

RECOMMENDATIONS TO ECE GOVERNMENTS ON RATIONAL USE OF WATER IN INDUSTRIAL PROCESSES

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Management policy

1. Governments should pursue a policy of rational use of water in industry aimed at controlling both water abstraction and the degree of pollution of waste-water discharge. Water-management policies at all levels of government should encourage the application of water-saving techniques to manufacturing processes. In this respect, traditional or existing principles, practices, methods and techniques should be analysed and verified.
2. Governments should consider the various administrative, legal and technical measures that can be used to control discharges of pollutants by industry.
3. Governments in industry should consider the integration into their policies of the various economic instruments of water management, while also taking into account: all aspects of environmental protection (air, water, soil, etc.); the economic aspects of the strategies used to combat industrial pollution; the utilization of the concept of cost-effectiveness in the decision-making process; and economic impediments to technological progress promoting improved use of water resources arising from statutory or financial provisions.
4. The concept of effluent charges and of fines and penalties for violation of pollution control regulations by industrial enterprises should be consistent with prevailing policy principles, such as the "polluter pays" principle, compensation for damage, and equivalent conditions for industrial competition. Consideration should also be given to charges, fines and penalties which have an economic influence on mitigating and counteracting damage

to water bodies caused by pollution. Effluent charges, when made, should be based both on the amount of waste water discharged and its pollution load.

5. Priority should be given to the effective enforcement of legal and administrative provisions which contribute to avoiding wastage of water and excessive water losses, in particular those which encourage efficient use of water in the industrial sector. Adequate regulatory instruments may take the form of permits or licences for water abstraction. Norms, criteria, limitations, guidelines, supervision, control activities or stop orders may be utilized to implement actions by water management authorities at a national or other appropriate level.

6. The use of incentives by Governments to encourage industry to apply all feasible water-saving measures and promote water recycling and re-use would contribute to the rational management of the overall water resources deployed in industry. Appropriate economic measures should be implemented by Governments to encourage applied research into water-saving measures for industry.

7. In water deficit areas, industry should be directed by administrative, economic or legal instruments to apply water-saving techniques to the greatest extent possible and to change from wet to dry processes. Use of drinking water should be limited to cases where it is strictly necessary. Tariffication of drinking water supply should discourage any water wastage in industrial use. Utilization of sufficiently treated waste water in industrial processes should be more widely recognized and applied, especially in urban-industrial regions, and when water deficiencies are apparent.

8. Charges for water abstraction of waste water discharge, when levied, should be geared towards reducing water wastage in industry, while reducing also the discharge of pollution. This rate, if necessary, should be progressive and take into account the interest of public health. Fees and charges, penalties and fines, grants, subsidies, tax relief, etc. should not be considered mutually exclusive but should be applied in combination. Fines and penalties could be increased in proportion to the degree by which established limits, standards, and norms are exceeded.

9. In evaluating the potential socio-economic benefits of industrial development projects, special care should be taken to assess also the possible adverse effects on the environment and, in particular, to balance the economic advantages against pollution hazards to surface water and ground water. Prior to undertaking new industrial development projects, and environmental impact assessment, including a cost-benefit analysis, should be conducted, as appropriate.

10. The establishment of comprehensive criteria, at the national and/or other appropriate levels, to control and regulate the siting and development of industries that are highly polluting or have an important water demand should be promoted. These criteria should, in particular, take into consideration the availability of both quantitatively and qualitatively adequate water supply, and the potential industrial pollution hazard to surface water and ground water.

11. Authorities responsible for water-quality management should carry out the regular monitoring of discharges and of water bodies and supplies liable to pollution from industrial enterprises.

12. Financial incentives as well as other measures should be applied to induce and encourage staff and managers engaged in industrial production activities to develop a more creative approach in the search for viable ways of rationalizing the use of water and for reducing water pollution. Efforts should also be directed towards establishing or improving self-control systems, especially in industries that are significant water users and/or polluters.

13. Industrial employees should be made widely and fully aware of the advantages and benefits of water-saving techniques which often have a close relationship with, and which have a positive influence on, a stable public water supply. In this regard, public information, education and training courses should be promoted.

Pollution abatement

14. Industry should, wherever possible and economically feasible, investigate and implement the best available technologies, that result in minimum water abstraction and water pollution,

with the ultimate aim of completely effluent-free processes. Dry processes should be preferred whenever the advantages in terms of water savings, material- or energy-recovery would offset installation or conversion costs and as long as they do not result in transfer of pollution to other media.

15. In applying in-plant control measures for the reduction of effluents, two basic principles should be applied: (a) reducing to a minimum the quantity of fresh water entering the processes; and (b) obtaining effluents with the lowest pollution load.

16. Evaluation of methods for rational water use should always take into consideration existing local conditions, such as: quantity and quality of available water resources, cost of water abstraction, treatment and transportation, waste-water treatment systems (combined or individual), and needs of other water users and consumers in order to avoid conflicts.

17. Priority should be accorded to the preparation and enforcement of guidelines for the abatement or significant reduction of pollution from industrial enterprises. These guidelines should take account of local circumstances, especially where the discharge of effluents or leakages could potentially harm drinking-water resources.

18. Industry should consider all possible methods for controlling the emission of pollutants within an industrial plant, including the appropriate technological changes in the manufacturing process. After the manufacturing process, selective treatment of effluent flows to achieve better control and separation of collection networks for effluents and cooling water offer advantages for recycling, re-use and the recovery of materials.

19. Regulations should be developed for the protection of water, especially ground water, against indirect or diffuse industrial pollution, essentially run-off containing salts, organic matter and suspended solids, and hazardous pollutants especially those which are toxic, persistent and bioaccumulative. The latter should receive adequate treatment according to their toxicity, whenever possible.

20. Special attention should be given to the use of automatic control and regulation systems for in-process water use and to the detection and repair of leakages in process circuits. Industry

should also take steps to introduce safety systems for avoiding accidental water pollution.

21. Every effort should be made to maximize, where feasible, the recovery from process water of thermal or material resources that would otherwise be discharged into waste-water streams.

Research into low- and non-waste technology

22. Governments should encourage and support the development and application of low- and non-waste technologies, especially in branches of industry where social, water-management, environmental or other important considerations call for such measures; multi-disciplinary research could contribute to this.

23. Among the topics for research programmes, careful attention should be paid to: (a) the impact of low- and non-waste technologies on conservation of water resources, and (b) the influence of the application of specific economic instruments on the development of new technologies.

24. New technologies should be evaluated, taking into account their effects on socio-economic and environmental conditions. Such technologies should, *inter alia*, ensure:

- The reduction or decrease of water abstraction/consumption, as well as water losses and discharge of polluted effluents;
- The application of water recycling and effluent re-use systems within production processes;
- Cost-effectiveness, e.g. in terms of energy savings and by-product recovery;
- Possibility of replacing water by other materials and the introduction of dry processes, while limiting transfer of pollution to other media;
- Alternative use of other means than water for purposes of transportation, cleansing and transferring heat in industrial processes.

25. Since cooling water, especially in thermal power plants, steel foundries, metallurgical and other industrial complexes, is the major water use by industry, special attention should be given

to the advantages of alternative cooling systems. Governments should especially encourage and support the development and application of industrial processes which allow the further re-use of cooling water for processes and transport, and recycling, or internal or external use, whenever possible.

26. Governments should increase efforts at the international level to promote and facilitate transfer of technology regarding water-saving techniques and water pollution control devices. To this end all channels at the bilateral and multilateral level for the exchange of information should be fully exploited in order to implement strategies for the rational use of water in industry.