



## **Alternatives for reducing fine particulate matter from industrial activities in Concepción Metropolitan Area, Chile**

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The urban center, known as the Concepción Metropolitan Area, is located in Central South Chile and is composed of ten districts and a population of about a million inhabitants. The economic development is based on intensive industrial activities that involve the combustion of biomass, coal, oil and natural gas for energy production and industrial processes. These industrial facilities emit important amount of air pollution, including particulate matter, carbon monoxide (CO) and sulfur dioxide (SO<sub>2</sub>). Several air quality monitoring stations located in the populated areas of Concepción Metropolitan Area show that the annual concentration of fine particulate matter, PM<sub>2.5</sub> (particulate matter with aerodynamic diameter  $\leq 2.5 \mu\text{m}$ ) exceed the Chilean Air Quality Standard.

The contribution of emissions from industrial sources located in various districts of the Concepción Metropolitan Area, Chile, are analyzed in order to control the concentrations of fine particulate matter using cost-effective alternatives. The results show that regulation by economic instruments or command and control should be complemented by cleaner fuels such as natural gas. Cost savings may occur even for 80% of the reduction goals, when 100% natural gas availability. Higher emission reduction requirements and lower natural gas availability, increases the cost of compliance since the industrial facilities must implement air pollution control technologies to reduce particulate matter emissions. In previous studies, the superiority of economic instruments over standards for achieving particulate matter reductions was demonstrated, but this study demonstrated that the availability of natural gas at a lower price (compared to petroleum-based fuels) can affect the total costs in a more efficient way than the chosen regulatory mechanisms.

**Keywords:** Natural gas, environmental economics; cost-effective; fine particulate matter