

## INTRODUCTION

The branch association Stybenex Packagings (Stybenex Verpakkingen) was established in July of 1988. As of that time, the organisation has dedicated itself to promoting the responsible use of the packaging material EPS (expanded polystyrene). In view of its responsibility towards society, Stybenex Packagings has always focussed special attention on environmental issues throughout the years. The fact is that Dutch society rightly adopts a critical attitude towards the effects of the production and application of packaging material on our living environment.

This Position Paper has been drawn up within the scope of the information activities of Stybenex Packagings. The paper is intended for anyone inside and outside of the packaging branch who would like to know more about EPS and the effects of this packaging material on the environment and the welfare of people. The Position Paper offers a complete survey with an in-depth description of all of the environmental issues pertaining to the production and use of EPS-packagings. In addition, the paper also explains the measures that the Dutch packaging branch has already taken and still intends to take in order to reduce the environmental impact due to EPS-packagings as much as possible with a view to optimising the life cycle management of EPS-packagings in the Netherlands.

The first Position Paper concerning EPS-packagings was published in 1994. This edition is a new, up-to-date version on the basis of the most recent available data. Information from our own branch as well as generally accepted sources were used to compile the contents of this paper.

- Chapter 1 provides general information concerning the material EPS, the areas of application as packaging material and the developments in the economic market.
- Chapter 2 discusses the production process 'from petroleum to EPS-packagings' in detail and explains the necessary steps.
- Chapter 3 specifically considers the characteristics of the material and the effects of producing EPS on the environment and the welfare of people.
- Chapter 4 describes the advantages and disadvantages of EPS as a disposable packaging material and the qualitative and quantitative waste prevention within the scope of a responsible use of the product.
- Chapter 5 is entirely devoted to the collection and reprocessing of EPS-packagings and indicates the share of EPS-packagings in the Dutch waste flow, the specific waste flows of EPS-packagings and the recycling techniques and return systems that are currently available.
- Finally, Chapter 6 describes the measures as taken by Stybenex Packagings and the co-operation with national and international organisations for the purpose of optimising the system for the integrated life cycle management of EPS-packagings in the Netherlands.

This Position Paper is a picture at a given moment and should also be considered as such. Great headway has been made since the first publication in 1994. However, the (international EPS-industry has continued to develop itself and institutes many activities on its own initiative in order to continuously improve the environmental profile of its products. It is the hope of Stybenex Packagings and its members that this document will once again contribute to a proper understanding of EPS and the varied uses of this extraordinary packaging material.

Stybenex Packagings, Zaltbommel, August 2006.

## SUMMARY

The object that Stybenex Packagings has in mind with this report is to provide a complete survey of the characteristic features of EPS-packagings. This report focuses special attention on the environmental aspects pertaining to the production, application, use, reprocessing and disposal of these packagings. On the one hand, the aim is to provide clarity and comprehensiveness in order to properly evaluate the environmental profile of EPS-packagings. On the other hand, Stybenex Packagings aspires to further optimise the (integrated) life cycle management of EPS-packagings in the Netherlands on the basis of this document and in further consultation with the government and the authorities.

EPS (expanded polystyrene) is an extremely versatile synthetic material that consists of 98 volume percents of air and, as a result, is extremely light in weight. The remaining 2 percent is polystyrene, for which petroleum serves as the basic raw material. EPS is made up of pearls that are filled with air. And so the material, in addition to having an excellent insulating capacity, also has a high shock-absorbing capacity. In addition, EPS is virtually insensitive to moisture, it is economically appealing and it can be produced in any form and any dimension that may be required. Thanks to these features, EPS is pre-eminently suitable as a lightweight, protective packaging material.

The fact that an EPS-packaging can fully fulfil its product function while requiring a mere 2 percent of raw material consumption renders the packaging extremely material-efficient. In addition, due to careful designing, EPS-packagings are being produced more and more cleverly with less material/raw material and the preservation of the protective function. What's more, better use is being made of the functionality of EPS-packagings. For example, accessories are being packaged along in the EPS-packaging more and more often, so that they no longer require separate packaging.

