

Physico-chemical characterisation of particle emissions from various industrial sources

Jorma Jokiniemi^{1,2}

¹VTT Technical Research Centre of Finland, Fine Particles, P.O.Box 1000, FI-02044 VTT, Espoo, Finland

²University of Kuopio, Department of Environmental Sciences, Fine Particle and Aerosol Technology Laboratory, P.O. Box 1627, FI-70211 Kuopio, Finland

Fine particle emissions from combustion sources have gained attention recently due to their adverse effects on human health. Here the effects of fuel quality, boiler type and control devices on particle emissions from energy production by combustion and some other industrial sources are reviewed. Several fossil and biomass based fuels are used for energy conversion processes. Here we consider coal, peat, heavy fuel oil, biomass and waste derived fuels and their effects on fine particle formation in boilers. Boiler types considered are pulverized combustion, bubbling fluidized boilers, circulating fluidized boilers, grate fired boilers, gasification-combustion boilers and oil burners. The emission control devices have the most important effect on particle matter (PM) emissions. Several PM removal devices are used like multicyclones, scrubbers, electrostatic precipitators, fabric filters with and without sulphur removal. Measurements have been performed for boilers with fuel power from 20 kW up to several hundred MWs. Extensive particle chemical composition characterisation methods are used to understand the role of different species on emissions. Understanding all these factors helps us to design the energy production units to meet the emission regulations and to assess the environmental fate of different alternatives in energy production.