

RECOMMENDATIONS TO ECE GOVERNMENTS ON THE FIVE R POLICIES-REDUCTION, REPLACEMENT, RECOVERY, RECYCLING AND REUTILIZATION OF INDUSTRIAL PRODUCTS, RESIDUES OR WASTES

**as adopted by the Senior Advisers to ECE Governments on
Environmental and Water Problems at their fifth session in March
1992**

The management of wastes, in particular hazardous wastes generated in various sectors of industry and commerce, as well as in the domestic sector, is a matter of serious concern for ECE member countries. Despite the increasing application of low- and non-waste technology, it can be expected that the waste problem will be aggravated in the future. If, in the long run, the systematic application of low- and non-waste technology, including, in particular, waste reduction at the source, becomes the cornerstone of policies to handle waste problems, short- and medium-term policies will have to be devised aiming at the recovery of residual materials, recycling and reutilization of wastes, effective and environmentally sound treatment of wastes for volume reduction, detoxification and/or destruction of wastes, and safe storage or temporary disposal for further reuse. These are all among the options of the five R policies (Reduction, Replacement, Recovery, Recycling and Reutilization of industrial products, residues or waste) that should be applied as far as possible in place of land disposal of wastes with its inherent risks to man and the environment. These policies aim at recognizing the value of sources of energy, and at the minimization of cost, liability and environmental and health problems associated with waste disposal, as waste is regarded as a potential secondary resource, namely material and/or energy for which the generator has no further use for its own purposes of production, transformation or consumption and which has no current or perceived market value at the time and place of discard. With a view to promoting the five R policies,

it is therefore recommended that:

1. The five R policies should be included in and integrated with sustainable development policies at all appropriate levels. To this end, international cooperation should be strengthened to assist countries in formulating and implementing the five R policies, in particular countries with economies in transition.

2. Waste-management policies should be re-oriented away from reactive remedies and towards anticipatory

and preventive action. Goals of such policies should be defined in priority order as:

(a) Waste reduction, at the source, *inter alia*, by applying low- and non-waste technology (LNWT) as stipulated in the 1979 ECE *Declaration on Low- and Non-waste Technology and Reutilization and Recycling of Wastes*;⁴

(b) Materials, products and processes substitution, in particular for reducing toxicity emission and energy consumption;

(c) Waste recycling, recovery and reutilization; and, if necessary,

(d) Intermediate disposal of adequately treated waste.

3. Methods should be developed or further refined for assessing the effectiveness of the application of five R waste-management policies, including socio-economic criteria for evaluating direct as well as indirect benefits, such as: overall increased efficiency in using material, energy and labour; reduction in environmental stress; reduced costs for regulatory non-compliance and insurance; future cost savings by making clean-up of waste dumps and other contaminated sites obsolete; compensation of victims and relief for damage to air, soil and groundwater, and aquatic and terrestrial ecosystems; as well as improvement of public relations, enterprise image, market-share and know-how.

4. Priority should be given to the application of the five R policies in public waste programmes and state-owned facilities and institutes, thus aiming at providing examples to the private sector, industry and the public at large, and at raising their awareness and promoting environmentally sound behaviour.

5. Appropriate measures should be taken to stimulate the market acceptance of recycled materials.

⁴ This Declaration was adopted by the High-level Meeting within the Framework of the ECE on the Protection of the Environment (E/ECE/1 012).

6. The implementation of the five R policies should be supported by the application of integrated legal, administrative and economic measures and public participation. Integrated five R policies should apply the same principles to the various steps in manufacturing and consumption of products: generation, handling and disposal of solid waste, slurry and waste water from industrial, municipal and domestic origin; as well as planning, design, operation and decommissioning of related technical facilities. This integrated approach should also prevent or control transfer of pollution from waste generation, handling or disposal between environmental media including air, water and soils.

7. Legislative measures, legal provisions and administrative procedures should be developed and, where appropriate, harmonized at an international level by governments to promote the application of the five R policies, including regulations aimed at: optimizing the product's lifetime; substituting certain substances mainly of toxic, persistent and bio-accumulative nature; providing guidance for product and process designers to ease the dismantling of used product components and their subsequent recovery, recycling and reuse; preventing or controlling emissions during or after manufacturing and use of products; prohibiting or limiting generation of waste; as well as prohibiting the mixing or dilution of certain wastes (recognizing, however, that some waste can be appropriately treated only after mixing or diluting).

8. Effective enforcement of legislative measures should be provided, aiming at promoting the five R policies, strengthening the search for waste minimization at the source and preventing improper waste practices undertaken with a view to obtaining economic advantages.

