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The Whitebook on Waste Prevention and Recycling in Austria

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Abstract
A "Whitebook on Waste Prevention and Recycling in Austria" has been published by the Ministry of the Environment providing guidelines for the identification and proper design of waste prevention and recycling programs. The whitebook discusses the challenges lying ahead for the Austrian waste management sector, defines the objectives to be achieved by waste prevention and recycling projects and defines guiding principles on how to achieve these objectives. The whitebook explains the basic ideas of waste prevention and waste recycling options and illustrates them by corresponding "techniques" such as cleaner production, eco-efficient products and eco-efficient lifestyles. Economic and market barriers are discussed and the corresponding instruments to be used in overcoming these barriers through changing life styles and markets are illustrated.

Finally, guidance on how to select the most efficient waste prevention and recycling measures with which to solve upcoming problems is provided. The whitebook concludes by stating the potentials and limits of waste prevention and recycling.

1 Introduction
Socio economic trends including an increased percentage of single-households and single family-houses together with the increasing consumption of material intensive products required to achieve a higher standard of living have implied a steady increase in the consumption of raw materials and the generation of waste.

- Between 2001 and 2003 the importation of minerals to Austria grew by 10 % (Statistik Austria 2006).
- On a global scale the mining of copper, zinc and platinum increase steadily at annual rates of 3.3 %/a, 3.2 %/a) and 4.9 %/a, respectively (Gordon et al. 2006). The consumption of steel soars at an annual rate of 4.7 %/a) (Lennon 2005). Part of this growth can be referred to an increased rate of consuming of new products in Europe.
- Austria imports 85 % of fossil materials and 50 % of industrial materials (primarily metal) consumed (Weisz et al. 2005), revealing a constant increase in

importations for both material groups.
- The alternative use of renewable domestic resources has a limited potential.
- Appropriate areas for the disposal of waste are also becoming scarce.

The Austrian waste sector can contribute towards meeting future challenges and enhancing the development of a sustainable Austrian economy through:
- Waste prevention
- Reuse of products and recycling of waste
- The safe disposal of substances which cannot be reused in an efficient environmentally friendly way.

In order to achieve the above aims the waste sector cannot operate as an island but has to act in close contact with all economic sectors, especially those characterized by a high material demand. The Whitebook on Waste Prevention and Recycling will provide the necessary guidelines for developing waste prevention and recycling programs as means of the coordinated development of the waste sector and the economy as a whole under public supervision.

2 Objectives and guiding principles

Reduced amounts of waste and increased recycling rates do not represent an actual objective on their own. The realistic objectives of waste prevention and recycling programs include:
- Emission reduction
- Reduction of hazardous substances
- Reduction of the dissipation of these substances
- Conservation of resources and resource efficiency.

In order to achieve these objectives in an efficient way, the following guiding principles should be applied:
- Sustainability: In order to achieve sustainable production and consumption it is necessary
  - to maximize efficiency and effectiveness of products, services and investments,
  - and to maximize efficiency of their utilization,
  - in order to meet the needs of the society,
  - and to achieve an improved quality of life
  - while minimizing the consumption of natural resources, the mobilization of toxic materials and the emissions of waste and hazardous substances over the whole life cycle,
  - so as not to jeopardize the needs of future generations (based on Norwegian Ministry of the Environment 1994).
- Eco-efficiency: Meeting a given demand at minimal resource consumption and minimal environmental impact.

