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REPORT OF THE SEMINAR/WORKSHOP ON  
"POLICIES FOR THE REGULATION AND CONTROL OF AIR POLLUTION  
FROM FIXED SOURCES IN THE PRODUCTION AND  
ENERGY SECTORS"

(Santiago, Chile, 5-7 December 1990)

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## Introduction

1. This report contains basic background information and a summary of the presentations made at the seminar/workshop on "Policies for the regulation and control of air pollution from fixed sources, in the production and energy sectors".
2. The seminar/workshop was organized by the National Commission on the Environment of the Government of Chile and the Economic Commission for Latin America and the Caribbean (ECLAC).
3. This event was organized as an activity under the project on "Guidelines and Consultancy Services on Controlled Environmentally Sound Waste Management", which is being implemented by the Joint ECLAC/UNEP Development and Environment Unit, with the collaboration of the German Agency for Technical Cooperation (GTZ).
4. A document will be published later containing the complete texts of the papers presented and a summary of the discussions held during the seminar.

## I. BACKGROUND AND OBJECTIVES

5. Between September and November 1990 eight meetings were held of the working group of the joint programme of ECLAC with the Government of Chile on "Policies for the regulation and control of air pollution from fixed sources, in the production and energy sectors", within the framework of the ECLAC project on "Guidelines and Consultancy Services on Controlled Environmentally Sound Waste Management".
6. The activities under this project include several working meetings, which were held between the months of September and November 1990, the seminar/workshop, of which the present document is the report, and the seminar on participatory planning by objectives (ZOPP) to be held in the second week of January 1991, in which a strategy will be elaborated for the implementation of the policy.
7. ECLAC contracted four consultants who are examining the juridical, institutional, technological and economic aspects of the subject and undertaking a bibliographic review of relevant international experience. All of this information will serve as the basis for the implementation of the policy.
8. The following objectives were set out for the seminar/workshop.
  - a) To present to the authorities of the Government of Chile the results of the work of the ECLAC consultants.
  - b) To report on the work prepared by the Government as a complement to the reports of the ECLAC consultants.
  - c) To report on the international experience on policies aimed at controlling atmospheric pollution.
  - d) To facilitate an exchange of views on the subject.
  - e) To help standardize the level of knowledge of the subject in order to permit the elaboration of a strategy for the implementation of the policy.

f) To present a preliminary text of the decree elaborated by the Ministry of Mining, with contributions from the Ministry of Agriculture and the Ministry of Public Health, on the control of emissions of sulphur dioxide ( $\text{SO}_2$ ) and of total suspended particulate matter (SPM) in fixed sources of high rate emissions.

## II. ATTENDANCE AND ORGANIZATION OF WORK

### Place, date and attendance\*

9. The seminar/workshop on "Policies for the regulation and control of air pollution from fixed sources in the production and energy sectors" was held from 5-7 December 1990, in Santiago, Chile, at the headquarters of ECLAC.

10. Participants in the seminar included representatives of the Government of Chile, the Joint ECLAC/UNEP Development and Environment Unit, and the German Agency for Technical Cooperation (GTZ), as well as the General Coordinator of Environmental Projects for Mexico City.

### Opening meeting

11. The seminar was opened by Mr. Rafael Asenjo, Executive Secretary of the National Commission on the Environment of Chile, who stressed the importance which the Government of Chile attached to environmental problems, as well as the valuable contribution which ECLAC had made to the above-mentioned project; and Hernán Durán, the ECLAC expert in charge of the project. The closing meeting took the form of a round-table discussion at which the issues of greatest interest that emerged from the seminar were reviewed.

### Organization of the seminar

12. The seminar took the form of expositions, commentaries and subsequent discussions on each one of the agenda items listed on the following page.

13. Other highlights of the seminar were the exchange of experiences in the area of projects for the protection of the environment by the participants in the seminar, and the closing round-table discussion.

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\* See list of participants in annex 1.

Agenda\*\*

14. The seminar covered the following subjects:

1. Presentation of the draft text of the decree of the Ministry of Mining, which regulates emissions of sulphur dioxide (SO<sub>2</sub>) and of total suspended particulate matter (SPM).  
Moderator: Jaime Vincent, Ministry of Agriculture of Chile.  
Exposition: Jaime Solari, Ministry of Mining of Chile.  
Commentary: Juan Escudero, Special Committee on Pollution Control in the Metropolitan Area of Santiago, Chile.  
Discussion.
2. Presentation of the policy of Mexico City on combating environmental pollution.  
Moderator: Hernán Durán, ECLAC.  
Exposition: Fernando Menéndez, General Coordinator of Environment Projects of Mexico City.  
Discussion.
3. Juridical and institutional aspects of the policy.  
Moderator: Ana María Ibacache, Chilean National Commission on the Environment.  
Exposition: Rafael Valenzuela, ECLAC Consultant.  
Commentaries: Rafael Asenjo, Chilean National Commission on the Environment.  
Discussion.
4. Economic aspects of the policy.  
Moderator: Hernán Durán, ECLAC.  
Exposition: José Miguel Sánchez, ECLAC Consultant.  
Commentaries: Alejandro Jadresic, Ministry of the Economy, Development and Reconstruction.  
Discussion.
5. Technological aspects of the policy.  
Moderator: Jaime Solari, Ministry of Mining.  
Exposition: Alejandro Steiner, ECLAC Consultant.  
Commentaries: Juan Escudero, Special Committee on Pollution Control in the Metropolitan Area of Santiago, Chile.  
Discussion.
6. Round-table discussion  
Moderator: Hernán Durán, ECLAC.