EPS is entirely CFC-free. In addition, CFC's were never used during the production process. The expansion of the small balls of expandable polystyrene into EPS-pearls is achieved with the blowing agent pentane that is inserted on a cellular level: a CFC-free, saturated and non-toxic hydrocarbon. Upon being heated with steam, the blowing agent becomes gaseous and expands, resulting in the EPS-pearls. Agreements have been reached within the scope of the KWS project 2000 concerning the pentane that is emitted within the production location during this process. An emission reduction of over 40 can be achieved through a process-integrated post-combustion technique, without any disadvantageous consequences for the environment. The RK 8 measure has been incorporated in the NeR as a 'security' measure.

The petroleum consumption for the production of EPS-packagings amounts to less than 0.1 of the total petroleum consumption in Europe. The extent to which fossil raw materials are depleted is rendered even smaller due to the fact that EPS can be recycled fully mechanically up to five times. Upon proper combustion at the end of the life cycle, 80 of the energy that has been used can subsequently be won back. And so one can virtually disregard the depletion of fossil raw materials due to the production of EPS in relationship to the petroleum consumption in general. In addition, the EPS-industry saves energy thanks to the reuse of pentane within the scope of KWS 2000. Also, it has been found that an energy savings of 75 generally applies to EPS compared to 10 years ago due to altered techniques pertaining to the production and processing of EPS.

An EPS-packaging is completely safe for one's health. Various international research studies have shown that the material does not present a health risk, neither during the production of EPS nor during its use. The same applies to the migration of substances in foodstuffs and any estrogenic effects.

The environmental profile of EPS-packagings on the basis of full life cycles is better or even much better than that of single-use packaging materials.

The discussion concerning the use of single-use or repeated-use packagings is based more on emotional rather than rational motives. However: although it is not in the least certain that the life cycle of repeated-use packagings is more favourable than that of an EPS-packaging, studies are currently underway into EPS-packagings with a higher density and perhaps an extra coating that allows for repeated use.

The proportion of EPS-packagings in the entire Dutch waste flow amounts to 0.01. The proportion of EPS-packagings in Dutch domestic waste is less than 0.1. Because EPS is a mono-material, it is pre-eminently suitable for recycling. The following recycling techniques are used:

- Reprocessing of production waste by means of grinding before adding to virgin material for new EPS-products.
- Reprocessing of used EPS-packagings by means of grinding before adding to virgin material for new EPS-products.
- Reprocessing of used EPS-packagings by means of grinding into Styromull for soil aeration or as a secondary raw material for insulating bricks.
- Reprocessing of used EPS-packagings by means of melting and granulating into PS-granulate for new injection moulding products.
- Reprocessing of used EPS-packagings by means of combustion in combination with recovering energy. Provided EPS is combusted properly, less hazardous substances are released compared to the combustion of materials such as wool, cork and wood.

Over 54 of the amount of EPS-packagings that is produced in the Netherlands is currently collected and reprocessed. In 1994, that percentage was still 25. This major progress is due to the success of the return-systems, which were mostly initiated by the EPS-branch itself:

- EPS Gardentrays, return system in the Green sector. The amount of used EPS-products that is collected and reprocessed represents 78 of the total amount of EPS-products that is produced in the Netherlands for the green sector.
- Return systems in the Industry sector. Separate collection of used EPS-packagings at shop establishments and distribution centres in the kitchen-equipment and small electronics sectors and in the sector for consumer electronics and industrial electronics by means of EPS-collection bags. In addition, opening all of the EPS production locations in the Netherlands and a large, in-branch recycling installation in Etten-Leur, enabling used EPS-packagings to be delivered directly. Furthermore, other recycling installations and distribution centres in the Netherlands, as well as various independent collection companies.

For the purpose of being able to adequately monitor the further optimisation of the life cycle management of EPS-packagings, Stybenex Packagings has formulated a recycling model that indicates the possibilities for additional improvement measures.

Due to the far-reaching measures that were taken in the past years, one can now clearly state that not only the cycle, but also the industrial column of EPS-packagings has been expanded in an extremely positive sense: used EPS serves as a base material for entirely different products. This contributes to the fact that the material EPS can be considered a beautiful 'pearl' within the Dutch and international packaging industry.