

COUNCIL FOR MUTUAL ECONOMIC ASSISTANCE

Secretariat

INFORMATION

**ON CO—OPERATION BETWEEN THE CMEA MEMBER
COUNTRIES IN THE FIELD OF ENVIRONMENTAL
PROTECTION AND IMPROVEMENT AND THE RELATED
RATIONAL USE OF NATURAL RESOURCES**



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In connection with the signing in November, 1979, of the Convention on Long-range Transboundary Air Pollution and the Declaration on Low- and Non-range Technology and Recycling of Wastes the CMEA Board on Environmental Protection and Improvement worked out proposals related to the organization of co-operation within the CMEA connected with the implementation of tasks for CMEA member countries that stem from Conventions and Declarations. It was decided to envisage in the "Overall Expanded Programme of Co-operation of the CMEA Member Countries for 1981-1985 in the Field of Environmental Protection and Improvement and the Related Rational Use of Natural Resources" a task to conduct joint works in interested CMEA member countries in implementing tasks stemming from the Convention and the Declaration that can be solved only through multilateral co-operation.

Given below is brief information on the results of multilateral co-operation within the CMEA framework obtained in 1984 in the course of implementing the above programme.

I. Implementation of tasks for CMEA member countries stemming from the Convention on Long-range Transboundary Air Pollution

Co-operation of research and design organizations of interested CMEA member countries on the matter of "Protection of the atmosphere against harmful substances pollution" involves a broad spectrum of works in the field of developing equipment designed to protect clean air. New, effective methods and technology have been developed to purify flue gases from sulphur dioxide, nitrogen oxides, bad smelling substances, and dust, and to lower the content of harmful substances in exhaust gases from vehicles, and also analytical and measuring methods to determine harmful substances.

As regards the reduction of sulphur dioxide emission, there is a particular interest in various modifications of the limestone slime wet method. Works continue on the application and improvement of the limestone additive method. A common methodology is worked out to evaluate the absorption ability of limestone.

Designs have been worked out of industrial installations employing different methods and used to desulphurate flue gases at power stations, non-ferrous metallurgy enterprises and sulphuric acid plants. Construction commenced of a pilot installation to desulphurate flue gases through magnesite method for a 200 MW unit and also of an industrial installation to purify flue gases of the power station through the cyclic ammonia method, capacity 1 mln cu m/hr.

Works are also conducted to utilize waste substances that are formed during desulphuration of gases, for instance, as construction materials.

In the field of reduction of nitrogen oxide content in industrial flue gases new methods are developed and existing ones improved for alkali absorption, absorption and oxidation of nitrogen oxides, recovery of nitrogen oxides with the help of urea. A number of technical designs have been prepared for industrial application of different methods. Pilot and industrial installations have been developed that ensure a significant reduction of nitrogen oxides emission.

To cut down emission of harmful gases from industrial enterprises, catalytic and thermal reheating is used.

As regards dedusting, new types of filter materials continued to be developed as well as pilot design works in the field of electric filters and fabric dedusters.

To reduce toxic emissions from vehicles, work is being done to develop systems to neutralize these emissions. Neutralizing devices for diesel automobiles have been tested, instructions have been worked out for checking, diagnosis, maintenance and repair of engines and methods to calculate harmful substances emission.

Measuring equipment is developed to determine harmful substances emission in various technologies.

On the problem of "Meteorological aspects of atmospheric pollution" research is made into atmospheric diffusion, modelling and calculation of air pollution with the account taken of the types of sources, landscape relief, methods are developed for forecasting high levels of air pollution, chemical basis and

methods to monitor pollution, research is made into inter-relation of air pollution and urban microclimate.

Works were conducted to evaluate and compare designed models of long-range admixtures transfer used by some participating countries. Methodology is developed to evaluate the quantity of atmospheric admixtures falling in the vicinity of the source depending on meteorological conditions and characteristics of underlying surface. A scheme has been worked out to determine the flow of admixtures washed out by precipitation on the basis of climatological information, velocity and direction of wind and precipitation, and also location of sources. Computer-aided calculation was made of the distribution of concentrations from spot sources with the account taken of dry admixture sedimentation effect.

