

Feature: Promotion of "ECO-CIRCLE®"

# Aim for a recycle-based society Teijin's "ECO-CIRCLE®"

In 1992, the Teijin Group established the "Global Environmental Charter" utilizing chemical technology to create business models for the compatibility of both environmental and financial issues. One of the models was "ECO-CIRCLE," which allows polyester products to be converted back to its raw material, and the raw material is used for new products. We are contributing to the realization of a sustainable society by completely recycling these materials.



Top: Collection box outside US's outdoor goods and clothes manufacturer, Patagonia

Center: Uniforms recycled by ECO-CIRCLE were used for the "Teijin Soccer School"

Bottom: With the aim of reducing shopping bags, we have provided Eco Bags for member corporations and spread awareness of ECO-CIRCLE activities to consumers

**The significance of the development of "ECO-CIRCLE"**

Teijin Group's development of the world's first chemical recycling technology for polyester allows polyester fibers and PET bottles to chemically decompose and be converted into new polyester raw materials equal in quality to those made from petroleum.

According to the Ministry of Economy, Trade, and Industry's 2001 Fiber industrial activation measure investigation, in Japan, 1.74 million tons of fiber was buried or burned. The Teijin Group believes that by recycling these fibers, we move one step closer to contributing more to build a sustainable society.

**LCA Evaluation of recycling Polyester material**

The LCA evaluation of "ECO-CIRCLE" regarding the preservation of natural resources was that it can expect the reduction of crude oil and natural gas by using used polyester products as raw materials. For example, by having the "ECO-CIRCLE" in full operations, it is possible to reduce 39 thousand tons of crude oil and 24 million Nm<sup>3</sup> of natural gas in one year.

Compared to when manufacturing raw polyester material (DMT) from petroleum, it is possible to reduce the CO<sub>2</sub> by 50% and about 80% when CO<sub>2</sub> produced

from burning materials is added when it concerns the depression effect of global warming of CO<sub>2</sub>. So, with 1 ton of polyester, it is possible to reduce CO<sub>2</sub> by approximately 3.2 tons.

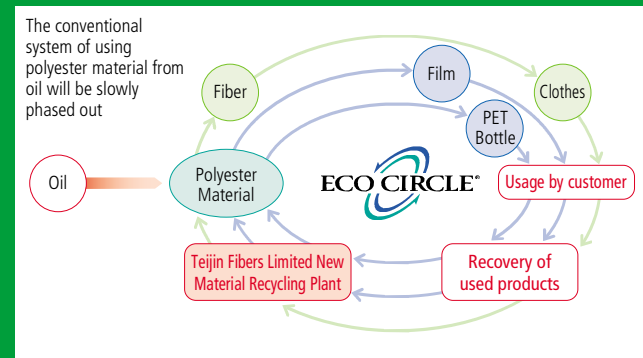
About 80% of reduction is estimated compared with the case when raw polyester material is produced from petroleum by the reduction effect of the energy.

**Aiming toward activities which reaches in the consumer**

For those companies that approve the ECO-CIRCLE, the TEIJIN Group has those companies register as an ECO-CIRCLE member, and we cooperate to develop, commercialize, retrieve and recycle products that answers the customers needs for products that are considerate to the global environment. This movement is now expanding into the recycling of uniforms, underwear, train seats, train or bus passes and other products. In the future, we hope to expand our "ECO-CIRCLE" system to general consumers.

Not only do we consider the environment for product development, we cannot forget the views and opinions of the consumer, where we will develop products that will emphasize an additional value of functionality and design so that our customers will purchase these products with an "ECO-CIRCLE" incentive.

**ECO-CIRCLE System**



**Main issues of "ECO-CIRCLE"**

- 1 Cost
- 2 Recovery Network
- 3 Creation of appealing products
- 4 Legal issues, etc



\*\*"ECO-CIRCLE" received the 2005 Good Design Award for its role in contributing to a recycling-oriented society.

## Stakeholder Dialogue

On 14 March 2007, we invited five specialists on environmental issues, along with five representatives from the Teijin Group to open our dialog with stakeholders. In particular, this meeting included a panel discussion of Teijin's ECO-CIRCLE recycling system, which was relevant to the theme of promoting a recycling-oriented society.



**To increase the recycling of polyester**

**Chairman Oshibu (abbreviated hereafter):** I feel it is important to greatly expand the scope of Teijin's "ECO-CIRCLE" as a business model. In order to do this, I think the panel needs to look at the way society is organized and how it behaves in regard to recycling. Do you have ideas on this?

**Hattori:** We should try to wear clothes for as long as possible, based on the 3Rs (Reduce, Reuse, and Recycle). Unlike PET bottles, which have a short life from consumption to disposal, in most households, clothes are worn until they cannot be worn anymore and thrown out; so it is difficult to collect them. However, for uniforms and other clothes that are only worn for fixed periods of time, it should be possible to collect some of them. Another issue is that consumers tend to put greater value on design than on environmental considerations. In order to persuade consumers to purchase ECO-CIRCLE products, we need to provide some incentive for them to do so.

