.g. fighting SMOG containing UfP.

Air Protection Policy-challenges

- Despite the EU Clean Air Package and related Directives the death- toll from air pollution remains high in Europe and in the world (UfP role?)
- The UNECE Air Convention and its key protocols to control heavy metals, persistant organic pollutants, acidification, eutrophication and tropospheric ozone have been slow to enter into force and at present cover only part of the UN/ECE region>Go global
- Diesel fleets and residential heating by coal and wood are a major cause of SMOG (local air pollution) and contribute to climate warming via UfP
- Many non-CO2 greenhouse gases (NCGG) are also of concern because they contribute to local air pollution and are also in the form of UfP
- Energy transition (GREEN DEAL) must rely on greater energy efficiency which is an effective measure for controlling both greenhouse gases and local air pollutants, BUT
- Air policy and Climate Policy still remain two separate policy domains

Targeting UfP may solve most of the challenges

Air Protection Policy: dilemmas

- Wood burning>considered as climate friendly while more toxic than coal
- Urgency in introducing mitigating measures for diesel cars e.g. bans in cities, cleaning-up of dirty diesels on the road and checks over the vehicles lifespan because of the slow penetration of electric vehicles on the market
- E-mobility is a recipe provided „fuel" comes from renewable energy sources not from large combustion plants on fossil fuels (mainly coal)
- NCGG underestimated by climate community, all pollutants-climate forcers on equal footing
- SMOG kills on the spot while toll of climate change seems distant and exotic and is subject to „believe or not"
- GHGs vs Co-pollutants leads to co-problems, air protection fully integrated with climate policy and vice versa>more interactions needed NOW

Targeting UfP may solve most of the dilemmas

Way forward towards UfP policy as response

- Integrate UfP findings into the review paper of 2008 and promote it as well as the White Paper at different fora
- Keep in touch and contribute to the „WHO Guidelines Development Group"
- Extend the EMEP programme on pilot measurement to UfPs, as for BC under the Air Convention (EB decision)
- WG Effects under the Air Convention; investigate relevance of short lived climate forcers for human and ecosystem health (EB decision)
- Consider UfPs during the forthcoming revision of the Gothenburg Protocol (GAP Forum held in Istanbul)
- Include UfP issue into the action to implement Long-term Strategy of the Air Convention
- Use all regimes and mechanisms at global, regional (UNECE) and EU level related to source control, air quality and product management

Don't sleep whilst awaiting the outcome, it's a lengthy and painful proces e.g. Black carbon as UfP ***per excellence*** still in the waiting room

Conclusions

- Relevant EU Directives as well as UN legal instruments for the protection of the atmosphere may increase their cost-effectiveness by considering adjacent atmospheric objectives and targeting explicitly UfP
- Implementation level of existing legal framework is lagging behind initial targets and goals at all levels from local to global
- The legislative framework for the protection of the atmosphere is incomplete and needs geographical extention (EECCA and othe UN Regions) and more stringent although region-specific solutions, including new metric on UfP (Global treaty may be needed)
- Introducing climate-related mitigating measures are globally very important but also important and more urgent is SMOG fighting at local level, which kills via UfP (valuable TFTEI contribution by Guidance on SCIs)
- Anticipating „ONE ATMOSPHERE" policy, all stakeholders, co-led by governments, industry and civil society may want to fill the present gap by more explicitly integrating their cleaner air and climate protection legislation, (common challenges and interactions) including concrete measures with expected co-benefits and not forgeting to target the smallest fraction of Particulate Matter e.g. UfP.
- Guidance from WCAC to be fully taken into account when targeting UfP

Thank you for listening to EFCA

We welcome your questions and comments

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