Work was done to improve models to evaluate long-range transfer of sulphur and nitrogen compounds and on the programme of sulphur concentrations and their fall-out on the underlying surface. Works have been done in theoretical substantiation for the selection of the transformation coefficient of sulphur dioxide into sulphates in the process of long-range transfer.

Scientists and specialists from research institutes of the co-operating countries took part in comparing methods to determine nitrogen oxides in atmosphere, in a complex experiment to study admixture distribution under the conditions of a complicated relief, and also in a seminar on common subjects which discussed matters related to:

- Models to calculate long-range and medium-range admixture transfer and to determine fall-out;
- Experimental research into sulphur containing compounds and other substances in the flares of industrial enterprises, atmospheric air and precipitation;
- Observation systems of transboundary flows of polluting substances and fall-out.

The main task of co-operation on the problem of "The Global System of Environmental Monitoring" (GSEM) is to create an integrated network of complex background monitoring stations on the territory of the interested countries to evaluate and forecast environmental conditions in the region.

By the present time progress as follows has been achieved:

- systematic measurements are made under the "Programme of observations of abiotic component of the environment at inland background stations" of the CMEA member countries;

- joint expedition experiments are conducted that are an effective form of introducing the results of co-operation, mutual exchange of experience that enables also to identify the most optimum methods of stations' operation and the scale of background observations;

- systematic comparison is made of methods for analysis of pollutants organic to the monitoring programme of operating background stations, during expedition experiments, and also through interlaboratory analysis of standard models and standard samples selected during experiments;

- research has been completed related to the evaluation of pollutants fall-out share from local and area sources, elaboration of the methodology has been completed to evaluate integral pollution of the territories with the use made of snow during standard network snow sampling;

- significant attention is paid to developing methods to evaluate and forecast environmental condition which will serve the basis for elaborating practical recommendations to prevent pollution effects;

- results of co-operation are discussed at scientific coordination meetings, at meetings of the board of commissioners, at scientific seminars, at scientific schools convened periodically on individual directions of work;

- co-operation materials are reflected in the regularly published collected articles "Problems of background monitoring of environmental condition results of co-operation of the CMEA member countries on problem GSEM".

The network of stations that make observations in the East European region could become a subsystem of the GSEM elaborated within the UNEP framework.

II. Co-operation in the implementation of tasks stemming from the Declaration on Low- and Non-waste Technology and Recycling of Wastes

Within the framework of the Council for Mutual Economic Assistance broad international co-operation is maintained in elaborating and introducing in production low- and non-waste technologies in accordance with the "Overall expanded programme of co-operation of the CMEA member countries in the field of environmental protection and improvement and related rational utilization of natural resources", namely on the problems "Development of low and non-waste technologies" and "Decontamination and utilization of household, industrial, agricultural and other wastes".

Research and design organizations participating in co-operation have accomplished evaluation work in the field of development level of technological processes and eventual directions for their transformation into low and non-waste technologies with the account taken of utilization of wastes and complex utilization of natural resources.

Comparison of results of research into calculation of economic efficacy of shift to non-waste technology of the existing, reconstructed and designed productions ensures the possibility of elaborating a unified methodology of studies into economic efficiency designed as recommendations for the interested CMEA member countries.

Besides, within the framework of co-operation works are carried out to evaluate the saving of the primary raw materials through utilization of wastes. Calculation algorithms have been elaborated and optimization programmes that envisage alternatives to cut down to the minimum wastes in specific productions. Forms have also been elaborated to obtain information necessary for drawing schemes for the development and territorial location of enterprises for utilization of wastes. Reciprocal exchange of curricula is effected for training and improvement of skills of engineers and technicians, in the environmental protection field, including the matters related to the utilization of wastes and introduction of low and non-waste technologies.

The results of co-operation aimed at extracting compounds of aluminium, gallium, germanium and vanadium have enabled to master the production of concentrates of these metals.

New technologies have been developed (wet and dry ones) for magnetite dust catching that will enable, for instance, Poland to boost its production to 60 thousand tons by 1990 (in 1980 the production equalled about 7 thousand tons).

As to catching of aluminium compounds from ash, methods have been developed such as cake disintegration and acidic ones.

The results of research into the elimination of germanium compounds from ash have enabled to obtain a semi-product rich in germanium on an industrial scale.