**Sato:** For most consumers, it is difficult to persuade them of the merits of recycling clothes. Rather than saying "recycle clothes", it may be more effective

to stress that this material "should not be thrown away as garbage."

**Umeda:** If we consider the increase in volume of material that needs to be processed, we not only have to consider B2B (Business-to-Business) recycling that is at the core of ECO-CIRCLE, but we also have to include B2C (Business-to-Consumer) recycling as well.

**Enhancing the appeal to ordinary consumers**

**Teijin:** For example, in the case of Teijin's B2B recycling, we just need to talk to their business partners, but whom should we speak to about B2C recycling.

**Hosoda:** In addition to enlightening consumers of the merits of recycling, it is also important to improve the labeling for polyester products to increase consumer's awareness of the need to separate these products from other waste. We also need to think about how we can best explain the flow for the separation of these products.

**Hattori:** The collection of polyester is inefficient. We need to consider how we make it easier to extract polyester from existing recycling routes. For example, if there is clear labeling about separation for recycling agencies, then it should be possible to use existing routes.

**Sato:** As you can see from this LCA (Life Cycle Assessment) graph, even if we only eliminate the polyester from waste that is incinerated, we can reduce CO<sub>2</sub> emissions by 50%. The other point we need to stress is that this will not mean a reduction in quality. We should point out to consumers that this "reduces CO<sub>2</sub> emission without effecting the quality of products."

**Hattori:** The problem is that unlike the disposal of PET bottles or empty cans, the recycling of fiber is not regarded as a social problem, so consumers are not aware that fiber is included in garbage.

**Oshibu:** If there a way to raise the awareness of consumers, who are the users of these product, of this problem. Then, we can use that to strengthen legal requirements.

**Sato:** It is important to get consumers to think about the environment when buying clothes. For example, by includ-

**Consideration for how society is organized and behaves**



Participants from NPOs Representative from the EcoDesign Promotion Network  
**HIROAKI OSHIBU(Chairman)**  
Graduate of Keio University's Faculty of Law. Joined Fuji Xerox Co., Ltd. in 1963. Retired in 2002 after serving as Environment and Product Safety Manager which involved dealing with environmental issues etc. Currently a regular adviser to the Green Purchasing Network, vice-chairman of the Japanese committee of ISO/IEC JTC1 SC28, and the Environmental Management System (EMS) Auditor, etc.

ing environmental information on the label tags on clothes, or through a campaign similar to the Japanese government's Team Minus 6% campaign.

### Importance of cooperation with similar industries and retailers

**Oshibu:** The vast majority of fiber products are imported from China. Working out how we can get China involved in helping to resolve this issue is a major consideration.

**Teijin:** This is an issue that cannot be resolved by Teijin alone, but requires the involvement of industry as a whole.

**Hosoda:** As a national strategy, we can consider the introduction of a "Fiber Recycling Law" for imported products. This could be done by applying a recycling fee to all companies, including importers. This amount could all be considered as a recycling charge. Raw material producers who possess recycling technology would process their own products for free, but process those of other companies for a fee. In this way, raw material producers could fulfill their social responsibility, while also completing their EPR (Extended Producer Responsibility) as a business that can coexist with the environment. Not only that, it would help Japan's fiber industry to prosper. By the way, do you know which fields use polyester the most?

**Teijin:** Uniforms, sportswear, school PE garments (jerseys), etc. Ladies black formal wear is usually made of polyester. Also, fleecewear and linings tend to be made of polyester. Cutting edge dustproof clothing, which has to have a fine mesh, also uses ultra-fine polyester fabric.

**Teijin:** As for how we can best collect this material, we think it is important for Teijin to work for the rapid introduction of a system that encourages retailers to recycle material in the future.

### Working for the enactment of a "Fiber Recycling Law" that covers imported products

Keio University  
Professor of Economics

**Eiji Hosoda**  
Graduate of Keio University's Faculty of Economics Specialist in environment-economy studies and economic theory. Currently studying the balance of the ARTERIAL economy and VENOUS economy. Serving on various academic societies studying environment-economy and economics, and the environment. Author of "The Goods and Bads of Economics" published by TOYO KEIZAI Inc., and other books.



**Sato:** What is needed is a campaign to promote the image of a responsible society. For example, a campaign that promotes a social awareness for material that encompasses long use, the reuse, and finally the recycling of material.

**Hosoda:** The long use and reuse of material of is important, but in the end it is Teijin's responsibility to recycle material. If a company reduces waste as much as possible, it cannot but help business and the environment to coexist.

**Oshibu:** These ideas cost money. Are there any ideas on how we can reduce this cost?

**Umeda:** While we need to constantly appeal to consumers, companies need to start with cooperation with other companies in the same industry and also need to approach fiber recycling agents.

**Hattori:** It is difficult to get consumers to change their behavior just on an idea. We need a way of explaining to people in simple terms that by recycling fiber, we can avoid using oil.