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\*\* See list of documents in annex 2.

### III. SUMMARY OF PRESENTATIONS

Presentation of the draft text of the decree regulating emissions of sulphur dioxide (SO<sub>2</sub>) and of total suspended particulate matter (SPM) (agenda item 1)

15. With a view to regulating emissions of sulphur dioxide (SO<sub>2</sub>) and total suspended particulate matter (SPM) from stationary sources of high rate emissions, the Ministry of Mining, with the support of the Ministry of Agriculture and the Ministry of Health, as well as of the working group on the project on "Policies for the regulation and control of air pollution from fixed sources in the production and energy sectors", prepared for discussion a draft text of the decree, which has been revised several times with a view to its forthcoming entry into force.
16. The draft text has been prepared taking into consideration the fact that article 19, paragraph 8, of the Political Constitution of the State of Chile guarantees the population's right to live in a pollution-free environment, for which it is necessary to obtain indices of air quality throughout the national territory that are compatible with human life and the environment.
17. The country must join in international efforts to reduce current levels of air pollution on the planet.
18. Studies undertaken by the Ministry of Mining on emissions of sulphur dioxide and total suspended particulate matter from currently operating stationary sources point to the urgent need to regulate the operations of such sources in order to bring indices of air quality into line with the legislation in force throughout the national territory. The studies also suggest the need to elaborate plans for combating pollution in areas where standards of air quality are not being met, with a view to regularizing the situation of those sources which, because of their particular characteristics, are not in a position to comply immediately with the health legislation in force.
19. Mechanisms must be established to permit the incorporation of new sources of emission of sulphur dioxide and total suspended particulate matter in order to comply with the norms established for the protection of human, plant and animal health and of the

natural resources that sustain them, for which it is necessary to know the base reference quality of the air in the affected region and throughout the national territory.

Presentation of the policy to combat environmental pollution in Mexico City (agenda item 2)

20. The control of emissions of atmospheric pollutants from industries and commercial and service establishments in Mexico City dates from 1971, when the first legal ordinances on this matter were enacted.

21. At the present time the Federal Government is pursuing a strategy for the Management of Air Quality which is part of the Integral Programme against Air Pollution in Metropolitan Mexico City, under which fixed sources of pollution are regulated by the following mechanisms:

- inventory of emissions
- monitoring of air quality
- inspection and supervision, and
- action and social mobilization.

22. In the initial stages, fixed sources were regulated through visits of inspection to monitor emissions of smoke and dust. Currently, an inventory of emissions is maintained, monitoring is done at the perimetric and diagonal source, and dissemination models are employed. In addition, standards for the emission of particles, carbon monoxide, sulphur dioxide and nitrogen oxides are enforced and combustion processes treated in order to neutralize various polluting substances in the chemical industry.

23. Administrative sanctions or sanctions for infringements of federal regulations imposed upon persons or companies that violate legal provisions on environmental protection are becoming increasingly severe. Such sanctions may currently take the form of between one month and five years of imprisonment, a fine of between 20 and 100 000 days minimum wage --US\$200 to 1 million-- and the total or partial, temporary or permanent closure of the company.

24. The Law, regulations and norms are not enforced in an authoritarian or inflexible manner; the most common practice for controlling emissions from fixed sources is by mutual agreement. This means that the Government concludes agreements with industry with respect to emission control programmes under which deadlines are established for industries to install control equipment, improve their combustion processes and eliminate emissions of polluting substances.

25. The federal government has arranged open credits with national and international banks --for the purchase of equipment in

pollution-causing industries-- under conditions of preferential financing. In addition, for a certain period fiscal incentives were provided for the acquisition of control equipment. These incentives were subsequently withdrawn due to the economic situation of the country.

26. The thermoelectric plants located in the Valley of Mexico and the Mexican National Oil Corporation (PEMEX), which operates in the city itself, are the State enterprises with the highest emission levels, and special programmes have been established for their regulation.

27. Industries that cause heavy pollution, such as the cement, foundry, paper and chemical industries, have had to shut down, relocate to other areas of the country or eliminate emissions by installing highly efficient control equipment.