Co-operation is maintained on matters related to the utilization of volatile ash and slag in road construction. At present in the interested CMEA member countries in road construction about 2 mln of volatile ash per year is used. Ash and slag are used extensively in airdrome construction and when levelling the territories. Volatile ash and slag are used in the production of man-made materials, for fertilizing and amelioration of soils, and also when purifying water and water drains.

In the field of the coal industry the catalogue has been accomplished of optimum technological schemes of coking and energy coal for factories with low operational and low production line technology, capacity 1000 tons of coal per hour. The catalogue has been published for application during design and research work in the coal industry.

In the field of the chemical industry a technology has been developed for sodium pyrosulphate from associated gases of sulphuric acid production, and also tin recuperation method from waste waters with the help of aluminium debris cementation. Tin output is 85 per cent.

Technological process for butadiene and phenylbutazone production has been improved.

Non-waste and low-waste technologies for the production of mineral fertilizers have been developed.

In the field of construction the following methods have been developed:

- technology that ensures complex reduction of wastes from asbestos cement production;

- technology for utilizing production waste for the production of fire-proof asbestos cement sheets;

- technology for utilizing dump wastes for the production of hollow blocks for single-storey construction;

- technology for the production of viscous substances from asbestos cement production wastes.

The above technologies have ensures effective and complex technical solving of the task set, namely, the reduction of the quantity of wet wastes production, by 70 per cent, complete utilization of wet and dry wastes and their reprocessing into high quality asbestos cement products, reprocessing of dumps available into a valuable construction material.

Besides, a technological line has been introduced for the production of hollow blocks with the use made of wet asbestos cement wastes, capacity 8 mln pieces of conventional bricks per year. Compensation period of the line is about 2,5 years.

Utilization of crushed wastes as raw material in asbestos cement production reduces cement consumption by 2 per cent.

In the field of the light industry progressive technological processes have been developed for the production of soft leather for footwear tops with reduced production cycle and better finishing, that ensure cutting down consumption of water, chemicals and harmful substances content in waste waters.

A new method of ashing with a lesser quantity of alkali and their volume of waste waters has been introduced which ensures a significant saving of water, steam and energy.

To further summarize the experience in elaborating low- and non-waste technologies by federations of scientific and technical societies of socialist countries and the CIEA Board for Environmental Protection and Improvement it is envisaged to jointly convene in 1986 in Budapest the third International conference "Low- and non-waste technologies".

III. On other results obtained in the course of co-operation in the field of environmental protection and improvement

Besides the above results of multilateral co-operation within the CIEA framework which facilitates directly the implementation of tasks stemming from the above Convention and Declaration, scientific and technical organizations of the interested CIEA member countries co-operated also on other problems.

On Socio-economic, organizational, legal and educational aspects of environmental protection scientists and specialists of the interested CMEA member countries have elaborated:

- methods for planning the utilization of natural resources with the account taken of socio-economic and ecological forecasts and plans;
- organizational and legal measures of environmental protection;
- proposals related to management methods in the environmental field;
- methodological recommendations on economic and non-economic evaluation of the impact of human activity on the environment, experimentally tested results of research in the model regions on the territories of co-operating countries;
- general principles for working out cadasters of natural resources and environmental condition;
- a comparative analysis of organizational management systems in the field of nature preservation in the CMEA member countries;
- comparison of the curricula contents in the CMEA member countries participating in co-operation.

The CMEA Secretariat has published collected articles "Education on matters related to environmental protection at schools of the CMEA member countries" and "Recommendations on problems of economic education at secondary grammar schools and higher educational establishments".

Skills of scientific cadres are improved through workshop schools, namely:

- on socio-economic aspects of environmental protection;
- on legal matters of environmental protection;
- on educational matters in this field.

On matters of environmental health the co-operating health institutes of the CMEA member countries continued the elaboration and improvement of methodological basis of health regulation of factors and sanitary protection of environmental objects. Works were done to determine toxic substances in the atmospheric air and water. For example, in 1984, methods were published for quantitative determination of environmental chemical pollution and methodological recommendations were approved of health regulation of microbic

environmental pollution whose aim is to give a scientific substantiation of integral, representative indicators of epidemic safety of water and soil with regard to pathogens of intestinal infections of bacteria and virus nature.

