

A close-up photograph of a metal saw blade, likely used for cutting metal. The blade is composed of several segments, each with a green-colored cutting edge. The segments are arranged in a row, and the blade is shown in a slightly curved position. The background is dark and out of focus.

**24 March 2010**  
**Seminar 'Design for Recycling'**





*Products must be recyclable or sustainable or durable. For example, oak furniture is very durable and will certainly last for 1000 years. You just have to re-upholster it occasionally.*

## DESIGN FOR RECYCLING

Extended producer responsibility demands a greater awareness of the end-of-life phase of products that are put onto the market. Different industries take different approaches, depending on the product and market characteristics.

How has this evolved and can industries learn from each other, while taking into account these obvious differences?

### CHAIRMAN:

#### **Dr Saul M. Lemkowitz:**

Associate Professor of Chemical Risk Management at Delft University of Technology.

### LECTURERS:

#### **Maarten ten Houten:**

Sustainability Director at the Product Division of Philips Lighting

#### **Kasper Zom:**

Senior Consultant at the Knowledge Centre of ARN.

#### **Jaap Flendrie:**

Sales & Marketing Manager at Coolrec BV (van Gansewinkel Group BV)

#### **Karen van der Stadt:**

Packaging professional at Nedvang

#### **Roman Meininghaus:**

Director Environmental Policy at ACEA.

## PRESENTATIONS:

### Saul Lemkowitz:

#### Industrial Ecology (IE) and recycling: theory and application

Nature without humans is an almost complete recycling cycle. But with humans and in a typical modern industrial economy, we are confronted with a level of material extraction and waste production that far exceeds nature's source ability to supply materials and sink ability to absorb waste (i.e. pollution).

What can we do about this? We have to modify the industrial system to function like a natural (ecological) system. (Cradle to Cradle and Industrial Ecology)

The general principles of Industrial Ecology are:

1. Close cycles
2. Consider total life cycle
3. Minimise risks over all cycles
4. Minimise resource use
5. Minimise waste

Ideal recycling is a closed system. To close the system we need to research and develop new design methods, achieving greater sustainability through intelligent design. That is why IE uses these principles for design for recycling: design has to be sustainable and should take the total product cycle into consideration.

While Cradle to Cradle and Industrial Ecology have similar goals, Industrial Ecology takes a more comprehensive approach, one that considers not only technology, but also cultural aspects such as economics (especially internalising external costs), legislation, and social norms and values. Unlike Cradle to Cradle, Industrial Ecology is a field of study taught at universities, such as the Delft University of Technology.



*At the moment there is a gap between practice and policy. There is a wide range of tools is available that can help achieve recycling and environmental goals. For example, industry can give back to society through charities. As AgentschapNL we cannot change policy but we can help achieve these policy objectives.*



## **Karen van de Stadt representing Sharp Interpack: Balancing environmental issues with pragmatic business solutions**

The Directive on Packaging and Packaging Waste became effective on 1 January 2006. This Directive makes companies responsible for the organisation and costs of collecting and recycling their packaging. Nedvang was founded on 10 November 2005 by producers and importers to implement the Directive collectively.

The great packaging paradox:

Food packaging serves such purposes as reducing food waste and it contributes to food hygiene and security. But at the same time, packaging has become a symbol of a wasteful consumer society.

That is why retailers like Tesco, Carrefour and Albert Heijn set goals to reduce waste, demanding a different approach to packaging.

To meet the criteria of retailers and the food industry, Sharp Interpack has optimised weight through design and maximised supply chain efficiency, setting the pace for re-use of recycled materials and reducing lorry movements.

To meet the strict regulations, Sharp Interpack has developed a new technology with which post-consumer waste can be incorporated into products. This is called Extrusion Technology and allows companies to handle post-consumer waste including mixed plastic streams (PET/PE).

Sharp Interpack actively promotes the use of recycled plastics in packaging and is investing in new technologies for sustainable products. The company's motto is: Reduce, recycle, reformulate.



## **Jaap Flendrie: From scrap service provider to raw materials supplier**

With the help of new techniques, Coolrec is increasingly capable of separating materials. Why, then, is design for recycling necessary?