28. The Secretariat of Urban Development and Ecology (SEDUE), the Department of the Federal District (DDF) and the Commission on the Environment of the Government of Mexico, which are the government agencies responsible for ensuring compliance with the General Law on Ecological Balance and on Protection of the Environment in the Metropolitan Area of Mexico City, have a team of qualified inspectors to monitor approximately 1 000 industries and 6 000 service establishments that are considered to be polluting.

29. Denunciations and public complaints have increased as social awareness of ecological and environmental pollution problems has grown. In the 1970s public complaints were very few; at present, more than 1 000 complaints resulting in visits of inspection are received annually.

#### Juridical and institutional aspects of the policy (agenda item 3)

30. The present document offers a compact and relatively systematized synthesis of the legal norms in force in Chile with respect to the control of air pollution originating from stationary sources in the production and energy sectors. Thus it describes the procedures followed by the administrative organs of the State which are competent to act in this field; the instruments and methods established for the control of such emissions; the sanctions and corrective measures that could be applied or imposed and the procedures to be followed in each case according to the particular situation.

31. The analysis has excluded matters related to air quality standards or the standards laid down in current legislation governing the emission of pollutants into the air, as well as issues related to the numerous legal prohibitions and regulations that exist in this field. Familiarity with these norms is assumed and they are therefore mentioned only where strictly necessary for

a proper examination of the mechanisms of control of their prescriptive contents.

32. In the first part, the document contains a list of relevant agencies and the control mechanisms existing at the national level. The second part reviews the provisions established particularly for the Metropolitan Area of Santiago and for other zones in other regions where air pollution levels are critical.

#### Economic aspects of the policy (agenda item 4)

33. This article contains an inventory of existing methodologies in the field of cost-benefit analysis of the effect of air pollution in urban areas.

34. It describes the methods used to obtain monetary values for the benefits derived from reducing air pollution. These include the Market-Related Method and Methods of Contingent Valuation.

35. The Market-Related Method is based on the fact that there is no market for lowering pollution levels or, alternatively, for improving air quality. As a result, it is very complicated to determine the appropriate prices in order to attach a particular value to the benefits of an anti-pollution policy. One way of resolving this problem is to determine that price on the basis of inferences obtained from related markets.

36. Methods of Contingent Valuation, also called direct methods, consist in asking persons how much they would be prepared to pay for a given benefit, or what they would be prepared to accept in compensation for a loss of well-being.

37. Subsequently, a comparative analysis was undertaken of policy instruments designed to deal with the problem of pollution from fixed sources. This analysis took into account taxes or levies for emissions in combination with a set of legal provisions, that is to say, emission standards, technological standards and tradeable rights of pollution.

#### Technological aspect of the policy (agenda item 5)

38. It is necessary to distinguish three aspects of the problem of air pollution: quality standards; concentration of emissions in the environment, and the volume of emissions.

39. Air quality standards prescribe, for each polluting substance considered, the maximum acceptable concentration of pollutants in the air --as determined by the health authorities-- in order not to affect the health and quality of life of persons and of animal life and property; the limits on the concentration of emissions in

the environment or on the inspiration of polluted substances imposed by air quality standards; and emissions of such pollutants.

40. This document refers to the existing air quality standard, persistent environmental concentrations, such as those that occur in the centre of the Metropolitan Area, and the main sources of emission in the country. To these must be added the principal mechanisms for controlling emissions of polluting substances.

41. Industrial emissions in the form of gas are part of a panorama of environmental pollution that exists mainly in:

- the Metropolitan Area
- mineral foundries, industrial kilns and large fuel consumption centres
- cellulose plants, and
- fish meal plants.

42. It is necessary to distinguish between air pollution in the Metropolitan Area from that of the other regions. This is due to the fact that emissions from fixed sources in the Metropolitan Area originate from numerous sources, the combined effect of which makes it difficult to distinguish their precise origins. The above is not true for other areas in which the number of sources is limited and in many cases there is only a single source.

43. The present work consists basically of a matrix of emissions --for the Metropolitan Area and the other regions.

44. It also analyses systems for reducing emissions of each polluting substance which has been considered as treated --total suspended particulate matter and sulphur dioxide. Finally, it describes available processes and technologies for reducing pollution levels and estimates the costs of each one of these for the different sources of pollution.

## Annex 1

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Annex 2

DOCUMENTS PRESENTED AT THE SEMINAR\*

- 1) Principal emissions of air pollutants and available control mechanisms.
- 2) Notes on air pollution.
- 3) Project for the control of emissions from fixed sources at the national level. The case of Chile. Consultancy on institutional and legal systems.
- 4) Economic aspects of the control of emissions from fixed sources.
- 5) Draft text of the decree regulating the operation of fixed sources of high annual rate emissions of sulphur dioxide and total suspended particulate matter throughout the territory of the Republic of Chile.
- 6) Control of emissions from fixed sources in the Metropolitan Area of Mexico City.

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\* Documents in Spanish only.