9. Generation, handling and disposal of waste should be controlled by permit and/or licensing systems. Consideration should be given to the application of such systems where the total generation levels for different waste streams in a given area either will be kept constant or reduced over time. Such a system could be based on the critical loads approach and implemented following harmonized guidelines.

10. Granting of operation licences for new industrial facilities should be based on the proponent's waste-management plan and measures to apply low- and non-waste technology. Granting of waste disposal and discharge permits should be based on the proponent's proof that the wastes likely to be generated could not be prevented by the application of the five R policies. Such licences and permits should include specific provisions for the minimization, handling and, if necessary, disposal of waste.

11. Operating licences and permits for existing industrial facilities should be subject to review after an appropriate period of time (for example, every five years), in order to update the five R provisions of these licences and permits and reflect changing environmental needs. During such reviews, experts from competent authorities could advise on upcoming technological concepts and five R developments.

12. Environmental impact assessment procedures

should be further expanded to be applicable for low- and non-waste technology programmes and five R policies, as well as for all stages of manufacturing, use and storage of a product. Such procedures should be mandatory to provide sufficient information to the decision maker to opt for environmentally sound policies, programmes and technologies. Environmental impact assessment should be mandatory for planned five R installations, in particular waste-processing facilities, as well as for intermediate storage sites, to prepare the decision-making process for minimizing their expected impact on health and environment.

13. Strict liability on waste generators, including the generator's liability for damage to life, property or the environment, caused by waste already delivered to a third party, should be provided for by legislation at all appropriate levels. Legislative provisions should consider those cases involving a transfer of the liability of the producer to other persons. Such provisions should also play a forceful anticipatory role from which preventive duties can result, in particular for industry which could use such a concept as a tool to predict future expenditures arising from liability requirements. Consideration should be given to oblige operators to buy appropriate insurance against such liabilities when conducting certain industrial activities, aiming at internalizing external costs and minimizing the risk of adverse environmental effects by applying the five R measures.

14. Both manufacturers and consumers of products should be liable for the generation, handling and disposal of waste, particularly municipal waste. Producers and/or suppliers of goods that create serious waste problems should be required to take back and recycle their used products, thus assuming responsibility for the waste they generate. Consumers should be required to bear the costs for the recycling, treatment and disposal of municipal waste according to the amount and classification of the waste they generate.

15. A clear differential pricing policy should be established that is geared towards internalizing external environmental costs in waste management. The costs for treatment and landfill of industrial, municipal and domestic waste should reflect all inherent costs for environmental and health protection, including possible compensation for damage. General waste management fees or surcharges for wastes being land-filled or incinerated should vary with the amount and/or the classification of the waste and its potential environmental impacts in order to encourage the implementation of the five R waste-management policies. Criteria and methodologies should be developed or existing ones adapted and made compatible at the international level to evaluate the effectiveness of economic instruments (particularly waste charges, accelerated depreciation on capital investments, long-term and/or low-interest loans, investment grants, subsidies, and fines and sanctions for non-compliance with regulations and permits) to promote five R waste technology and management compared to add-on waste treatment and disposal.

16. Regulatory requirements for pollution abatement or control technology should be adapted to encourage

the development and application of five R^e processes instead of add-on technology, even those that are classified as best available technology or state-of-the-art technology. Product norms and standards should be revised to allow the controlled introduction of recycled material on the market.

17. Common methodologies and procedures should be made applicable and if necessary developed for classification, hazard-rating and labelling of waste, five R handling, storage and treatment facilities and storage sites. Methodologies and procedures should be made more efficacious by the inclusion of ecotoxicological parameters in order to specify the toxic, persistent and bio-accumulative nature of waste, and its potential for synergistic and secondary environmental adverse effects, as well as to characterize facilities and sites. Such methodologies and procedures should be made compatible at the international level to provide similar conditions for waste management.

18. So as to promote innovative technologies and procedures in the field of five R waste management, economic and administrative arrangements should be developed for the sharing of technical, economic, and environmental risks associated with such innovations by appropriate financial or insurance arrangements. Such assistance should in particular aim at projects that can be implemented widely and at small and medium-size companies or municipalities with limited financial resources.

19. In order to support recycling of material and to prevent the use of improper, low-cost methods, technological standards should be established and harmonized at the international level by governments, in particular for product design with respect to its lifetime; the environmental properties of the materials; possibilities for separating, dismantling and recycling; waste minimization; and treatment and disposal of different types of waste.