**Oshibu:** Finally, could I ask each of address a few words towards Teijin.

**Umeda:** As a raw materials producer, introducing such a system would be very welcome. I would like to see Teijin set an example of how this could be achieved. On the other hand, I would also like to see you set up a recovery system that includes imported products. By pursuing a pioneering strategy, in the same way that the recycling of cars and home appliances is done, I am sure this will be profitable for the future.

**Sato:** For general consumers this is not the first time they have been asked to recycle chemicals, and it is just a question of finding a means of successfully convincing them that this does not mean any loss of quality. By cooperating with the industry as a whole,

increasing awareness, and reducing transportation costs, it should be possible to get consumers to accept this idea. Since Teijin is an upstream company, I would like to see it cooperate with clothing stores and shopping malls to communicate this message more directly to consumers.

**Hattori:** I feel it is important for Teijin to expand its innovative fiber-to-fiber recycling system to the whole industry. It is also a question of persuading consumers to choose environmentally friendly products, and to understand the significance of the ECO-CIRCLE system. I hope that Teijin will introduce advances that help the environment, not only now but also in the future, and hope to see a constructive exchange of views between industry and NPOs, despite their different viewpoints.

**Hosoda:** First of all, it is important to decide on the basic concept. For example, when promoting the 3Rs, we need to consider how this can be positioned so that it appeals to consumers. Next, there is a need for a methodology and data to help people implement this within a business.

Also, for a raw material producer it would be helpful to view this from a manufacturer's perspective. With the realization that 85% of imports come from China, the distributors bringing these fiber products into Japan should bear some responsibility for recycling them. The EU is pursuing this strategy. Connected with the basic concept, mentioned earlier, I don't think anybody can object to the statement "working as a business while protecting the environment is best."

In the end, joint coordination between different companies in the same industry and clothing manufacturers is important. Through this vertical cooperation it should be possible to create a network that can solve the various problems involved,

### Creating a recycling system that also covered imported products would be great

Lecturer in engineering science at Osaka University, Graduate School of Engineering Science

**Yasushi Umeda**  
Graduate of, and PhD in engineering from University of Tokyo, Faculty of Engineering. Studying how eco-design can be used to produce products that are environmentally friendly, and serving on panels and committees advising industry. Author of "The Inverse Manufacturing Handbook" published by Maruzen, and other books.



including recovery and delivery, of recycled material. At the moment, Teijin is taking a lead in this area, but on a national level some legal procedures will need to be implemented. For example, a revision could be made to the Law for Promotion of Effective Utilization of Resources to encourage the recycling of fibers.

**Oshibu:** Implementing each of these recommendations from the specialists on the panel may be difficult, but I would like to see them implemented over time.

### Successfully convincing consumers that recycling does not mean a loss of quality is important



Green Purchasing Network  
Managing Director and Chief of Secretariat  
**Hiroyuki Sato**  
Graduate of Nagoya University's Faculties of Law and Economics. Specialist in purchasing of environmentally friendly products, environmental labeling, and environmental communication. Part-time lecturer at Tokyo Zokei University. Also a member and director of various associations. Author of "Environmental Labeling" published in collaboration with The Japan Environmental Management Association for Industry (JEMAI), and other books.

### Results of the stakeholder dialogue

We have heard various views on constructing a recycling society from some Japanese specialists in this field. The aspects that struck home for us, was our lack of consideration for the consumer's viewpoint, the need to increase society's understanding of our ECO-CIRCLE recycling system, and the need for the industry as a whole to make a stronger approach to recycling. Although this is a serious problem, the opinions and ideas we received through this dialogue will be very useful for our future efforts.

Participants from the Teijin Group  
(as of 14 March 2007)  
**Akihiro Suzuoka**  
CTO Assistant Executive Director for the Teijin Group and Director of Teijin Fibers Limited  
**Naoki Arai**  
Managing Director for the Teijin Group  
**Takao Kawai**  
Director  
**Kazuhiro Sato**  
General Manager, Raw Materials and Polymer Sales Dept., Teijin Fibers Limited  
**Yuichiro Ikeda**  
Team Leader, Eco-Operations Promotion Team, Teijin Fibers Limited

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### Since fiber has not become a social issue, consumers are unaware of the amount of waste fiber.



Environment Journalist  
Vice-chairman of the NPO Gomi Kankyo Vision 21 (Waste & Environment Vision 21)  
**Misako Hattori**  
Began campaigning on water pollution and waste issues in 1987. Established Gomi Kankyo 21 in 1997. Contributor to Japanese monthlies, such as Gekkan Haikibutsu (The Waste) and Chiho Jichi Shokuin Kenshu (Training for Local Government Employees). Author of "Chikyu-no-Mirai to Gomi Gakushu" (Study of Waste and The Future of the Earth) published by SAELA SHOBO, and "Gomishori-no-okaneha Darega Harau-noka" (Who Will Pay for Processing Garbage?) published in collaboration with Godo-shuppan.

# Stakeholder Dialogue