In the field of regulation of carcinogenous substances in the atmospheric air methodological recommendations were elaborated which established health norms of chemical components. Methodological recommendations were also elaborated on research into stability and transformation of chemical substances in water medium.

Principles and criteria are elaborated for determining real and maximum permissible degree of impact of environmental chemical factors on organism.

In the process of co-operation in the field of protection of waters against pollution design documentation has been elaborated for hydrocyclones, filters and sumps with the use made of synthetic and polymer materials. Methodological materials have been elaborated for comparable technical and economic evaluation of alternatives for purifying and final purification of waste waters. New effective technologies are worked out for purifying waste waters of a number of industrial productions with the use of physical, mechanical and biochemical methods. Experimental research is made into designs of thin-layer sumps with plastic modules. On the basis of production testing carried out technical instructions have been prepared for designing treatment stations with biofilters-stabilizers with plastic block production loading. Technological schemes and equipment have been developed for processing waste water sediments.

Research has been carried out into optimization of physical and chemical treatment of water used in closed water supply systems of main branches of industrial production, technical and economic parameters have been determined for a complex of purification devices.

The co-operating CIEA member countries have elaborated methodological recommendations for designing sumps and clarification devices of improved design for treating natural waters, and also proposals for the application of sorbents and oxidizers for removing organic substances and micropollutants from water.

In the field of elaborating and introduction of automated control the specialists of co-operating countries have developed relevant equipment and samples of complex automatic stations that enable a quicker and more exact determination of the quality of water with a possibility of obtaining continuous readings of major parameters, their automatic registration with the transmission to the central dispatcher board.

In 1984 the first part of Unified Methods for studying water quality was published. The fourth edition contains chemical, biological, technological, radiochemical and also microbiological methods of water analysis.

On the subject of protection of ecosystems (biogeocoenosis) and landscapes universal models of ecosystems are elaborated which are tested for determining the structure of concrete ecosystems in practical management of agro- and forest ecosystems, and also for studying. A number of CMEA member countries have completed the drawing up of large-scale vegetation maps of a number of territories protected, and also ecosystems most important from economic point of view. An active joint work is carried out in compiling the "Vegetation map of European CMEA member countries", and also on "Complex study into ecosystems of the Carpathian mountains".

The first part of methodological material of "Recommendations on introducing geocological principles in the normative documents" has been prepared. Results and recommendations of the technology worked out for agricultural and forest recultivation were handed over to the mining industry designers. The list of protected animals in the CMEA member countries prepared jointly and published has been proposed for use as well as the Catalogue of Notions used in studying protected territories.

The survey has been published entitled "Growth regulators, defoliation agents and desiccants and their danger for environmental components". The impact has been studied of a number of insecticides of pyrethroid group, a complex study of herbicide on strawberry agro-coenosis has been made and methodological recommendations have been given for its rational utilization. On the basis of studying saturn pesticide its utilization has been limited in rice growing.

Collected articles have been prepared for publication entitled "Biological circulation and modern processes of soil formation"

and "Man's heredity and the environment". Methodological recommendations have been published on mutagenic factor of a number of new medicinal preparations.

Besides, the above-mentioned results of co-operation of research and design organizations of the interested CMEA member countries numerous results have been obtained on other problems of the "Overall Expanded Programme" such as "Combating noise and vibration", "Ensuring radiation safety", "Basic guidelines for city planning, its natural zones, and also settling systems with the account taken of environmental protection and improvement in the CMEA member countries", "Protection of mineral wealth and rational utilization of natural resources connected with environmental protection and improvement". Extensive information support was provided with regard to problems of environmental protection and improvement.

At present within the framework of the CMEA Committee on Scientific and Technical Co-operation, first of all, in its working body- the Board on Environmental Protection and Improvement, the "Overall Expanded Programme" is elaborated for the period 1986-1990. In this connection research organizations of the CMEA member countries, co-ordination centres and Boards of Commissioners prepare proposals on problems aimed at further improvement of the efficiency of multilateral scientific and technical co-operation in environmental field and rational utilization of natural resources in the light of decisions of the Summit Economic Conference of the CMEA member countries held in June, 1984 in Moscow.