- Eco-sufficiency: Optimizing the demand by influencing life-style and consumption patterns in order to create a sustainable demand.
- Life-cycle and system thinking: All steps from raw material mining through material processing and production to distribution of goods and consumption are to be analyzed including
  - Impacts in foreign countries (ecological Rucksack)
  - Possible shifts of impacts
  - Ecological, economic and social aspects.
- Internalization of macro economic benefits & costs: Taking into account
  - Environmental impacts
  - Utilization of natural resources
  - Micro economic costs (investment, operation & maintenance, post-processing)
  - Social benefits and costs
  - Monetarization of all macro economic costs is rarely possible; when taking the latter into account on a main basis, however, it constitutes an important guide when designing waste prevention and recycling programs
- Cost-efficiency: Only those waste prevention and recycling measures implying higher macro economic benefits (i.e. showing a net benefit) will be implemented.
- Cooperation and participation: A waste prevention and recycling program has a higher chance of success when interested parties have been involved on a cooperative basis right from the design phase of the program.
- Efficient allocation of responsibilities: The person/entity in charge will be responsible for reducing environmental impacts,
  - best suited to overcome the system network
  - best suited to influence the system by means of its specific action.
- Polluter-pays-principle: The polluter shall cover all the macro economic costs he/she causes
- Producer responsibility: The responsibility of a producer is extended to different (all) phases of the life cycles of his/her products.
- The precautionary principle should be applied when, on the basis of scientific assessments, there is considerable reason for concern that possible hazards for environment and/or health may not be within acceptable limits (European Commission 2000).

3 Waste prevention and recycling techniques

The actual task of waste prevention and recycling is enacted when implementing one of the following techniques:

- Cleaner production, i.e. to
  - close material streams to loops,
  - apply new eco-efficient technologies and processes (e.g. for material

separation or recovery)
  - substitute hazardous substances
  - transfer corresponding knowledge by means of workshops and process analysis
- Eco-efficient products, i.e. products with one or more of the following properties:
  - durability,
  - easy to repair,
  - easy to reuse in original or new applications,
  - consisting in a scarce amount of material,
  - consumes little fuel and lubricants,
  - containing no hazardous substances,
  - made of renewable materials
- Eco-efficient services (such as repair services) and integrated product-service-systems
- Sustainable life style and efficient consumption, which
  - cover the needs at low material consumption and without hazardous substances
  - purchase only as much as is really needed
  - select products and services best fitted to the needs
  - adapt the utilization behavior to the actual needs
  - aim at covering a need and not at owning a product
  - operate products with due care, regular maintenance and efficient repair.

4 Barriers and means of overcoming these obstacles

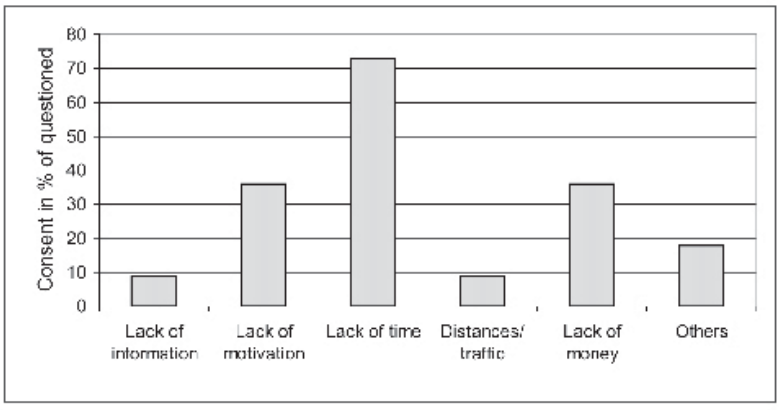


Fig. 1: Reasons for refraining from offers on immaterial consumption (Vogel et al. 2005).

Many waste prevention and recycling options are available today. The reasons why these options are not applied more extensively lies in the broad range of barriers existing. On the private consumers' side the most important barriers are lack of time, lack of motivation and lack of money (see Figure 1).

For enterprises limited expert capacity, higher risks with new technologies and lack of standards and established markets may represent additional barriers. However, many measures are available for use in attempting to overcome these barriers, including the following categories:

- Information and motivation initiatives,
- Fiscal instruments (e.g. grants, taxes, fees)
- Legal instruments (standards, obligations, bans).
- Cooperative instruments (such as voluntary agreements, voluntary labeling schemes)
- Green (public) procurement.