20. Safety standards, criteria and techniques for storage and treatment of waste, in particular hazardous waste, should be developed, existing ones adapted to present needs and harmonized at the international level by governments to provide similar regulations and practices for industry, to facilitate the mutual use of hazardous waste facilities and to increase their safety.

21. Enterprises expected to generate, handle or dispose of waste should perform waste-management audits to identify processes and procedures amenable to the application or improvement of five R installations. The obligation to perform properly defined audits annually should be included in operation licences, regulations or other appropriate legal instruments. Such audits should be certified by a competent environmental agency or consultant. Regulations for such reporting should be developed in cooperation with industrial associations.

22. Greater emphasis should be given to the substitution of hazardous substances in production and consumption processes by less dangerous or non-hazardous ones which would not impair health and environment during production, transportation, storage, consumption, recovery, recycling and discharge. Such substances should be identified, *inter alia*, on the basis of environmental risk and impact assessment. The choice of replac-

ing substances and materials should, if possible, take into account product durability, ease of later recycling, recovery and reutilization. Procedures should be established to this effect, as well as for the phasing out and/or substitution of hazardous substances within an agreed time-frame specific to each substance. Such procedures should be harmonized at the international level by governments to avoid distortion of competition, not only with regard to a banned substance but also to the manufacture of other products that use that substance as an intermediary.

23. Storage of different hazardous wastes at the same site should be regulated to prevent synergistic adverse effects and to facilitate their recuperation in the future. Priority should be given to intermediate or temporary storage of separate hazardous waste, rather than disposal, in order to allow for recovery of components of such waste and their reutilization in the future once suitable technologies have been developed, economic conditions have become more favourable or prices for raw materials and energy have changed.

24. Priority should be given to the development of a suitable infrastructure for recycling, recovery, reutilization and treatment of waste, in particular waste that has a potential for recuperation of materials, that carries risks for environmental adverse effects and that is generated in small quantities at scattered locations. Joint waste programmes by industry, hospitals or laboratories with similar or identical waste should be supported, in particular the installation of centralized recycling plants that benefit from economies of scale, as well as effective collection and storage systems.

25. Whenever required by five R waste management, reusable material should be separated from the waste streams preferably at the earliest stages possible in order to simplify and alleviate the handling of waste and thus save energy, ensure the recycling or reuse of materials, facilitate the treatment of waste and select the final disposal according to the specificity of the waste.

26. A legal and regulatory system should provide for the setting-up of funds and other financial assistance mechanisms for research into and development of the five R concepts; promotion of five R policies; the development and pilot application of five R waste technology, particularly in cases where there is as yet no economic justification for innovations; as well as for clean-up of abandoned waste dumps and other contaminated industrial sites for which liable persons cannot be found or are not in a position to compensate for damage.

27. Provisions should be made and appropriate instruments and procedures designed to ensure that information regarding five R policies is being disseminated widely, where appropriate, through five R information centres or databases which could be linked internationally. This information flow would in particular bring together the various partners in waste management, raise their environmental awareness, demonstrate the socio-economic benefits of the five R policies and point out the barriers that prevent the five R policies from being applied. Waste-related information should be contained in Environmental Product Profiles (EPP) and Ecolabel-

ling. Harmonization of principles underlying such instruments and procedures would assist those involved in waste management to rationalize and systematize the information flow at an international level.

28. Publication of successful practical five R examples should be viewed as an important tool to increase the understanding of planners, decision makers, manufacturing staff and consumers and to contribute to their change in behaviour regarding waste management. Disclosure of information should also be encouraged, *inter alia*, by economic incentives: the publication of relevant information and experience should be required in exchange for financial support of specific projects.

29. The development of special education programmes and training material regarding five R waste management should be fostered in order to raise awareness of environmental problems resulting from improper generation, handling and disposal of waste, as well as to provide potential solutions. Training programmes should aim at changing the attitude of designers and planners of manufacturing processes, consulting firms and competent authorities to encourage the application of five R

solutions rather than add-on installations for pollution control.

30. Efforts should be made to enlist the understanding and cooperation of the public at large and industry, as well as public participation in the development and implementation of the five R policies to benefit from their capability to make well-informed judgements on important environmental and social issues and to obtain public acceptance in support of such policies, which could imply changing patterns of production and consumption, as well as waste-handling practices. In this respect, attention should be given to the responsible role that industry, trade unions, universities, environmental associations and other relevant non-governmental organizations play as driving forces for negotiation, mediation and action, sources of innovation and information and as contributors of technical and management expertise to deal with environmental problems.

31. Cooperative arrangements should be promoted for the exchange of technology, in particular aiming at implementing the five R policies.