At the moment, we are still losing a lot of materials although we can already separate 99.9% useable materials that can be re-used immediately. In consultation with producers, we are looking for new production methods to further enhance product recycling.

A good example is Ahrend. Together with Ahrend we looked at the production process of the company's office chair. What could be changed in the design of the chair to improve recyclability? The solutions we found were adopted by Ahrend and the design of the chair adjusted. Now these chairs are much easier to recycle. With the experience we have at the end of the chain we can engage proactively with producers. For example, nowadays you can put tags in products so that it is even easier to recycle them because you know what materials have been used in the product.

*Rules are not going to work. Asking the right questions is the issue at the moment but that is not happening yet. Cooperation between all stakeholders is key.*

*At the moment a lot of good materials that can still be used are brought to the shredder.*



**Kasper Zom:**  
**Incorporating design choices in recycling operations**

What does design mean for ARN?

- Design is focused primarily on the use phase.
- Recycling operations follow the design and have to deliver low-cost solutions for each design and each design change.

Examples of design support ARN provides to the industry

- Specialised set of design rules for optimal recyclability
- Detailed analysis of substructures/subassemblies

Use phase is leading, but more attention to recycling can yield substantial benefits

Additional rules for creating designs that are easy to recycle:

- Homogeneity of construction materials
- Use modules that can be removed and reinstalled in other applications
- Make parts/subassemblies easy to separate
- Use identification symbols for easier recognition by dismantlers

Most common in car industry

Challenges we are facing with PST

- Use of heavy metals in paint of very old cars
- Use of PVC in dashboards, door liners, etc.



*The end user wants sustainable solutions. What impact does it have if large retail companies make sustainable choices? Retailers have a huge influence in the food sector for example. If producers do not meet the criteria, they will not get shelf space at major retailers. Even major brands have to settle in this.*



*Only single components on PVC can be recycled. Mixed with other plastics it is a problem. Another fundamental problem with PVC is that it is a dumpsite for Chlorine. You can find new markets for it and use it in another way, for example in the salt production, but in fact you only move the problem.*

### **Roman Meininghaus:**

#### **Post Shredder Treatment helps design for environment**

PST: Technology that sorts shredder residue, seen as means to achieve quotas  
PST in the context of design for recycling: is there any positive impact on the vehicle itself?

No significant environmental difference between the various EOL technologies as long as metals are recycled.

Hence no design changes are necessary for recycling as PST can treat any material mix.

Vehicle use is most important, design focuses on improving life cycle phase, recycling of metals has a positive impact on other life cycle stages, and PST boosts recycling and facilitates without compromising recycling quotas.

Backed up with: Substitution of virgin material and energy recovery of light fraction.

### **Maarten Ten Houten:**

#### **Closing the loop in Philips Lighting**

Philips has a long history in sustainability, starting in the early nineties. EcoDesign by Philips focused on what is called the 6 Green Focal Areas at Philips: energy consumption, packaging, hazardous substances, product weight, lifetime reliability, and recycling and disposal. Closing the material loop has not been successful at all, although many companies have attempted, albeit ineffectively, to design for recycling or recollection. A key difference with current EcoDesign practice is that closing the material loop involves several additional barriers. Apart from effective product design, the current value chain will have to be extended to include a business incentive to improve collection & recycling and production & usage of recycled material. This can only be achieved by a common business agenda in the value chain,

where trust and room for each other are created, which is currently not the case in the business paradigm. Finally, this extended value chain is one that reaches far into the future, as LED lighting systems have a long life, which leads to additional uncertainty with regard to the returning waste flows. With this in mind, it is easily understood that when consumer products are recycled, this has been prompted by legislation (e.g. for TVs, batteries, cars) or is highly subsidised.

Currently, external trends are shifting this paradigm, e.g. scarcity, extended producer responsibility and supply security for key materials. As the Cradle to Cradle philosophy has picked up as a trend with relatively simple products, (e.g. bathroom tiles, toilet paper and carpets), Philips has decided to investigate whether this principle can be applied with added value for Philips Lighting.

Philips Lighting is working on closing the material loop using principles for materials design, physical design and new business models across the supply chain.

*presentations can be accessed via [info@arn.nl](mailto:info@arn.nl)*



*The amount of energy required to recycle used plastic will never be more than the amount of oil needed to produce the raw material.*

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