When attempting to solve a specific problem by means of waste prevention and recycling, in most cases it will not be sufficient to apply only one single measure, but rather it will be necessary to select a combination of mutually supporting measures and provide for application as a comprehensive program. This program should be tailored to the respective target group. Principally it should prove able

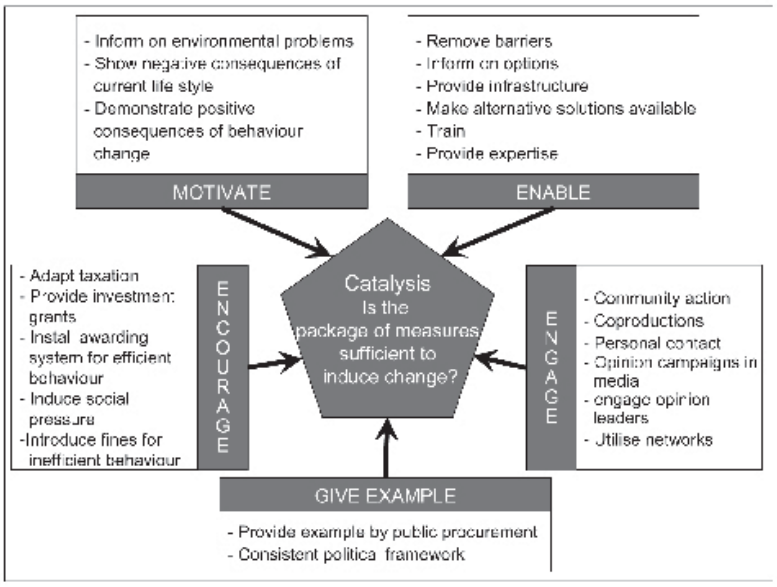


Fig. 2: How to achieve change – functions of a waste prevention and recycling program (derived from Jackson 2005)

to (see Figure 2):

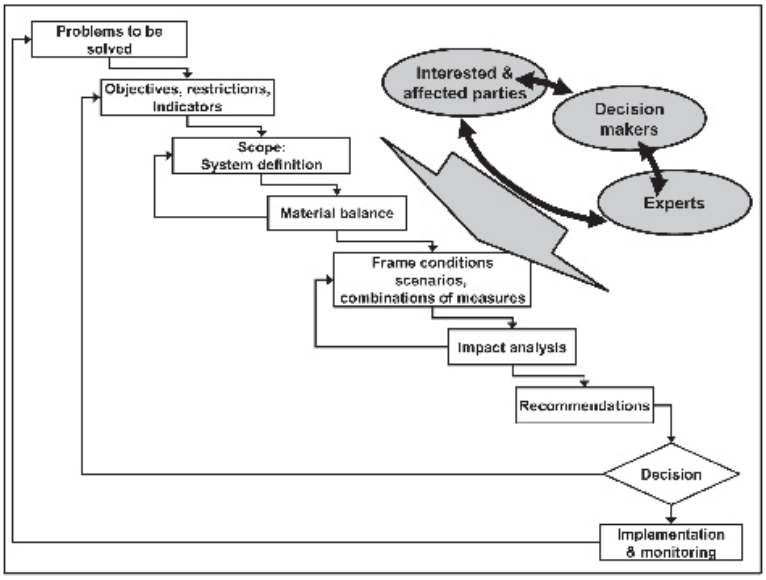
- motivate
- enable
- encourage
- and engage the target group
- as well as provide pilot examples.

5 Designing a waste prevention and recycling program

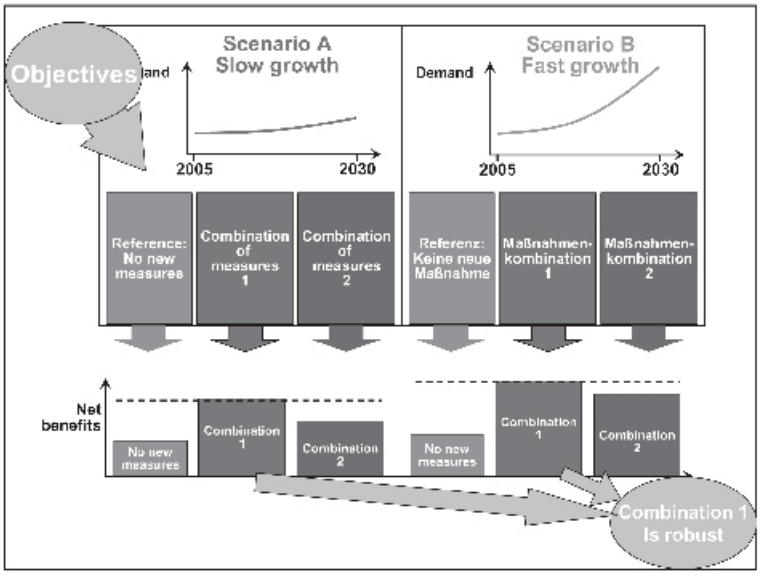
When designing a waste prevention and recycling program it is necessary to carefully select measures from a wide variety of options and to organize their application in a comprehensive combination. This selection and combining process should:

- Envisage the use of life-cycle and systematic options,
- Consider the uncertainties of future developments,
- Involve the target group and ensure that measures are directed towards this group
- Utilize synergies with other environmental protection initiatives
- Consider the differing motivations of single target groups.

The Austrian White Book on Waste Prevention and Recycling describes a methodology which allows these requirements to be fulfilled in a systematic way, leading from analysis of the problems to be solved, through determination of the objectives to be achieved and the indicators to be used, to a simulation of the effects



of the measures being investigated on the system and to recommendation as to



which combination of measures should be applied (see Figure 3).

Uncertainties of future developments are taken into account by way of scenario analysis, in which a robust combination of measures is identified as the combination providing the highest net benefits in all scenarios (see Figure 4).

Fig. 3: Procedure for the design of a robust waste prevention and recycling program

Fig. 4: Identifying a "robust" combination of measures (waste prevention and recycling program) by scenario analysis

6 Conclusions

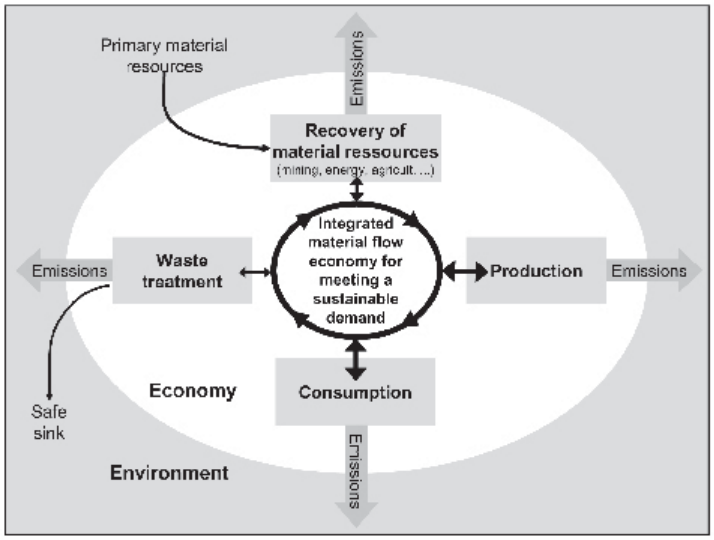
Waste prevention and recycling do not only represent important elements of the waste management system but can also provide valuable contributions to strategies aimed at resource saving and environmental protection. The long term goal is the development of a sustainable closed-loop economy (see Figure 5).

From a macro economic point of view the waste hierarchy providing for prevention measures prior to recycling and, ultimately disposal continues to be valid. All options, however, should be evaluated simultaneously and only those measures implying the obtaining of a net benefit from a macro economic point of view should be implemented.

In relation to the Austrian economy as a whole single waste prevention or recycling measures reveal only a limited potential. Many barriers will need to be removed and the majority of measures will be effective on a limited number of material streams. If, however, the waste prevention and recycling program con-

tains a larger number of measures and is complemented by other activities, the combined effect may be of substantial importance for the economy as a whole.

It is to be expected that waste prevention and recycling programs will be suc-



cessful when

- its measures are affordable, understandable, practical and attractive
- each party concerned receives a benefit from participating in the program
- the existing trend towards a services' society is supported
- the material streams can be kept at a high quality level while looping through the system.

Fig. 5: The ultimate objective of waste prevention and recycling – an integrated material flow economy capable of meeting a sustainable demand

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